

インド国

内務省 (Ministry of Home Affairs)

電力省 (Ministry of Power)

アンダマン・ニコバル連邦直轄領政府 (Andaman and
Nicobar Administration)

電力局 (Electricity Department)

インド国
アンダマン・ニコバル諸島
電力供給能力向上計画

準備調査報告書

(先行公開版 添付資料)

2021年4月

独立行政法人
国際協力機構 (JICA)

日本工営株式会社
株式会社沖縄エネテック

社基
JR (P)
21-035

添付資料

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添付資料-1

調査団員・氏名

調査団員・氏名

1. 第1次現地調査

No.	氏名	担当業務	所属先
1	福地 智恭	業務主任/電力計画	日本工営(株)
2	掛福 ルイス	ディーゼル発電設備計画	(株)沖縄エネテック
3	小川 良輔	系統計画	日本工営(株)
4	石村 明也	機材計画(1)	日本工営(株)
5	タンビル アハメド チョドリ	機材計画(2)	日本工営(株)
6	上江洲 友麻	系統安定化設備計画(1)	(株)沖縄エネテック
7	桃原 正悟	系統安定化設備計画(2)	(株)沖縄エネテック
8	松村 みか	経済・財務分析	日本工営(株)
9	外間 栄安	施設計画/自然条件	(株)沖縄エネテック
10	松井 孝太	調達計画/積算(1)	日本工営(株)
11	山入端 満	積算(2)	(株)沖縄エネテック

2. 第2次現地調査

No.	氏名	担当業務	所属先
1	福地 智恭	業務主任/電力計画	日本工営(株)
2	掛福 ルイス	ディーゼル発電設備計画	(株)沖縄エネテック
3	松村 みか	経済・財務分析	日本工営(株)
4	外間 栄安	施設計画/自然条件	(株)沖縄エネテック
5	佐藤 耕太	調達計画/積算(1)	日本工営(株)
6	鈴木 啓容	環境社会配慮	(株)沖縄エネテック
7	渡邊 登志哉	建築計画	日本工営(株)
8	坪井 修	SCADA 計画	日本工営(株)

3. 第3次現地調査

No.	氏名	担当業務	所属先
1	福地 智恭	業務主任/電力計画	日本工営(株)
2	ビスタ・ディパック	蓄電池設備計画	日本工営(株)
3	出井 孝広	機材計画(2)、 調達計画/積算(1)	日本工営(株)
4	渡邊 登志哉	建築計画	日本工営(株)
5	小林 要昭	施設計画/自然条件(2)	日本工営(株)
6	佐藤 耕太	調達計画/積算(1)	日本工営(株)

添付資料-2

調査行程

1. 第1回現地調査 (1/3)

日順	月日	曜日	コンサルタント団員							
			福地 智恭 業務主任/ 電力計画	小川 良輔 系統計画	掛福 ルイス ディーゼル発電 設備計画	石村 明也 機材計画(1)	タンビルアハ メドチョドリ 機材計画(2)	上江洲 友麻 系統安定化設 備計画(1)	外間 栄安 施設計画/ 自然条件	松村 みか 経済・財務分析
1	2016/8/14	日	移動 NRT-HKG 移動 HKG-CCU							
2	2016/8/15	月	移動 CCU-IXZ							
3	2016/8/16	火	ANAと協議							
4	2016/8/17	水	現地特殊傭人との契約作業		移動 NRT-HKG 移動 HKG-CCU				移動 NRT-HKG 移動 HKG-CCU	
5	2016/8/18	木	現地調査		移動 CCU-IXZ				移動 CCU-IXZ	
6	2016/8/19	金	現地調査	移動 OKA-HKG 移動 HKG-CCU	現地調査		移動 OKA-HKG 移動 HKG-CCU		現地調査	
7	2016/8/20	土	データ分析	移動 CCU-IXZ	データ分析		移動 CCU-IXZ		データ分析	
8	2016/8/21	日	調査団内会議							
9	2016/8/22	月	ANAと協議(キックオフミーティング)							
10	2016/8/23	火	ANAと協議、現地調査						現地調査	
11	2016/8/24	水	ANAと協議、現地調査						現地調査	
12	2016/8/25	木	データ分析							
13	2016/8/26	金	現地調査							
14	2016/8/27	土	データ分析							
15	2016/8/28	日	現地休日							
16	2016/8/29	月	現地調査							
17	2016/8/30	火	現地調査		移動 IXZ-DEL 移動 DEL-HKG		移動 IXZ-CCU		現地調査	
18	2016/8/31	水	現地調査		移動 HKG-NRT		移動 CCU-HKG 移動 HKG-OKA		現地調査	
19	2016/9/1	木	現地調査						現地調査	
20	2016/9/2	金	ANAと協議						ANAと協議	

日順	月日	曜日	コンサルタント団員									
			福地 智恭	小川 良輔	掛福 ルイス	石村 明也	タンビルアハ メドチョドリ	上江洲 友麻	外間 栄安	松村 みか	松井 孝太	
			業務主任/ 電力計画	系統計画	ディーゼル発電 設備計画	機材計画(1)	機材計画(2)	系統安定化設 備計画(1)	施設計画/ 自然条件	経済・財務分析	調達計画/ 積算(1)	
21	2016/9/3	土	データ分析								データ分析	
22	2016/9/4	日	現地休日								現地休日	
23	2016/9/5	月	移動 IXZ-DEL JICAインド事務所と協議 移動 DEL-HKG								移動 IXZ-DEL JICAインド事務所と協議 移動 DEL-HKG	
24	2016/9/6	火	移動 HKG-NRT								移動 HKG-NRT	

凡例 NRT: 成田 ANA: Andaman & Nicobar Administration
 OKA: 那覇 ED: Electricity Department
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 IXZ: ポートブレア

1. 第1回現地調査 (2/3)

日順	月日	曜日	コンサルタント団員									
			福地 智恭 業務主任/ 電力計画	タンビルアハ メドチョドリ 機材計画(2)	掛福 ルイス ディーゼル発電 設備計画	小川 良輔 系統計画	石村 明也 機材計画(1)	桃原 正悟 系統安定化設 備計画(2)	外間 栄安 施設計画/ 自然条件	山入端 満 積算(2)	松村 みか 経済・財務分析	松井 孝太 調達計画/ 積算(1)
1	2016/10/31	月	移動 NRT-BKK 移動 BKK-CCU									移動 NRT-BKK 移動 BKK-CCU
2	2016/11/1	火	移動 CCU-IXZ									移動 CCU-IXZ
3	2016/11/2	水	現地調査									現地調査
4	2016/11/3	木	現地調査				移動 NRT-BKK 移動 BKK-CCU					現地調査
5	2016/11/4	金	現地調査	移動 OKA-HKG 移動 HKG-CCU	移動 NRT-BKK 移動 BKK-CCU	移動 CCU-IXZ		移動 OKA-HKG 移動 HKG-CCU		移動 NRT-BKK 移動 BKK-CCU		現地調査
6	2016/11/5	土	現地調査	移動 CCU-IXZ	移動 CCU-IXZ	現地調査		移動 CCU-IXZ		移動 CCU-IXZ		現地調査
7	2016/11/6	日	現地調査									
8	2016/11/7	月	現地調査									
9	2016/11/8	火	現地調査									
10	2016/11/9	水	現地調査									
11	2016/11/10	木	現地調査									
12	2016/11/11	金	現地調査									移動 IXZ-CCU
13	2016/11/12	土	現地調査									移動 CCU-BKK 移動 BKK-NRT
14	2016/11/13	日	現地調査									
15	2016/11/14	月	現地調査									
16	2016/11/15	火	現地調査									
17	2016/11/16	水	現地調査									
18	2016/11/17	木	現地調査				移動 IXZ-CCU				移動 IXZ-MAA	
19	2016/11/18	金	現地調査				移動 CCU-BKK 移動 BKK-OKA				移動 MAA-BKK 移動 BKK-NRT	
20	2016/11/19	土	現地調査									

日順	月日	曜日	コンサルタント団員									
			福地 智恭 業務主任/ 電力計画	タンビルアハ メド チョドリ 機材計画(2)	掛福 ルイス ディーゼル発電 設備計画	小川 良輔 系統計画	石村 明也 機材計画(1)	桃原 正悟 系統安定化設 備計画(2)	外間 栄安 施設計画/ 自然条件	山入端 満 積算(2)	松村 みか 経済・財務分析	松井 孝太 調達計画/ 積算(1)
21	2016/11/20	日	現地調査				移動 IXZ-CCU					
22	2016/11/21	月	現地調査				移動 CCU-BKK 移動 BKK-NRT					
23	2016/11/22	火	移動 IXZ-DEL JICAインド事務所と協議									
24	2016/11/23	水	移動 DEL-BKK 移動 BKK-NRT									

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1. 第1回現地調査 (3/3)

日順	月日	曜日	コンサルタント団員		
			福地 智恭	掛福 ルイス	タンビルアハ メドチョドリ
			業務主任/ 電力計画	ディーゼル発 電設備計画	機材計画(2)
1	2018/2/5	月	移動 NRT-DEL		
2	2018/2/6	火	Ministry of Powerと協議、 JICAインド事務所と協議		
3	2018/2/7	水	移動 DEL-IXZ ANA,EDと協議		
4	2018/2/8	木	ANA,EDと協議、Minutes調印		
5	2018/2/9	金	ANA,EDと協議		
6	2018/2/10	土	移動 IXZ-DEL		
7	2018/2/11	日	移動 DEL-NRT		

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 MAA: チェンナイ
 CCU: コルカタ
 IXZ: ポートブレア

2. 第2回現地調査

日順	月日	曜日	コンサルタント団員							
			福地 智恭	掛福 ルイス	佐藤 耕太	渡邊 登志哉	坪井 修	松村 みか	外間 栄安	鈴木 啓容
			業務主任/ 電力計画	ディーゼル発 電設備計画	調達計画/ 積算(1)	建築計画	SCADA計画	経済・財務分析	施設計画/ 自然条件	環境社会配慮
1	2019/1/7	月	移動 NRT-BKK 移動 BKK-CCU							
2	2019/1/8	火	移動 CCU-IXZ					移動 OKA-HKG 移動 HKG-CCU		
3	2019/1/9	水	ANA,EDと協議					移動 CCU-IXZ		
4	2019/1/10	木	ANA,EDと協議					ANA,EDと協議		
5	2019/1/11	金	現地調査					現地調査		
6	2019/1/12	土	現地調査				移動 NRT-BKK 移動 BKK-CCU	現地調査		
7	2019/1/13	日	現地祝日		移動 IXZ-CCU	現地祝日	移動 CCU-IXZ	現地祝日		
8	2019/1/14	月	現地調査		移動 CCU-BKK 移動 BKK-NRT	現地調査				
9	2019/1/15	火	現地調査			現地調査				
10	2019/1/16	水	現地調査			移動 IXZ-CCU	現地調査			
11	2019/1/17	木	移動 IXZ-DEL			移動 CCU-BKK 移動 BKK-NRT	移動 IXZ-CCU	移動 IXZ-CCU		
12	2019/1/18	金	移動 DEL-BKK 移動 BKK-NRT				移動 CCU-BKK 移動 BKK-NRT	移動 CCU-HKG 移動 HKG-OKA		

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DEL: デリー

MAA: チェンナイ

CCU: コルカタ

IXZ: ポートブレア

3. 第3回現地調査

日順	月日	曜日	コンサルタント団員					
			福地 智恭	渡邊 登志哉	ビスタ・ ダイパック	出井 孝広	小林 要昭	佐藤 耕太
			業務主任/ 電力計画	建築計画	蓄電池設備 計画	機材計画(2)、 調達計画/積算(1)	施設計画/ 自然条件(2)	調達計画/ 積算(1)
1	2019/12/23	月	移動 NRT-BKK-MAA					
2	2019/12/24	火	移動 MAA-IXZ EDとの協議					
3	2019/12/25	水	Globe Consultanciesとの協議、 サイト調査					
4	2019/12/26	木	ANA, EDとの協議					
5	2019/12/27	金	移動 IXZ-CCU					
6	2019/12/28	土	移動 CCU-BKK-NRT					
1	2020/1/27	月	移動 NRT-SIN-CCU					
2	2020/1/28	火	移動 CCU-IXZ EDとの協議					
3	2020/1/29	水	Minutes・図面作成					
4	2020/1/30	木	系統連系協議、 サイト調査					
5	2020/1/31	金	サイト調査					
6	2020/2/1	土	系統連系協議、サイト調 査、Minutes調印					
7	2020/2/2	日	移動 IXZ-CCU					
8	2020/2/3	月	移動 CCU-SIN-NRT					

凡例 NRT: 成田 ANA: Andaman & Nicobar Administration

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添付資料-3

関係者(面会者)リスト

関係者(面会者)リスト

Sr. No.	Name	Post
ANA		
	Mr. Sanjeev Khirwar	Commissioner-cum-Secretary, Shipping/Civil Aviation/APWD/Power
	Mr. Sudhir Mahajan	Secretary (Power)
ED		
	Mr. Uttam Kumar Paul	Superintendent Engineer, ED
	Mr. AJIT Kumar	Superintending Engineer, ED
	Mr. Karuna Jaydhar	Executive Engineer, Power Generation
	Mr. Yogesh Tiwari	Assistant Engineer, Planning
	Mr. Richpal Singh	Assistant Engineer, Store
	Mr. K. Madhara Rao	Assistant Engineer, IPP
	Mr. R. Revi Kumar	Junior Engineer, (Phoenix Bay) Maintenance
	Mr. Anil	Junior Engineer, Chatham power house
	Mr. Sandeep Mukherjee	Junior Engineer, Chatham Power House
	Mr. K. Ravi Kumar	Junior Engineer, Operation, Chatham Power House
	Mr. N. Durga Rao	Assistant Engineer, Operation, Chatham Power House
	Mr. Vinay Sandesh	Junior Engineer (Tech), Operation, Chatham Power House
	Mr. Subrata nag	Assistant Engineer, Garacharma Sub Station

添付資料-4

協議議事録(M/D)

**Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Power Supply in Andaman and Nicobar Islands in India**

In response to the request letter from the Government of India (Ministry of Finance) dated 19th October, 2015 (No.4/8/2015-Jap II) and the subsequent letter dated 9th May, 2019 (D.O. No. 4/8/2015-JICA Projects (J.II)), related to the Project for Improvement of Power Supply in Andaman and Nicobar Islands (hereinafter referred to as “the Project”), JICA sent the Mission for confirming the components of the Project (hereinafter referred to as “the JICA Mission”) to India, headed by Mr. Toru Kobayakawa, Senior Director (Energy), Industrial Development and Public Policy Department, JICA, from 19th to 23rd August, 2019.

The JICA Mission held a series of discussions with the officials concerned of the Andaman and Nicobar Administration (hereinafter referred to as “the A&NA”) from 19th to 22nd August, 2019, and conducted a field survey in the tentative Project site. In the course of the discussions, both the A&NA side and the JICA Mission (hereinafter referred to as “both sides”) have confirmed the main items described in ATTACHMENT, as an updated Minutes of Discussion signed on 8th February, 2018.

Port Blair, 21st August, 2019

小早川 徹

Mr. Toru Kobayakawa
Senior Director (Energy)
Industrial Development and Public Policy
Department
Japan International Cooperation Agency
Japan



Mr. Sudhir Mahajan
Secretary (Power)
Andaman and Nicobar Administration
India

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve power supply efficiency, reliability and stability of entire energy system in South Andaman, by introducing necessary equipment and facilities for energy storage of solar PV generation, thereby contributing to social and economic development and poverty reduction in Andaman and Nicobar Islands.

It was noticed that the objective of the Project is to be confirmed through the Preparatory Survey.

2. Title of the Preparatory Survey

Both the A&NA side and the JICA Mission (hereinafter referred to as “both sides”) confirmed the title of the Preparatory Survey as “The Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands”.

3. Project Site

Both sides confirmed that the site of the Project is Port Blair, which is shown in Annex 1. Both sides confirmed that the location for the installation of facilities under the Project should be identified, based on the capacity of necessary batteries. In case the location needs to be changed from the previous one, i.e. Phoenix Bay power house, Electricity Department, Andaman and Nicobar Administration (hereinafter referred to as “ED”) confirmed to arrange the alternative land. The Preparatory Survey team will review the proposed site.

4. Executing Agency

- 4.1. Both sides confirmed the executing agency of the Project is ED. The executing agency shall ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in Annex 2.
- 4.2. ED shall also coordinate with all the relevant agencies to ensure smooth implementation of the Project.

5. Items requested by the Indian side

The Indian side requested the modified scope of the work through the letter dated 9th May, 2019 (D.O. No. 4/8/2015-JICA Projects (J.II)). ED explained to the JICA Mission that the Island Development Authority (IDA) meeting dated on 30th June, 2018 and its review meeting dated on 18th December, 2018, directed that Islands of Union Territories (UTs), including Andaman and Nicobar Islands, should become self-sufficient in energy, for which solar PV generation should be given topmost priority. Based on those decisions above, ED was directed to further increase the renewable energy generation, i.e. solar PV generation. ED also explained to the JICA Mission that A&NA is moving towards de-dieselization of power generation.

5.1. Rationale

ED explained to the JICA Mission that the grid code for solar PV generation has been enforced to IPPs, who are responsible for installing grid stabilization system with batteries for the purpose of mitigating short-term fluctuation. Therefore, new IPPs for solar PV generations are to install batteries, while the existing IPPs for solar PV generation have also been requested to stabilize the fluctuating output of solar PV generation for the interconnection with the grid.

In addition, according to ED, the 50 MW LNG based power plant has been approved and is to be operated by M/s NTPC/NVVN, which is scheduled to commence its operation in the end of CY2021. Planned LNG plant is the sum of several units (i.e. 10MW x 5). ED also explained to the JICA Mission that the proposed LNG based power generation would be IPP, who will operate the plant in accordance with the demand and the power supply from solar PV generation. ED confirmed to the JICA Mission that the power supply from solar PV generation would be prioritized over the supply from LNG based power generation, and the excess from solar PV generation during daytime needs to be stored for meeting peak demand during evening. ED also explained to the JICA Mission that, according to ED's demand/supply plan from 2022 to 2026, the average daily output from the LNG will be 25 MW and the minimum output will be 8 MW (with the presumption of 10MW of each unit).

Under such circumstances, ED and the JICA Mission confirmed that the main purpose of storage batteries under the Project is to shift energy of solar PV output from daytime to peak time during evening. Such operation of batteries is expected to reduce the fuel consumption of conventional power plants. In addition, the installation of storage batteries could contribute to secure the stability of grid in case of sudden drop of power generation caused by faults depending on the magnitude.

5.2. Details of items requested by the Indian side

As a result of discussions, both sides confirmed that the items requested by the Indian side are as follows:

- Batteries

The purpose of storage batteries under the Project is to shift excess energy of solar PV output from daytime to peak time during evening, to secure the grid stability and to reduce fossil fuel consumption. Both sides confirmed that the total capacity and detailed specifications of batteries would be determined, based on the analysis of the future grid operation, which will be conducted during the course of the Preparatory Survey.

- Set of Power System Stabilizer

The power system stabilizer under the Project will function as "battery management unit", which is to control charge/discharge of batteries.

- SCADA.

The SCADA system under the Project is to supervise, control and acquire data of the batteries and system stabilizer, which are the scope of the Project. Although the coverage of this SCADA will be limited to the equipment of the Project, the supervision/control/data acquisition of wider range of facilities in the South Andaman network is to be covered by Energy Management Centre (EMC), which will control all of power generation plants, substations and batteries. EMC could function as load dispatch center of South Andaman, under which the SCADA of the Project will be connected.

- Building

Building under the scope of the Project is for the purpose of installing batteries, power system stabilizer and SCADA. The potential site for the construction of building will be decided based on the necessary capacity of batteries. Depending on the specification and cost estimation, the batteries might be installed in the containers.

5.3. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

6. Japanese Grant Scheme

- 6.1. The A&NA side agreed that the procedures and basic principles of Japanese Grant as described in Annex 3 shall be applied to the Project.
- 6.2. The A&NA side agreed to take the necessary measures, as described in Annex 4, for smooth implementation of the Project, as a condition for the Japanese Grant to be implemented. The contents of the Annex 4 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report. The contents of Annex 4 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

- 7.1. Subject to the clarification on battery capacity and land allocation by A&NA, JICA will dispatch the Preparatory Survey Team with the modified TOR, for the further survey in India, tentatively in September/October 2019.
- 7.2. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to India in order to explain its contents, tentatively around April 2020.
- 7.3. If the contents of the draft Preparatory Survey Report is acceptable in principle and the undertakings are fully agreed by the Indian side, JICA will finalize the Preparatory Survey Report and send it to Indian side, tentatively around July 2020.
- 7.4. The schedule is subject to be changed, depending upon land availability, battery size and the report of survey team.

8. Environmental and Social Considerations

- 8.1. The A&NA side confirmed to give due environmental and social considerations during implementation of the Project, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).
- 8.2. The A&NA side also confirmed that all the mandatory clearances shall be obtained from the relevant agencies, before signing of Grant Agreement.

9. Other Relevant Issues

9.1. Harmonization between EMC and SCADA

- 9.1.1. For SCADA under the Project and EMC functions appropriately, smooth and fast transmission of data between those systems will be necessary. Therefore, the compatibility of those two systems needs to be carefully reviewed during the process of detailed designing of components of the Project. ED agreed to share to JICA India Office the information regarding specification of EMC's system, by 15th September, 2019.
- 9.1.2. EMC will control all of power generation plants, substations and batteries for optimizing energy efficiency of the entire network of South Andaman. Connecting to EMC is critical for the equipment under the Project to be able to function effectively and appropriately. Therefore, EMC should be installed before the installation of SCADA under the Project. ED agreed to it.
- 9.1.3. The interconnecting works of SCADA should consider the compatibility with the entire system of EMC, as an upper system. A&NA agreed that the Indian side should be responsible for the works to interconnect EMC and SCADA.

9.2. Customs Duties, Internal Taxes and Other Fiscal Levies

As described in Annex 4, the JICA Mission explained to the A&NA that it is necessary to ensure that customs duties, internal taxes and other fiscal levies which may be imposed in India with respect to the purchase of the products and/or the services be exempted or be borne by its designated authority without using the Grant. The JICA Mission requested that the A&NA side will confirm the detailed procedure to exempt/refund the duties and taxes including GST (The Goods and Service Tax act, 2017). A&NA agreed to provide to JICA India Office with the detailed procedure in writing, by the end of CY2019.

- 9.3. Necessary permit to stay in Andaman & Nicobar Islands for Consultants and Contractors
In order to secure the implementation of the Project, the JICA Mission explained that the sufficient length of stay of consultants and contractors in Andaman & Nicobar Islands is necessary. On the other hand, current regulation allows foreigner to stay at the Andaman & Nicobar Islands up to 2 weeks. During the Preparatory Survey, the schedule of implementation and the length of stay of the consultants and contractors will be elaborated. The JICA Mission requested the A&NA side to coordinate with relevant authorities to make necessary arrangement to ensure issuing the permit for the implementation of the Project, based on the necessary length of stay elaborated during the Preparatory Survey. The A&NA side agreed to it.

9.4. Necessary Project Management by ED

For an efficient implementation of the Project, the JICA Mission requested the A&NA side that ED will manage technical matters in the course of the Project implementation, such as RoW, signing authorities of official letter or minutes related to the meetings with consultants and contractors. The A&NA side agreed to it.

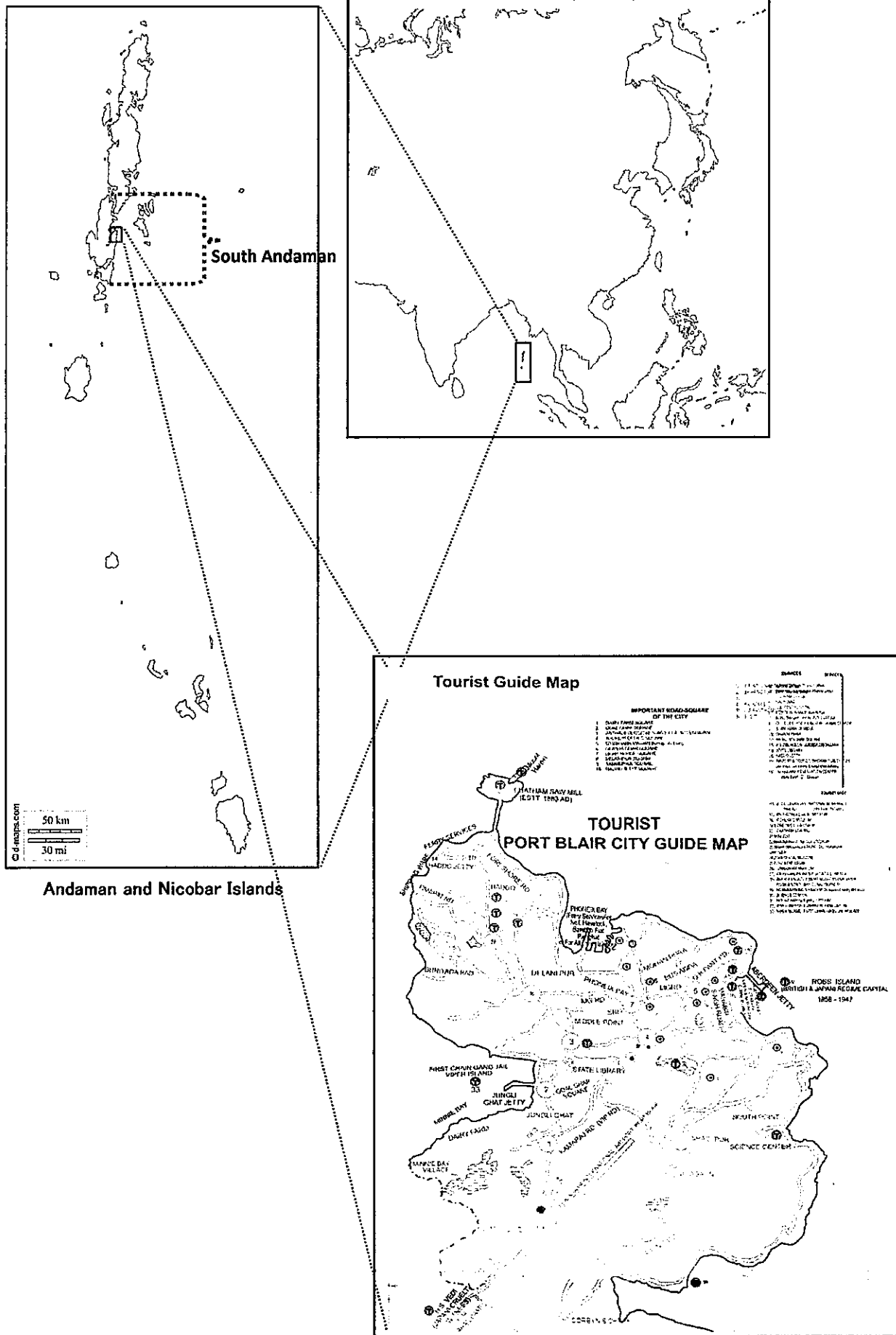
Annex 1 Project Site

Annex 2 Structure of A&NA

Annex 3 Japanese Grant

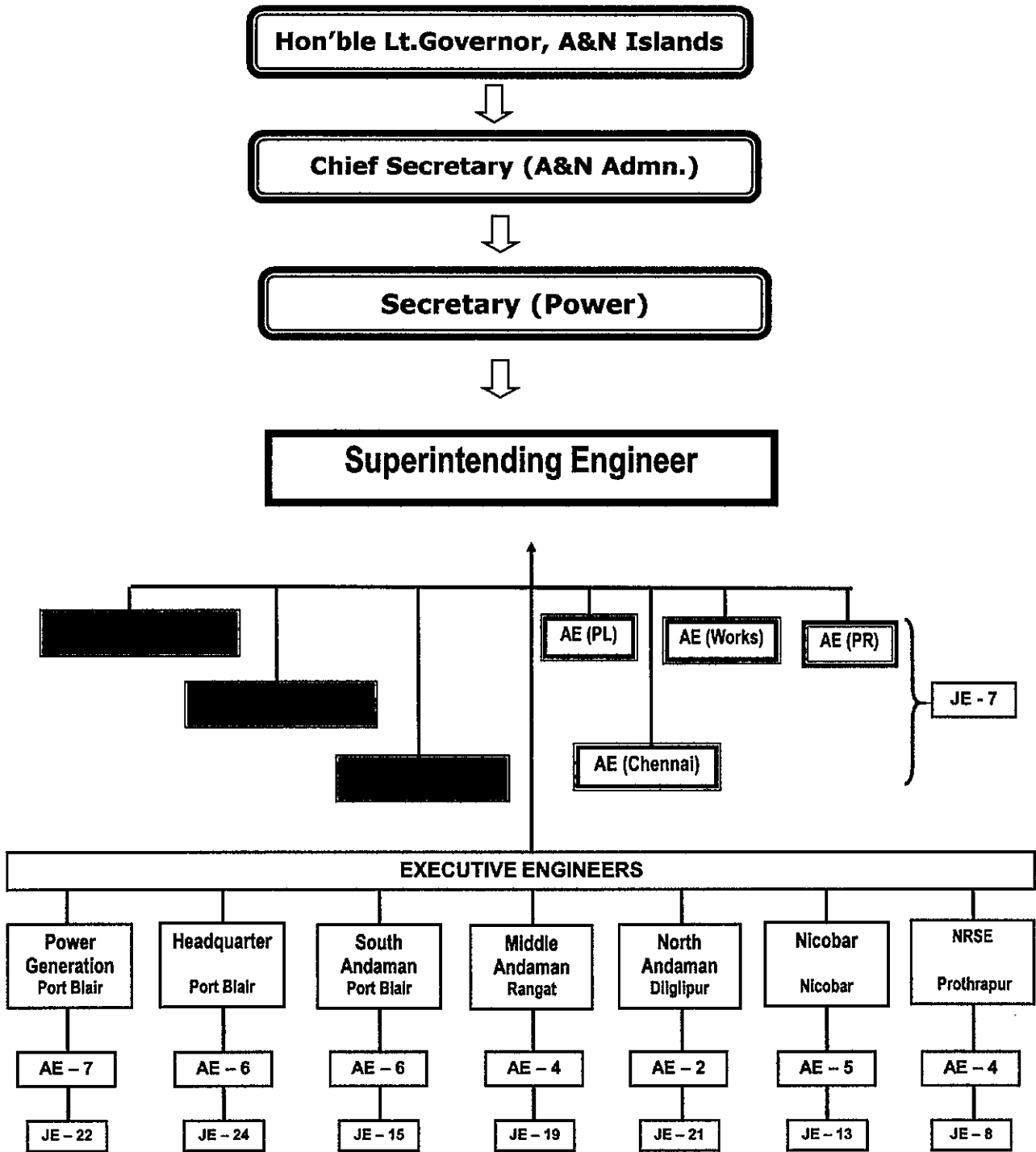
Annex 4 Major Undertakings to be taken by the Government of India

Tentative Project Site



Source: d-maps.com / Tourist Guide Maps (Four in One) of A&N Islands, Port Blair City, Havelock & Neil Islands

Structure of A&NA



JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”) will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the “General Terms and Conditions for Japanese Grant (January 2016).”

2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as

followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

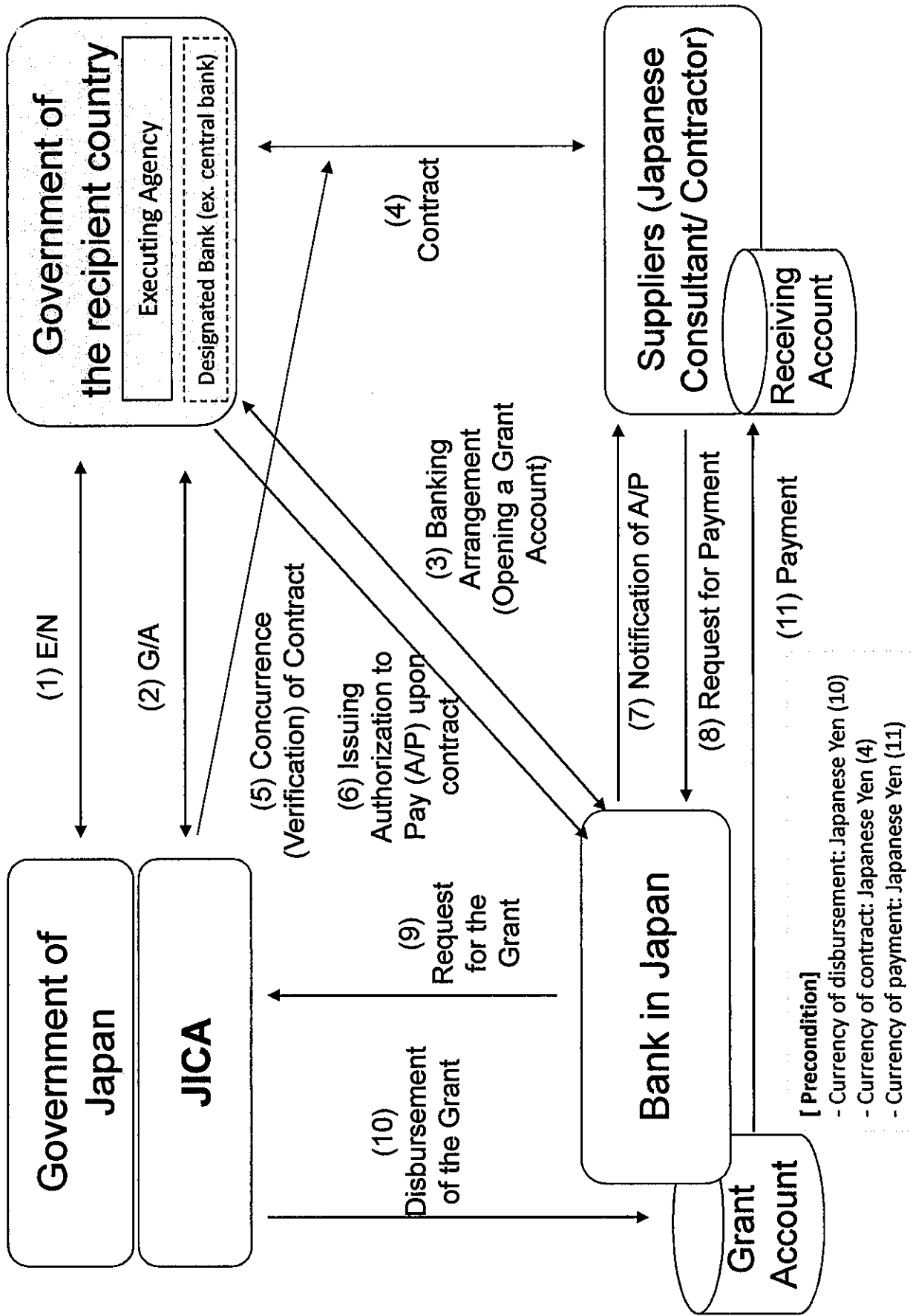
PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

Financial Flow of Japanese Grant (A/P Type)



Major Undertakings to be taken by the Government of India

1. Specific obligations of the Government of India which will not be funded with the Grant

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open Bank Account (Banking Arrangement (B/A))	within 1 month after the signing of the G/A	To be confirmed by ED		
2	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract(s)	To be confirmed by ED		
3	To approve IEE or EIA (If necessary) (* To be confirmed)	within 1 month after the signing of the G/A	To be confirmed by ED		
4	To secure and clear the following lands 1) project site for building for the purpose of installing batteries, power system stabilizer and SCADA	before notice of the bidding document(s)	ED		
5	To obtain the planning, zoning, building permit (If necessary) (* To be confirmed)	before notice of the bidding document(s)	ED		
6	Earth filling, elevation raising, and preparing retaining wall for the sites of power house building and other facilities necessary for the Project	before notice of the bidding document(s)	ED		
7	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding document(s)	ED		
8	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	before the tender	To be confirmed by A&NA		
9	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted or be borne by its designated authority without using the Grant.	before the tender	To be confirmed by A&NA		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after the signing of the contract(s)	To be confirmed by ED		
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	To be confirmed by ED		
	2) Payment commission for A/P	every payment	To be confirmed by ED		
3	To ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	ED		
4	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	A&NA, ED		
5	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	every month	ED		
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	ED		
6	To submit a report concerning completion of the Project	within six months after completion of the Project	ED		
7	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)		ED		
	1) Electricity The distributing line to the site	before start of the construction			
	2) Water Supply The city water distribution main to the site	before start of the construction			
	3) Drainage The city drainage main (for storm, sewer and others) to the site	before start of the construction			
	4) Furniture and Equipment General furniture	1 month before completion of the construction			
8	To take necessary measure for safety construction- - rope off - necessary power shutdown for the work	during the construction	ED		
9	To implement Environment Management Plan (EMP) and Environment Monitoring Plan (EMoP)	during the construction	ED		
10	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the construction	ED		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	ED		
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between A&NA and JICA.	for three years after the Project	ED		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure Routine check/Periodic inspection	After completion of the construction	ED		

2. Other obligations of the Government of India funded with the Grant

NO	Items	Deadline	Amount (Million Japanese Yen)*
1	To construct XXX (To be finalized by the end of next mission) 1) To conduct the following transportation a) Marin (Air) transportation of the products from Japan to the country of the Recipient b) Internal transportation from the port of disembarkation to the project site 2) To provide equipment with installation and commissioning		/
2	To implement detailed design, bidding support and procurement supervision (Consulting Service)		
3	To prepare XXX		
4	Contingencies		
	Total		

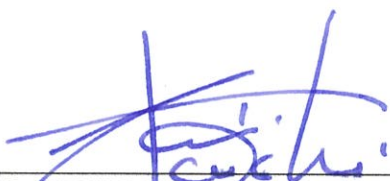
*The Amount is provisional. This is subject to the approval of the Government of Japan.

**Minutes of Meeting for Technical Matters
for
Preparatory Survey for the Project for Improvement of Power Supply
in
Andaman and Nicobar Islands in India**

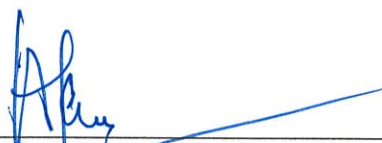
between

**The Consultant of JICA Survey Team
and
Electricity Department, Andaman and Nicobar Administration**

**Port Blair
December 26, 2019**



Mr. FUKUCHI Tomoyasu
The Consultant Team Leader of
JICA Survey Team
Nippon Koei Co., Ltd.



Mr. AJIT Kumar
Superintending Engineer
Electricity Department,
Andaman and Nicobar Administration

The Consultant Team of Preparatory Survey (the Consultant) for the Project for Improvement of Power Supply in Andaman and Nicobar Islands, which is carried out by Japan International Cooperation Agency (JICA), arrived in Port Blair on December 24, 2019.

On the same date December 24, the Consultant had a meeting with Electricity Department, Andaman and Nicobar Administration (ED), and the Consultant and ED (both sides) confirmed the followings.

1. **Selection of battery type :** The Consultant explained the evaluation result of battery type with the Evaluation Table for Battery Type Selection (Attachment-1). Based on the evaluation result, ED selected the lithium-ion battery for this Project.
2. **Interim result of battery capacity analysis:** The Consultant explained to ED the interim result of battery capacity analysis for the lithium-ion battery with Attachment-2. The battery capacity is optimized for the surplus power generated by solar in the daytime to be utilized to the maximum extent. The result indicates that the the capacity is 14.8 MWh to 15.6 MWh. The Consultant explained that the design of the Project would be carried out with the battery capacity of 15 MWh, and the output power of 5 MW in three hours and 30 MW in short term. ED agreed to the battery capacity and the output power for the design work.
3. **Energy Management Center (EMC) Specification:** ED provided the Consultant with a copy of Establishment of Energy Management Center in South Andaman (Detailed Proposal). Besides, ED informed that Power Grid India gave the award of the EMC bidding to General Electric (GE) on December 18, 2019. The Consultant requested ED to provide the technical specification of EMC.
4. **Joint Electricity Regulatory Commission (JERC)'s approval of the project :** ED explained the Consultant that JERC's approval is not required for this Project. However, in case if any approval of JERC is required at later stage, this same shall be taken by ED.
5. **Stockyard :** ED explained that the stockyard for the Project during the implementation is available in Phoenix Bay Power Station premises as shown in Attachment-3
6. **Connection voltage and point to the south Andaman grid :**
Both sides agreed that the connection voltage of the Project to the south Andaman grid is 33 kV and the connection point is shown in Attachment-3 in



7. **Design Standard:** Both sides agreed that the design standards for the Project are Indian Standard (IS), International Electrotechnical Commission (IEC), Japanese Industrial Standards (JIS), and other equivalent standards.
8. **Meteorological Data:** ED recommended the Consultant to check the data that was supposed to have been given to the Consultant from Mr. Vinay of ED in Chatham Power Station. The Consultant agreed to do so.
9. **Land preparation of the Project site:** The Consultant requested ED to dismantle Old Rest Room, and handover the Project site indicated in Attachment-3, free from vegetation. The Consultant agreed to take over the pond area in its as is condition in place of earlier of concrete removal and earth filling.
10. **Office space for the Consultant in the implementation stage:** ED explained that ED would provide the Consultant with the office space in Phoenix Bay Power Station premises in the implementation stage.
11. **For the Contractor, temporary site office, resting place for workers and space for parking for vehicles to be used for the construction works:** ED explained that the Contractor would be able to manage such space in Phoenix Bay Power Station premises under the control of ED.
12. **Water and electricity supply to the site:** ED explained that the supply points of water and electricity to the Project site are available in Phoenix Bay Power Station premises for temporarily in the implementation period and for permanent purpose.
13. **Clearance:** ED explained that all the required statutory clearance for establishing the Project would be carried out by ED.
14. **Allowable variation range of voltage and frequency of the south Andaman grid:** ED explained that the allowable variation range shall be as for stated at Grid Code Regulations 2010 notified by Central Electricity Regulatory Commission (CERC) and lists amendment made time to time by JERC/CERC.
15. **Expected overall schedule:** The Consultant explained the expected overall schedule as shown in Attachment-4.



16. Update of ongoing projects: ED updated the status of ongoing projects as shown below.

Project Name	Present Status	Expected Completion Date
Solar Generation Attam Pahad and Dollygunj 20 MW with battery 16 MW	2.5 MW solar already installed. Balance of 17.5 MW solar with 16 MW-8 MWh Battery Energy Storage System (BESS) will be installed at the end of March 2020	March 2020
EMC	The contractor was decided on December 18, 2019.	March 2021
LNG Dual Fuel Power Plant	(1) Letter of Award to EPC contractor for the power plant (28/02/2020) (2) Letter of Award to fuel supply (15/03/2020)	August 2022

17. Next Site Work : The next site work of the Consultant is shown below.

Around one week in Port Blair at end of January 2020

End

Attachment:

1. Evaluation Table for Battery Type Selection
2. Required Battery Capacity (Lithium-ion)
3. Project Site Area
4. Expected Overall Schedule



Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands
Evaluation Table for Battery Type Selection

2019/12/24 Nippon Koei Co., Ltd.

Battery Types for Evaluation: (1) Lithium-ion (LiB), (2) Lead Acid (LA), and (3) Sodium-Sulfur (NAS)

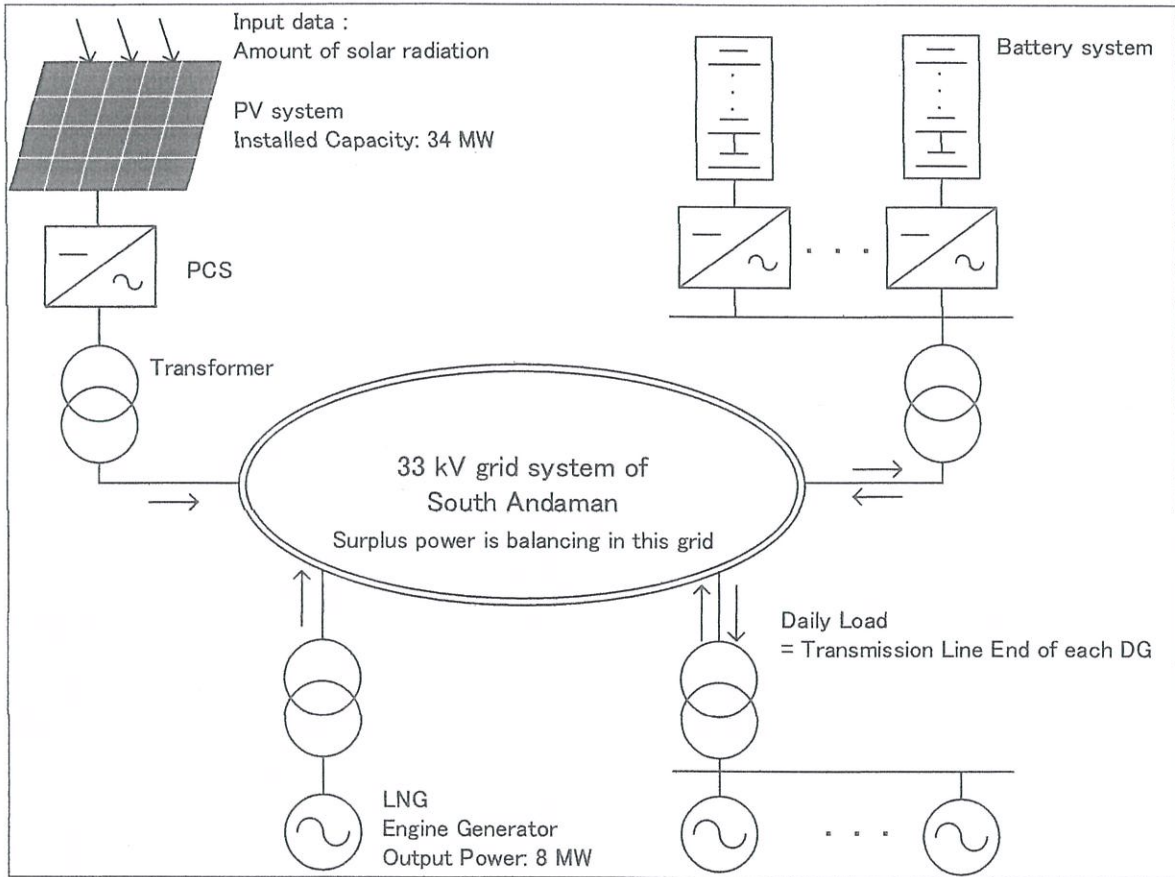
Evaluation Method: By scoring 3 (excellent), 2 (good), and 1 (poor)

No.	Evaluation Item	Evaluation Score			Evaluation Criteria*	Remarks
		LiB	LA	NAS		
1	Contribution to secure the grid stability against short-term demand-and-supply unbalance in the grid.	3	1	2	3: high contribution to the short-term large instability caused by changes of solar radiation, feeder trip, and power source fault drop, 2: contribution to the short-term small instability, 1: contribution to the short-term small instability but reduce life-span of battery	Judged by characteristic of each battery
2	Easiness of operation and maintenance	3	2	2	3: maintenance free, 2: daily and periodic inspection is required, 1: hands on operation is required	Judged by characteristic of each battery
3	Efficiency of charge and discharge	3	1	2	3: 85% or more, 2: 80% or more but less than 85%, 1: less than 80%.	Charged energy is AC low-voltage input energy to charger and discharged energy is AC low-voltage output energy from inverter. Judged by characteristic of each battery
4	Life-span	2	1	1	3: 21 years or more, 2: 16 years or more but less than 21 years, 1: 15 years or less.	The expected life-span is lifetime in year with the condition that discharge and charge is one time per day. Judged by characteristic of each battery
	Total score	11	5	7		

Evaluation Result: Lithium-ion battery was evaluated best for battery type selection of this Project.

Required Battery Capacity (Lithium-ion)

2019/12/24



System Model

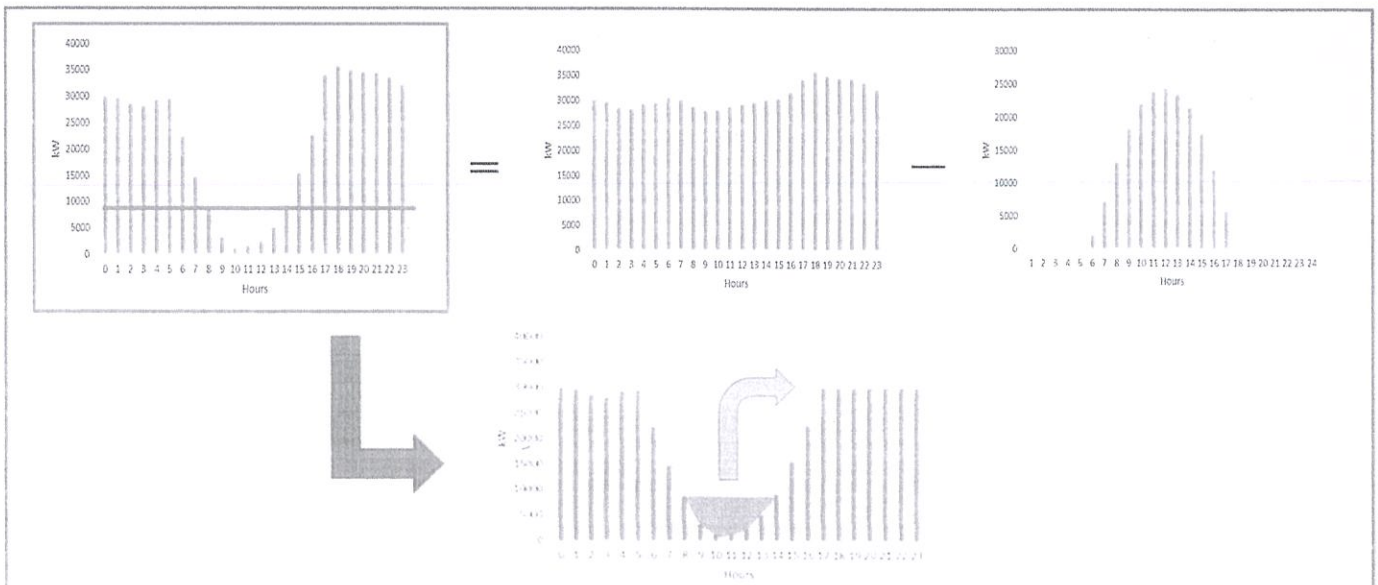
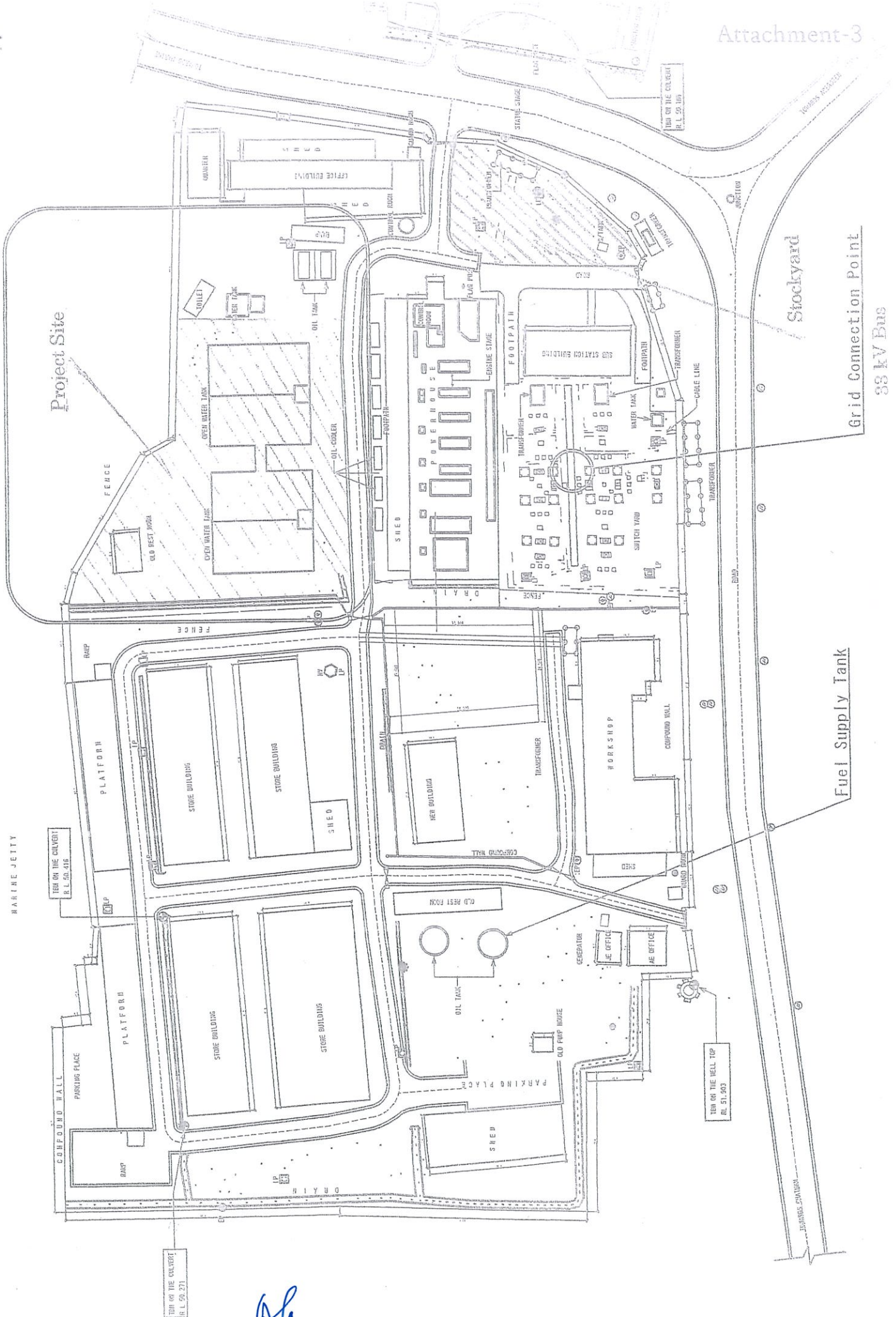


Image of Solar Surplus Energy in Daytime to Night-time

Required Battery Capacity (Lithium-ion):

14.8 to 15.6 MWh

depending on depth of discharge



MARINE JETTY

Project Site

Stockyard

Grid Connection Point

88 kV Bus

Fuel Supply Tank

TEN ON THE CURVE
R.L. 50.271

TEN ON THE CURVE
R.L. 50.416

TEN ON THE WELL TOP
R.L. 51.903

Handwritten signature in blue ink.

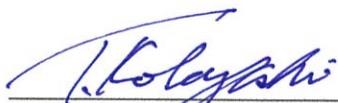
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**Technical Understandings
for
Preparatory Survey for the Project for Improvement of Power Supply
in
Andaman and Nicobar Islands in India**

between

**The Consultant of JICA Survey Team
and
Electricity Department, Andaman and Nicobar Administration**

**Port Blair
February 1, 2020**



Mr. KOBAYASHI Toshiaki
Senior Electrical Engineer of
JICA Survey Team
Nippon Koei Co., Ltd.



Mr. AJIT Kumar
Superintending Engineer
Electricity Department,
Andaman and Nicobar Administration

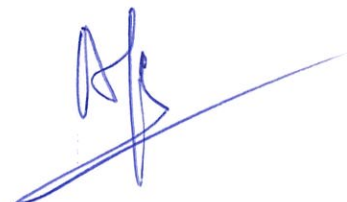
The Consultant Team of Preparatory Survey (the Consultant) for Project for Improvement of Power Supply in Andaman and Nicobar Islands (the Project), which is carried out by Japan International Cooperation Agency (JICA), arrived in Port Blair on January 28th, 2020.

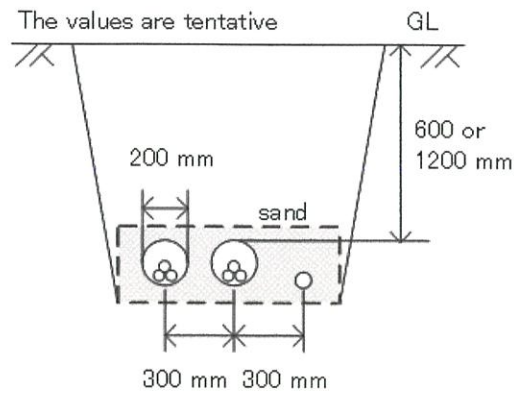
The Consultant and Electricity Department, Andaman and Nicobar Administration (ED) discussed how to interconnect the battery energy storage system (BESS) to existing ED's 33 kV grid in the Phoenix Bay power plant (PB power plant) to prepare the outline design of the Project. The Consultant and ED (both sides) confirmed the following topics regarding the design work by the Consultant.

1. **33 kV Grid connection outline:** The Project will install 33 kV metal-clad switchgear [5 panels: 2 incomer, 2 outgoing, 1 bus-coupler] (JICA's cubicles) in BESS building and 33 kV 2 circuits power cable from JICA's cubicles to ED's outside 33 kV switchgear bay via west side of BESS building as shown in Attachment. Besides, for this connection, the Project will provide and install the following equipment.
 - Surge Arrester
 - Circuit Breaker
 - Disconnection Switch
 - Current Transformer
 - Potential Transformer
 - Support Structures (similar to the existing bus connection)
 - 33 kV Cable Terminals
 - Control Panel (inside substation building)

ED agreed for the Consultant to carry out the design work according to the above 33 kV grid connection outline. ED will make arrangement of power suspensions for safety work.

2. **Cable Route:** The Project will lay protection pipe for 33 kV power cables and control cables from outside of BESS building to the road crossing point as section drawing below, and the manholes will be installed both side of the internal road. The Project will construct new cable trench for 33 kV power cables and control cables from the internal road edge to existing cable trench. The both cable trench will be jointed. The materials of new cable trench will be RCC (Reinforced Cement Cover) with L angle. ED allowed to demolish the old wall which will disturb the joint work of both cable trench.





Section drawing of underground protection pipe



Old wall



New cable trench route

3. **Existing Specification:** ED supplied the specifications of existing 33 kV switchgear including transformer, 33 kV metal-clad switchgear and underground cable.
4. **Update of ongoing projects:** ED updated the status of ongoing projects as shown below.

Project Name	Present Status	Expected Completion Date
Solar Generation Attam Pahad and Dollygunj 20 MW with battery 16 MW	2.5 MW solar already installed. Balance of 17.5 MW solar with 16 MW-8 MWh Battery Energy Storage System (BESS) will be installed at the end of March 2020	March 2020
EMC	The contractor (GE) was decided on December 18, 2019. According to PGCIL, GE do	March 2021

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	not start submission of design documents and drawings. GE started modification work of EMC building from Jan 20 th .	
LNG Dual Fuel Power Plant	(1) Retendering for EPC contractor (before 15/02/ 2020) (2) Expected bid opening date (end of March 2020) (3) Letter of Award to fuel supply (15/04/2020)	December 2022

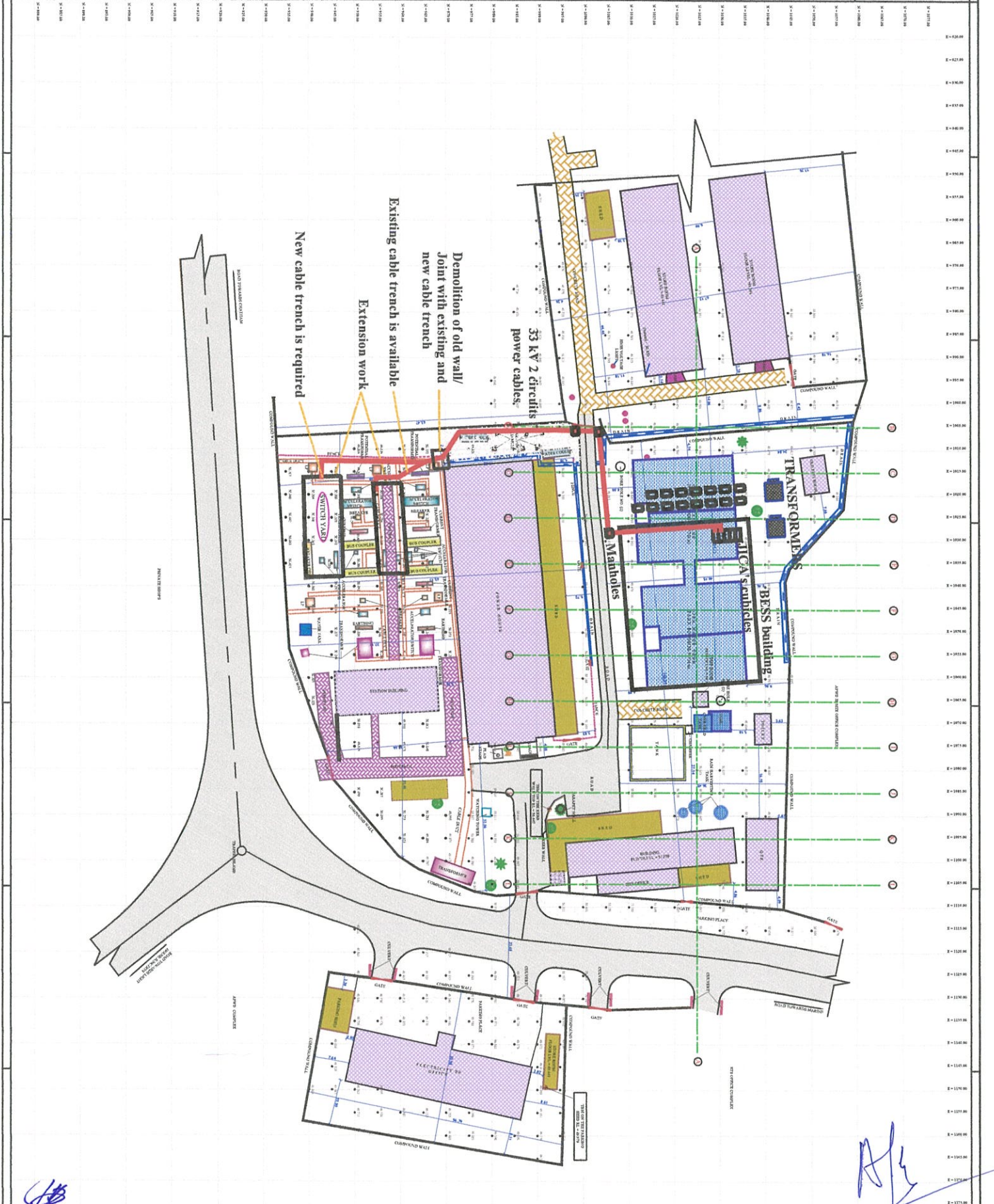
5. **Other Information:** Existing HPP-1 (5 MW) and HPP-2 (10 MW) which are interconnecting to existing 33 kV switchyard inside PB power plant will be removed after LNG power plant start operation.

End

Attachment:

1. Location plan





NOTES:
 1. All dimensions are in m.
 2. Not 1. All levels are related to Mean Sea Level (MSL).
 3. Grid RL @ 3.0m interval is provided.

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NO.	DATE	REVISION	DESCRIPTION
		REVISION	
		REVISION	

DRAWING NO. - 4
 REVISION NO. | 0 | 0 | 1/1
 ISSUE DATE - JAN2020 SCALE - 1:400
 CLIENT: JICA JAPAN

LEGEND:

- ROAD
- FOOT PATH
- COMPOUND WALL
- WALL
- FENCE
- CULVERT
- GATE
- CONCRETE ROAD
- PARKING
- BUILDING
- SHED
- TRANSFORMER
- WATER TANK
- BUS COUPLER
- ACCELERATOR SWITCH
- POTENTIAL TRANSFORMER
- LIGHT POST (LP)
- BREAKER
- CURRENT TRANSFORMER
- EARTHING
- WATER COOLER
- CABLE DUCT
- DRAIN
- RAMP
- WATCH TOWER
- PARADET WALL
- HERB WALL
- FLAG STAGE
- ELECTRIC POLE
- STATION POINT
- TMN
- RL AT GRID INTERSECTION
- TREE
- COCONUT TREE
- MANGO TREE
- NEEM TREE

ORIENTATION:

PROJECT:
 Topographical survey of phosphenol power house complex, Part B (a) - Andaman.

DRAWING TITLE:
 Survey site plan with levels.

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Power Supply in Andaman and Nicobar Islands in India
(Explanation on Draft Preparatory Survey Report)

In response to the request letter from the Government of India (Ministry of Finance) dated 19th October, 2015 (No.4/8/2015-Jap II) and the subsequent letter dated 9th May, 2019 (D.O. No. 4/8/2015-JICA Projects (J.II)), related to the Project for Improvement of Power Supply in Andaman and Nicobar Islands (hereinafter referred to as "the Project"), and with reference to the minutes of discussions signed between Andaman and Nicobar Administration (hereinafter referred to as "ANA") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 21st August, 2019, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project.

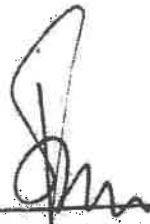
As a result of the discussions, both sides agreed on the main items described in the attached sheets. The both parties acknowledge and agree that the signing of this Minutes of Discussions may be executed by electronic signature, which is considered as an original signature, and therefore has the same force and effect as an original signature. "Electronic signature" includes electronically scanned and transmitted versions (e.g. via pdf) of an original signature.

Port Blair, December, 2020


Tokyo, 4th December, 2020



Mr. YUZURIO Susumu
Director
Energy and Mining Group
Infrastructure Management Department
Japan International Cooperation Agency
Japan



Mr. Sudhir Mahajan
Secretary (Power)
Andaman and Nicobar Administration
India



Mr. Vivek Kumar Dewangan
Additional Secretary (IC)
Ministry of Power
India



Mr. Govind Mohan
Additional Secretary (UT)
Ministry of Home Affairs
Government of India

ATTACHEMENT

1. Objective of the Project

The objective of the Project is to utilize the power generated from renewable energy sources and stabilize power supply in South Andaman, by introducing necessary equipment and facilities for energy storage of solar PV generation, thereby contributing to promotion of actions towards climate change and improvement of living standard in Andaman and Nicobar Islands.

2. Title of the Preparatory Survey

Both the ANA side and the JICA Mission (hereinafter referred to as “both sides”) confirmed the title of the Preparatory Survey as “The Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands”.

3. Project Site

Both sides confirmed that the site of the Project is in Phoenix Bay power house in Port Blair, which is shown in Annex 1. ANA confirmed that the Project site will not be shifted to other locations, nor reduce the size of the above mentioned site. ANA agreed to the JICA Mission that, before the bidding procedure starts, ED will conduct cutting/clearing of vegetation and removal of existing structure etc, in order to make the project site ready for construction, and will hand over the site to Contractor right after contract signing without delay.

4. Responsible authority for the Project

Both sides confirmed that Electricity Department, Andaman and Nicobar Administration (hereinafter referred to as “ED”) will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization charts are shown in Annex 2.

5. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Indian side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Indian side around March 2021.

6. Cost estimate

Both sides confirmed that the cost estimate including the contingency explained by the

Team is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

7. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

8. Procedures and Basic Principles of Japanese Grant

The ANA side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as “the Grant”) as described in Annex 3 shall be applied to the Project. In addition, the ANA side agreed to take necessary measures according to the procedures.

9. Timeline for the project implementation

The Team explained to the ANA side that the expected timeline for the project implementation is as attached in Annex 4.

10. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The ANA side will be responsible for the achievement of agreed key indicators targeted in year 2026 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative indicators]

Indicators	Baseline (2020)	Target (2026) (3 years after completion of the new facilities)
Maximum Output of Battery (MW)	-	30
Maximum Capacity of Battery (MWh)	-	14.25
Annual discharge of energy derived from surplus PV energy (MWh /year)	0	**
Fluctuation range of system frequency (Hz)	49.08 – 51.83	50 +/- 0.5
Reduction in greenhouse gas emissions (tCO2 /year)	-	**

** Figures of indicators will be calculated and described in the Final Report of the Preparatory Survey

[Qualitative indicators]

- Promotion of actions towards climate change
- Improvement of living standard

11. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The ANA side is required to provide necessary support for the data collection.

12. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 5. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in Item No. 9 of Annex 5, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by ED, ANA during the implementation stage of the Project.

The ANA side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 5 will be used as an attachment of G/A.

13. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 6. The timing of submission of the PMR is described in Annex 5.

14. Project completion

Both sides confirmed that the project completes when all the facilities constructed and equipment procured by the Grant are in operation. The completion of the Project will be reported to JICA promptly by the Executing Agency, but in any event not later than six months after completion of the Project.

15. Environmental and Social Considerations

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as C because the Project is likely to have minimal adverse impact on

the environment under the Guidelines.

16. Other Relevant Issues

16.1. Harmonization between EMC and SCADA

For SCADA under the Project and EMC functions appropriately, smooth and fast transmission of data between those systems will be necessary. Therefore, the compatibility of those two systems needs to be carefully reviewed during the process of detailed designing of components of the Project. ED agreed to coordinate with supplier of EMC system, in order for consultant under the Project to design the SCADA system in a harmonized manner.

EMC will control all of power generation plants, substations and batteries for optimizing energy efficiency of the entire network of South Andaman. Connecting to EMC is critical for the equipment under the Project to be able to function effectively and appropriately. Therefore, EMC should be installed before the installation of SCADA under the Project. ED agreed to it.

The interconnecting works of SCADA should consider the compatibility with the entire system of EMC, as an upper system. ANA agreed that the Indian side should be responsible for the works to interconnect EMC and SCADA.

16.2. Customs Duties, Internal Taxes and Other Fiscal Levies

As described in Annex 5, the JICA Mission explained to the ANA that it is necessary to ensure that customs duties, internal taxes and other fiscal levies which may be imposed in India with respect to the purchase of the products and/or the services be exempted or be borne by its designated authority without using the Grant. The JICA Mission requested that the ANA side will confirm the detailed procedure to exempt/refund the duties and taxes including GST (The Goods and Service Tax act, 2017). ANA agreed to provide to JICA India Office with the detailed procedure in writing, before signing of Grant Agreement.

16.3. Necessary permit to stay in Andaman & Nicobar Islands for Consultants and Contractors

In order to secure smooth implementation of the Project, the JICA Mission explained that the sufficient length of stay of consultants and contractors in Andaman & Nicobar Islands is necessary. On the other hand, current regulation allows foreigner to stay at the Andaman & Nicobar Islands up to 2 weeks. JICA mission provided the staff assignment schedule (Annex 7). The JICA Mission requested the ANA side to coordinate with relevant authorities to make necessary arrangement to ensure issuing the permit for the implementation of the Project, based on the staff assignment schedule. The ANA side agreed to it.

16.4. Necessary Project Management by ED

For an efficient implementation of the Project, the JICA Mission requested the ANA side that ED manage technical matters in the course of the Project implementation, such as RoW, signing authorities of official letter or minutes related to the meetings with consultants and contractors. The ANA side agreed to it.

16.5. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

End.

Annex

Annex 1 Project Site

Annex 2 Organization Chart

Annex 3 Japanese Grant

Annex 4 Project Implementation Schedule

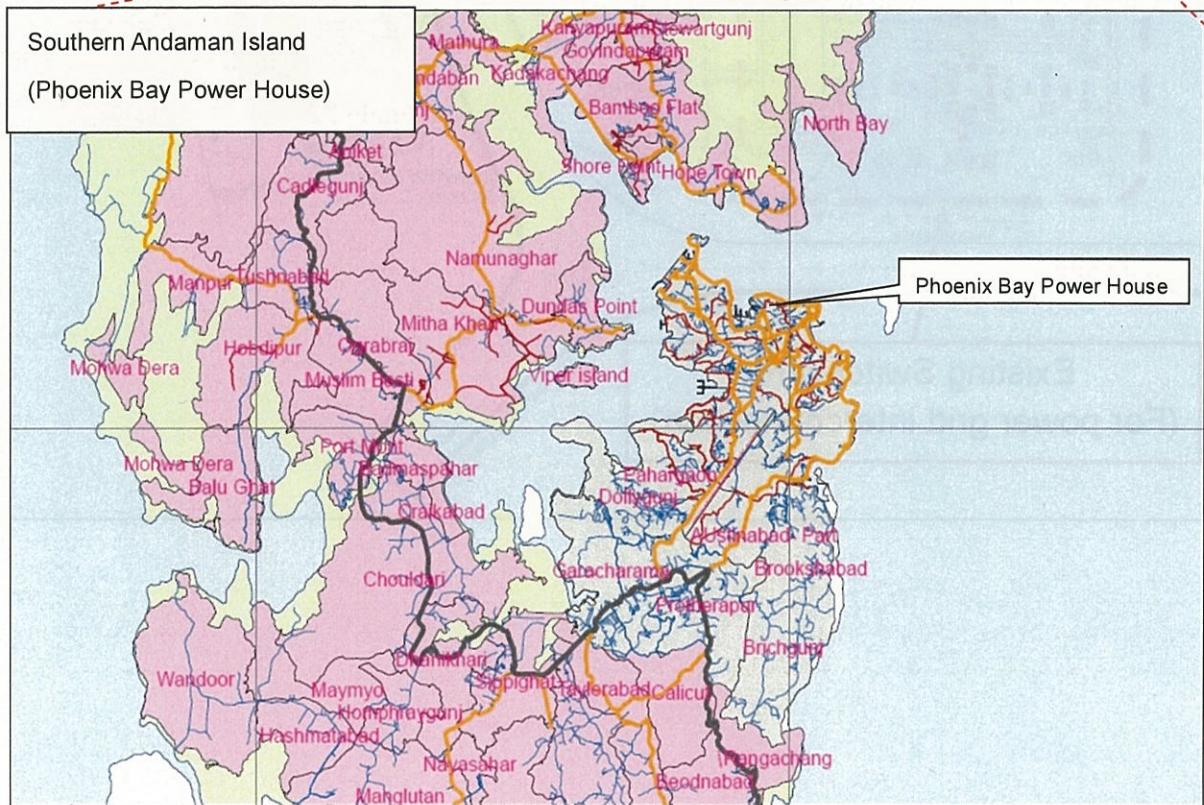
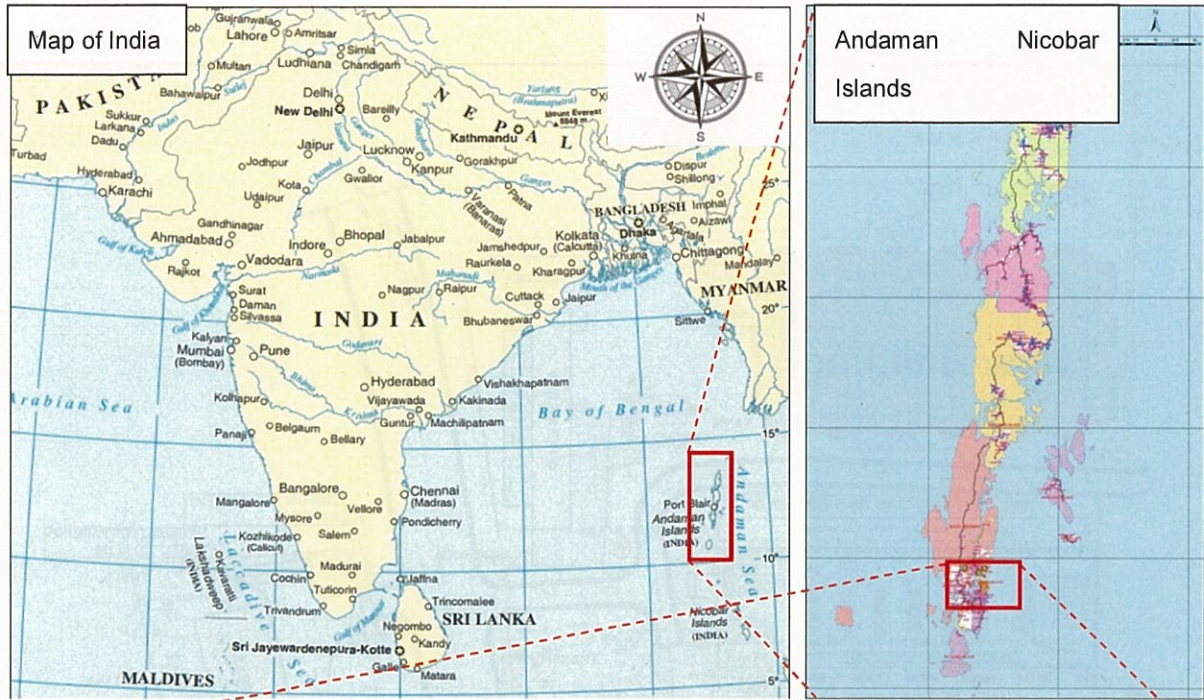
Annex 5 Major Undertakings to be taken by the Government of India

Annex 6 Project Monitoring Report (template)

Annex 7 Staff Assignment Schedule

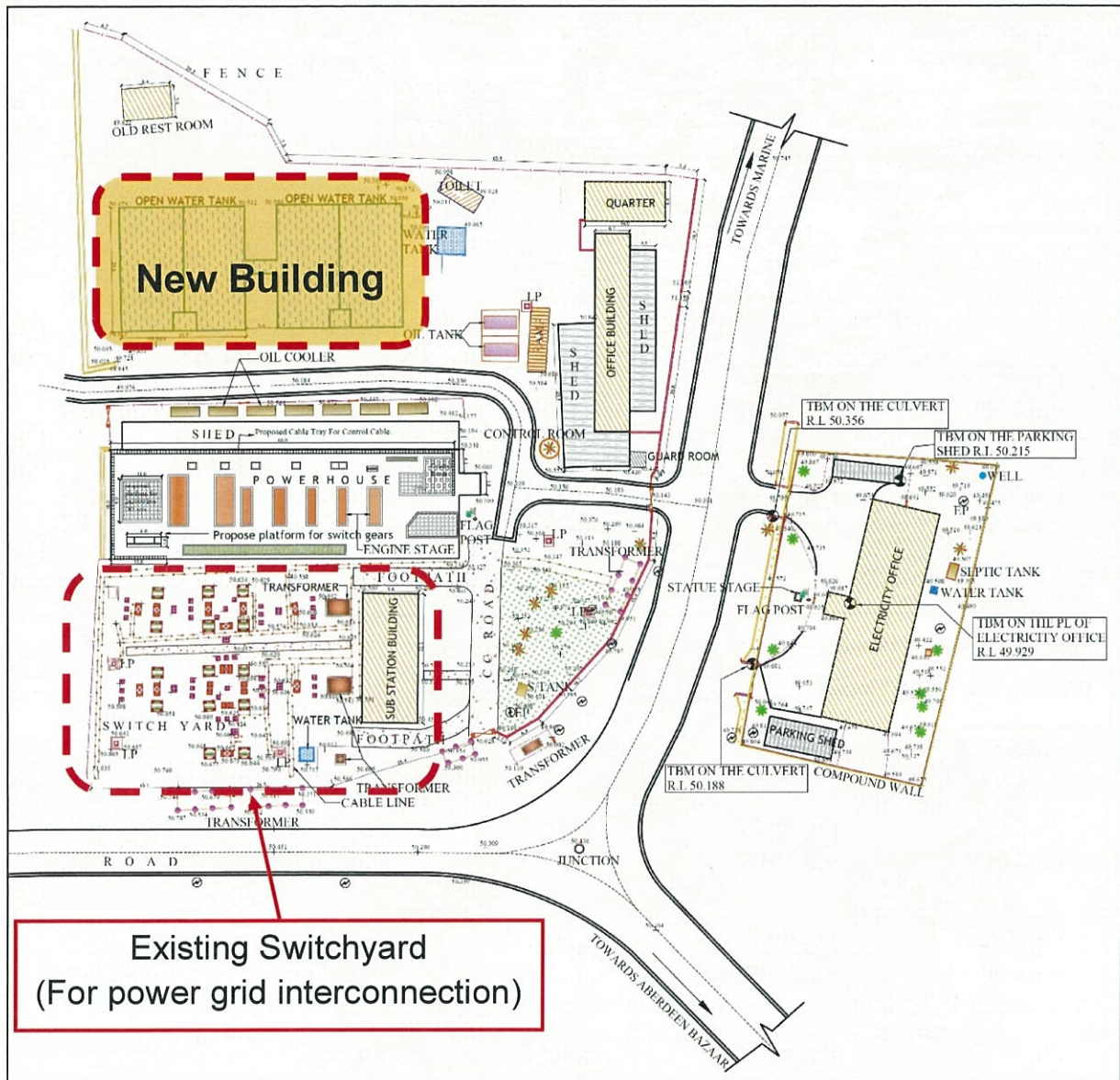


Project Site

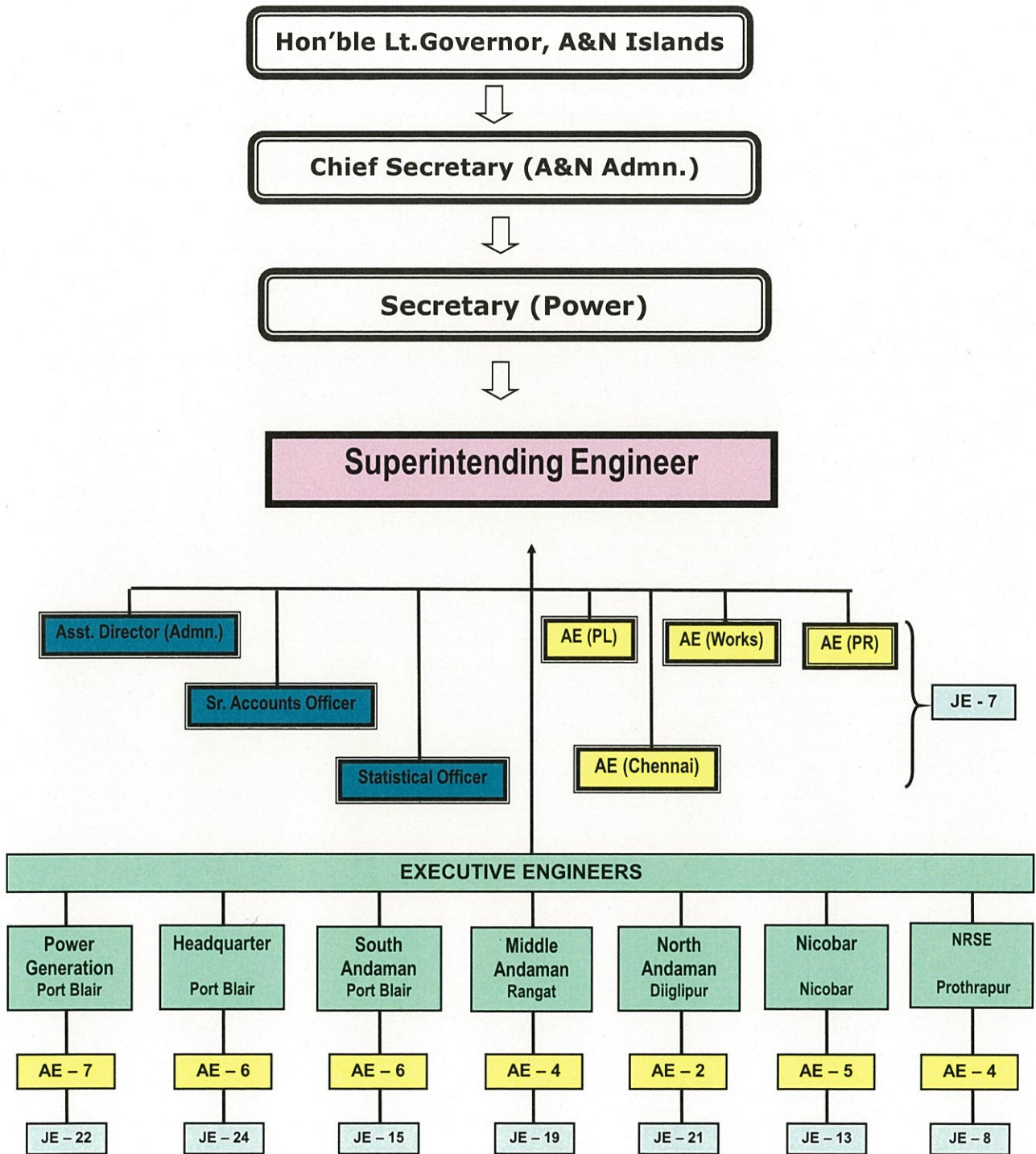


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Project Site
(Specific location inside Phoenix Bay Power House)



Structure of A&NA



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JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”) will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the “General Terms and Conditions for Japanese Grant (January 2016).”

2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of

the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of

construction.

- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Expected timeline for the project implementation

	2021												2022												2023			
	Year	Month	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
Contract	① Exchange of Note (E/N)		▼																									
	② Grant Agreement (G/A)		▼																									
	③ Consultant Contract			▼																								
Tender	① Final Confirmation of Project Plan			■																								
	② Review of Equipment Specification			▭																								
	③ Preparation of Tender Document			▭																								
	④ Approval of Tender Document				■																							
	⑤ Tender Announcement						▼																					
	⑥ Tender							▼																				
	⑦ Tender Evaluation								■																			
	⑧ Contractor Contract									▼																		
Procurement	① Design									▨																		
	② Manufacturing										▨																	
	③ Transportation																											
	④ Building Construction																											
	⑤ Equipment Installation																											
	⑥ Adjustment / Test operation																											
	⑦ Initial operation / Operation planning guidance																											
	⑧ Inspection and Taking over																											

Major Undertakings to be taken by the Government of India

1. Specific obligations of the Government of India which will not be funded with the Grant**(1) Before the Tender**

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open Bank Account (Banking Arrangement (B/A))	within 1 month after the signing of the G/A	ANA		
2	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract(s)	ANA		
3	To approve IEE or EIA (Not necessary)	within 1 month after the signing of the G/A			
4	To secure and clear the following lands 1) project site for building for the purpose of installing batteries, power system stabilizer and SCADA	before notice of the bidding document(s)	ED	USD 6,200	
5	To obtain the planning, zoning, building permit (If necessary)	before notice of the bidding document(s)	ED		
6	Earth filling, elevation raising, and preparing retaining wall for the sites of power house building and other facilities necessary for the Project	before notice of the bidding document(s)	ED		
7	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding document(s)	ED		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after the signing of the contract(s)	ANA		
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	ANA	6,000 JPY/each issue	
	2) Payment commission for A/P	every payment	ANA	This is closed due to the confidentiality.	
3	To ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	ED		
4	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	ANA, ED		
5	1) To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	Within one month after completion of Each work	ED		
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	ED		
6	To submit a report concerning completion of the Project	within six months after completion of the Project	ED		
7	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	before the tender	Secretary (Power), ANA		
8	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted or be borne by its designated authority without using the Grant.	before the tender	Secretary (Power), ANA		
9	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)		ED		
	1) Electricity The distributing line to the site	before start of the construction			
	2) Water Supply The city water distribution main to the site	before start of the construction			
	3) Drainage The city drainage main (for storm, sewer and others) to the site	before start of the construction			
	4) Furniture and Equipment General furniture	1 month before completion of the construction			
10	To take necessary measure for safety construction- - rope off - necessary power shutdown for the work	during the construction	ED		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid	After completion of the construction	ED	17,751,000 INR /year	
	1) Operation and maintenance of the Procured Facilities (Maintenance of equipment)				
	2) Operation and maintenance of the Procured Facilities (Cost for human resources)				
3) Operation and maintenance of the building	After completion of the construction	ED	1,200,000 INR /year		

2. Other obligations of the Government of India funded with the Grant

NO	Items	Deadline	Amount (Million Japanese Yen)*
1	Installation of Battery Energy Storage System 1) Installation of Energy Storage System 2) Related equipment 3) Construction of building	April 2023 (Expected project completion)	/
2	Detailed design, bidding support and procurement supervision (Consulting Service)		
4	Contingencies		
	Total		

*The Amount is provisional. This is subject to the approval of the Government of Japan.

This is closed due to the confidentiality.

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) _____ Contacts: Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	Person in Charge (Designation) _____ Contacts: Address: _____ Phone/FAX: _____ Email: _____
Line Ministry	Person in Charge (Designation) _____ Contacts: Address: _____ Phone/FAX: _____ Email: _____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description	
-------------------------------	--

1-1 Project Objective

--

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

--

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original <i>(proposed in the outline design)</i>	Actual
1.		

2-2 Scope of the work

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)



2-3 Implementation Schedule

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	

Reasons for any changes of the schedule, and their effects on the project (if any)

--

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original ^{1,2)} <i>(proposed in the outline design)</i>	Actual
	1.			
Total				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original ^{1,2)} <i>(proposed in the outline design)</i>	Actual
	1.			



- Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design) name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)
Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)



Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:



	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.



Attachment

1. Project Location Map
 2. Specific obligations of the Recipient which will not be funded with the Grant
 3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
 5. Environmental Monitoring Form / Social Monitoring Form
 6. Monitoring sheet on price of specified materials (Quarterly)
 7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
 8. Pictures (by JPEG style by CD-R) (PMR (final) only)
 9. Equipment List (PMR (final) only)
 10. Drawing (PMR (final) only)
 11. Report on RD (After project)

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (₹) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment Price (Decreased) E=C-D	Condition of payment Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●			
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

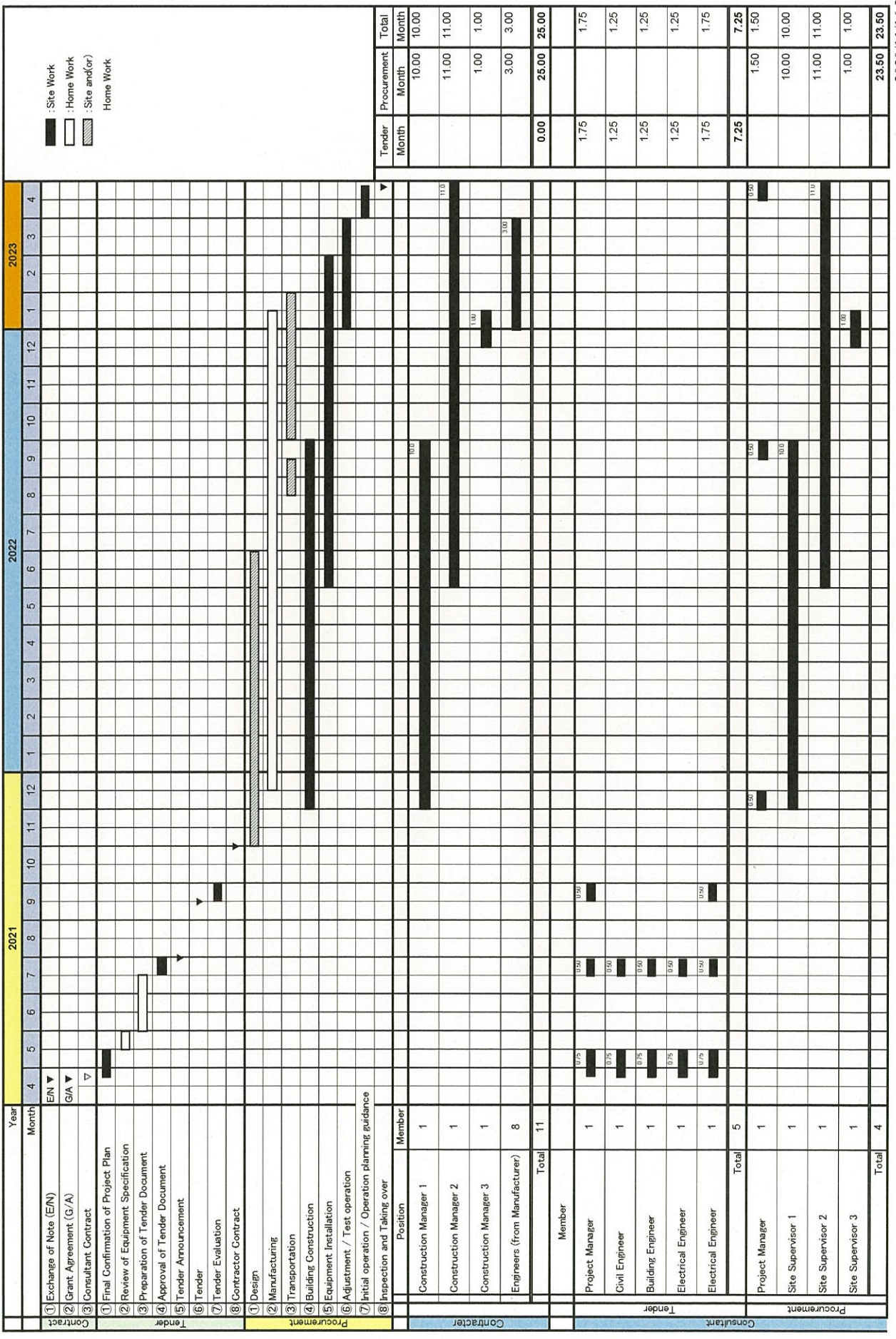
	Items of Specified Materials	1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
1	Item 1	●	○	○			
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Staff Assignment Schedule



添付資料-5

参考資料

2026年太陽光発電余剰電力の蓄電池放電電力量

計算方法と仮定

1 計算方法

- 1) 計算対象年を、2026年の1年とする。
- 2) 2026年の南アンダマン系統のピーク需要予測値を定める。添付-1
- 3) 上記年間ピーク需要から乾期と雨期の半年ピークを定める。添付-1
- 4) 雨期・乾期の典型的な日負荷曲線のピーク値に上記ピーク需要を当てはめ、各時間帯の需要値を比例させ、乾期・雨期の日負荷曲線を定める。
日負荷曲線は1時間ごとの平均値データ24個より構成する。添付-2
- 5) アンダマン地域の日射量データを以下のとおり準備する。
 - 1時間ごとの25度傾斜面日射量(kW/m²)データ24時間分
 - 上記日射量は1月から12月までの各月の平均値
- 6) 上記日射量データから南アンダマン系統に接続された太陽光発電設備(PV)より発電される1時間毎の平均発電電力(MW)を算出する。
上記より毎月のPV日発電曲線(晴・曇り・雨を含めた平均値としての)が、12個(1年12ヵ月分)できる。
- 7) PV発電のピーク時間帯におけるエンジン発電機の運転最小出力を、雨期および乾期で定める。
- 8) 各月・各時間に対応させ、下記の計算を行い、結果がプラスになる部分が余剰電力となる。
$$(PV\text{発電出力} + \text{エンジン発電機の運転最小出力}) - (\text{需要})$$
- 9) 上記で算出した1時間ごとの余剰電力(MWh)を1日分合計し、1日の余剰電力(MWh/日)を算出する。
- 10) 上記を対応する月の日数倍(例えば、30日の月なら30倍)して、その月の余剰電力量(MWh/月)を算出する。
- 11) 上記各月の余剰電力量を合計し、2016年の余剰電力量(MWh/年)を算出する。
- 12) 上記余剰電力量が蓄電池に充電され放出されるとし、年間余剰電力量に充放電効率を掛けて年間放電電力量(MWh/年)を算出する。

2 仮定

- 1) 2026年南アンダマン系統に接続された太陽光発電設備出力

モジュール出力: 55 MW

内訳: 下記の既存および計画PVより、

メガソーラー50MW、ルーフトップ5MWとする。

(既存および計画PV)

メガソーラー	MW (2021/3時点の状況)
Gharacharma PV 発電所	5 稼働中
Attam Pahad and Dollygunj PV 発電所	20 稼働(未確認)
Chidiyatapu PV 発電所	8 計画
Manglutan PV 発電所	17 計画
<hr/>	
小計	50
ルーフトップ設置 PV発電	
稼働中	4
計画	5
<hr/>	
小計	9

- 2) PV発電のピーク時間帯におけるエンジン発電機の運転最小出力

PV発電のピーク時間帯での南アンダマン系統の予測需要に対し20%以上の出力で運転するとする。

LNGエンジン発電機8MW/台(10MW/台の80%出力)の倍数とする。

雨期: 予測需要 43.26 MW @12:00

=> エンジン発電機出力: 16MW

乾期: 予測需要 38.15 MW @12:00

=> エンジン発電機出力: 8MW

- 3) 太陽光発電所の蓄電池の働き

南アンダマン系統に連系されるメガソーラー発電所には、蓄電池の設置が義務付けられている。

南アンダマン系統で太陽光発電の1日の余剰電力が14MWhを超えた場合は、超過分を太陽光発電所の蓄電池が吸収するものとする。

以上

添付-1: 2026年の南アンダマン系統のピーク需要予測

1 ピーク需要予測対象年： 2026年

本件プロジェクト完成時期を2023年3月と想定する。

プロジェクト評価を3年後として、ピーク需要予測対象年を2026年とする。

2 予測方法： 過去の年間ピーク需要値より年平均伸び率を算定し、この年平均伸び率からピーク需要を予測する。

ANA Electricity Department (ED)に南アンダマン系統の正式に承認された需要予測の有無を確認した結果、存在しないことが判明した。

EDから得られた過去の年間ピーク需要値は以下のとおりである。

Annual Peak Demand of South Andaman Grid (MW)

Year			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Recorded	Month							June	April	April	October	April	August
	Date							21	29	4	30	23	31
	Time							18:30	20:30	21:30	18:30	1:30	18:30
Recorded Peak Demand (MW)			30.70	33.50	33.30	36.20	38.00	39.12	40.66	38.75	38.90	42.21	37.30

上記データ中、2020年のピーク需要が前年より大きく低下している。これは同年の新型コロナウイルス(COVID-19)の影響による電力需要の低下と考えられる。このため、需要予測に使用するデータは2010年から2019年までのデータとする。

3 ピーク需要予測

Recorded Values

Year			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Recorded Peak Demand (MW)			30.70	33.50	33.30	36.20	38.00	39.12	40.66	38.75	38.90	42.21
Annual Increase Ratio (%)				9.12	-0.6	8.71	4.97	2.95	3.94	-4.7	0.39	8.51

2010年のピーク需要値と2019年のピーク需要値から、この間9年間の年平均伸び率を算出すると以下の値となる。

年間平均伸び率: 3.60 %/年

Forecasted Peak Demand

Base Year

Year			2019	2020	2021	2022	2023	2024	2025	2026
Forecasted Peak Demand (MW)			42.21	43.73	45.30	46.93	48.62	50.37	52.19	54.07
Annual Increase Ratio (%)				3.60	3.60	3.60	3.60	3.60	3.60	3.60

2026年の年間ピーク需要予測値: 54.07 MW

4 雨期と乾期のピーク需要予測

年間の雨量データより、アンダマンの雨期と乾期を以下の期間と定義する。

雨期 (Wet Season): 5月-10月 (6ヵ月)

乾期 (Dray Season): 11月-4月 (6ヵ月)

上記2項に示した年間ピーク需要記録で、ピーク需要発生日時も記録されている2015年から2020年の6年において、ピーク発生時期は雨期3年、乾期3年と偏りが見られないことから、雨期と乾期のピーク需要は同じ値とする。

2026年の雨期6か月間ピーク需要予測値: 54.07 MW

2026年の乾期6か月間ピーク需要予測値: 54.07 MW

添付-2: 2026年の南アンダマン系統の日負荷変動予測

1 2020年の代表的日負荷変動記録(雨期および乾期)

ANA Electricity Department (ED)より得られた2020年雨期および乾期の代表的日負荷変動(1時間毎)データは以下のとおりである。

雨期

Month:	September																							
Data:	07.09.2020																							
Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Demand (MW)	25.37	25.51	24.4	24.41	23.64	24.09	24.48	26.1	25.7	28.27	31.86	33.89	33.4	30.67	29.48	29.71	28.55	30.64	30.55	28.73	29.18	28.7	27.39	25.8

乾期

Month:	February																							
Data:	26.02.2020																							
Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Demand (MW)	27.57	26.36	25.29	25.29	25.91	26.45	27.93	28.72	28.44	29.36	33.74	33.84	29.58	30.25	32.11	30.56	30.98	33.66	38.35	37.46	36.79	35.37	32	28.81

2 最大負荷を1とした2020年の日負荷変動の比例値

上記の日負荷変動データにおいて、最大負荷を1とした比例値で示すと以下のとおりとなる。

雨期

Month:	September																							
Data:	07.09.2020																							
Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Demand (MW)	25.37	25.51	24.40	24.41	23.64	24.09	24.48	26.10	25.70	28.27	31.86	33.89	33.40	30.67	29.48	29.71	28.55	30.64	30.55	28.73	29.18	28.70	27.39	25.80
最大負荷を1とした比例値	0.749	0.753	0.720	0.720	0.698	0.711	0.722	0.770	0.758	0.834	0.940	1.000	0.986	0.905	0.870	0.877	0.842	0.904	0.901	0.848	0.861	0.847	0.808	0.761

乾期

Month:	February																							
Data:	26.02.2020																							
Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Demand (MW)	27.57	26.36	25.29	25.29	25.91	26.45	27.93	28.72	28.44	29.36	33.74	33.84	29.58	30.25	32.11	30.56	30.98	33.66	38.35	37.46	36.79	35.37	32.00	28.81
最大負荷を1とした比例値	0.719	0.687	0.659	0.659	0.676	0.690	0.728	0.749	0.742	0.766	0.880	0.882	0.771	0.789	0.837	0.797	0.808	0.878	1.000	0.977	0.959	0.922	0.834	0.751

3 2026年の代表的日負荷変動予測値

2026年の雨期および乾期の日負荷変動の形は上記の2020年の雨期および乾期の日負荷変動の形と同じと仮定する。

上記の仮定の下、2020年日負荷変動最大値を1とした比例値に対し次のように仮定し、2026年雨期・乾期の代表的日負荷変動とする。

$$\begin{aligned} \text{最大値1に対応する需要値(MW)} &= \text{先の需要予測で算定した2026年雨期6ヵ月間・乾期6ヵ月間それぞれのピーク需要予測値の80\%}^{(注)} \\ &= 54.1 \times 80\% = 43.26 \text{ MW} \end{aligned}$$

(注) 日々のピーク需要はその日の気温や天候、平日と休日の稼働負荷の違いなどにより変化する。

そのため、6ヵ月間のピーク需要予測値を6ヵ月間の平均的な日負荷変動の最大値に変換する必要があり、変換係数として80%を仮定した。

以上の仮定から算定された2026年雨期・乾期の代表的日負荷変動予測値を以下に示す。

雨期

	最大値1に対応する需要値: 43.26 MW																							
Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Demand (MW)	32.40	32.57	31.14	31.14	30.19	30.76	31.23	33.31	32.79	36.08	40.66	43.26	42.65	39.15	37.63	37.94	36.42	39.10	38.97	36.68	37.24	36.64	34.95	32.92
最大負荷を1とした比例値	0.749	0.753	0.720	0.720	0.698	0.711	0.722	0.770	0.758	0.834	0.940	1.000	0.986	0.905	0.870	0.877	0.842	0.904	0.901	0.848	0.861	0.847	0.808	0.761

乾期

	最大値1に対応する需要値: 43.26 MW																							
Time:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Demand (MW)	31.10	29.72	28.51	28.51	29.24	29.85	31.49	32.40	32.10	33.13	38.07	38.15	33.35	34.13	36.21	34.48	34.95	37.98	43.26	42.26	41.48	39.88	36.08	32.49
最大負荷を1とした比例値	0.719	0.687	0.659	0.659	0.676	0.690	0.728	0.749	0.742	0.766	0.880	0.882	0.771	0.789	0.837	0.797	0.808	0.878	1.000	0.977	0.959	0.922	0.834	0.751

添付資料5-2 温室効果ガスの削減量の算出過程

15. Renewable Energy / Hydropower and Others

Project Name

Sample

Country

India

Emission Reduction

		Value	Unit
ER _y	Emission reduction	2,683	tCO ₂ /year
BE _y	Baseline emission	2,683	tCO ₂ /year
PE _y	Project emission	0	tCO ₂ /year

Inputs

1) Electricity generation projects (Grid connected system or standalone or mini-grid system) *Input only orange cell

Parameter	Description	Value	Unit
-	The project is a development of geothermal power plant	No	
-	The project is a development of hydro power plant and CH ₄ emission from reservoirs of hydro power plants is	No	
EG _y	Power generation by the renewable energy system in year y	2,971	MWh/year
EF _{elec}	CO ₂ emission factor of the electricity	0.903	tCO ₂ /MWh
EF _{Res}	Default emission factor for emissions from reservoirs of hydro power plants	0	kgCO _{2-eq} /MWh
W _{Main,CO2}	Average mass fraction of carbon dioxide in the produced steam		tCO ₂ /t
W _{Main,CH4}	Average mass fraction of methane in the produced steam		tCH ₄ /t
GWP _{CH4}	Global warming potential of methane	25	tCO ₂ /tCH ₄
M _{S,y}	Quantity of steam produced in year y		t/year
FC _{i,y}	Consumption of fossil fuel i at the power plant in year y		t/year
NCV _i	Net calorific value of the fossil fuel i		TJ/t
EF _{fuel,i}	CO ₂ emission factor of the fossil fuel i		tCO ₂ /TJ

2) Solar water system

*Input only orange cell

Parameter	Description	Value	Unit
-	The project is installation of solar water systems	No	
EF _{fuel,i}	CO ₂ emission factor of fossil fuel i which would have used in the baseline		tCO ₂ /GJ
ε _{BL}	Efficiency of baseline heating system		-
F _y	Amount of hot water supplied by the solar water heating system in year y		m ³
ΔT	Temperature rise of water (or heat carrier) by the solar water heating system		K
C	Specific heat of water (or heat carrier)		GJ/t.K
ρ	Density of water (or heat carrier)		t/m ³

15. Renewable Energy / Hydropower and Others

Project Name

Sample

Country

India

Calculations

	Value	Unit
Emission reduction	2683	tCO ₂ /year
Baseline emission	2683	tCO ₂ /year
Baseline emission (Electricity generation projects (Grid connected system or standalone or mini-grid system))	2683	tCO ₂ /year
Power generation by the renewable energy system in year y	2971	MWh/year
CO ₂ emission factor of the electricity	0.903	tCO ₂ /MWh
Baseline emission (Solar water system)	0	tCO ₂ /year
CO ₂ emission factor of fossil fuel i which would have used in the baseline	0	tCO ₂ /GJ
Efficiency of baseline heating system	0	-
Amount of hot water supplied by the solar water heating system in year y	0	m ³
Temperature rise of water (or hear carrier) by the solar water heating system	0	K
Specific heat of water (or hear carrier)	0	GJ/t.K
Density of water (or heat carrier)	0	t/m ³
Project emission	0	tCO ₂ /year
Default emission factor for emissions from reservoirs of hydro power plants	0	kgCO ₂ -eq/MWh
Average mass fraction of carbon dioxide in the produced steam	0	tCO ₂ /t
Average mass fraction of methane in the produced steam	0	tCH ₄ /t
Global warming potential of methane	25	tCO ₂ /tCH ₄
Quantity of steam produced in year y	0	t/year
Consumption of fossil fuel i at the power plant in year y	0	t/year
Net calorific value of the fossil fuel i	0	TJ/t
CO ₂ emission factor of the fossil fuel i	0	tCO ₂ /TJ

別表4 系統電力のCO₂排出係数 (コンバインド・マージン)

当該国の値を下表より選択 (あるいは IGES の最新版の情報参照)。

(t-CO₂/MWh)

Region	Host Party	Combined Margin EF (Average)
Asia	China	0.874
	India	0.903
	Viet Nam	0.564
	Thailand	0.547
	Republic of Korea	0.631
	Indonesia	0.761
	Philippines	0.508
	Malaysia	0.668
	Pakistan	0.543
	Sri Lanka	0.674
	Papua New Guinea	0.679
	DPR Korea	0.912
	Bangladesh	0.6441
	Cambodia	0.665
	Lao PDR	0.560
	Singapore	0.486
	Mongolia	1.061
	Bhutan	0.892
Latin America	Brazil	0.298
	Mexico	0.528
	Chile	0.614
	Peru	0.598
	Argentina	0.518
	Honduras	0.643
	Colombia	0.335
	Uruguay	0.574
	Panama	0.591
	Ecuador	0.576
	Guatemala	0.587
	Dominican Republic	0.654
	Costa Rica	0.274
	Nicaragua	0.679
	El Salvador	0.682
	Bolivia	0.589
	Cuba	0.874

	Jamaica	0.732
	Bahamas	0.723
	Guyana	0.948
	Belize	0.152
Africa/Middle and Near East	South Africa	0.953
	Israel	0.705
	Kenya	0.603
	Morocco	0.652
	Egypt	0.533
	United Arab Emirates	0.676
	Iran	0.692
	Lebanon	0.650
	Cote d'Ivoire	0.649
	Uganda	0.532
	Nigeria	0.573
	Jordan	0.584
	Tunisia	0.554
	Libya	0.794
	Madagascar	0.552
	Mauritius	0.972
	Namibia	0.920
	Senegal	0.681
	Rwanda	0.654
	Ghana	0.479
	Saudi Arabia	0.654
	Sierra Leone	0.402
	Sudan	0.305
	Tanzania	0.529
	Burkina Faso	0.368
	Zambia	0.964
	Mali	0.614
	Mozambique	0.964
Others	Cyprus	0.798
	The former Yugoslav Republic of Macedonia	0.861
	Azerbaijan	0.590
	Serbia	1.099
	Georgia	0.402
	Armenia	0.436
	Fiji	0.567
	Albania	0.393
	Montenegro	0.984
	Bosnia & Herzegovina	0.973

	Uzbekistan	0.593
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出典 : List of Grid Emission Factor, IGES, version 10.2 (29 May 2018 update)

<https://pub.iges.or.jp/pub/iges-list-grid-emission-factors>

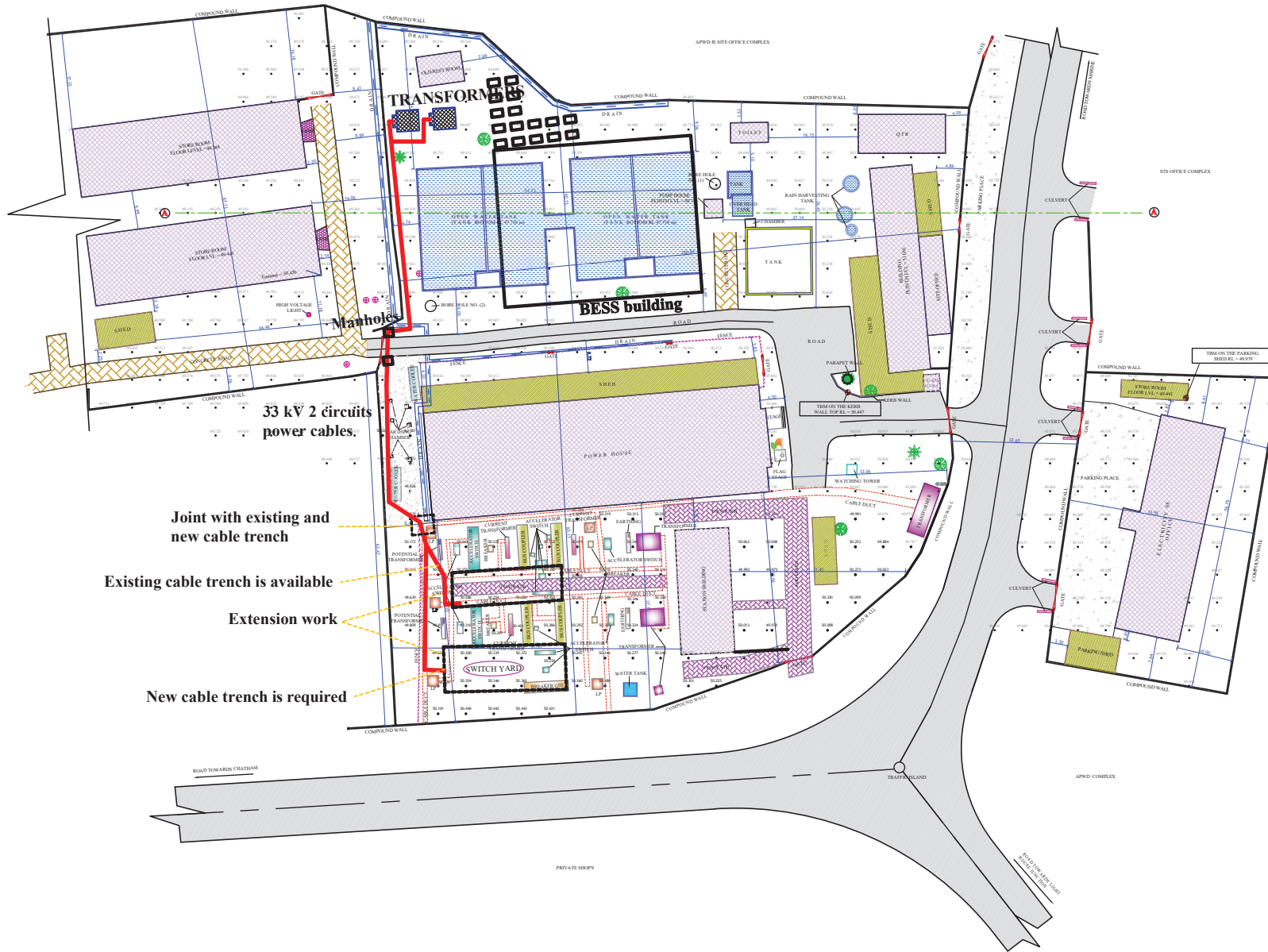
※南部アフリカ諸国については以下を参照できる。

CDM Standardized baseline, Grid emission factor for the Southern African power pool

添付資料-6

概略設計図

No.	図面番号	図面名称
1	No.1	Project site / Cable route layout plan
2	No.2	33 kV outside switchgear and BESS feeder single line diagram
3	No.3	33 kV outside switchgear layout plan
4	No.4	33 kV outside switchgear sectional plan
5	No.5	SCADA System Architecture (for reference)
6	No.6	SCADA Panel Arrangement (for reference) SCADA Room Layout (for reference)
7	No.7 – No.11	Building Drawings (Site layout, Floor plan, Elevation, Section)



Notes:
 1. All dimensions are in m.
 2. TBM 50.0m assumed at Survey Station No.1. All Levels are related.
 3. Grid RL @ 5.0m interval is provided.

LEGEND:

- ROAD
- FOOT PATH
- COMPOUND WALL
- WALL
- FENCE
- CULVERT
- GATE
- CONCRETE ROAD
- PARKING
- BUILDING
- SHED
- TRANSFORMER
- WATER TANK
- BUS COUPLER
- ACCELERATOR SWITCH
- POTENTIAL TRANSFORMER
- LIGHT POST (LP)
- BREAKER
- CURRENT TRANSFORMER
- EARTHING
- WATER COOLER
- CABLE DUCT
- DRAIN
- RAMP
- WATCHING TOWER
- PARAPET WALL
- KERB WALL
- FLAG POLE
- ELECTRIC POLE
- STATION POINT
- TBM
- RL AT GRID INTERSECTION
- TREE
- COCONUT TREE
- MANGO TREE
- NEM TREE



ORIENTATION:

33 kV 2 circuits power cables.

Joint with existing and new cable trench

Existing cable trench is available

Extension work

New cable trench is required

DRAWING NO. 1

REVISION NO.	0						/
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CLIENT:

PROJECT:

Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands in India

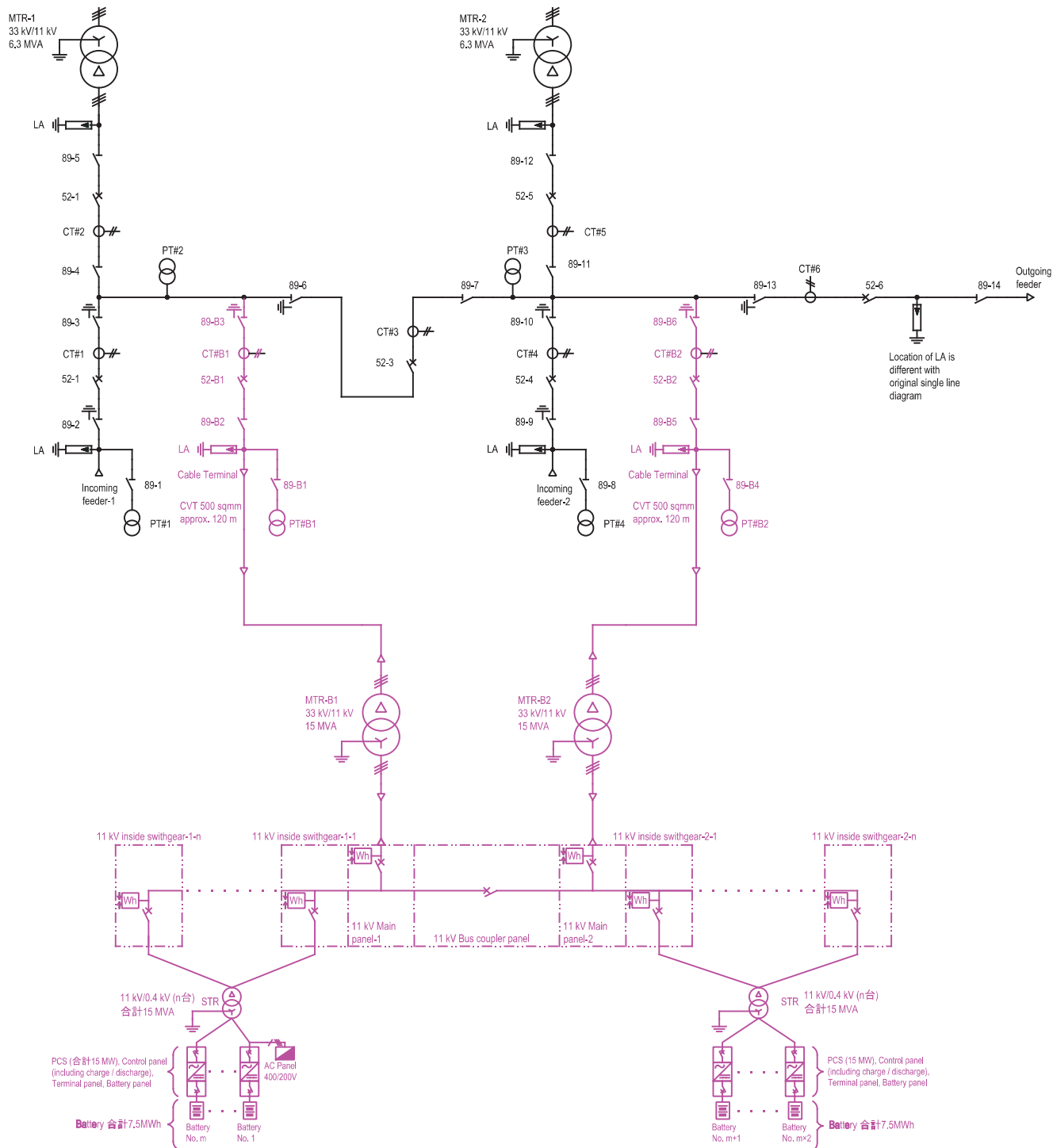
DRAWING TITLE:

Project site /Cable route layout plan

DRAWN BY:

CHECKED BY: -

APPROVED BY: -



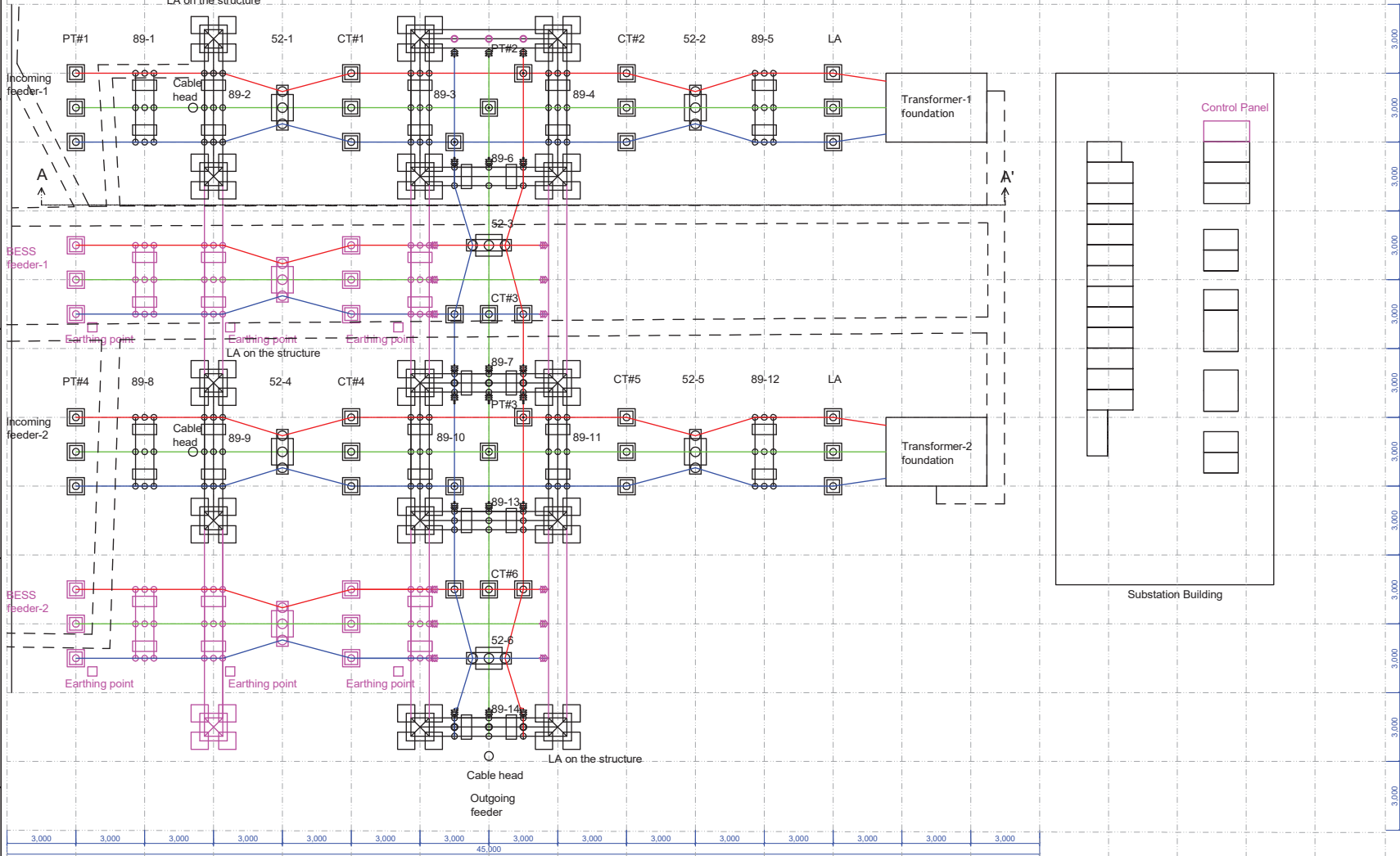
1. Existing equipment
- LA: Lighting Arrester
 - 89-1~14: Disconnection Switch
 - [89-2,3,6,9,10: Disconnection Switch with earthing switch]
 - 52-1~6: Circuit Breaker
 - CT#1~6: Current Transformer
 - PT#1~4: Potential Transformer
 - MTR-1,2: 33 kV/11 kV 6.3 MVA

2. Purple line is Project's scope

DRAWING NO. 2	
REVISION NO. 0	/
CLIENT:	
PROJECT:	Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands in India
DRAWING TITLE:	33 kV outside switchgear and BESS feeder single line diagram

Edge of existing cable pit

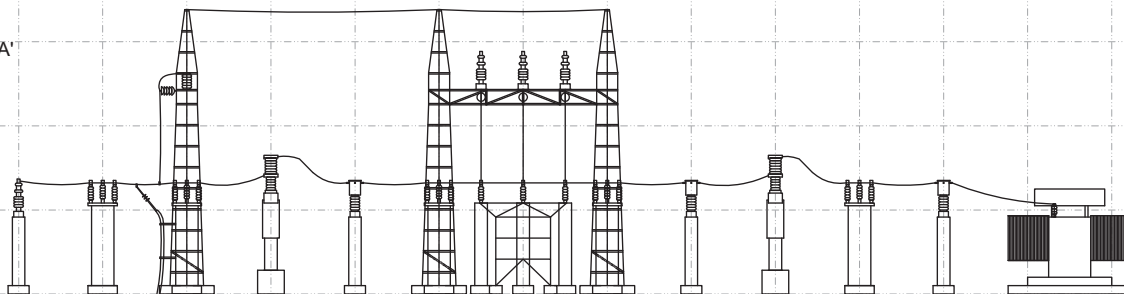
LA on the structure



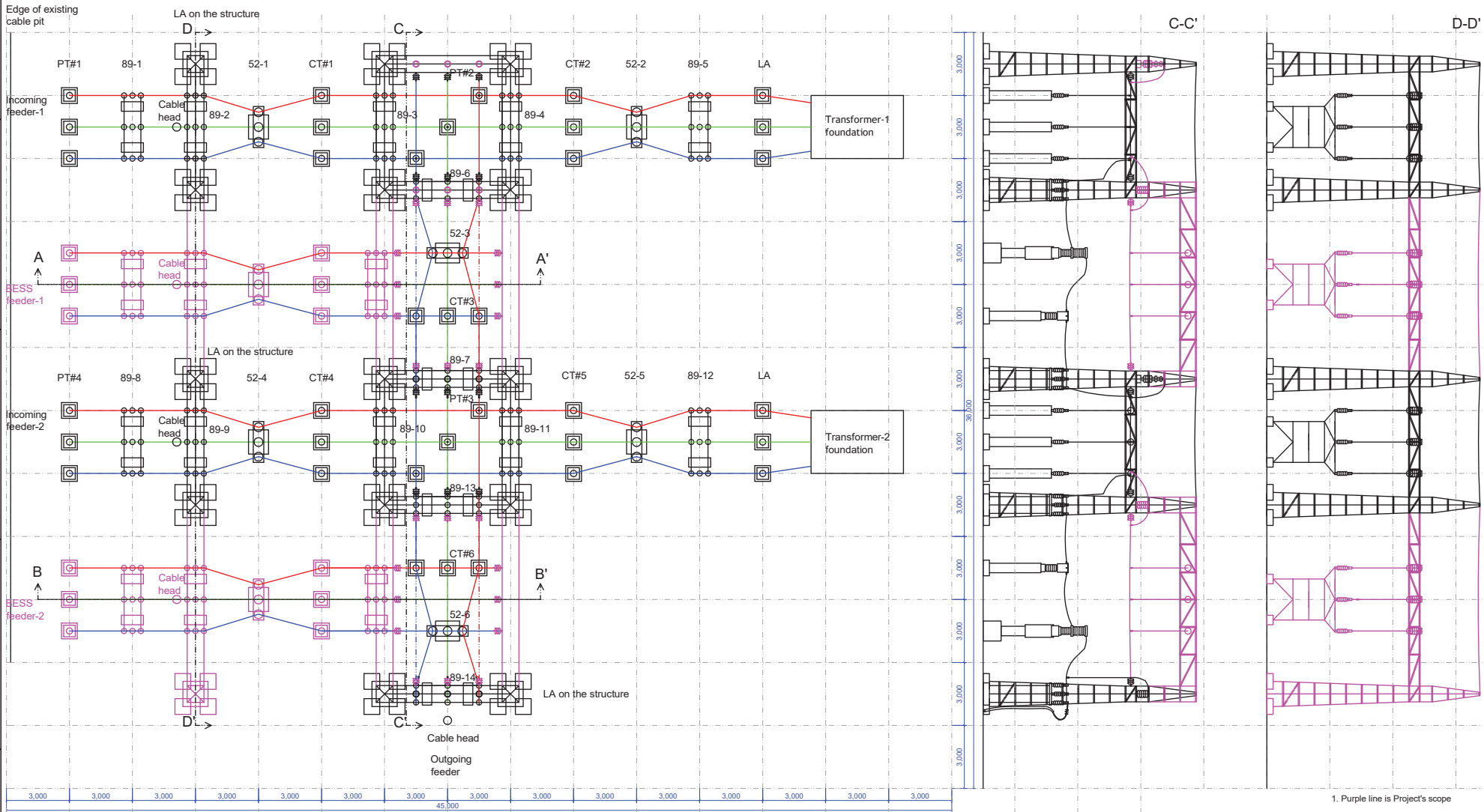
1. Purple line is Project's scope

PT#1 89-1 89-2 52-1 CT#1 89-3 PT#2 89-4 CT#2 52-2 89-5 LA Transformer-1

A-A'



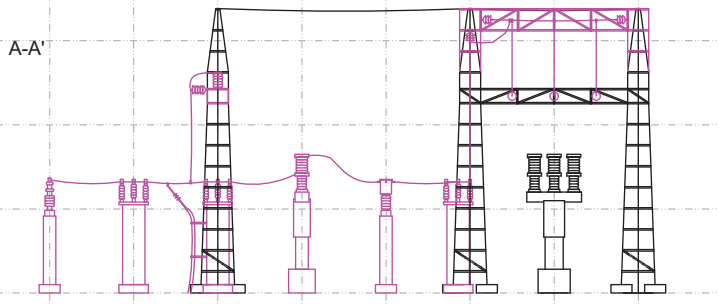
DRAWING NO. 3	
REVISION NO. 0	/
SCALE -	
CLIENT:	
PROJECT:	
Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands in India	
DRAWING TITLE:	
33 kV outside switchgear layout plan	



1. Purple line is Project's scope

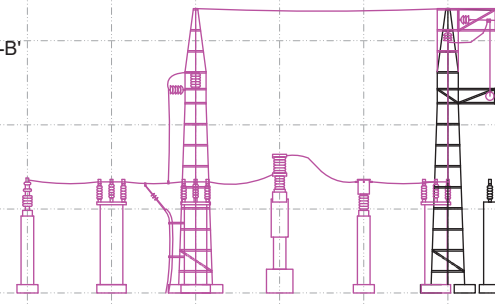
PT#B1 89-B1 89-B2 52-B1 CT#B1 89-B3 45,300

A-A'

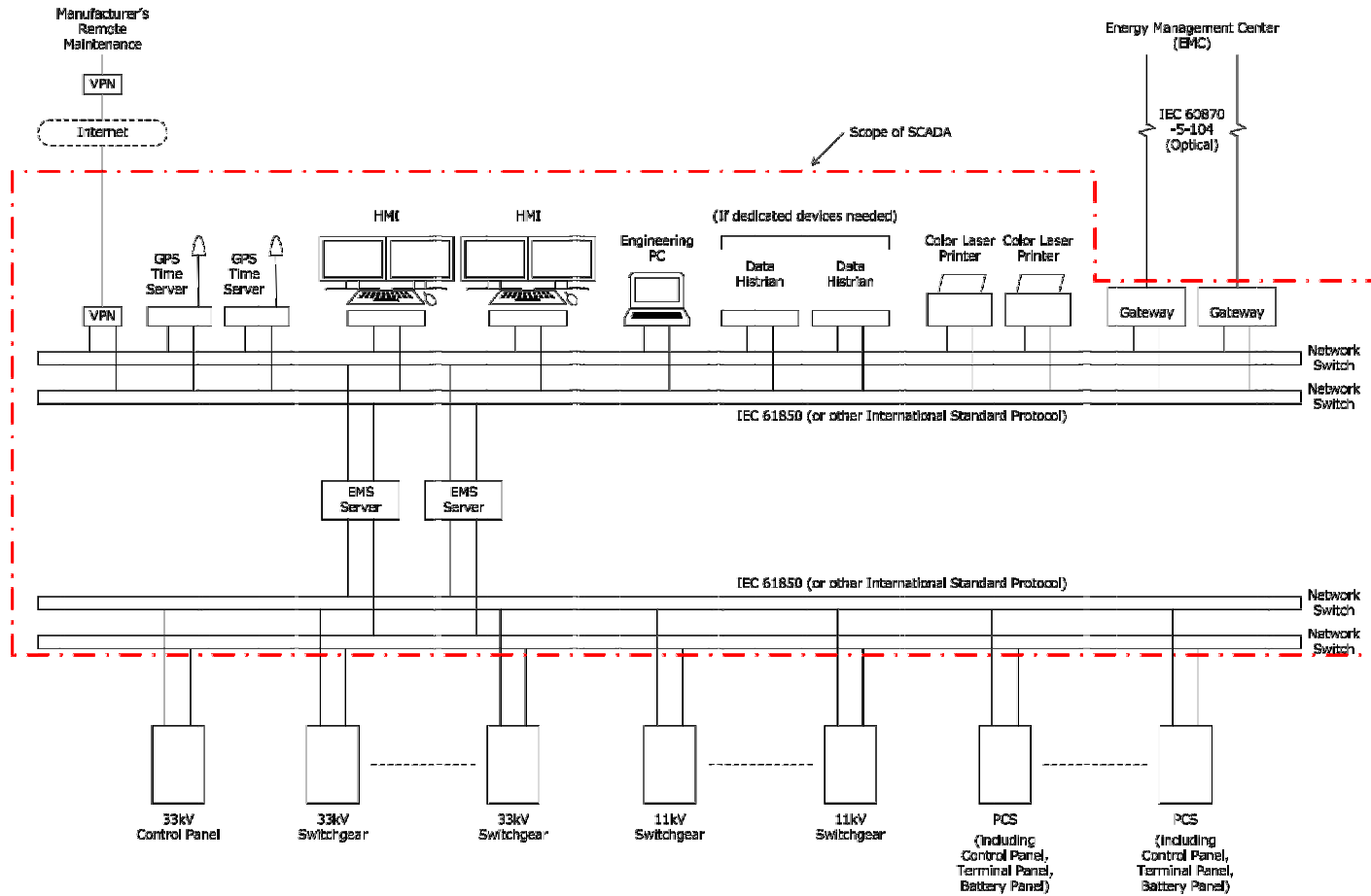


PT#B2 89-B4 89-B5 52-B2 CT#B2 89-B6

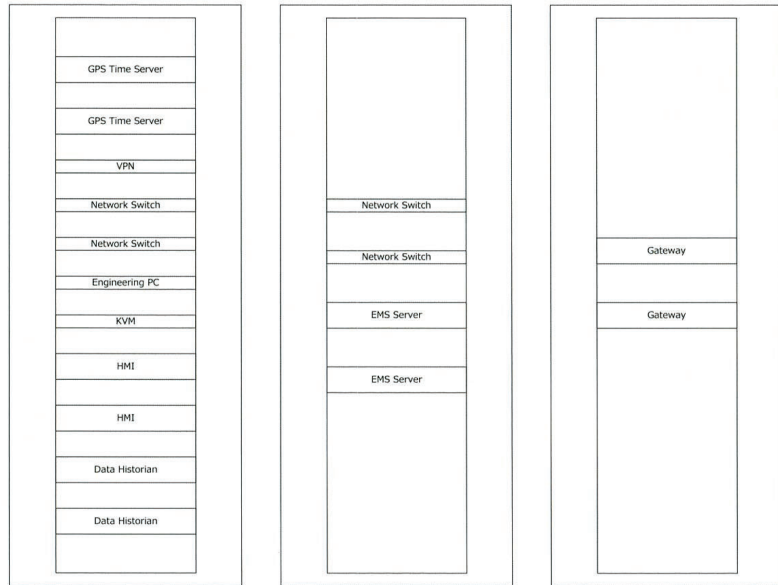
B-B'



DRAWING NO. 4			
REVISION NO.	0	/	
SCALE -			
CLIENT:			
PROJECT:			
Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands in India			
DRAWING TITLE:			
33 kV outside switchgear sectional plan			



DRAWING NO. 5									
REVISION NO. 0									
CLIENT:									
PROJECT:									
Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands in India									
DRAWING TITLE:									
SCADA System Architecture (for reference)									



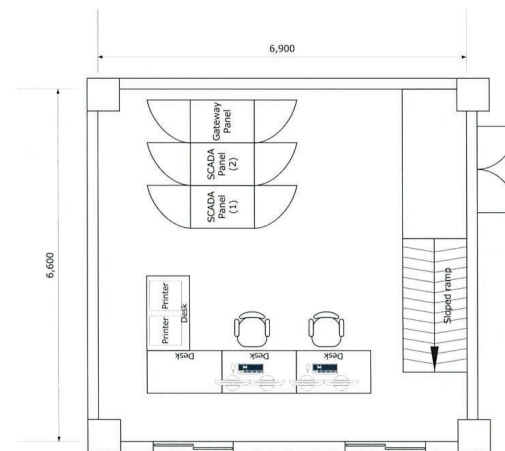
SCADA Panel (1)

SCADA Panel (2)

Gateway Panel

One or Two Panels

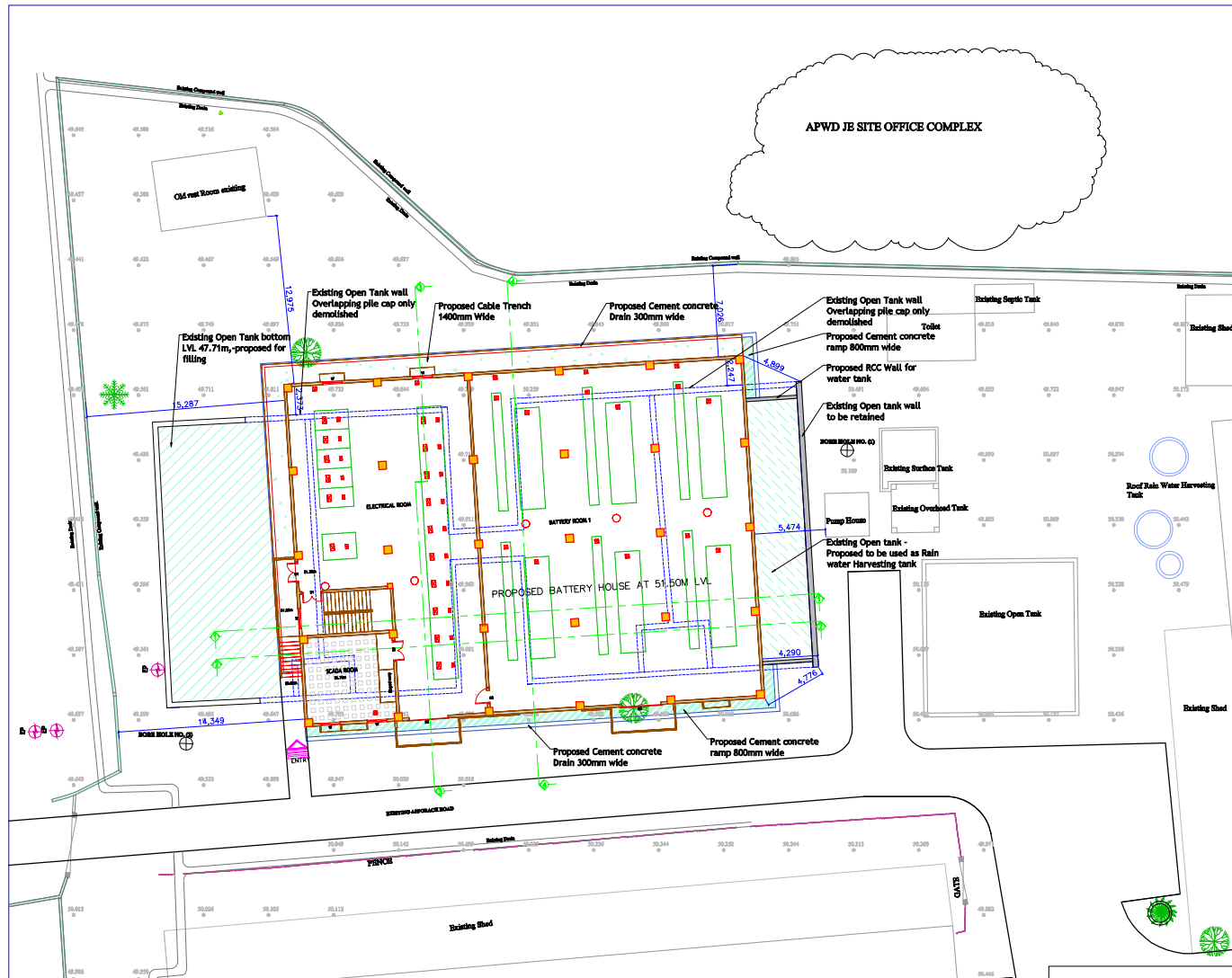
SCADA Panel Arrangement (For Reference)



Room Layout

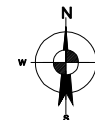
SCADA Room Layout (For Reference)

DRAWING NO.	6										
REVISION NO.	0										/
CLIENT:											
PROJECT:	Preparatory Survey for the Project for Improvement of Power Supply in Andaman and Nicobar Islands in India										
DRAWING TITLE:	SCADA Panel Arrangement (for reference) SCADA Room Layout (for reference)										



APWD JE SITE OFFICE COMPLEX

ORIENTATION:



1.	18-06-2020	Landscape arrangement removed, existing wall demolition note modified.
SL NO.	DATE	DESCRIPTION
REVISION		
DRAWING NO. - GL/20-21/12-1/R1		SHEET NO.
REVISION NO.	0 1	7
ISSUE DATE - JUNE 2020		SCALE - 1:250

PROJECT:

Preparatory Survey for the project for Improvement of Power Supply in Andaman and Nicobar Islands in India.

PROJECT COMPONENT:

Battery House

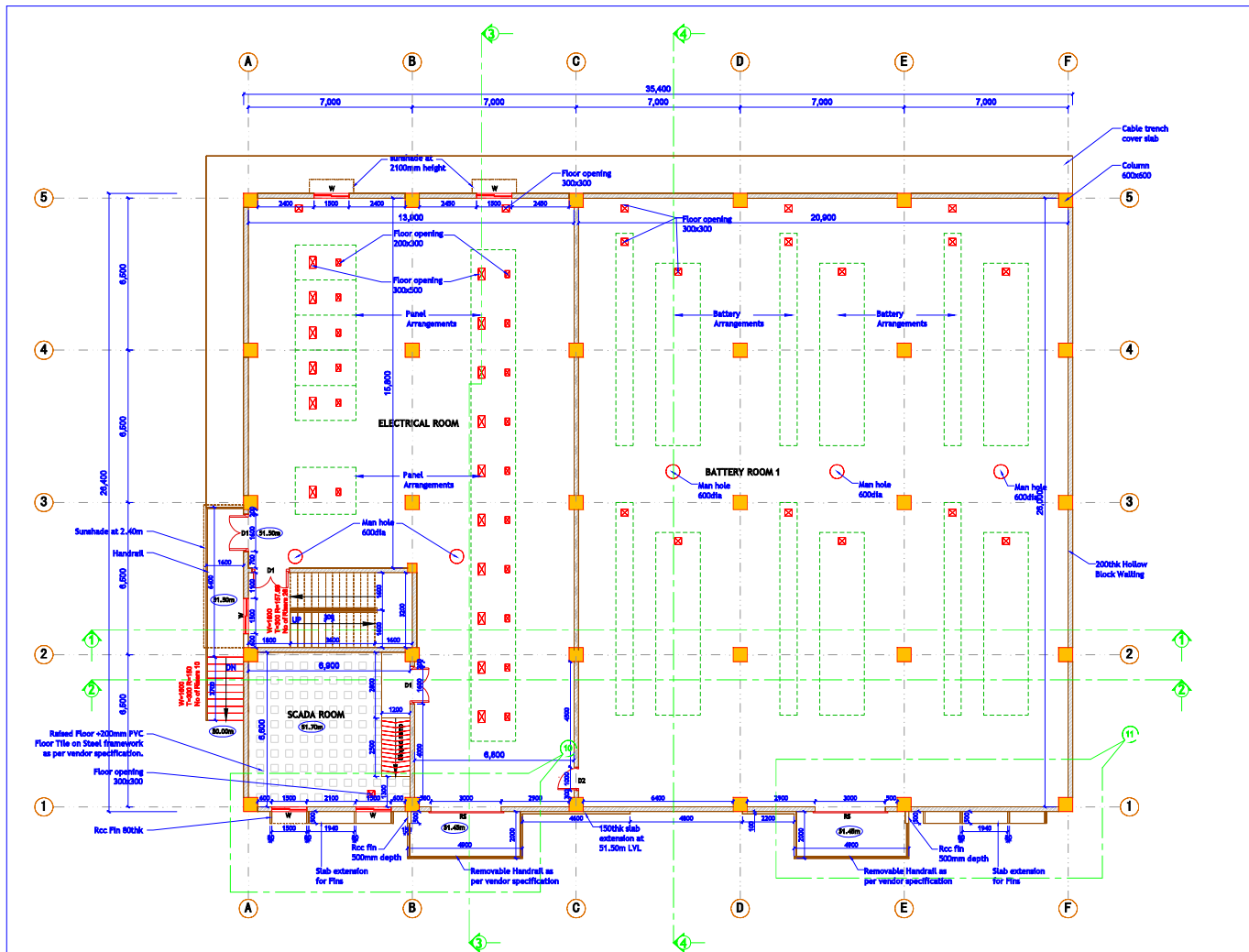
DRAWING TITLE:

Layout Plan.

DESIGN BY:

NIPPON KOEI Co., Ltd.

CONSULTANT



GROUND FLOOR PLAN - 952.16 Sqm

SCHEDULE OF OPENINGS

Sl	Mkd	Description	Width	Height
1	RS	Rolling Shutter	3000	3000
2	D1	Steel Flush door double hung	1600	2100
3	W	Aluminium Glazed sliding window with Grills	1500	1200
4	D2	Steel Flush door Single hung	1000	2100

S.NO	NOTES
01.	ALL THE DIMENSIONS ARE IN MM SCALE UNLESS NOTED OTHERWISE
02.	FOLLOW WRITTEN DIMENSIONS ONLY AND DONOT SCALE THE DRG.
03.	ANY DISCREPANCY FOUND IN THE DRG. SHALL BE BROUGHT TO THE NOTICE OF CONSULTANT IMMEDIATELY
04.	READ THIS DRG. WITH ALL RELEVANT STR./ ELECT./ PLUMBING DRGS. AND AS PER SPECIFICATIONS OF THE CONTRACT.

WORKING DRAWING

1.	18-06-2020	SCADA Room flooring note modified, Open balcony floor level depressed by 50mm.
SL NO.	DATE	DESCRIPTION

REVISION		SHEET NO.
DRAWING NO. -	GL/20-21/12-5/R1	8
REVISION NO.	0 1	
ISSUE DATE -	JUNE 2020	SCALE - 1:100

CLIENT:

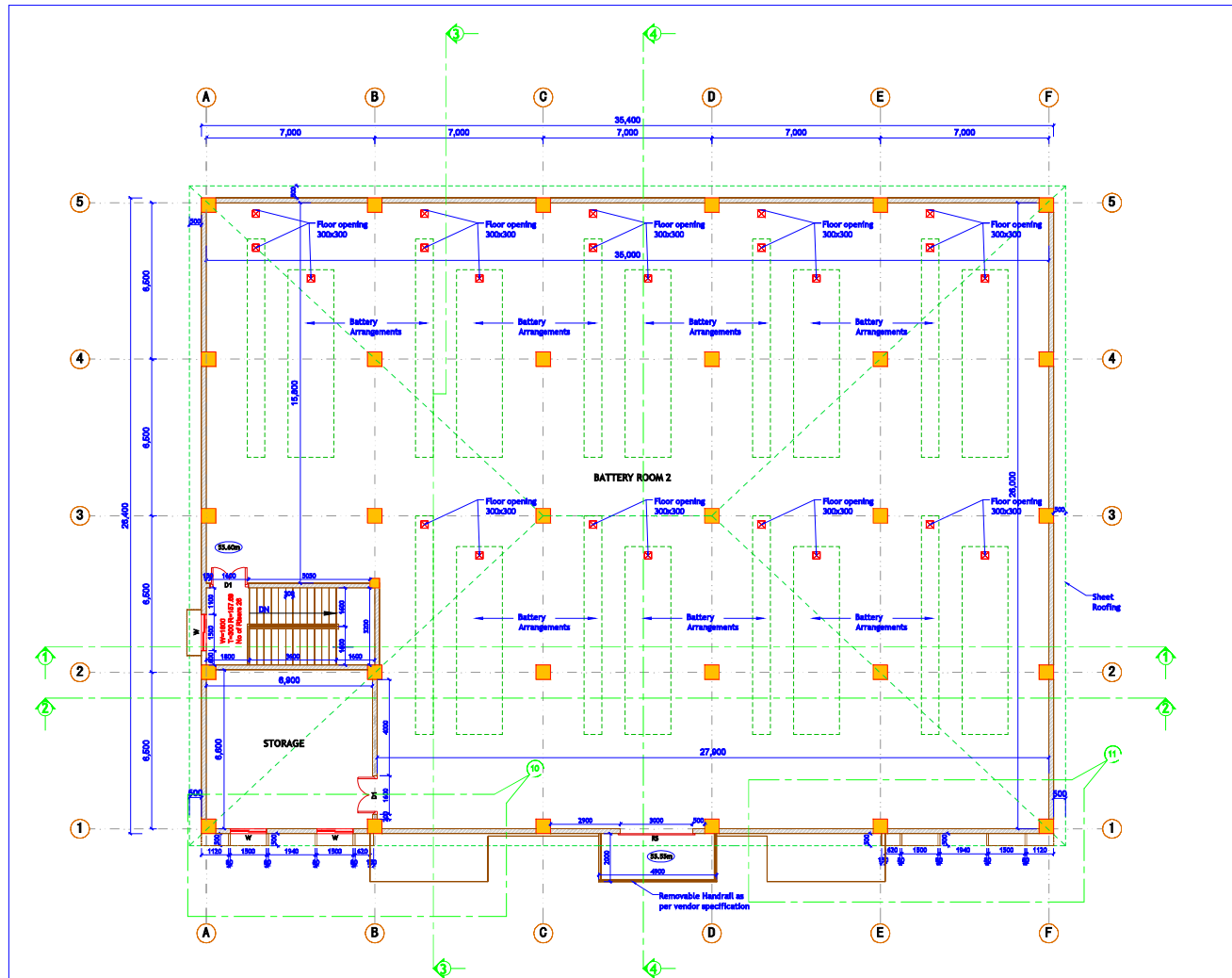
PROJECT:
Preparatory Survey for the project for Improvement of Power Supply In Andaman and Nicobar Islands In India.

PROJECT COMPONENT:
Battery House

DRAWING TITLE:
Architectural Details- Ground Floor Plan and Opening Schedule.

DESIGN BY:
NIPPON KOEI Co., Ltd.

CONSULTANT



FIRST FLOOR PLAN - 943.36 Sqm

SCHEDULE OF OPENINGS

Sl	Mkd	Description	Width	Height
1	RS	Rolling Shutter	3000	3000
2	D1	Steel Flush door double hung	1600	2100
3	W	Aluminium Glazed sliding window with Grills	1500	1200
4	D2	Steel Flush door Single hung	1000	2100

S.NO	NOTES
01.	ALL THE DIMENSIONS ARE IN MM SCALE UNLESS NOTED OTHERWISE
02.	FOLLOW WRITTEN DIMENSIONS ONLY AND DONOT SCALE THE DRG.
03.	ANY DISCREPANCY FOUND IN THE DRG. SHALL BE BROUGHT TO THE NOTICE OF CONSULTANT IMMEDIATELY
04.	READ THIS DRG. WITH ALL RELEVANT STR./ ELECT./ PLUMBING DRGS. AND AS PER SPECIFICATIONS OF THE CONTRACT.

WORKING DRAWING

1. 18-06-2020 Open balcony floor level depressed by 50mm.

SL NO.	DATE	DESCRIPTION

REVISION

DRAWING NO. - GL/20-21/12-6/R1 SHEET NO.

REVISION NO. 0 1 9

ISSUE DATE - JUNE2020 SCALE - 1:100

CLIENT:

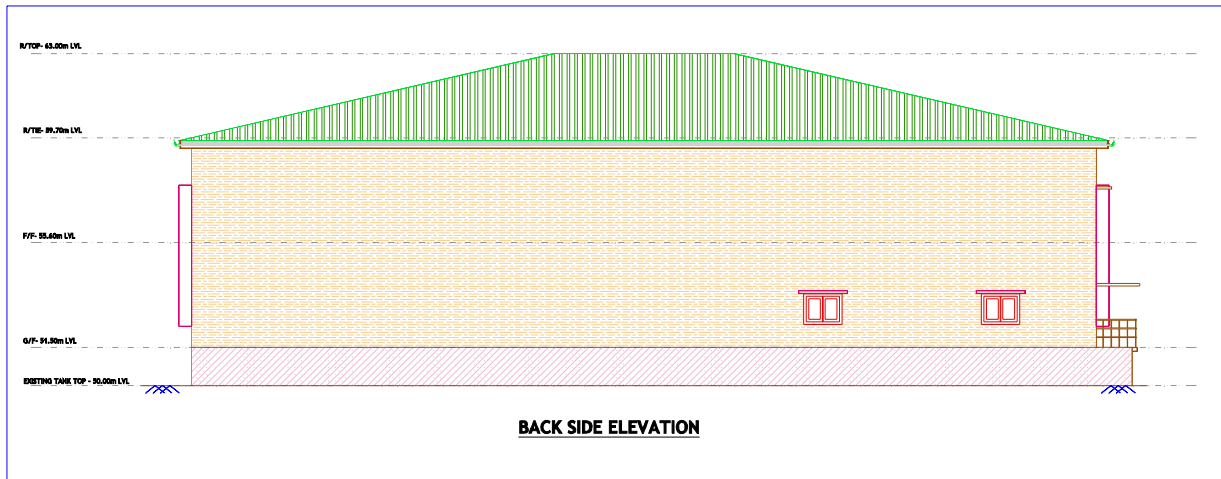
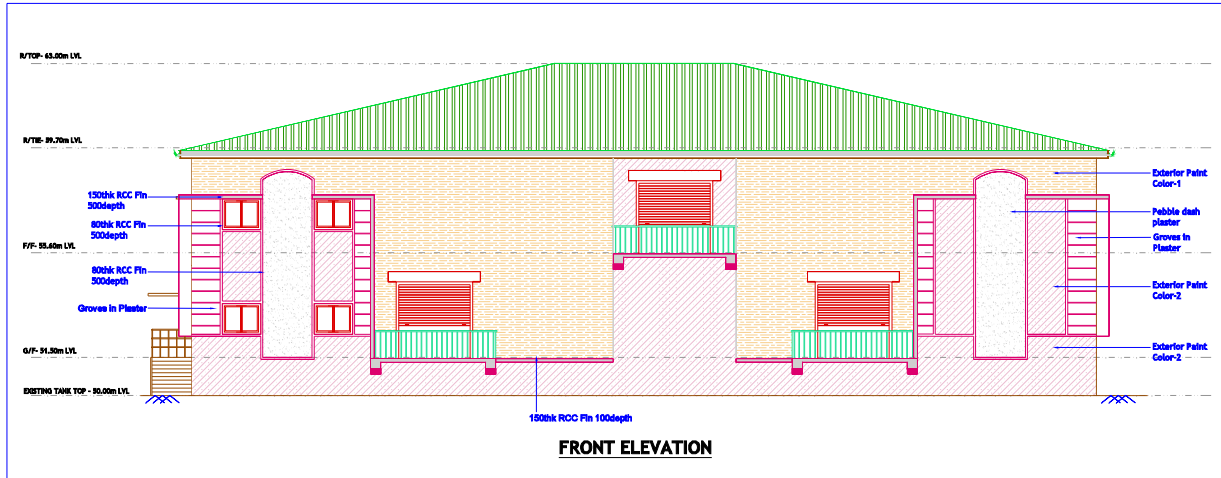
PROJECT:
Preparatory Survey for the project for Improvement of Power Supply In Andaman and Nicobar Islands In India.

PROJECT COMPONENT:
Battery House

DRAWING TITLE:
Architectural Details- First Floor Plan and Opening Schedule.

DESIGN BY:
NIPPON KOEI Co., Ltd.

CONSULTANT



S.NO	NOTES
01.	ALL THE DIMENSIONS ARE IN MM SCALE UNLESS NOTED OTHERWISE
02.	FOLLOW WRITTEN DIMENSIONS ONLY AND DONOT SCALE THE DRG.
03.	ANY DISCREPANCY FOUND IN THE DRG. SHALL BE BROUGHT TO THE NOTICE OF CONSULTANT IMMEDIATELY
04.	READ THIS DRG. WITH ALL RELEVANT STR./ ELECT./ PLUMBING DRGS. AND AS PER SPECIFICATIONS OF THE CONTRACT.

WORKING DRAWING

		Open balcony floor level depressed by 50mm in front elevation, in front elevation and back side elevation handrail detail modified for Passage area.
1.	18-06-2020	

SL. NO.	DATE	DESCRIPTION
REVISION		
DRAWING NO. - GL/20-21/12-8/R1		SHEET NO.
REVISION NO.	0 1	10
ISSUE DATE - JUNE2020		SCALE - 1:100

CLIENT:

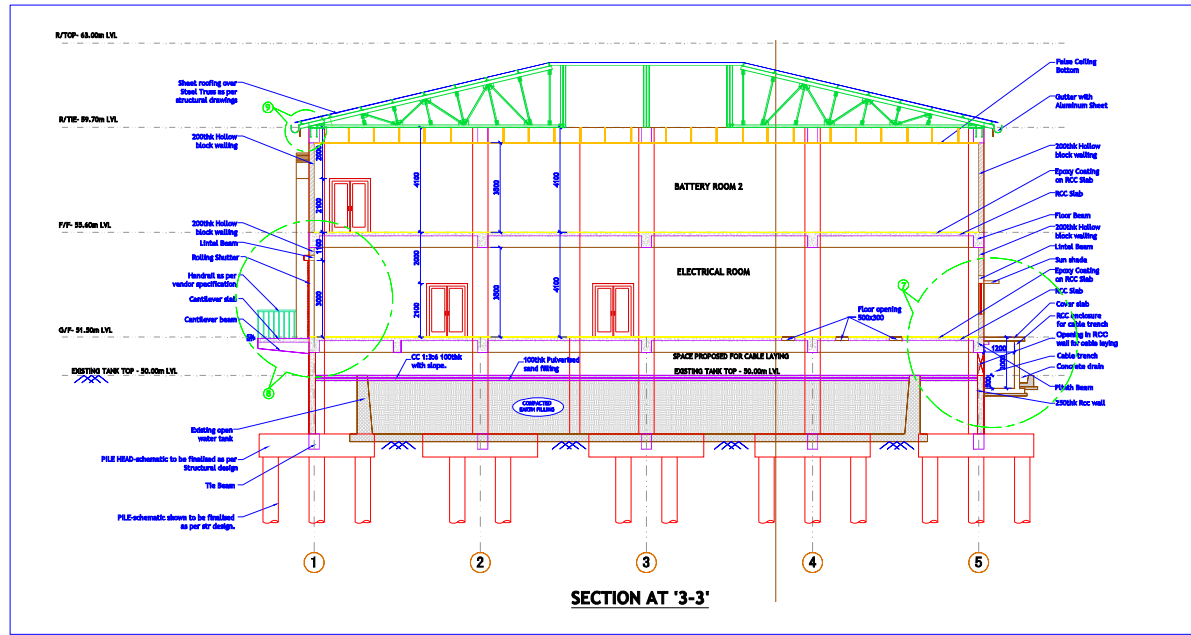
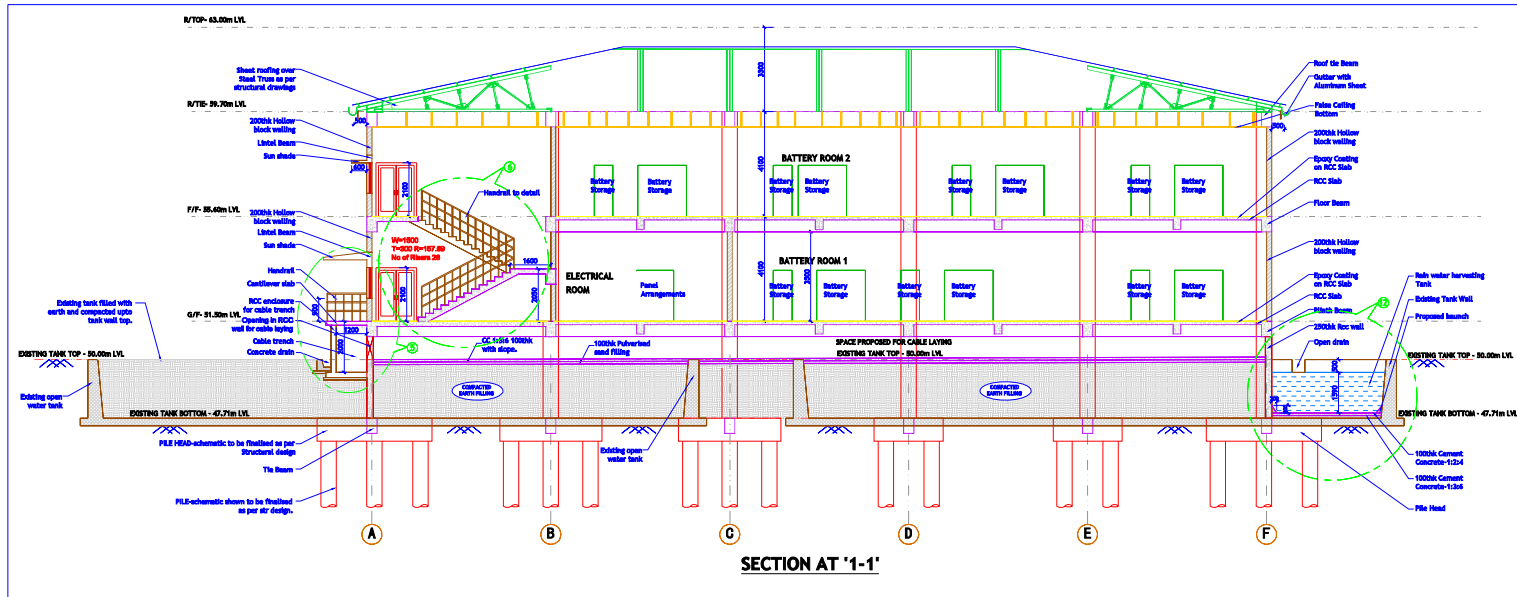
PROJECT:
Preparatory Survey for the project for Improvement of Power Supply In Andaman and Nicobar Islands In India.

PROJECT COMPONENT:
Battery House

DRAWING TITLE:
Architectural Details- Front elevation and Back side elevation.

DESIGN BY:
NIPPON KOEI Co., Ltd.

CONSULTANT



S.NO	NOTES
01.	ALL THE DIMENSIONS ARE IN MM SCALE UNLESS NOTED OTHERWISE
02.	FOLLOW WRITTEN DIMENSIONS ONLY AND DONOT SCALE THE DRG.
03.	ANY DISCREPANCY FOUND IN THE DRG. SHALL BE BROUGHT TO THE NOTICE OF CONSULTANT IMMEDIATELY
04.	READ THIS DRG. WITH ALL RELEVANT STR./ ELECT./ PLUMBING DRGS. AND AS PER SPECIFICATIONS OF THE CONTRACT.

WORKING DRAWING

1. 18-06-2020 In section 1-1 Staircase & Passage Handrail detail modified, in section 3-3 Open balcony floor depressed by 50mm.

SL NO.	DATE	DESCRIPTION	SHEET NO.
REVISION			
DRAWING NO. -	GL/20-21/12-10/R1		11
REVISION NO.	0 1		
ISSUE DATE -	JUNE2020	SCALE -	1:100

CLIENT:

PROJECT:
Preparatory Survey for the project for Improvement of Power Supply In Andaman and Nicobar Islands In India.

PROJECT COMPONENT:
Battery House

DRAWING TITLE:
Architectural Details- Section at '1-1' & '3-3'.

DESIGN BY:
NIPPON KOEI Co., Ltd.

CONSULTANT