

#### 4. 討議議事録 (M/D)

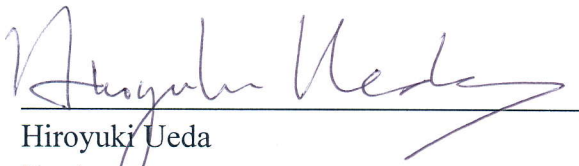


**Minutes of Discussions**  
**on**  
**the Preparatory Survey**  
**for**  
**the Project for Improvement of Aircraft Surveillance System**

Based on the several preliminary discussions between the Government of the Republic of the Union of Myanmar (hereinafter referred to as “Myanmar”) and Japan International Cooperation Agency (hereinafter referred to as “JICA”), JICA dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as “the Team”) of the Project for Improvement of Aircraft Surveillance System (hereinafter referred to as “the Project”) to Myanmar.

The Team held a series of discussions with the officials of the Government of Myanmar and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Yangon, 16<sup>th</sup> May 2018



Hiroyuki Ueda  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency  
Japan



Min Lwin  
Director General  
Department of Civil Aviation  
Ministry of Transport and Communications  
The Republic of the Union of Myanmar

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to improve safety of aircraft operations and enhance capacity of air navigation services in the vicinity of three international airports, Yangon, Mandalay and Nay-Pyi-Taw by upgrading aircraft surveillance system at those airports, thereby contributing to enhancement of civil aviation in Myanmar.

### 2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Aircraft Surveillance System”.

### 3. Project Site

Both sides confirmed that the sites of the Project are Yangon, Mandalay and Nay-Pyi-Taw International Airports, which are shown in Annex 1.

### 4. Responsible Authorities for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

- 4-1. The Department of Civil Aviation (hereinafter referred to as “DCA”) 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 managed by relevant authorities properly and on time. The organization chart of DCA is shown in Annex 2.
- 4-2. The line ministry of the Executing Agency is Ministry of Transport and Communications (hereinafter referred to as “MOTC”). The MOTC shall be responsible for supervising the Executing Agency on behalf of the Government of Myanmar.

5. Items requested by the Government of Myanmar

5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Myanmar are as follows:

Scope of the Project
<p><b>1. Yangon International Airport</b></p> <p><u>Radar Site</u></p> <p>1-1. Airport Surveillance Radar (ASR)/Secondary Surveillance Radar (SSR)</p> <p>1-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Management Center (ATMC)</u></p> <p>1-3. Multi Sensor Data Processing System (MSDPS)</p> <p>1-4. Approach Control Consoles for Yangon, Mandalay and Nay-Pyi-Taw</p> <p>1-5. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>1-6. Voice Communication Control System (VCCS)</p> <p>1-7. Radar Control Training Simulator</p> <p>1-8. Provision of Nay-Pyi-Taw SSR Data with En-route MSDPS</p> <p>1-9. Provision of Yangon new SSR and Mandalay new SSR Data with En-route MSDPS as backup system</p> <p>1-10. VHF Air to Ground Communication System for Approach Control</p> <p><u>Air Traffic Control Tower</u></p> <p>1-11. Radar Data Display (RDD) and Flight Data Display (FDD)</p>
<p><b>2. Mandalay International Airport</b></p> <p><u>Radar Site</u></p> <p>2-1. Airport Surveillance Radar (ASR)/Secondary Surveillance Radar (SSR)</p> <p>2-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Control Tower</u></p> <p>2-3. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>2-4. VHF Air to Ground Communication System for Approach Control</p>
<p><b>3. Nay-Pyi-Taw International Airport</b></p> <p><u>Radar Site</u></p> <p>3-1. Secondary Surveillance Radar (SSR)</p> <p>3-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Control Tower</u></p> <p>3-3. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>3-4. VHF Air to Ground Communication System for Approach Control</p>

5-2. 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.

5-3. The Government of Myanmar shall submit an Official Application Form with cover letter of the Project to the Government of Japan through a diplomatic channel by the end of September 2018.

The format of the application and letter will be arranged among relevant authorities of

Japan and Myanmar.

## 6. Procedures and Basic Principles of Japanese Grant

- 6-1. The Myanmar 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 Myanmar side agreed to take the necessary measures, as described in Annex 4, for smooth implementation of the Project. The contents of the Annex 4 will be elaborated and refined during the Preparatory Survey and 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 (hereinafter referred to as "G/A").
- 6-3. As for the monitoring of the implementation of the Project, JICA requires Myanmar side to submit the Project Monitoring Report, the form of which is attached as Annex 5.

## 7. Schedule of the Survey

- 7-1. The Team will proceed with further survey in Myanmar until 10<sup>th</sup> June 2018.
- 7-2. An official Application Forms with cover letter to the Government of Japan will be submitted by the end of September 2018.
- 7-3. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Myanmar in order to explain its contents around middle of November 2018.
- 7-4. If the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Myanmar side, JICA will finalize the Preparatory Survey Report and send it to Myanmar around February 2019.
- 7-5. The above schedule is tentative and subject to change.

## 8. New Yangon Air Traffic Management Center (ATMC)

- 8-1. The Myanmar side explained to the Team that new enroute radar control system is planned for ATMC to replace existing system at Yangon ACC, and estimated completion of the new system would be end of 2020.
- 8-2. The Myanmar side ensured that the requested equipment stated in 5-1 of this Minutes of Discussions shall not overlap with the equipment to be procured by the Myanmar side for the ATMC.

## 9. Environmental and Social Considerations

- 9-1. The Myanmar side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance

with the JICA Guidelines for Environmental and Social Considerations (April 2010).

- 9-2. Both sides confirmed that the Project is categorized as “C” in the JICA Guidelines because the Project is not located in a sensitive area, nor has it sensitive characteristics, nor falls into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

#### 10. Technical Assistance (Soft Components)

The Myanmar side requested the Team the following technical assistance as Soft Components under the Project.

- Training Radar Approach Controllers
- Training Maintenance Staff
- Modification of Airspace
- Safety Assessment

The Team took note the requests from Myanmar side, and would continue technical assessment for the soft component.

#### 11. Other Relevant Issues

- 11-1. The Myanmar side shall, at its own expense, provide the Team with the following items in cooperation with DCA and other organizations concerned:

- (1) Data and information related to the Preparatory Survey;
- (2) Counterpart personnel;
- (3) Suitable office space with necessary equipment and services;
- (4) Credentials or identification cards;
- (5) Entry permits necessary for the Team members to conduct field surveys;
- (6) Support in obtaining other privileges and benefits, if necessary;
- (7) Security-related information as well as measures to ensure the safety of the Team;
- (8) Information as well as support in obtaining medical service.

- 11-2. The Myanmar side agreed to ensure that customs duties, internal taxes and other fiscal levies which may be imposed in Myanmar with respect to the purchase of the products and the services be exempted.

- 11-3. The Myanmar side understood the principle of the Japan's Development Cooperation Charter, which stresses that ODA must not be utilized for military purpose or promoting international conflicts, and agreed to ensure that neither the equipment and facility to be procured under the Project nor air traffic control data collected by the equipment under the Project will be used for any military purposes.

- 11-4. Both sides agreed that the contents of the Preparatory Survey Report excluding cost estimation of the Project will be disclosed to the public after completion of the Preparatory Survey. All the contents of the Preparatory Survey Report including cost

estimation of the Project will be disclosed to the public after the contract for construction/supply of the Project facilities/equipment is concluded. Nevertheless of the above, both can discuss the parts of the Preparatory Report that should not be disclosed to the public from security aspect, and exclude those parts from disclosure before the Preparatory Report is published.

11-5. To avoid accidents on site during the implementation of the Project, the Myanmar side agreed to cause the consultant and the contractor to enforce safety measures such as setting safety assurance to the site, providing information for security control to public, and deploying adequate security personnel, based on the JICA Guidance for the Management of Safety for Construction Works in Japanese ODA Projects (September 2014), which has been published on JICA's website shown below.

[https://www.jica.go.jp/english/our\\_work/types\\_of\\_assistance/c8h0vm00008zx0m8-att/guidance\\_en.pdf](https://www.jica.go.jp/english/our_work/types_of_assistance/c8h0vm00008zx0m8-att/guidance_en.pdf)

11-6. The Myanmar side shall provide security measures for all concerned Japanese nationals working for the Project, if deemed necessary.

Annex 1: Project Site

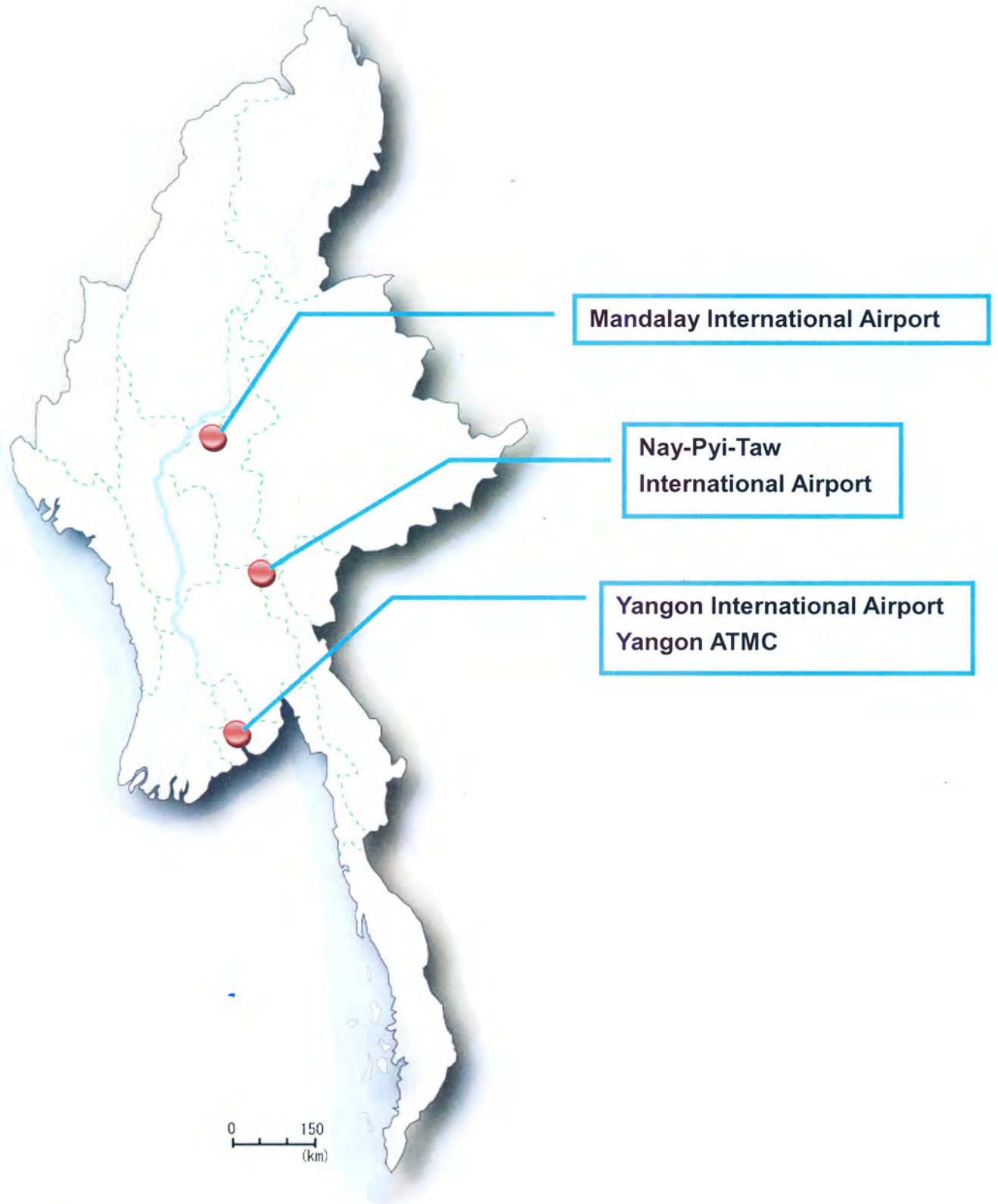
Annex 2: Organization Chart of DCA

Annex 3: Japanese Grant

Annex 4: Major Undertakings to be taken by the Government of Myanmar

Annex 5: Project Monitoring Report (template)

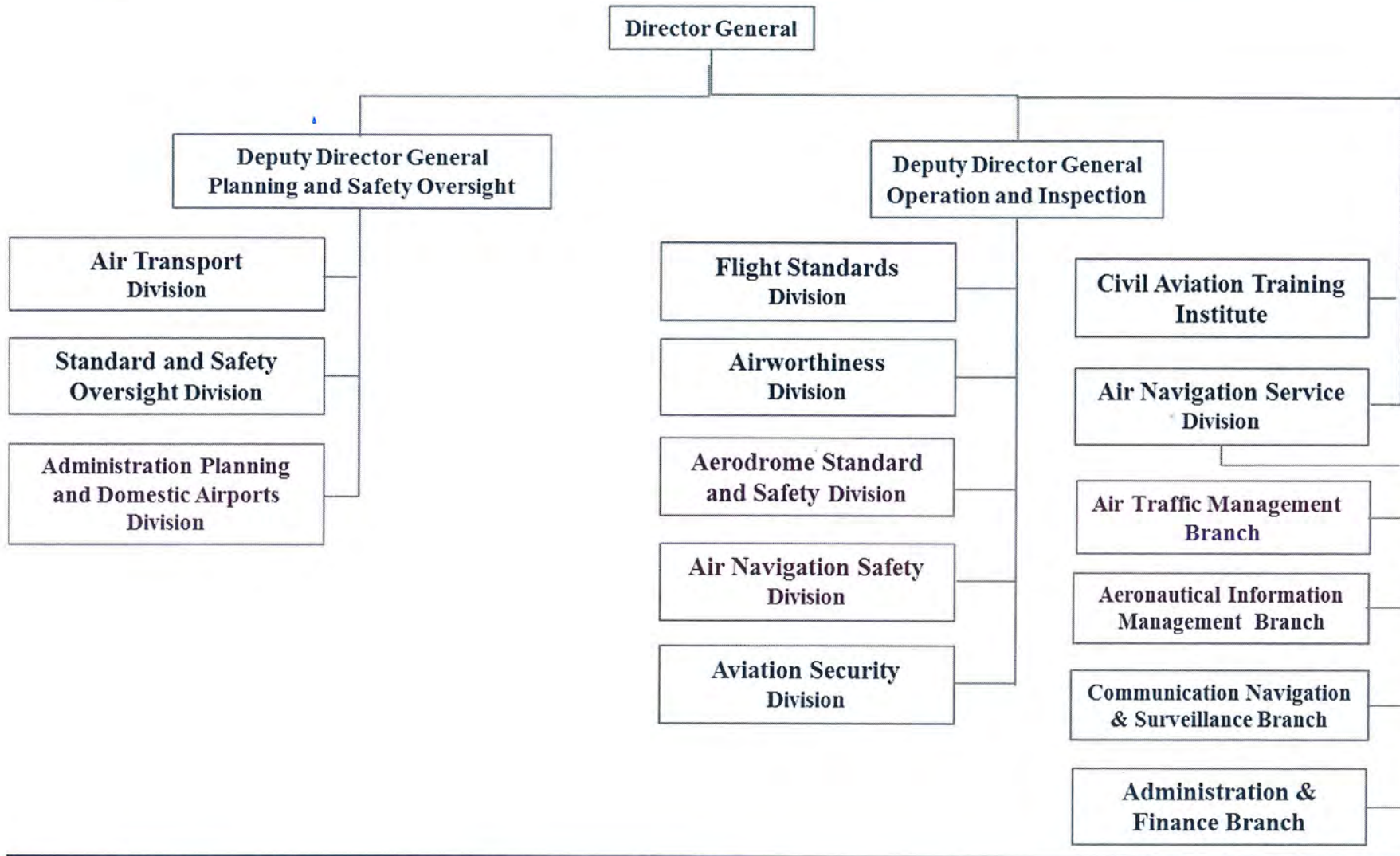
**PROJECT SITE**





**ORGANIZATION CHART OF DEPARTMENT OF CIVIL AVIATION OF MYANMAR**

**DCA Myanmar Organization Chart**



## 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 “Attachment-1: 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 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 “Attachment 2: Financial Flow of Japanese Grant (A/P Type)” for details)

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- 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.

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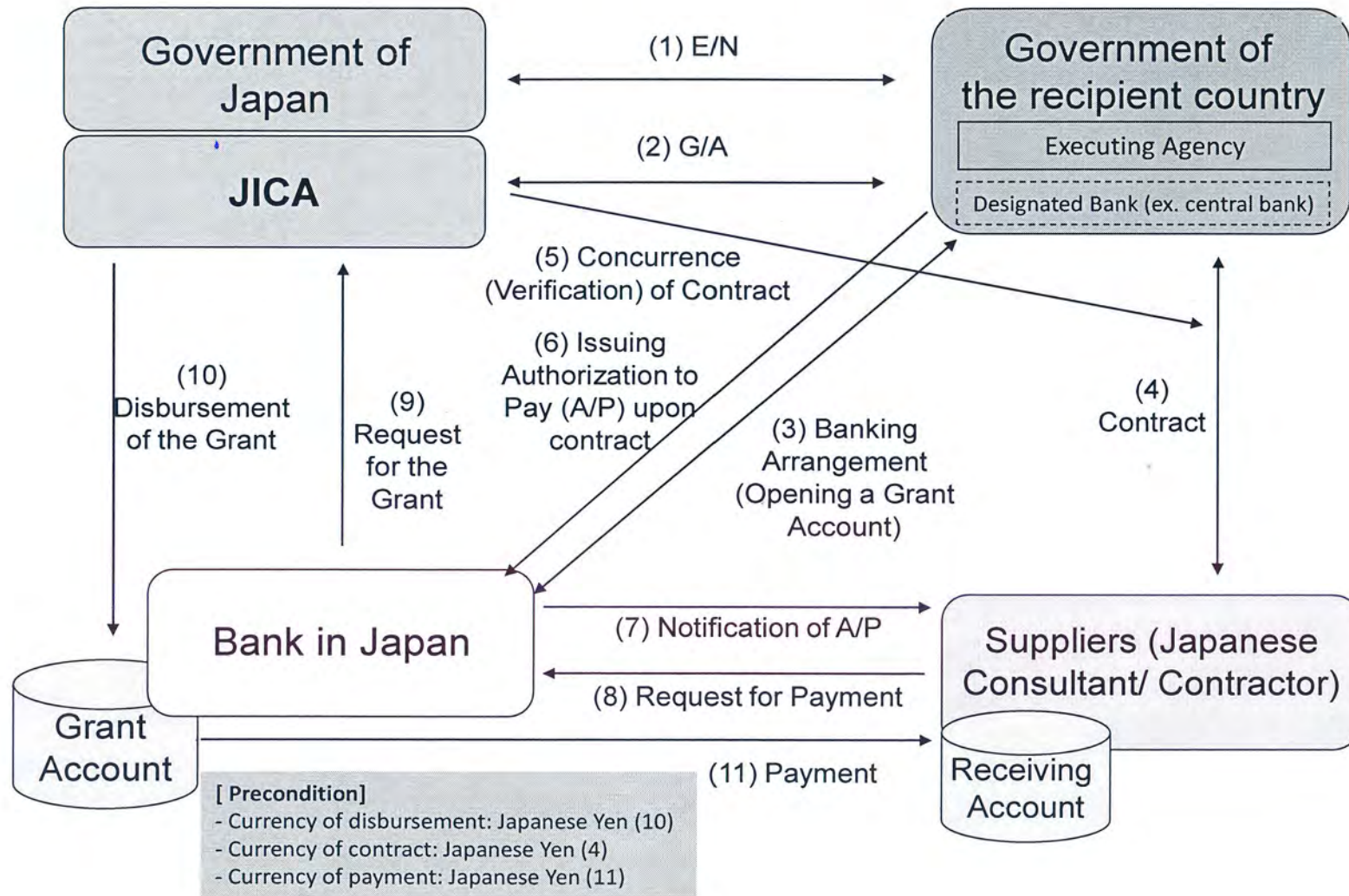
**PROCEDURES OF JAPANESE GRANT**

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:

- Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
- Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

**FINANCIAL FLOW OF JAPANESE GRANT (A/P TYPE)**





**MAJOR UNDERTAKINGS TO BE TAKEN BY**  
**THE GOVERNMENT OF MYANMAR**

**1. Specific obligations of the Government of Myanmar 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	MOPF/M OTC		
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	MOPF/M OTC		
3	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding document(s)	DCA		
4	To secure necessary land/site within Yangon, Mandalay and Nay-Pyi-Taw International Airport for installation of Radar with necessary administrative permission(s)	before preparation of bidding document(s)	DCA		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable), (MOPF: Ministry of Planning and Finance, MODS: Ministry of Defense and Security, MOFAC: Ministry of Foreign Affairs and Cooperation)

(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)	MOPF/M OTC		
2	To bear the following commissions to a bank of 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) with Contractor(s) and Supplier(s)	MOPF/M OTC		
	2) Payment commission for A/P	every payment for Consultant, Contractor(s) and Supplier(s)	MOPF/M OTC		
3	To issue the Working Visa for workers	before commencement of the Project	DCA		

4	To enable provision of electric power supply for the equipment	1 month before installation of each equipment	DCA		
5	To enable provision of leased landline circuit between Yangon – Mandalay and Yangon - Nay-Pyi-Taw	1 month before installation of radar equipment	DCA		
6	To enable provision of leased VSAT circuit between Yangon – Mandalay and Yangon - Nay-Pyi-Taw	1 month before installation of radar equipment	DCA		
7	To conduct adjustment of En-route MSDPS at Yangon ATMC for connection of radar data from new SSRs at Yangon, Mandalay and Nay-Pyi-Taw	after installation of radar equipment	DCA		
8	To take necessary measure for safety of construction and installation	during the the Project	DCA		
9	To ensure prompt unloading and customs clearance at ports of disembarkation in recipient country and to assist the Contractor(s) and/or Supplier(s) with internal transportation therein	during the the Project	DCA		
10	To accord Japanese nationals 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	during the the Project	DCA		
11	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	during the the Project	MOTC/ DCA		
12	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the the Project	DCA		
13	1) To submit Project Monitoring Report	every month	DCA		
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	DCA		
	To submit a report concerning completion of the Project	within 6 months after completion of the Project	DCA		

(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 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	DCA		

**2. Major Undertakings to be covered by the Grant Aid**

No	Items	Deadline	Amount (Million Japanese Yen)*	
1	<p>To construct and/or install the following facilities and equipment</p> <p>1. Yangon International Airport</p> <p><u>Radar Site</u></p> <p>1-1. Airport Surveillance Radar (ASR)/Secondary Surveillance Radar (SSR)</p> <p>1-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Management Center (ATMC)</u></p> <p>1-3. Multi Sensor Data Processing System (MSDPS)</p> <p>1-4. Approach Control Consoles for Yangon, Mandalay and Nay-Pyi-Taw</p> <p>1-5. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>1-6. Voice Communication Control System (VCCS)</p> <p>1-7. Radar Control Training Simulator</p> <p>1-8. Provision of Nay-Pyi-Taw SSR Data with En-route MSDPS</p> <p>1-9. Provision of Yangon new SSR and Mandalay new SSR Data with En-route MSDPS as backup system</p> <p>1-10. VHF Air to Ground Communication System for Approach Control</p> <p><u>Air Traffic Control Tower</u></p> <p>1-11. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>2. Mandalay International Airport</p> <p><u>Radar Site</u></p> <p>2-1. Airport Surveillance Radar (ASR)/Secondary Surveillance Radar (SSR)</p> <p>2-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Control Tower</u></p> <p>2-3. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>2-4. VHF Air to Ground Communication System for Approach Control</p> <p>3. Nay-Pyi-Taw International Airport</p> <p><u>Radar Site</u></p> <p>3-1. Secondary Surveillance Radar (SSR)</p> <p>3-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Control Tower</u></p> <p>3-3. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>3-4. VHF Air to Ground Communication System for Approach Control</p>	before end of contract		
2	To conduct flight calibration of radar system			
3	To provide training for operation and maintenance of the systems by equipment manufacturer			
4	To implement detailed design, bidding support and construction supervision (Consulting Service)			
	Total			XXX

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

**Organizational Information**

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

**General Information:**

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

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**1: Project Description**

**1-1 Project Objective**

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**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

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**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)
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**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)

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**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 <sup>1),2)</sup> <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 <sup>1),2)</sup> <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)
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**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.

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

<b>Original</b> (at the time of outline design)
<b>Actual</b> (PMR)

**3-2 Budgetary Arrangement**

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

<b>Original</b> (at the time of outline design)
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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):
<b>Actual Situation and Countermeasures</b>	
(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.

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### 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.

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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	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	2nd	3rd	4th	5th	6th
		●month, 2015	●month, 2015	●month, 2015			
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

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

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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%)	

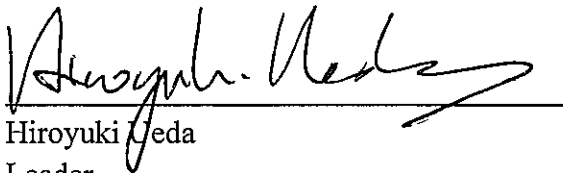


**Minutes of Discussions**  
**on the Preparatory Survey for the Project for**  
**Improvement of Aircraft Surveillance System**  
**(Explanation on Draft Preparatory Survey Report)**

With reference to the minutes of discussions on the Project for Improvement of Aircraft Surveillance System (hereinafter referred to as "the Project") signed between the Department of Civil Aviation (hereinafter referred to as "DCA") of the Ministry of Transport and Communications (hereinafter referred to as "MOTC") of the Republic of the Union of Myanmar (hereinafter referred to as "Myanmar") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 16<sup>th</sup> May 2018, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team" ) headed by Hiroyuki UEDA, Senior Transport Sector Advisor of JICA, to Myanmar for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") of the Project from 3<sup>rd</sup> to 7<sup>th</sup> December 2018.

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Yangon, 6<sup>th</sup> December 2018



Hiroyuki Ueda  
Leader  
Preparatory Survey Team  
Japan International Cooperation Agency  
Japan



Min Lwin  
Director General  
Department of Civil Aviation  
Ministry of Transport and Communications  
The Republic of the Union of Myanmar

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to improve safety of aircraft operations and enhance capacity of air navigation services in the vicinity of three international airports, Yangon, Mandalay and Nay-Pyi-Taw by upgrading aircraft surveillance system at those airports, thereby contributing to enhancement of civil aviation in Myanmar.

### 2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Aircraft Surveillance System”.

### 3. Project Site

Both sides confirmed that the sites of the Project are Yangon, Mandalay and Nay-Pyi-Taw International Airports, which are shown in Annex 1.

### 4. Responsible Authorities for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

- 4-1. The DCA 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 managed by relevant authorities properly and on time.
- 4-2. The line ministry of the Executing Agency is the MOTC. The MOTC shall be responsible for supervising the Executing Agency on behalf of the Government of Myanmar.

### 5. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Myanmar side agreed to its contents.

### 6. Cost Estimate

The Team explained to the Myanmar side that the rough estimate of the Project Cost is as described in Annex 2. Both sides confirmed that the cost estimate including the contingency shown in Annex 2 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. Timeline of the Project Implementation

The Team explained to the Myanmar side that the expected timeline of the Project implementation is as attached in Annex 3.

9. Procedures and Basic Principles of Japanese Grant

The Myanmar side agreed that the procedures and basic principles of Japanese Grant as described in Annex 4 shall be applied to the Project. In addition, the Myanmar side agreed to take necessary measures according to the procedures.

10. Expected Outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Myanmar side will be responsible for the achievement of agreed key indicators targeted in year 2024 and shall monitor the progress based on those indicators.

[Quantitative indicators]

Indicators	Baseline Value (Year 2017)	Target Value (Year 2024) 3 years after the Project Completion
Percentage of aircraft that will take off and land at Yangon and Mandalay Airports with Terminal Radar Control Services (%)	0%	100%
Surveillance capability for airspace below altitude 15,000 feet around Nay-Pyi-Taw Airport	0%	100%

[Qualitative indicators]

- Improvement in safety and efficiency of aircraft operations in the terminal area of Yangon and Mandalay Airports through provision of Terminal Radar Control Services
- Improvement in efficiency of Air Traffic Control Services at Yangon and Mandalay Airports
- Improvement in safety of aircraft operations over air routes around Nay-Pyi-Taw Airport.

#### 11. Technical Assistance (“Soft Component” of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, following technical assistance for ATCs and ATSEPs is planned under the Project. The Myanmar side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

- Develop capacity of ATSEP in operation and maintenance of the radar system
- Develop capacity of ATSEP in management of spare parts
- Develop capacity of ATCOs and ATSEP in system transition and troubleshooting
- Develop capacity of ATCOs and ATSEP in safety management of transition to the terminal radar control services, and operation and maintenance of the radar system

ATCO: Air Traffic Control Officer

ATSEP: Air Traffic Safety Electronics Personnel

#### 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 (2)-1)-12 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 DCA during the implementation stage of the Project.

The Myanmar 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 6.

#### 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, but in any event not later than six months after completion of the Project.





15. Operation and Maintenance of the Project Equipment

DCA agreed to secure staff and labor cost, regular maintenance and overhaul cost for proper and sustainable operation and maintenance of the equipment under the Project.

(1) Minimum Number of ATCOs and ATSEP

- Number of ATCOs for Radar Approach Control Services: 36

Supervisor: 1 x 4 shifts = 4

Mingaladon Approach: 4 (2 Controllers, 2 Coordinators) x 4 shifts = 16

Mandalay Approach: 2 (Controller and Coordinator) x 4 shifts = 8

Nay-Pyi-Taw Approach: 2 (Controller and Coordinator) x 4 shifts = 8

$4+16+8+8=36$

- Number of ATSEP for Maintenance of Radar Systems: 21

Yangon Airport (1 RM1 x 4 shifts, 1 RM1, 1 TS, 1 AE = 7)

Mandalay Airport (1 RM1 x 4 shifts, 1 RM1, 1 TS, 1 AE = 7)

Nay-Pyi-Taw Airport (1 RM1 x 4 shifts, 1 RM1, 1 TS, 1 AE = 7)

$7+7+7=21$

(RM1: Radio Mechanic Grade 1, AE: Assistant Engineer, TS: Technical Supervisor.)

(2) Estimated Regular Maintenance Cost including spare parts

USD 10,000 to 15,000 per year for three airports

(3) Estimated Cost for Overhaul of Radars (Every 5 year)

USD 50,000 per one time for 3 airports

16. 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, and Sustainability). The result of the evaluation will be publicized. The Myanmar side is required to provide necessary support for the data collection.

17. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Myanmar side around April 2019.

18. Environmental and Social Considerations

- The Myanmar side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April 2010).
- Both sides confirmed that the Project is categorized as "C" in the JICA Guidelines because the Project is not located in a sensitive area, nor has it sensitive characteristics,

nor falls into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

## 19. Other Relevant Issues

### 19-1. Disclosure of Information

Both sides agreed on the disclosure of the Preparatory Survey Report to the public as follows;

- The Preparatory Report without cost estimation of the Project will be disclosed to the public after the completion of the Preparatory Survey.
- The Preparatory Report including cost estimation of the Project will be disclosed to the public after all the contracts under the Project are concluded.

### 19-2. New Yangon Air Traffic Management Center (ATMC)

- The Myanmar side explained to the Team that new En-route radar control system is planned for ATMC to replace existing system at Yangon ACC, and estimated completion of the new system installation would be end of 2020.
- The Myanmar side ensured that the equipment procured by the Grant under the Project shall not overlap with the equipment to be procured by the Myanmar side for the ATMC.

19-3. The Myanmar side understood the principle of the Japan's Development Cooperation Charter, which stresses that ODA must not be utilized for military purpose or promoting international conflicts, and agreed to ensure that neither the equipment and facility to be procured under the Project nor air traffic control data collected by the equipment under the Project will be used for any military purposes.

19-4. To avoid accidents on site during the implementation of the Project, the Myanmar side agreed to cause the consultant and the contractor to enforce safety measures such as setting safety assurance to the site, providing information for security control to public, and deploying adequate security personnel, based on the JICA Guidance for the Management of Safety for Construction Works in Japanese ODA Projects (September 2014), which has been published on JICA's website shown below.

[https://www.jica.go.jp/english/our\\_work/types\\_of\\_assistance/c8h0vm00008zx0m8-att/guidance\\_en.pdf](https://www.jica.go.jp/english/our_work/types_of_assistance/c8h0vm00008zx0m8-att/guidance_en.pdf)

19-5. The Myanmar side shall provide security measures for all concerned Japanese nationals working for the Project, if deemed necessary.

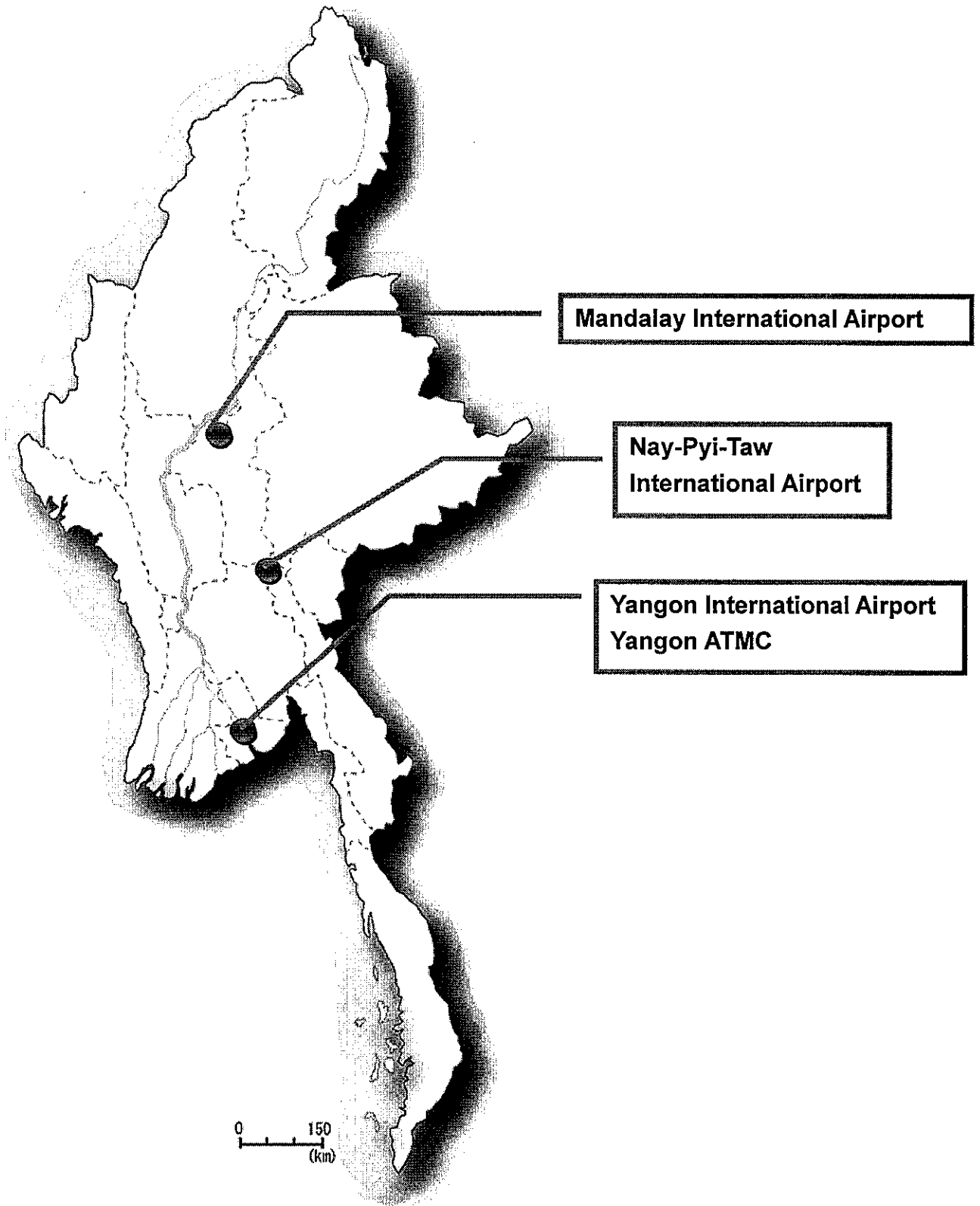
19-6. DCA requested Weather Radars for Yangon, Mandalay and Nay-Pyi-Taw Airports. The Team explained that it is difficult for Japanese side to add the requested Weather Radars to this Project. DCA understood it.

- Annex 1: Project Site
- Annex 2: Cost Estimate of the Project
- Annex 3: Expected Timeline of the Project Implementation
- Annex 4: Japanese Grant
- Annex 5: Major Undertakings to be taken by the Government of Myanmar
- Annex 6: Project Monitoring Report (template)

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**ANNEX1: PROJECT SITE**



**ANNEX2: COST ESTIMATE OF THE PROJECT**

1. Cost Estimate borne by the Government of Japan

No	Items	Estimate Cost (Million Japanese Yen)
1	<p>To construct and/or install the following facilities and equipment</p> <p>1. Yangon International Airport</p> <p><u>Radar Site</u></p> <p>1-1. Airport Surveillance Rader (ASR)/Secondary Surveillance Radar (SSR)</p> <p>1-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Management Center (ATMC)</u></p> <p>1-3. Multi Sensor Data Processing System (MSDPS)</p> <p>1-4. Approach Control Consoles for Yangon, Mandalay and Nay-Pyi-Taw</p> <p>1-5. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>1-6. Voice Communication Control System (VCCS)</p> <p>1-7. Radar Control Training Simulator</p> <p>1-8. Provision of Nay-Pyi-Taw SSR Data with En-route MSDPS</p> <p>1-9. Provision of Yangon new SSR and Mandalay new SSR Data with En-route MSDPS as backup system</p> <p>1-10. VHF Air to Ground Communication System for Approach Control</p> <p><u>Air Traffic Control Tower</u></p> <p>1-11. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>2. Mandalay International Airport</p> <p><u>Radar Site</u></p> <p>2-1. Airport Surveillance Rader (ASR)/Secondary Surveillance Radar (SSR)</p> <p>2-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Control Tower</u></p> <p>2-3. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>2-4. VHF Air to Ground Communication System for Approach Control</p> <p>3. Nay-Pyi-Taw International Airport</p> <p><u>Radar Site</u></p> <p>3-1. Secondary Surveillance Radar (SSR)</p> <p>3-2. Radar Tower and Radar Building</p> <p><u>Air Traffic Control Tower</u></p> <p>3-3. Radar Data Display (RDD) and Flight Data Display (FDD)</p> <p>3-4. VHF Air to Ground Communication System for Approach Control</p>	
2	Flight inspection of radar system	
3	Training for operation and maintenance of the systems by equipment manufacturer	

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4	Soft Component	
5	Implementation of detailed design, bidding support and procurement supervision (Consulting Service)	
6	Contingency	
	TOTAL	

2. Cost Estimate borne by the Government of Myanmar

No	Items	Estimate Cost (Million Myanmar Kyat)
1	Preparation for Radar Site in Three Airports (Land clearing, Provision of power and water supply, security fence and toilet etc.)	16.23
2	Banking Commission	37.27
	TOTAL	53.50

Note:

1) Conditions of Cost Estimate

- Timing of Estimation: June 2018
- Exchange Rate  
USD 1.00 = JPY 108.75  
Myanmar Kyat 1.00 = JPY 0.0805

2) Others

The project is implemented in accordance with the system of Japanese Grant. The above cost estimation does not assure the ceiling cost on the E/N and will be reviewed by the Government of Japan before the conclusion of E/N between the two governments.

Cost estimate borne by the Government of Myanmar in the above is provisional, and requires review for implementation.

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**ANNEX3: EXPECTED TIMELINE OF THE PROJECT IMPLEMENTATION**

Estimated timeline of the Project Implementation is as follows;

- Exchange of Note (E/N) and Grant Agreement (G/A): April 2019
- Detailed Design and Procurement of Supplier: April – August 2019
- Manufacturing, Delivery and Installation of the Equipment: August 2019 – March 2021
- Soft Component: January – March 2021
- Warrantee Period: March 2021 – March 2022

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## **ANNEX 4: 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 “Attachment-1: 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

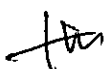
#### (4) Ex-post Monitoring and Evaluation

- 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 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

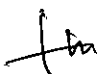
JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

### 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 “Attachment 2: 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.



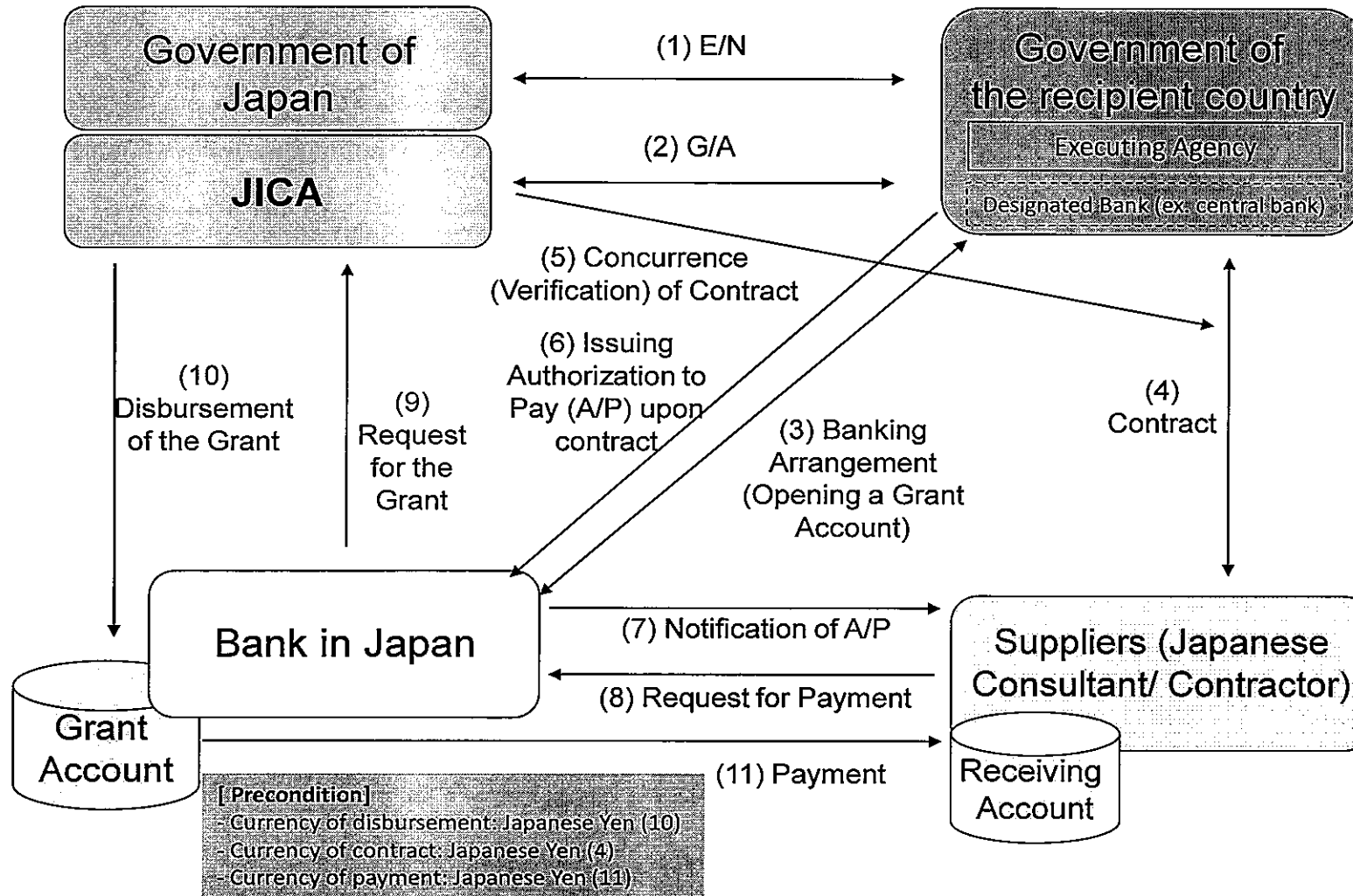
**PROCEDURES OF JAPANESE GRANT**

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.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

**FINANCIAL FLOW OF JAPANESE GRANT (A/P TYPE)**



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**MAJOR UNDERTAKINGS TO BE TAKEN BY**  
**THE GOVERNMENT OF MYANMAR**

**1. Obligations of the Government of Myanmar 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	MOPF/M OTC		
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	MOPF/M OTC		
3	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding document(s)	DCA		
4	Applying and assigning of ASR frequency to/by radio committee.	before Tender Notice	DCA		
5	Applying and assigning Interrogator Identification Code to/by ICAO Asia and Pacific Regional Office.	before Tender Notice	DCA		

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable MOPF: Ministry of Planning and Finance),

(2) During the Project Implementation

1) General

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)	MOPF/M OTC	37.27 Million MMK	
2	To bear the following commissions to a bank of 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)	MOPF/M OTC		
	2) Payment commission for A/P	every payment for Consultant, Contractor(s) and Supplier(s)	MOPF/M OTC		
3	Preparation for Radar Site in Three Airports with necessary administrative permission(s) (Land clearing, Provision of power and water supply, security fence and toilet etc.)	See 2) Specific at Each Airport	DCA	16.23 Million MMK	
4	To issue the Working Visa for workers	before commencement of the Project	DCA		
5	To enable provision of electric power supply for the equipment		DCA		

		See 2) Specific at Each Airport			
6	To enable provision of leased landline circuit between Yangon – Mandalay and Yangon - Nay-Pyi-Taw	See 2) Specific at Each Airport	DCA		
7	To enable provision of leased VSAT circuit between Yangon – Mandalay and Yangon - Nay-Pyi-Taw	See 2) Specific at Each Airport	DCA		
8	Integration new radar data into En-route MSDPS (Top Sky-ATC) manufactured by Thales (Technical coordination with Thales)	after installation of radar equipment (Target date will be decided between DCA and Thales.)	DCA		
9	To take necessary measure for safety of construction and installation	during the Project	DCA		
10	To ensure prompt unloading and customs clearance at ports of disembarkation in recipient country and to assist the Contractor(s) and/or Supplier(s) with internal transportation therein	during the Project	DCA		
11	To accord Japanese nationals 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	during the Project	DCA		
12	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	during the Project	MOTC/ DCA		
13	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	DCA		
14	1) To submit Project Monitoring Report	every month	DCA		
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	DCA		
	To submit a report concerning completion of the Project	within 6 months after completion of the Project	DCA		



2) Specific at Each Airport

Site	Equipment	Obligation of Myanmar side	Deadline (Expected Target Date)
<b>Yangon International Airport</b>			
ASR/SSR site	Site Area	<ul style="list-style-type: none"> <li>Land clearing such as cutting trees and removing bushes, construction of access road</li> </ul>	Before Conclusion of Supplier's Contract (Sep. 2019)
		<ul style="list-style-type: none"> <li>Provision of power supply source</li> </ul>	Before Completion of Radar Building Construction (Within 7 Months After Conclusion of Supplier's Contract, Mar. 2020)
		<ul style="list-style-type: none"> <li>Construction of security fence, water supply and toilet</li> </ul>	Before Completion of the Project (Within 19 Months After Conclusion of Supplier's Contract, Mar. 2021)
ATMC equipment room, Approach control room, Radar simulator room and Control Tower	Radar System Equipment	<ul style="list-style-type: none"> <li>Securing of installation space for new equipment and provision of power supply</li> </ul>	Before Arrival of Shipped Equipment (Within 11 Months After Conclusion of Supplier's Contract, Jul. 2020)
ATMC equipment room	MSDPS equipment	<ul style="list-style-type: none"> <li>Provision of leased line &amp; VSAT Satellite channel between Yangon and Mandalay, Yangon and Nay Pyi Taw</li> </ul>	Before Arrival of Shipped Equipment (Within 11 Months After Conclusion of Supplier's Contract, Jul. 2020)
<b>Mandalay International Airport</b>			
ASR/SSR site	Site Area	<ul style="list-style-type: none"> <li>Land clearing such as cutting trees and removing bushes, construction of access road</li> </ul>	Before Conclusion of Supplier's Contract (Sep. 2019)
		<ul style="list-style-type: none"> <li>Provision of power supply source</li> </ul>	Before Completion of Radar Building Construction (Within 7 Months After Conclusion of Supplier's Contract, Mar. 2020)
		<ul style="list-style-type: none"> <li>Construction of security fence, water supply and toilet</li> </ul>	Before Completion of the Project (Within 19 Months After Conclusion of Supplier's Contract, Mar. 2021)
ATC operation building GF and Control Tower	Radar System Equipment	<ul style="list-style-type: none"> <li>Securing of installation space for new equipment and provision of power supply</li> </ul>	Before Arrival of Shipped Equipment (Within 11 Months After Conclusion of Supplier's Contract, Jul. 2020)
<b>Nay Pyi Taw International Airport</b>			
SSR site	Site Area	<ul style="list-style-type: none"> <li>Land clearing such as cutting trees and removing bushes, construction of access road</li> </ul>	Before Conclusion of Supplier's Contract (Sep. 2019)
		<ul style="list-style-type: none"> <li>Provision of power supply source</li> </ul>	Before Completion of Radar Building Construction (Within 7 Months After

Site	Equipment	Obligation of Myanmar side	Deadline (Expected Target Date)
			Conclusion of Supplier's Contract, Mar. 2020)
		<ul style="list-style-type: none"> <li>• Construction of security fence, water supply and toilet</li> </ul>	Before Completion of the Project (Within 19 Months After Conclusion of Supplier's Contract, Mar. 2021)
ATC operation building 9F and Control Tower	Radar System Equipment	<ul style="list-style-type: none"> <li>• Securing of installation space for new equipment and provision of power supply</li> </ul>	Before Arrival of Shipped Equipment (Within 11 Months After Conclusion of Supplier's Contract, Jul. 2020)

(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 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the equipment installation works	DCA		

**2. Obligations of the Government of Myanmar funded by the Grant**

No.	Items	Deadline	Amount (Million Japanese Yen)
1	Procurement, Transportation and Installation for the equipment under the Project.		
2	Implementation of detailed design, bidding, and procurement supervision (Consulting Service)		
3	Soft Component		
4	Contingency		
	TOTAL		

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

**Organizational Information**

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

**General Information:**

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

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**1: Project Description**

**1-1 Project Objective**

[Empty box for 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

[Empty box for Project Rationale details]

**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)

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**2-3 Implementation Schedule**

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

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	Original		Cost (Million Yen)	
	(proposed in the outline design)	Actual (in case of any modification)	Original <sup>1)2)</sup> (proposed in the outline design)	Actual
1.				
Total				

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

**2-5-2 Cost borne by the Recipient**

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

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- 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.

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

**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.)

<p>Original (at the time of outline design)</p>
<p>Actual (PMR)</p>

**3-2 Budgetary Arrangement**

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

<p>Original (at the time of outline design)</p>
---

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):
<b>Actual Situation and Countermeasures</b> (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.

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**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.

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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	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	2nd	3rd	4th	5th	6th
		● month, 2015	● month, 2015	● month, 2015			
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

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

·  
·  
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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%)	

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## 5. ソフトコンポーネント計画書

独立行政法人 国際協力機構

ミャンマー国

航空機監視システム改良計画準備調査

ソフトコンポーネント計画書

2019年3月

日 本 工 営 株 式 会 社  
株式会社日本空港コンサルタンツ

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## 第1章 ソフトコンポーネントを計画する背景

ミャンマー政府は全国運輸マスタープランに基づき、国際民間航空機関（ICAO）の国際標準の施設整備を進めているが、ミ国の航空輸送の中心であるヤンゴン国際空港およびマンダレー国際空港では、空港監視レーダーが未設置又は老朽化による機能不全のため、ターミナル管制空域における管制処理容量が低く、航空機の運航における効率性および安全性の確保に大きな懸念がある。

また、ネピドー国際空港周辺空域は、国内線の約8割が飛行するミ国におけるもっとも重要な空域であるが、航空路監視レーダーが未設置のため、高度15,000フィート未満は、航空路監視レーダーの監視範囲外となっており、管制間隔を短縮することができず、航空需要の増加に伴う航空交通量の増加に対応することが困難な状況である。

本無償資金協力は、ヤンゴン国際空港内に建設された航空交通管理センター（ATMC）において、ヤンゴン国際空港およびマンダレー国際空港のターミナルレーダー管制業務を実施するため、両空港に一次監視レーダー（PSR）を含む空港監視レーダー（ASR）を設置すること、およびネピドー国際空港に航空路監視レーダーを設置して現在運用されているヤンゴン航空管制センター（ACC）の情報処理システムに同レーダーを接続し、ネピドー国際空港周辺空域の監視機能の強化を図るものである。

ミ国では、レーダーによる進入管制を唯一マンダレー国際空港で実施しているものの、使用されているレーダーは、ヤンゴン ACC における航空路管制用の航空路監視レーダーであり、既存の空港監視レーダーは故障のため使用されていない。このような状況から、航空需要の著しい増加が見込まれるヤンゴンおよびマンダレーの両国際空港においてターミナルレーダー管制業務を実施するためには、本無償資金協力での機器整備が必要である。

一方で、本無償資金協力で導入されるレーダー、情報処理装置が故障した場合等の航空機運航への影響は大きく、ミ国で現在実施している機器に関する維持管理方法の改善を行う必要がある。整備機材の円滑かつ安定した運用を行うため、ミ国の航空保安無線施設を担当している管制技術官<sup>1</sup>を対象に機材の運用および保守・点検の能力向上を図り、障害時の対応を迅速に行うため、予備品の補給管理に関する実務能力の向上も図ることが必要である。

あわせて、本無償資金協力においては、既存装置の運用を継続しながら新設される装置への切り替えを実施する必要がある。このためには、関係機関により綿密に調整された移行計画の策定、現行の運用に影響を与えない移行試験の実施、および移行当日の移行判断や緊急時の切り戻しを実施する必要がある。このため、計画段階から移行までの手順に係る手法の研修が必要である。

なお、本事業はミ国における ATMC への進入管制業務を一元化する計画に則っており、一連の施設整備に伴い、当該国の航空保安業務を実施する組織体制の変更、システムや機器等のハードおよびソフトに係る変更、業務の運用に係る変更など、航空保安業務の安全性に影響を及ぼす可能性のある変更を伴うことが予想される。よって、それらの変更によって、安全性が損なわれることがないよう、想定されるリスクの洗い出しと各リスクを軽減するための対策を事前に検討しておくことも必要である。

<sup>1</sup> 本事業で整備する機器に係る職種としては、航空管制官と管制技術官がある。航空管制官は航空機相互間の安全間隔を設定するために航空交通の指示等を行い、航空管制技術官は各種航空保安無線施設等の整備および管理・運用を行う。



## 第2章 ソフトコンポーネントの目標

ソフトコンポーネントの実施による技術移転を通じて達成する目標は、新レーダーシステムの運用が既存レーダーシステムから円滑に移行され、運用維持管理を持続的に行う能力が開発されている状態になることである。

具体的には、以下の6項目を目標として実施する。

### 目標1：レーダーの運用・保守点検能力を向上させる

管制技術官に対して、本事業で整備する機材の運用維持管理について、適切な実施方法に関する講義と実務的な演習を行い、現場レベルでの運用維持管理能力の向上を実現する。

### 目標2：レーダーの補給品管理能力を向上させる

管制技術官に対して、本事業で整備する機材の予備品の適切な管理方法に関する講義と実務的な演習を行い、補給品管理能力の向上を図る。

### 目標3：管制運用移行計画表の作成能力を向上させる

(管制官向け)

管制官に対して、システム移行に伴う管制運用移行計画表の作成方法を指導し、当該計画表作成を指導する。

### 目標4：システム移行計画作成能力・トラブル対応能力を向上させる

(管制技術官向け)

管制技術官に対して、本邦におけるシステム移行の事例を紹介し、既存のレーダーシステムから本事業で導入するレーダーシステムへの移行に必要な作業内容の理解を助ける。あわせて、移行作業プロセスと必要な文書等について実務担当者との協議し、ミ国の現場担当者が自力でシステムを円滑に移行させ、またトラブルに対応できるようにする。

### 目標5：ターミナルレーダー管制への運用移行に関する安全管理能力を向上させる

(管制官向け)

管制官に対して、ターミナルレーダー管制への運用移行、ならびに2空港のターミナルレーダー管制所をATMCで一元的に運用する際におけるリスク分析の必要性を教示するとともに、リスク分析手法を指導する。

### 目標6：レーダーの運用・維持管理に関する安全管理能力を向上させる

(管制技術官向け)

管制技術官に対して、レーダーの運用および維持管理におけるリスク分析の必要性を教示する。さらに、管制技術官に対して実際のリスク分析を行うための手法を指導する。それにより、新たなシステムおよび運用導入時、ならびに導入後の安定した運用の継続ができるよう、リスク低減策を実施可能とする。

リスク分析は ICAO 安全管理マニュアル (Doc9859) に則り、リスクを特定しその分析をする。発生頻度と影響度の観点から評価し、容認できるレベルまで緩和する対策を実施する過程をいう。具体的には、①ハザードの特定、②結果分析と重大性の検証、③原因分析と発生頻度の推定、④緩和策の検討およびリスク受容性の評価、⑤リスク低減策、⑥安全性評価文書の作成である。

リスク受容性の評価は以下の表による。

発生頻度		被害の程度 (重大性)				
		致命的 壊滅的 A	危険 B	重大 C	軽微 D	無視できる E
極めて多い	5	(5 A) 受容不可	(5 B) 受容不可	(5 C) 受容不可	(5 D) 受容可能 【リスク低減】	(5 E) 受容可能 【リスク低減】
比較的多い	4	(4 A) 受容不可	(4 B) 受容不可	(4 C) 受容可能 【リスク低減】	(4 D) 受容可能 【リスク低減】	(4 E) 受容可能 【リスク低減】
少ない	3	(3 A) 受容不可	(3 B) 受容可能 【リスク低減】	(3 C) 受容可能 【リスク低減】	(3 D) 受容可能 【リスク低減】	(3 E) 受容可能
まれ	2	(2 A) 受容可能 【リスク低減】	(2 B) 受容可能 【リスク低減】	(2 C) 受容可能 【リスク低減】	(2 D) 受容可能	(2 E) 受容可能
極めてまれ	1	(1 A) 受容可能	(1 B) 受容可能	(1 C) 受容可能	(1 D) 受容可能	(1 E) 受容可能

### 第3章 ソフトコンポーネントの成果

ソフトコンポーネント実施の結果として、達成されるべき状況は、以下のとおりである。

- 目標 1 関連：  
レーダー・通信機材の運用維持管理に必要なスキルが習得され、運用・保守点検能力が向上している。
- 目標 2 関連：  
レーダー・通信機材の予備品管理の実務が理解され、補給品管理能力が向上している。
- 目標 3 関連：  
ATMC における一元的なターミナルレーダー管制運用の開始に伴う運用移行手順の概念<sup>2</sup>が習得され、新しいターミナルレーダー管制運用への移行が計画的に行われる。
- 目標 4 関連：  
ATMC の運用開始に必要となるレーダーシステムの運用移行手順に関する概念<sup>2</sup>が習得され、新レーダーシステムへの移行が計画的に行われる。
- 目標 5 関連：  
ターミナルレーダー管制への運用移行に係るリスクの洗い出し、評価、リスク低減策の策定を主体的に実施するために必要な知識が習得され、安全管理能力が向上している。
- 目標 6 関連：  
レーダーの運用・維持管理に係るリスクの洗い出し、評価、リスク低減策の策定を主体的に実施するために必要な知識が習得され、安全管理能力が向上している。

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<sup>2</sup> 運用移行に関する概念とは、システム移行の正常手順にとどまらず、異常時の対応、事前の関係機関との調整、移行体制の構築等の整理の必要性など、このような移行を実施するための整理の考え方をいう。

## 第4章 成果達成度の確認方法

### 目標 1 関連：

レーダー・通信機材の運用・保守点検能力については、構成機器の一部（例えば SSR 送信機）に関する運用要領書および保守点検要領書を作成させ、その成果物の完成度により判断する。

### 目標 2 関連：

レーダー・通信機材の補給品管理能力については、物品管理要領書および補給管理要領書の一部を作成させ、その成果物の完成度により判断する。

### 目標 3 関連：

管制運用移行については、マンダレー国際空港を対象とした移行計画表案を作成させ、その完成度により判断する。

### 目標 4 関連：

システム移行については、本整備の機材の一つ（例えば、レーダーまたは通信装置）を対象とした移行計画表案を作成させ、その完成度により判断する。

### 目標 5 関連：

管制運用の安全管理については、ATMC における統合ターミナルレーダー管制を対象として、セーフティアセスメントに関するリスク管理表を作成させ、そのリスク管理表の完成度により判断する。

### 目標 6 関連：

システムの安全管理については、一部の機器を対象としたセーフティアセスメントに関するリスク管理表を作成させ、そのリスク管理表の完成度により判断する。

## 第5章 ソフトコンポーネントの活動（投入計画）

日本側およびミ国側の投入の内容・規模を、以下に示すように計画する。

表 5-1 目標 1：レーダーの運用・保守点検能力向上の投入計画

研修項目	日本国側	ミャンマー国側
<b>【成果】</b> レーダー・通信機材の運用維持管理に必要なスキルが習得され、運用・保守点検能力が向上している		
<b>1. 活動内容</b>		
必要な技術・業種	活動 1. 本邦の運用・維持管理の体系、実務について講義する 活動 2. 運用要領書作成を指導する 活動 3. 保守点検要領書作成を指導する	機材の維持管理を担当している通信(C) 2名、監視(N) 2名、および情報処理システム担当の管制技術官 2名 (合計：2名×3=6名)
現状の技術水準・必要とされる技術水準	—	現状： メーカーマニュアルに基づき運用操作、および保守点検作業が実施されているので実施担当者により作業のバラつきがある。機材によっては、機材障害のため片系のみで運用する等、適切な機材管理が行われていない。  計画： 運用要領書、および保守点検要領書を作成し、共通の作業手順を確立して適切な機材運用を確保することができる。
対象者(ターゲットグループ)	—	通信、監視、および情報処理の機材の維持を担当している管制技術官
<b>2. 実施方法</b>		
実施リソース	本邦航空局の管制技術官の経歴がある日本人コンサルタント 2名 (各 1.0M/M、計 2.0M/M 現地作業)	研修施設の提供
成果品の種類	研修テキスト等 (詳細は「第 8 章 ソフトコンポーネントの成果品に示す」)	運用要領書および保守点検要領書 (整備機材の一部)
<b>3. 研修内容</b>		
概要	本邦におけるレーダーを含む航空保安無線施設の維持管理体系を説明し、効率的かつ適切な実施方法を座学にて教示する。遠隔地においてターミナルレーダー管制業務を実施している、本邦航空局広域レーダー進入管制所の業務実施方法を座学にて教示する。 運用要領書および保守点検要領書の作成は、メーカーマニュアルおよび実機による操作および保守点検作業の写真を活用する等、適正に操作できる運用要領書、および保守点検要領書を作成できるようにするための実習を行う。	—
研修項目	<ul style="list-style-type: none"> <li>・本邦の機材維持管理体系の座学</li> <li>・本邦の広域レーダー進入管制所の業務実施に関する座学</li> <li>・点検保守復旧に関する座学</li> <li>・運用要領書の作成</li> <li>・保守点検要領書の作成</li> </ul>	—

表 5-2 目標 2：レーダーの補給品管理能力向上の投入計画

研修項目	日本国側	ミャンマー国側
【成果】 レーダー・通信機材の予備品管理の実務が理解され、補給品管理能力が向上している。		
1. 活動内容		
必要な技術・業種	活動 1. 本邦の補給品管理の実施方法について講義する 活動 2. 本整備に係る機材の物品管理要領書作成を指導する。 活動 3. 本整備に係る機材の補給管理要領書作成を指導する。	機材の維持管理を担当している通信 (C) 2 名、監視 (N) 2 名、および情報処理システム担当の管制技術官 2 名 (合計：2 名×3=6 名)
現状の技術水準・必要とされる技術水準	—	現状： マンダレー国際空港の計器着陸装置 (ILS) 等は、片系の送受信機のみで運用されている。これは、予備品管理が適切に実施されていないことが要因の一つとなっている。  計画： 物品管理および補給管理の方法を教示することにより、予備品を適切に確保できる補給管理体制を確立することができる。
対象者(ターゲットグループ)	—	通信、監視、および情報処理の機材の維持を担当している管制技術官
2. 実施方法		
実施リソース	本邦航空局の管制技術官の経歴がある日本人コンサルタント 2 名 (各 0.4M/M、計 0.8M/M 現地作業)	研修施設の提供
成果品の種類	研修テキスト等 (詳細は、「第 8 章 ソフトコンポーネントの成果品」に示す)	物品管理要領書、および補給品管理要領書 (整備機材の一部)
3. 研修内容		
概要	本邦航空局における、補給管理の基本的なノウハウを座学で教示する。実習で物品管理要領書を作成させることにより、調達、部品交換、廃棄等の事務処理が確実に実施される仕組みづくりの基礎資料となるようにする。補給管理要領書を作成させ、これを用いて同一規格の予備品の保管場所、および予備品の運搬方法等を管理することにより、迅速な対応構築の体制づくりの基礎資料とする。	
研修項目	<ul style="list-style-type: none"> <li>・本邦の補給品管理の仕組みの説明</li> <li>・本邦の補給管理システム (APPS) の概要説明</li> <li>・物品管理要領書の作成</li> <li>・補給管理要領書の作成</li> </ul>	

表 5-3 目標 3 : 管制運用移行計画書の作成能力向上の投入計画 (管制官向け)

研修項目	日本国側	ミャンマー国側
<b>【成果】</b> ATMC における一元的なターミナルレーダー管制運用の開始に伴う運用移行手順の概念 が習得され、新しいターミナルレーダー管制運用への移行が計画的に行われる。		
<b>1. 活動内容</b>		
必要な技術・業種	活動 1. 本邦で実施されているシステム移行に伴う管制運用移行計画の策定方法を講義する。 活動 2. 管制運用移行計画表案作成を指導する。	ーヤンゴンおよびマンダレー国際空港で進入管制を担当している管制官各 2 名 (合計: 4 名)
現状の技術水準・必要とされる技術水準	—	現状： ヤンゴンの ATMC 庁舎において、ヤンゴン国際空港およびマンダレー国際空港のターミナルレーダー管制業務を実施するため、管制業務に関する綿密な調整を実施する必要があるが、ミャンマー航空局では同様の運用移行に対する経験が乏しい。  計画： 障害発生時の切り戻し運用等、システム移行に伴う管制運用移行のノウハウを教示し、管制運用移行計画表案を作成させることにより、ヤンゴン国際空港およびマンダレー国際空港の運航に影響を与えることなく、ATMC におけるターミナル管制業務を実施することができる。
対象者(ターゲットグループ)	—	ー進入管制を担当している管制官
<b>2. 実施方法</b>		
実施リソース	ー本邦航空局の管制官の経歴がある日本人コンサルタント 1 名 (0.5M/M 現地作業)	研修施設の提供
成果品の種類	研修テキスト等 (詳細は、「第 8 章 ソフトコンポーネントの成果品」参照)	管制運用移行計画表案
<b>3. 研修内容</b>		
概要	本邦航空局におけるシステム移行の実例等を用いて、管制運用移行計画書の作成方法を座学で教示し、円滑かつ確実な移行のために、管制運用移行計画表案の作成実習を行う。	
研修項目	・システム移行に伴う管制運用移行の概要講義 ・管制運用移行計画表案の作成実習	

表 5-4 目標 4：システム移行計画作成能力・トラブル対応能力向上の投入計画  
(管制技術官向け)

研修項目	日本国側	ミャンマー国側
【成果】 ATMC の運用開始に必要なとなるレーダーシステムの運用移行手順に関する概念が習得され、新レーダーシステムへの移行が計画的に行われる。		
<b>1. 活動内容</b>		
必要な技術・業種	活動 1. 本邦で実施されているシステム移行計画の概念、実施方法を講義する。 活動 2. 移行計画表案作成を指導する。	一機材の維持管理を担当している通信 (C) 2 名、監視(N)2 名、および情報処理システム担当の管制技術官 2 名 (合計：2 名×3=6 名)
現状の技術水準・必要とされる技術水準	—	現状： 運用移行にあたっては、新レーダーシステム機材の正常動作をモニターするほか、ヤンゴン国際空港およびマンダレー国際空港の従来機材の正常動作を保つことも必要となる。機材動作の不具合発生時は、必要に応じて従来機材への切り戻しを行うなど、機材運用業務に関する綿密な調整を実施する必要がある。ミャンマー航空局は同様の運用移行に対する経験に乏しい。  計画： 円滑かつ安全にシステムを移行する要件として、機材整備面では障害発生時の不具合部位の特定や当該機材のチャネル切替え、さらに従来機材の運用への切り戻し作業に関する計画策定が考えられる。これらを含む本邦におけるシステム移行のノウハウを教示し、これに必要な機材運用業務に関する移行計画表案の作成により正常な機材動作を維持し、ヤンゴン国際空港およびマンダレー国際空港の運航に影響を与ることなく、ATMC におけるターミナル管制業務を実施することができる。
対象者(ターゲットグループ)	—	通信、監視、および情報処理機材の維持を担当している管制技術官
<b>2. 実施方法</b>		
実施リソース	本邦航空局の管制技術官の経歴がある日本人コンサルタント 2 名 (各 0.3M/M、計 0.6M/M 現地作業)	研修施設の提供
成果品の種類	研修テキスト、計画概要書 (計画した成果、活動状況、達成状況等)、課題および改善事項等の整理表 (詳細は、「第 8 章 ソフトコンポーネントの成果品」参照)	移行計画表案 (機材運用業務編)



研修項目	日本国側	ミャンマー国側
<b>3. 研修内容</b>		
概要	<p>本邦航空局において実施されているシステム移行の実例を用いて、機材の移行計画表の策定方法を座学で教示する。本整備に伴うターミナルレーダー管制業務の移行に必要な機材運用業務に関する計画表案を作成する実習により、円滑かつ確実な移行方法のノウハウを教示する。</p>	
研修項目	<ul style="list-style-type: none"> <li>・ 本邦の移行計画表説明</li> <li>・ 整備機材の移行に関する作業整理</li> <li>・ 移行計画表案の作成</li> </ul>	

表 5-5 目標 5 : ターミナルレーダー管制への運用移行に関する安全管理能力向上の投入計画  
(管制官向け)

研修項目	日本国側	ミャンマー国側
<p><b>【成果】</b> ターミナルレーダー管制への運用移行に係るリスクの洗い出し、評価、リスク低減策の策定を主体的に実施するために必要な知識が習得され、安全管理能力が向上している。</p>		
<p><b>1. 活動内容</b></p>		
必要な技術・業種	<p>活動 1. 安全管理に係る基本事項について講義する。 活動 2. 本邦で実施されている管制運用に係る安全管理について講義する。 活動 3. システム移行に伴う管制運用移行を対象としてリスクの洗い出し、緩和策等のリスクアセスメント作成を指導する。</p>	<p>ーヤンゴンおよびマンダレー国際空港で進入管制を担当している管制官各 2 名 (合計: 4 名)</p>
現状の技術水準・必要とされる技術水準		<p>現状： 本整備の機材を使用して、ATMC でヤンゴン国際空港およびマンダレー国際空港のターミナルレーダー管制業務を安全かつ確実に実施するには、管制運用に関するリスクの洗い出し、およびその緩和策を確立する必要がある。現状では安全管理の規定はあるものの、実務としての安全管理、およびリスク分析を実施できる状況とはなっていない。</p> <p>計画： 本邦航空局における安全管理、およびリスクアセスメントの手法を教示し指導することにより、管制運用移行にあたって ATMC におけるターミナルレーダー管制業務が安全かつ確実に実施させるようにする</p>
対象者(ターゲットグループ)		<p>進入管制を担当している管制官</p>
<p><b>2. 実施方法</b></p>		
実施リソース	<p>本邦航空局の管制官の経歴がある日本人コンサルタント 1 名 (0.5M/M 現地作業)</p>	<p>研修施設の提供</p>
成果品の種類	<p>研修テキスト等 (詳細は、「第 8 章 ソフトコンポーネントの成果品」参照)</p>	<p>ーリスク管理表 (管制運用編)</p>

研修項目	日本国側	ミャンマー国側
<b>3. 研修内容</b>		
概要	<p>管制運用における安全管理およびリスク分析の概要と必要性を教示し、本邦航空局における取組み等を説明するとともに、管制運用移行に伴うリスクアセスメントを管制運用面から実施することにより、ハザード・リスクおよびその緩和策を教示し、リスク管理表（管制運用編）を作成させる。</p>	—
研修内容	<ul style="list-style-type: none"> <li>・安全管理に関する座学</li> <li>・セーフティアセスメントに関する座学</li> <li>・リスク管理表の作成</li> </ul>	—

表 5-6 目標 6 : レーダーの運用・維持管理に関する安全管理能力向上の投入計画  
(管制技術官向け)

研修項目	日本国側	ミャンマー国側
<p><b>【成果】</b> レーダーの運用・維持管理に係るリスクの洗い出し、評価、リスク低減策の策定を主体的に実施するために必要な知識が習得され、安全管理能力が向上している。</p>		
<p><b>1. 活動内容</b></p>		
必要な技術・業種	<p>活動 1. 安全管理に係る基本事項について講義する。 活動 2. 新たに整備される機材の維持管理に関し、本邦で実施されている安全管理について講義する。 活動 3. 本整備の機材を対象としてリスクの洗い出し、緩和策等のリスクアセスメント作成を指導する。</p>	<p>—機材の維持管理を担当している通信 (C) 2名、監視 (N) 2名、および情報処理システム担当の管制技術官 2名 (合計: 2名×3=6名)</p>
現状の技術水準・必要とされる技術水準		<p>現状： 本整備の機材を使用して、ATMC でヤンゴン国際空港およびマンダレー国際空港のレーダーターミナル管制業務を安全かつ確実に実施するには、レーダーシステムなど管制に用いられる機材が常に正常動作するように維持することが必要である。そのため、これを阻害するリスクの洗い出し、およびその緩和策を確立する必要がある。安全管理の規定はあるものの、その実務としての安全管理、およびリスク分析が実施されている状況とはなっていない。</p> <p>計画： 本邦航空局における管制機材の運用および維持に関する安全管理、およびリスクアセスメントの手法を教示することにより、整備機材に対するリスク低減策が図られ、ATMC におけるターミナルレーダー管制業務の運航への影響を最低限に留めることができる。</p>
対象者(ターゲットグループ)		通信、監視、および情報処理機材の維持を担当している管制技術官
<p><b>2. 実施方法</b></p>		
実施リソース	本邦航空局の管制技術官の経歴がある日本人コンサルタント 2名 (各 0.3M/M、計 0.6M/M 現地作業)	研修施設の提供
成果品の種類	機材に関する安全管理およびリスクアセスメントの研修テキスト等 (詳細は、「第 8 章 ソフトコンポーネントの成果品」参照)	リスク管理表 (機材編)

研修項目	日本国側	ミャンマー国側
<b>3. 研修内容</b>		
概要	本邦航空局における安全管理に関する取り組み、および実務を説明するとともに、安全管理およびリスク分析の必要性を教示する。本整備に伴うリスクアセスメントを機材面から実施することにより、ハザード・リスクおよびその緩和策を教示し、リスク管理表（機材編）を作成させる。	—
研修内容	<ul style="list-style-type: none"> <li>・機材に関する安全管理に関する座学</li> <li>・機材に関するセーフティアセスメントに関する座学</li> <li>・機材に関するリスク管理表の作成</li> </ul>	—

## 第6章 ソフトコンポーネントの実施リソースの調達方法

日本の航空局で実施されている機材点検保守、補給品管理、システムならびに運用移行、およびセーフティアセスメントの対応について研修を実施することから、日本から指導員を派遣する計画とする。したがって、受注コンサルタント直接支援型としての実施を計画する。

上記の内容は、本邦航空局において管制業務および機材維持管理を経験した者でなければ、研修に必要な知識およびノウハウを有していないことから、管制官および管制技術官の経歴を持つ日本人を指導員として派遣する計画とする。

なお、本事業による整備機材はレーダー装置、情報処理装置、管制卓、および通信関連装置等、多種類の装置群から構成されており、本邦航空局においてもそれらの専門性に依りレーダー・情報処理系と管制卓・通信装置関連の専門家に分かれて機材の維持管理が行われている。DCAの管制技術官もCNS別に業務が分かれているので担当以外の業務は実施しないことも踏まえ、レーダー・情報処理担当と通信装置担当の2名により研修を対応する必要がある。



## 7.1 管制官向けの研修内容

本研修の対象者は、ヤンゴンおよびマンダレー国際空港で進入管制を担当している管制官から各2名、合計4名とし、指導員は航空管制業務の専門家1名とする。

なお実施時期については、メーカーによる初期操作・運用指導が約半分程度完了した時期から開始するものとし、新しいシステムを使用した運用環境下におけるリスクを十分に想定できる状態になってから実施する。以下に研修工程、および指導員の派遣計画（M/M）を示す。

表 7-2 研修工程・派遣計画（管制官向け）（M/M）

項目／月		1	講師数	M/M
1	目標5 安全管理関連		1	0.50
4	目標3 運用移行関連		1	0.50
派遣期間合計 MM				1.0

表 7-3 研修日程（管制官向け）

日数	1ヶ月目
1	移動（日本→ヤンゴン）
2	DCA 訪問／打合せ、研修場所確認
3	安全管理とは（ICAO の思想および規定）
4	安全管理の本邦事例紹介
5	リスク管理の手法
6	内部安全監査について
7	研修結果整理
8	研修準備
9	リスク管理の例題／リスク分析の実技
10	リスク分析の評価
11	システム移行・運用移行に係るハザード抽出
12	具体的ハザードのリスク管理
13	具体的ハザードのリスク管理
14	研修結果整理
15	研修準備
16	運用移行計画の座学
17	運用移行計画表の作成
18	運用移行計画表の作成
19	運用移行計画表の作成
20	運用移行計画表の作成
21	研修結果整理
22	研修準備
23	運用移行計画表の評価
24	運用移行計画表の検証
25	運用移行計画表に検証
26	運用移行計画表の見直し
27	成果物の評価、DCA 打合せ
28	研修結果整理
29	研修結果整理、移動（ヤンゴン→日本）
30	帰国



## 7.2 管制技術官向けの研修内容

本研修の対象者は、通信・監視および情報処理システムの各担当者から2名、合計6名とする。指導員は、本事業で整備される機器がレーダー・情報処理装置および管制卓を含む通信制御装置と多岐にわたっているため専門分野ごとに指導員が必要であり、通信担当1名と監視および情報処理システムの専門家1名の合計2名<sup>3</sup>とする。

なお、目標1関連の研修で1ヶ月、目標2・4・6関連の研修で1ヶ月の合計2カ月間を予定している。2つの研修の間に3週間ほどの期間をおくこととする。これは、この期間中にミ国側が自ら全体の保守点検・運用要領に関する各種資料を作成するとともに「研修の効果」、「自身による復習時間確保」を行うこと、および「研修生は本来の管制技術業務に携わっているため長期間にわたり研修を受講することが難しい」等の要因を考慮し、3週間程度のクールダウンを設定して、2回に分けて研修を実施することが最適であるためである。以下に研修工程、指導員の派遣計画（M/M）を示す。

本計画のうち、運用要領書、保守点検要領書、物品管理マニュアル、および補給管理マニュアルの作成に関する実施予定項目は以下のとおりである。

### (1) 運用要領書

運用要領書の概要、整備機材の操作および各種パラメータ変更項目に関する講義、運用要領書の作成実習、および成果物の発表と指導を行う。

### (2) 保守点検要領書

保守点検要領書の概要、整備機材に必要な主要保守点検項目に関する講義、保守点検要領書の作成実習、および成果物の発表と指導を行う。

### (3) 物品管理マニュアル

本邦の物品に関する法体系（物品管理法等）、装置予備品の購入・修理・廃棄等の手続きに関する講義、装置部品に関する物品管理マニュアルの作成実習、および成果物の発表と指導を行う。

### (4) 補給管理マニュアル

本邦の補給管理システム（APPS）の概要、補給品の管理（保管基準・保管方法・発送・受入）に関する講義、補給管理マニュアルの作成実習、および成果物の発表と指導を行う。

<sup>3</sup> レーダー・情報処理担当が対象とする機材はレーダー、情報処理装置（MSDPS）、通信担当の対象機材は通信制御装置（VCCS）、進入管制卓、対空通信装置であり、各専門家がDCAのそれぞれの担当者に対して必要な成果品作成のための講義および実習を行う。

表 7-4 研修工程・派遣計画（管制技術官向け）（M/M）

項目／月		1	2	3	講師数	M/M
1	目標 1 運用保守点検関連				2	2.00
2	目標 2 補給管理関連				2	0.80
3	目標 6 安全管理関連				2	0.60
4	目標 4 システム移行関連				2	0.60
派遣期間合計 MM						4.00

表 7-5 研修日程（管制技術官向け）

日数	1ヶ月目	日数	2ヶ月目
1	移動（日本→ヤンゴン）	1	移動（日本→ヤンゴン）
2	DCA 訪問／打合せ、研修場所確認・機材確認	2	補給管理の概要
3	機材維持管理体系の座学	3	補給管理システム（APPS）の概要
4	広域レーダー進入管制所業務の座学	4	物品管理マニュアル作成
5	点検保守復旧の実務座学	5	物品管理マニュアル作成
6	点検保守復旧の実務座学	6	物品管理マニュアル作成
7	研修結果整理	7	研修結果整理
8	研修準備	8	研修準備
9	運用要領書の作成	9	補給管理マニュアル作成
10	運用要領書の作成	10	補給管理マニュアル作成
11	運用要領書の作成	11	補給管理マニュアル作成
12	運用要領書の作成	12	補給管理マニュアル作成および成果物評価
13	運用要領書の成果物の評価	13	安全管理の座学
14	研修結果整理	14	研修結果整理
15	研修準備	15	研修準備
16	保守点検要領書の作成	16	セーフティアセスメント座学
17	保守点検要領書の作成	17	本整備機材に係るリスク管理表作成
18	保守点検要領書の作成	18	本整備機材に係るリスク管理表作成
19	保守点検要領書の作成	19	リスク管理表の成果物評価
20	保守点検要領書の作成	20	移行計画表の座学
21	研修結果整理	21	研修結果整理
22	研修準備	22	研修準備
23	保守点検要領書の作成	23	移行計画表の座学
24	保守点検要領書の作成	24	本整備の機材に係る移行計画表作成
25	保守点検要領書の作成	25	本整備の機材に係る移行計画表作成
26	保守点検要領書の作成	26	本整備の機材に係る移行計画表作成
27	保守点検要領書の成果物の評価、DCA 打合せ	27	移行計画表の成果物評価、DCA 打合せ
28	研修結果整理	28	研修結果整理
29	研修結果整理、移動（ヤンゴン→日本）	29	研修結果整理、移動（ヤンゴン→日本）
30	帰国	30	帰国

## 第8章 ソフトコンポーネントの成果品

本ソフトコンポーネントの実施に係る成果品は、以下のとおりである。

- (1) 施主側への提出物
  - 1) Final Report of Soft Component (Technical Assistance) on the Completion of Activities
  - 2) 教材テキスト
- (2) 日本側への提出物
  - 1) ソフトコンポーネント実施状況報告書
    - A) 当初定めた目標・成果
    - B) 当初定めた投入・活動の履行状況
    - C) 現時点での成果
    - D) 施主側コメント
  - 2) ソフトコンポーネント完了報告書
    - A) 案件概要（案件名、E/N 締結日、E/N 限度額、コンサルタント契約額）
    - B) ソフトコンポーネント概要（経費、背景、計画した目標、計画した成果、計画した活動内容、従事者、相手国の参加者、実施期間（時期および M/M）、活動実績、成果の達成状況）
    - C) 効果を持続・発展させ、目標を達成するための今後の課題・提言等
    - D) 添付書類（ソフトコンポーネント実施スケジュール、相手国参加者リスト、研修出席簿、成果物リスト（成果物資料の名称、作成者、概要））
    - E) 別添資料集（成果物（施主への完了報告書、作成したマニュアル類、使用したテキスト等）、その他（映像資料、写真、新聞記事等））

## 第9章 ソフトコンポーネントの概略事業費

本ソフトコンポーネントの活動に係る概算事業費を、以下に示す。

表 9-1 概略事業費内訳

番号	項目	金額 (円)	備考
1	直接人件費	非公開	
2	直接経費		
3	間接費 －その他原価 －一般管理費		
	合 計		

## 第10章 相手国側の責務

1. 研修に必要な施設の提供 (研修の実施場所、施設・機材の提供)
2. 研修員の派遣、滞在に要する経費

(余 白)

## 6. 概略設計図

# 概略設計図

## システム系統図

1. 全体レーダーシステム系統図
2. 管制通信制御システム系統図
3. レーダー管制訓練シミュレーターシステム系統図
4. VHF 対空通信システム系統図

## サイト別概略設計図

### ヤンゴン国際空港

- YA-1 空港平面図
- YA-2 ASR/SSR, MSDPS, 管制卓システム図
- YA-3 レーダーサイト敷地平面図
- YA-4 レーダー局舎平面図
- YA-5 レーダー局舎立面図 (1)
- YA-6 レーダー局舎立面図 (2)
- YA-7 レーダー局舎機器配置図
- YA-8 レーダー鉄塔立面図
- YA-9 レーダー鉄塔接地図
- YA-10 ヤンゴン ATMC 機器室平面図
- YA-11 ヤンゴン ATMC レーダー管制室平面図
- YA-12 ヤンゴン ATMC シミュレーター室平面図
- YA-13 主電源・遠隔制御ケーブル布設計画図
- YA-14 電源系統図

### マンダレー国際空港

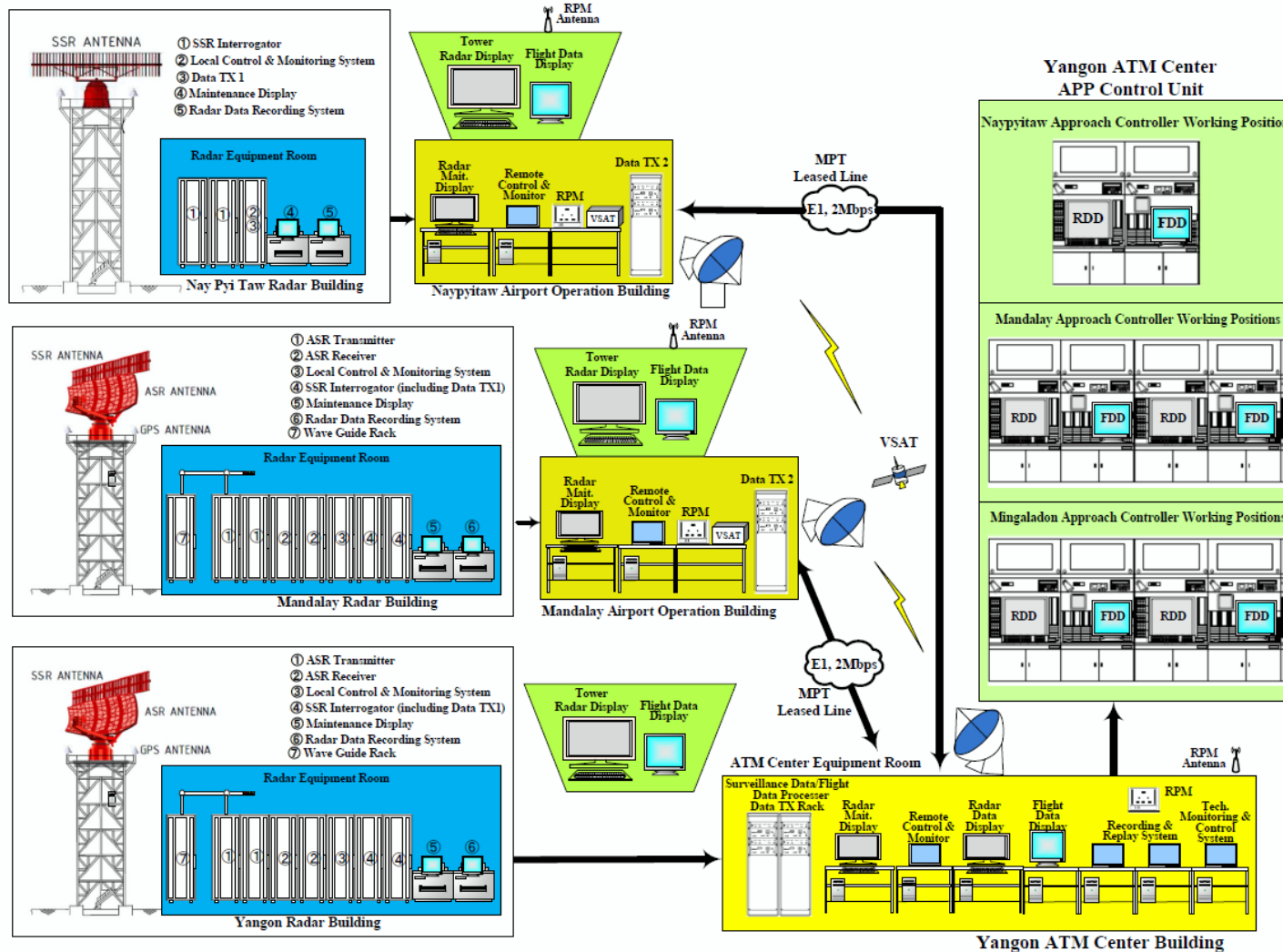
- MA-1 空港平面図
- MA-2 ASR/SSR, MSDPS, 管制卓システム図
- MA-3 レーダーサイト敷地平面図
- MA-4 レーダー局舎平面図
- MA-5 レーダー局舎立面図 (1)
- MA-6 レーダー局舎立面図 (2)
- MA-7 レーダー局舎機器配置図
- MA-8 レーダー鉄塔立面図
- MA-9 レーダー鉄塔接地図
- MA-10 主電源・遠隔制御ケーブル布設計画図
- MA-11 電源系統図

### ネピドー国際空港

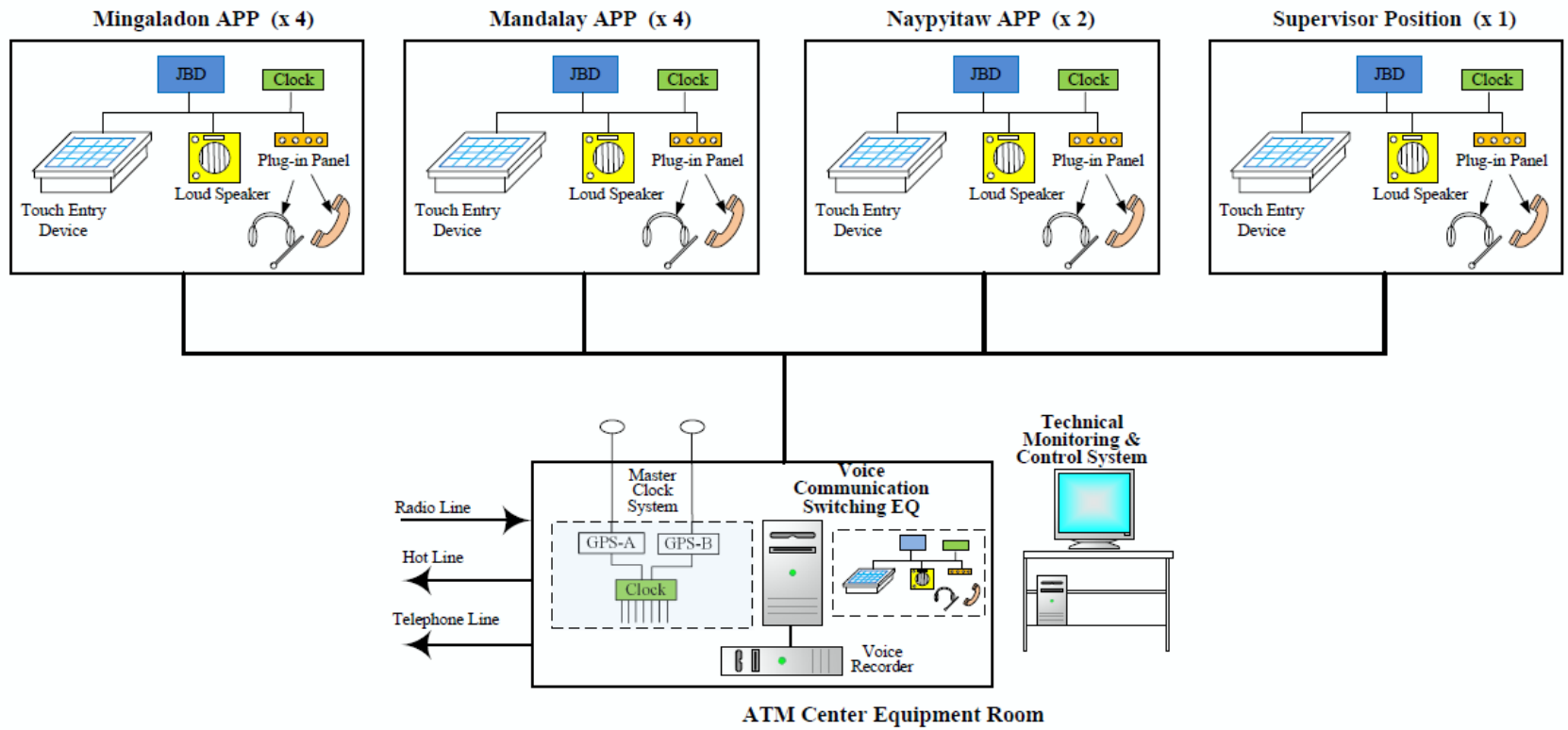
- NA-1 空港平面図
- NA-2 SSR, MSDPS, 管制卓システム図

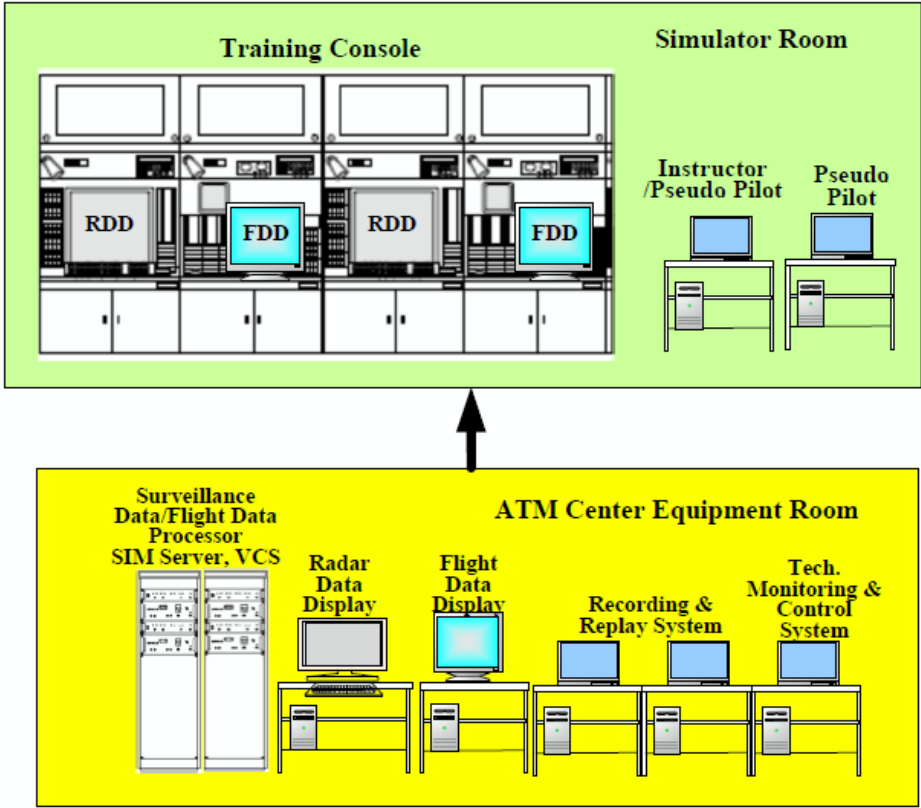


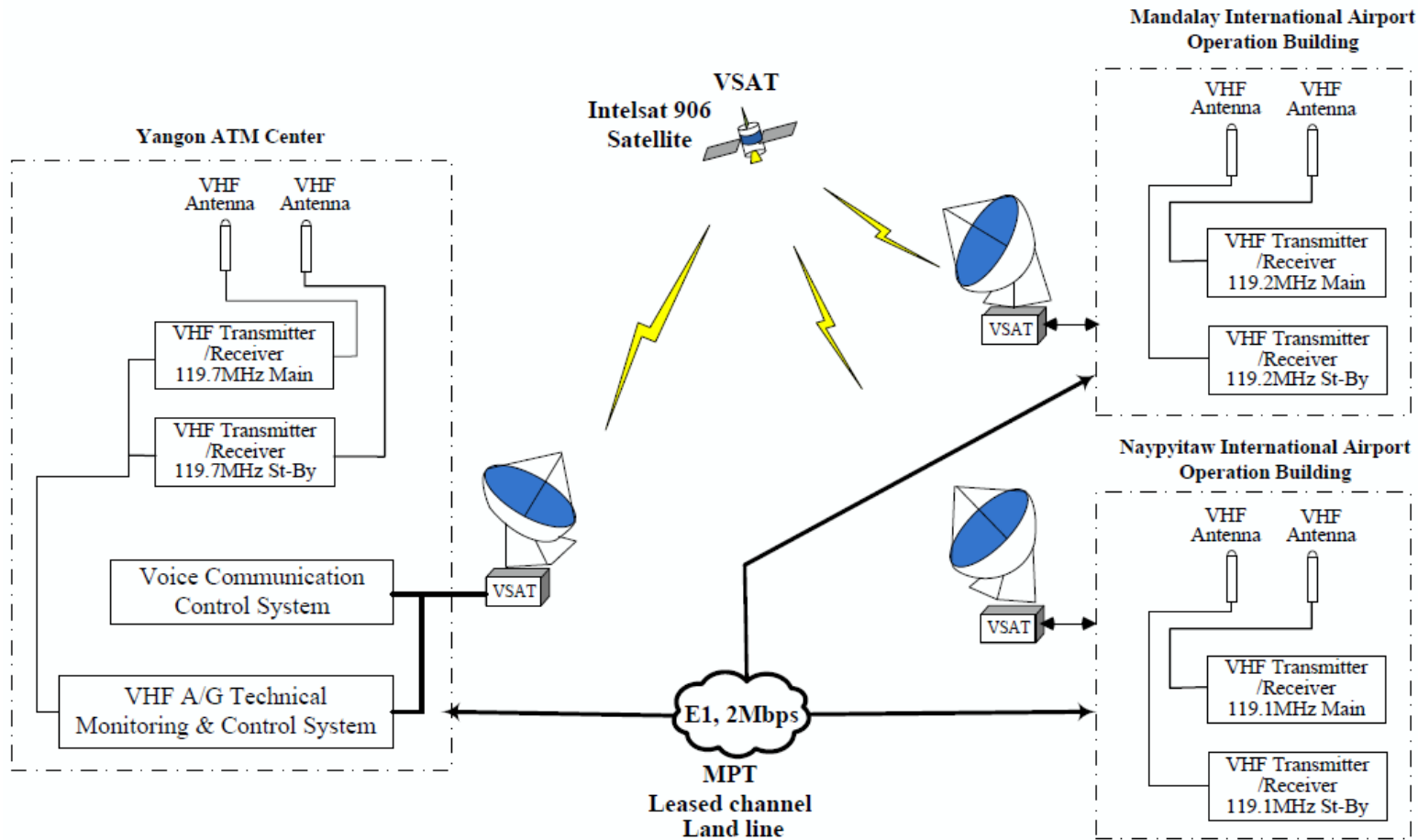
- NA-3 レーダーサイト敷地平面図
- NA-4 レーダー局舎平面図
- NA-5 レーダー局舎立面図 (1)
- NA-6 レーダー局舎立面図 (2)
- NA-7 レーダー局舎機器配置図
- NA-8 レーダー鉄塔立面図
- NA-9 レーダー鉄塔接地図
- NA-10 主電源・遠隔制御ケーブル布設計画図
- NA-11 電源系統図



Note: Remote control line by leased channel and VSAT will be done by Myanmar side.

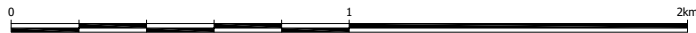
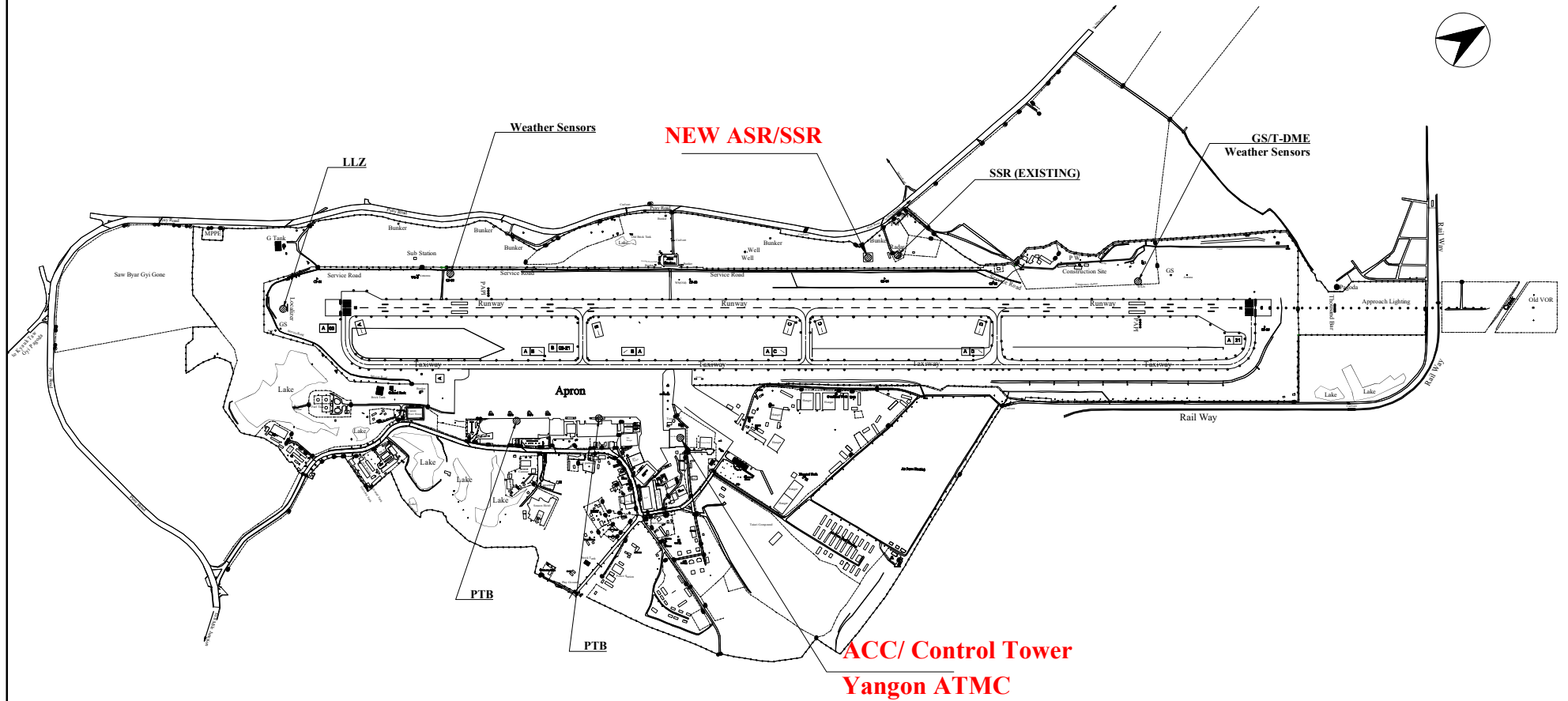






Note: Remote control line by leased channel and VSAT will be done by Myanmar side.

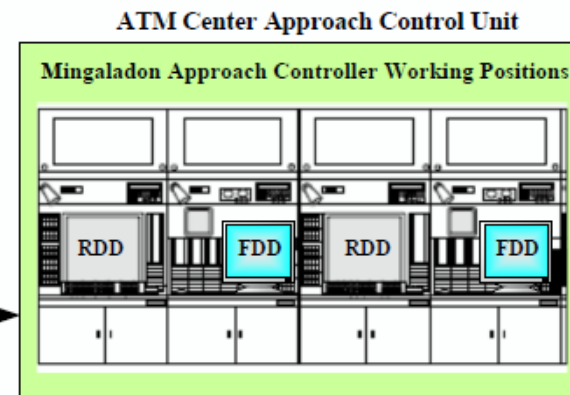
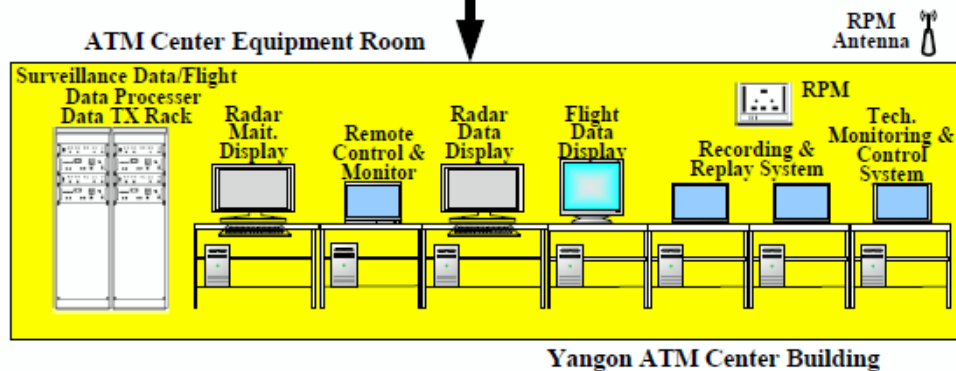
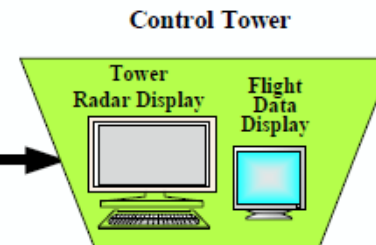
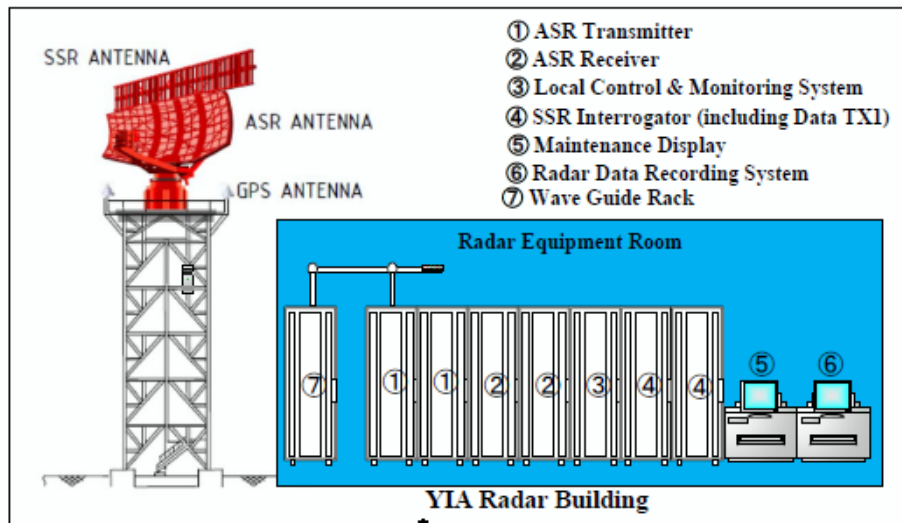
# Yangon Airport Layout Plan

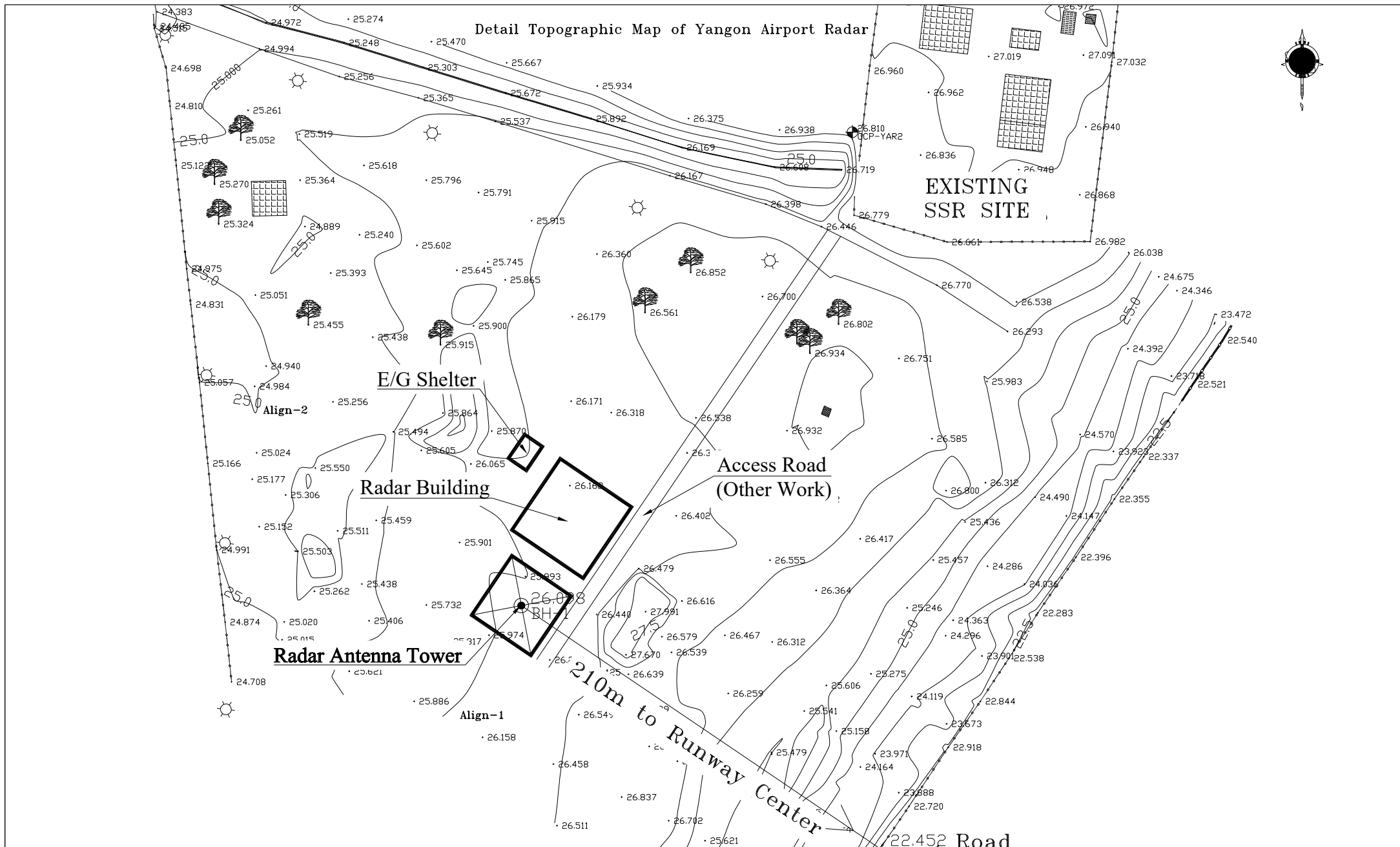


**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: YANGON INTERNATIONAL AIRPORT LAYOUT PLAN

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: YA-1





Detail Topographic Map of Yangon Airport Radar

EXISTING  
SSR SITE

E/G Shelter

Radar Building

Access Road  
(Other Work)

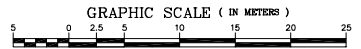
Radar Antenna Tower

Align-1

Align-2

210m to Runway Center

22.452 Road

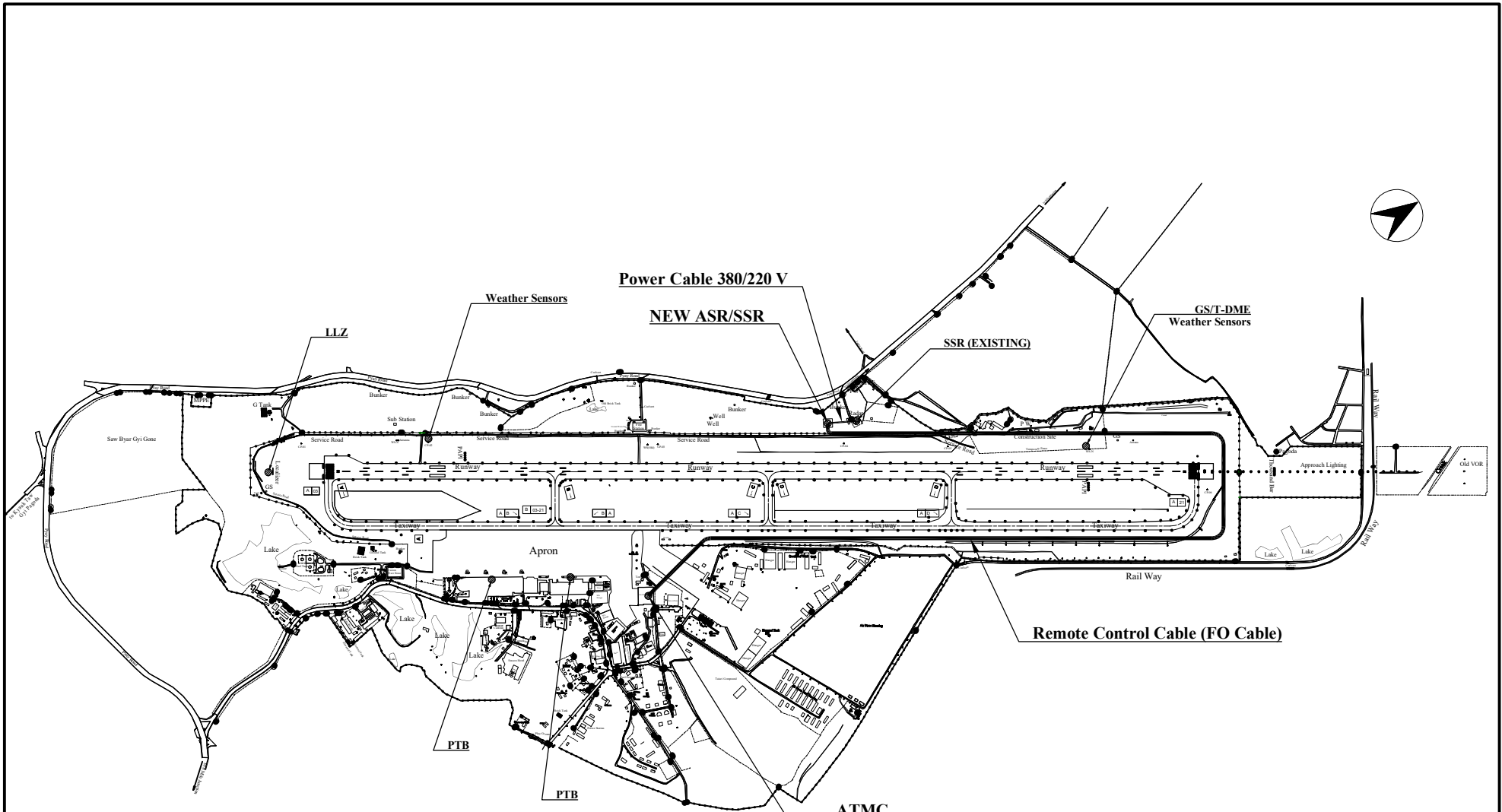


**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
DRAWING TITLE: YANGON INTERNATIONAL AIRPORT RADAR SITE LAYOUT PLAN

DATE: Sep. 2018  
SCALE: N/A  
DRAWING No.: YA-3





Note;  
 Power Cable: From the existing SSR substation to new ASR/SSR site, approx. 70m  
 Remote Control Cable: From ATMC to new ASR/SSR site, approx. 4500m



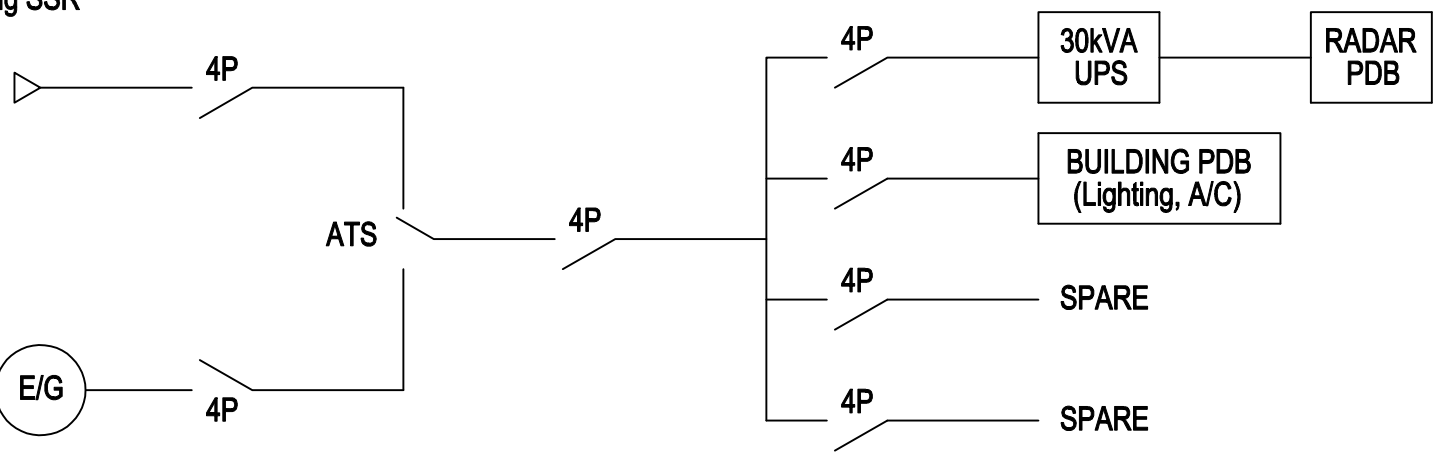
**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: YANGON INTERNATIONAL AIRPORT POWER CABLE AND REMOTE CONTROL CABLE ROUTE

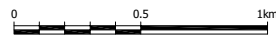
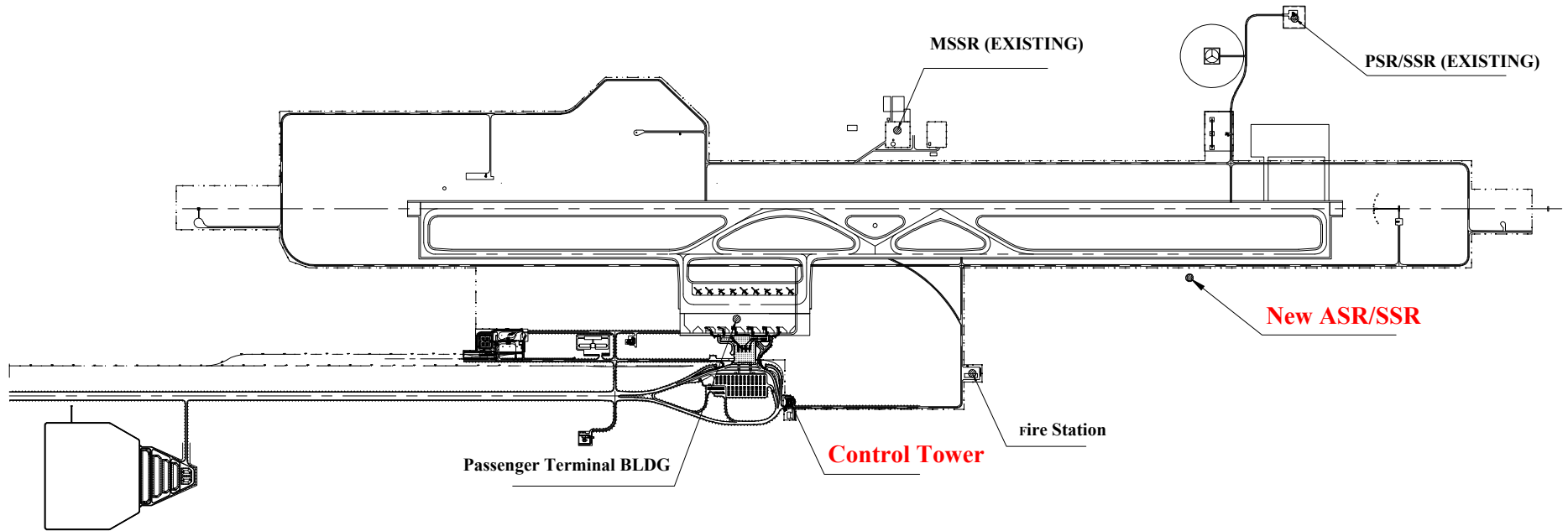
DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: YA-13

From Existing SSR  
Substation  
3Φ4W  
380/220 V

3Φ4W  
380/220 V  
65 kVA  
E/G



# Mandalay Airport Layout Plan

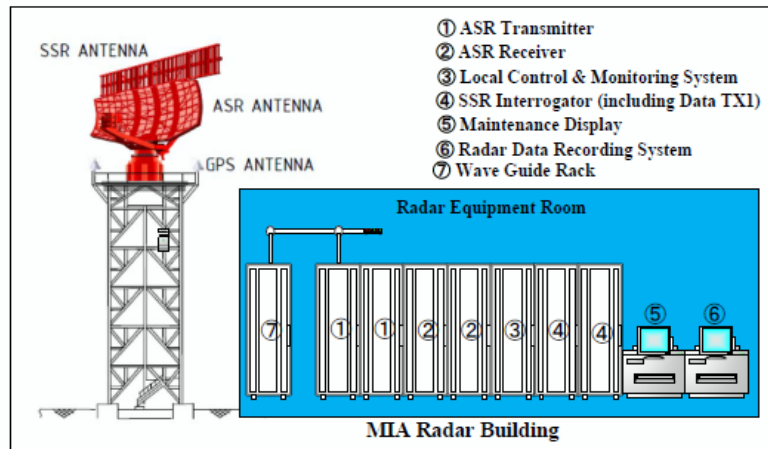



**NIPPON KOEI CO.,LTD.**  

**JAPAN AIRPORT CONSULTANTS, INC.**

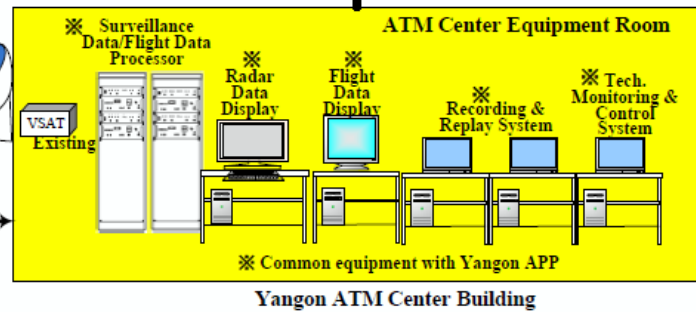
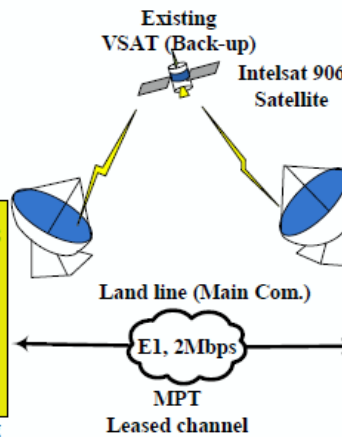
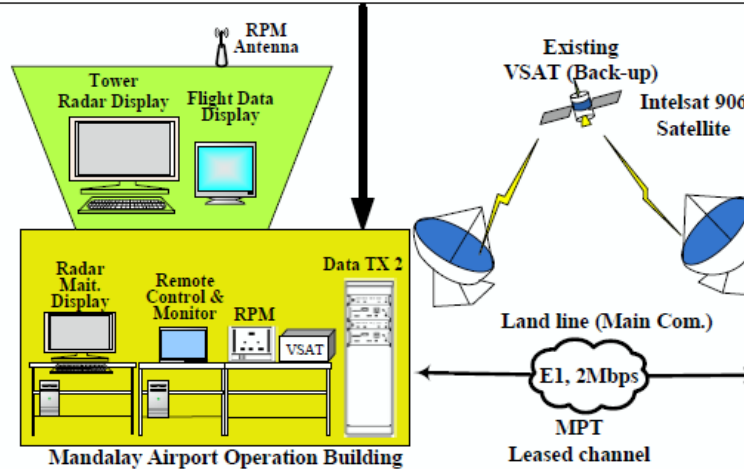
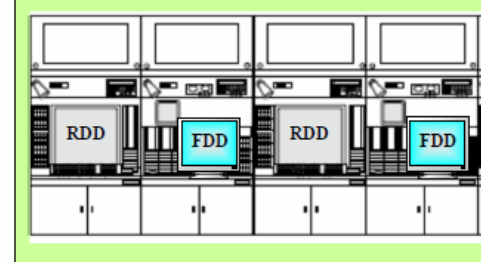
PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE  
 IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: MANDALAY INTERNATIONAL AIRPORT LAYOUT PLAN

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: MA-1



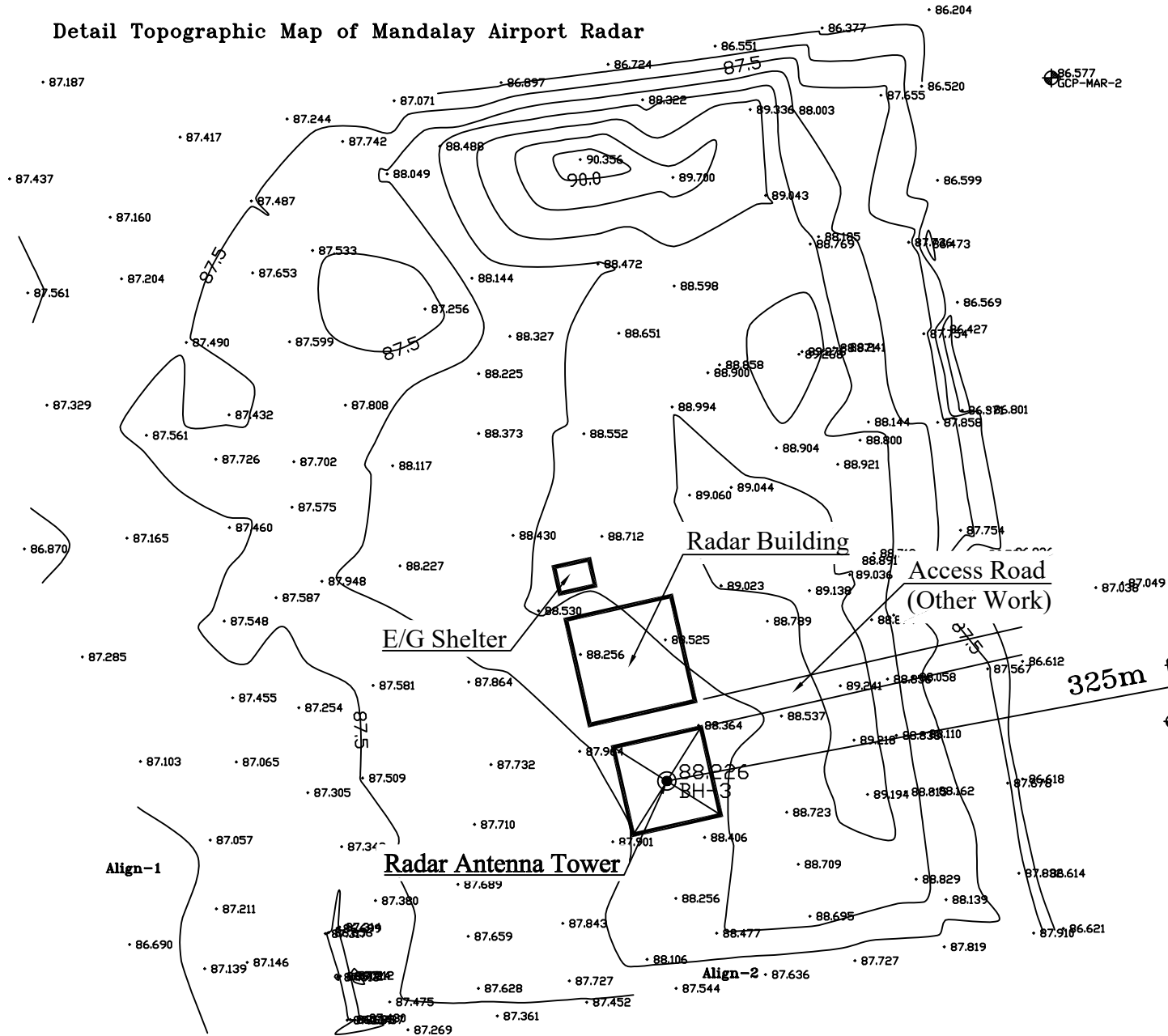
Yangon ATM Center Approach Control Unit

Mandalay Approach Controller Working Positions



Note: Remote control line by leased channel and VSAT is done by Myanmar side.

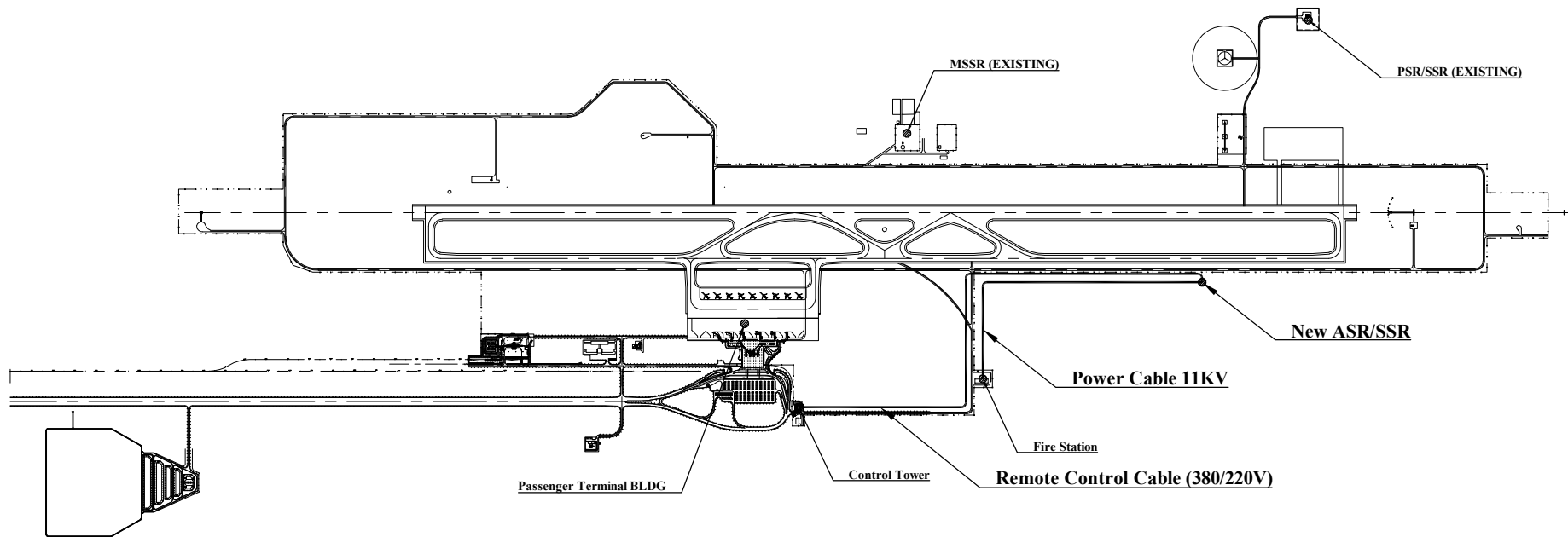
# Detail Topographic Map of Mandalay Airport Radar



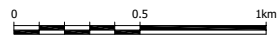
**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: MANDALAY INTERNATIONAL AIRPORT RADAR SITE LAYOUT PLAN

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: MA-3



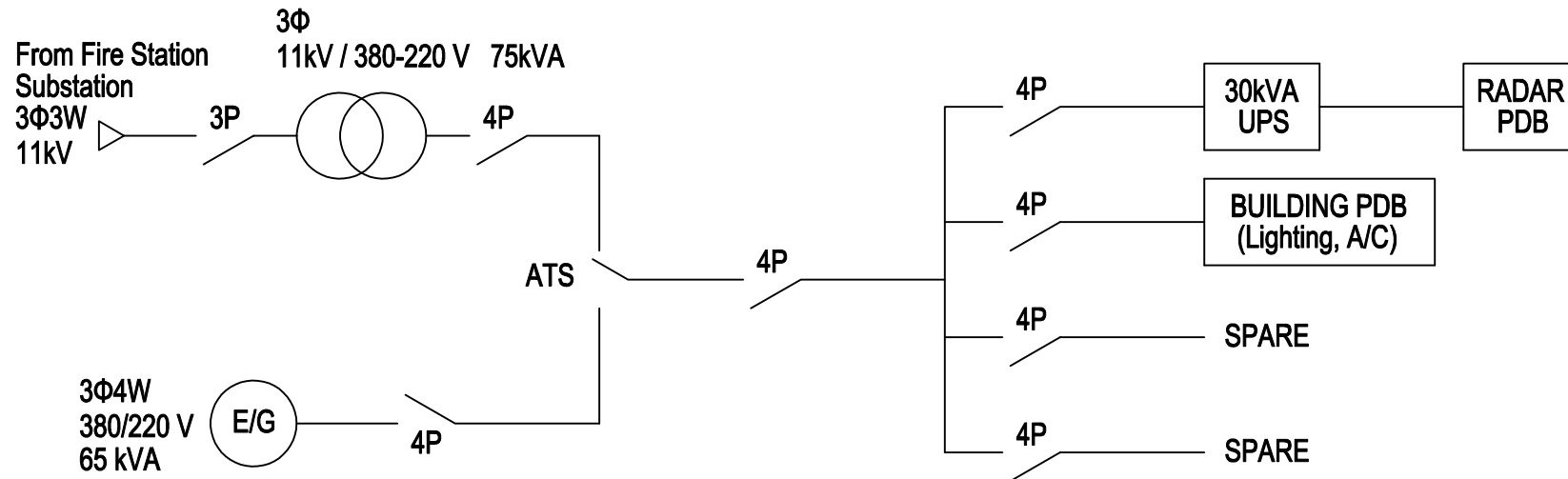
Note;  
 Power Cable: From fire station substation to new ASR/SSR site, approx. 1500m  
 Remote Control Cable: From control tower to new ASR/SSR site, approx. 2500m



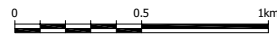
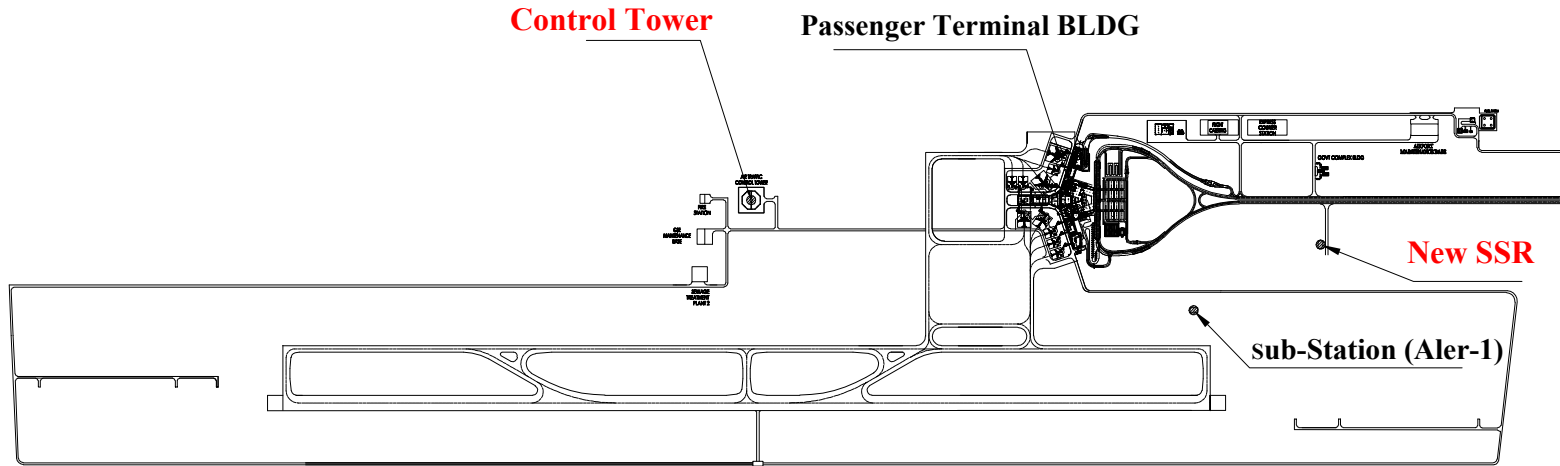
**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: MANDALAY INTERNATIONAL AIRPORT POWER CABLE AND REMOTE CONTROL CABLE ROUTE

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: MA-10



# NayPyitaw Airport Layout Plan

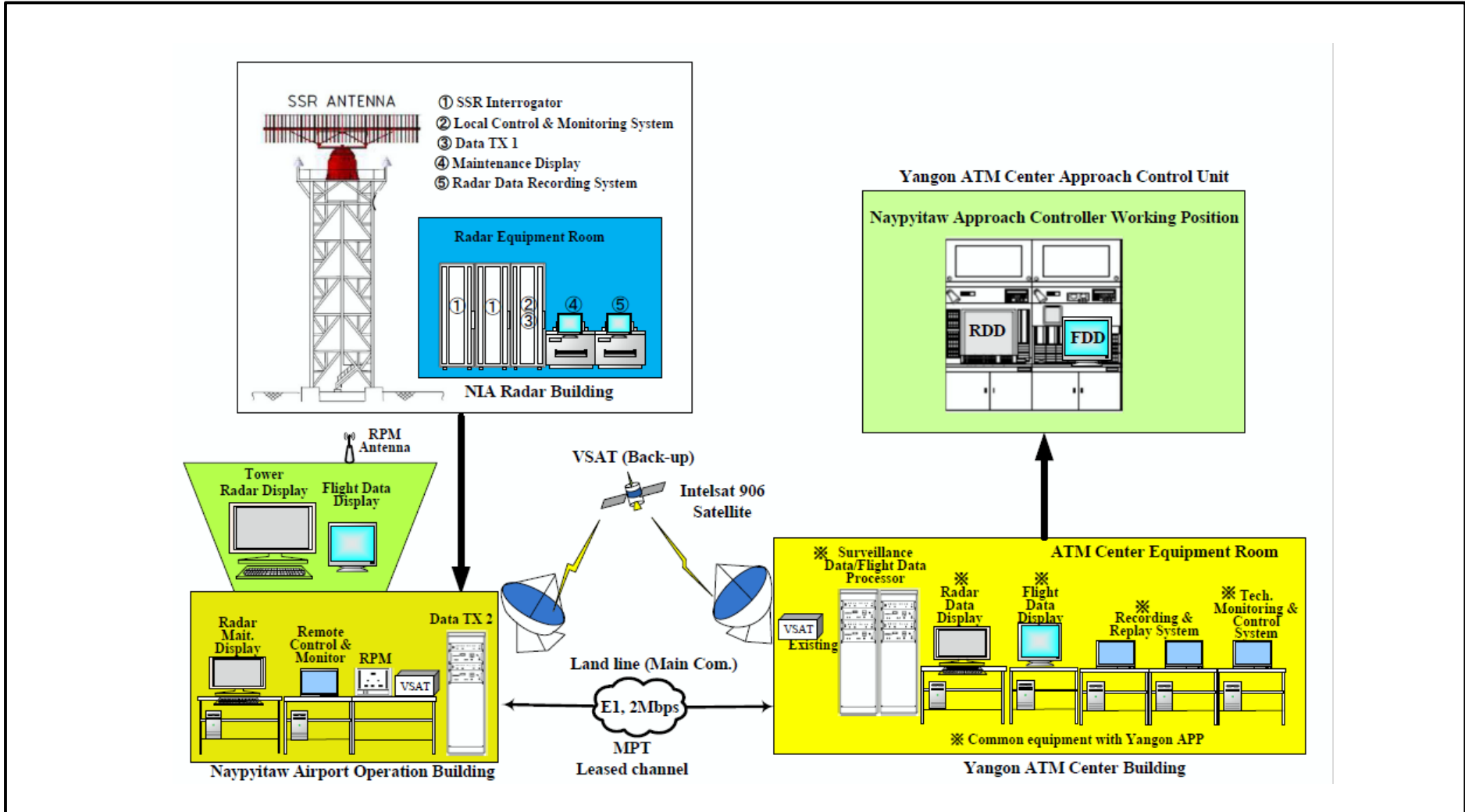


**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: NAYPYITAW INTETNATIONAL AIRPORT LAYOUT PLAN

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: NA-1

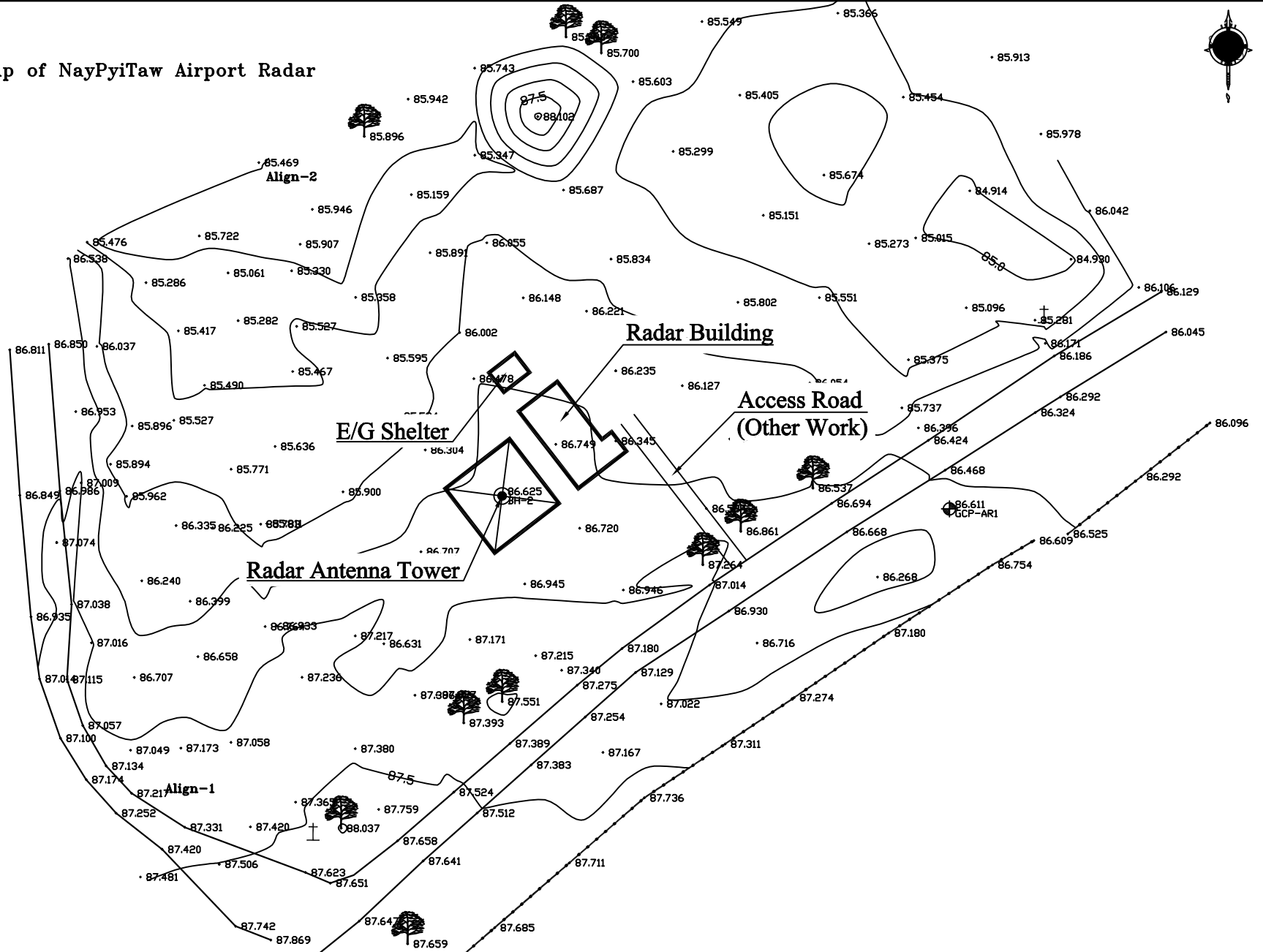




Note: Remote control line by leased channel and VSAT is done by Myanmar side.

 	PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR	DATE: Sep. 2018
	DRAWING TITLE: Nay Pyi Taw SSR, MSDPS, CONSOLE SYSTEM DIAGRAM	SCALE:
		DRAWING No.: NA-2

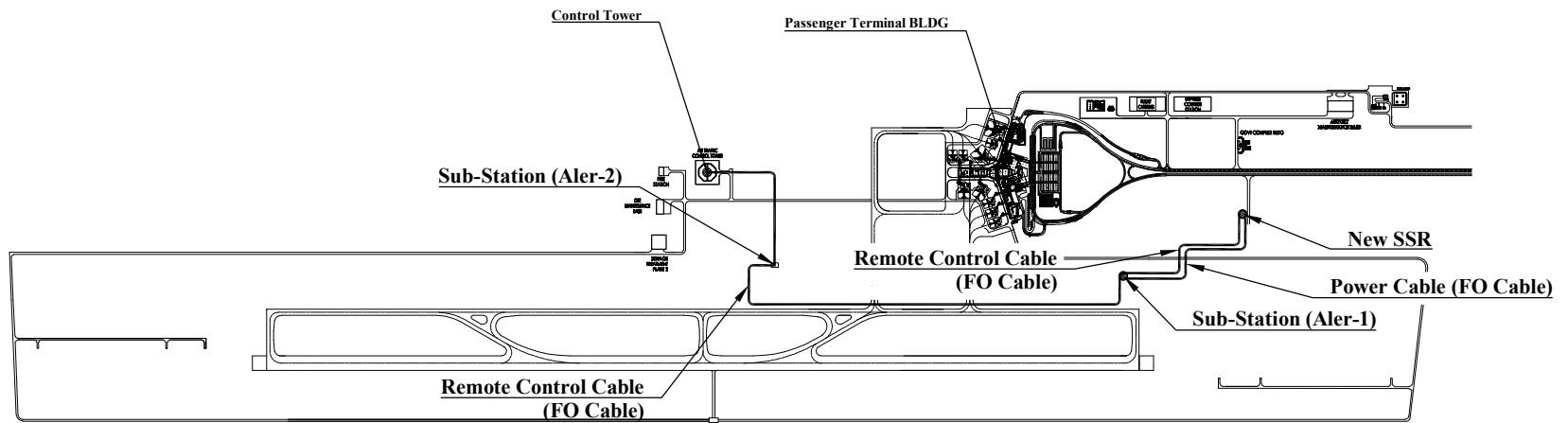
# Detail Topographic Map of NayPyiTaw Airport Radar



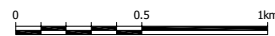
**NIPPON KOEI CO., LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: NAYPYITAW INTERNATIONAL AIRPORT RADAR SITE LAYOUT PLAN

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: NA-3



Note;  
 Power Cable: From Aler-1 to new SSR site, approx. 800m  
 Remote Control Cable: From control tower to new SSR site, approx. 3500m

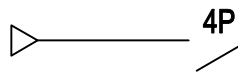


**NIPPON KOEI CO.,LTD.**  
**JAPAN AIRPORT CONSULTANTS, INC.**

PROJECT NAME: THE PROJECT FOR IMPROVEMENT OF AIRCRAFT SURVEILLANCE IN THE REPUBLIC OF THE UNION OF MYANMAR  
 DRAWING TITLE: NAYPYITAW INTERNATIONAL AIRPORT POWER CABLE AND REMOTE CONTROL CABLE ROUTE

DATE: Sep. 2018  
 SCALE: N/A  
 DRAWING No.: NA-10

From Aler-1  
Substation  
3Φ4W  
380/220 V



ATS

3Φ4W  
380/220 V  
65 kVA



30kVA  
UPS

RADAR  
PDB



BUILDING PDB  
(Lighting, A/C)



SPARE



SPARE

## 7. 參考資料

**TECHNICAL MEMORANDUM  
ON  
THE PREPARATORY SURVEY  
FOR  
THE PROJECT  
FOR  
IMPROVEMENT OF AIRCRAFT SURVEILLANCE SYSTEM  
IN  
THE REPUBLIC OF THE UNION OF MYANMAR**

Based on the Minutes of Discussion dated 16 May 2018 signed by Mr. Min Lwin, Director General of Department of Civil Aviation, MOTC and Mr. Hiroyuki Ueda, Leader of Preparatory Survey Team of JICA, the Survey Team held technical discussions with officials concerned of the Government of Myanmar for the above-captioned survey to wrap-up the works carried out during their stay in the Myanmar.

In the course of technical discussions and field survey, the both sides confirmed the main items described in the attached sheets.

Yangon, 5 June 2018



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Masaaki Uehara  
Consultant Leader  
JICA Survey Team



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Min Lwin  
Director General  
Department of Civil Aviation, MOTC

## ATTACHMENT

### 1. Basic Technical Requirements of the Systems

The detailed system configuration of each project component will be designed with the following basic technical requirements:

- The system equipment characteristics will follow and conform to any relevant ICAO Standards and Recommended Practices (SARPs), and other related national or international regulations and practices.
- The designs for the system will take into account human engineering considerations; for example, Human-Machine Interface (HMI) of the operational and technical position will be of window type, multi-color and user-friendly graphical environment.
- The hardware of radar system, data processing system and relevant systems should be as much as practicable Commercial Off-The-Shelf (COTS) products with state-of-the-art technology.

### 2. Equipment Configuration of the Systems

System equipment configuration for each system based on the basic technical requirements is shown in the following Table;

Note: Further analysis for equipment configuration of each system will be implemented during the works for the preparation of Draft Final Report & Equipment Specifications by the Survey Team.

#### 2.1 Radar System

##### 2.1.1 Airport Surveillance Radar /Secondary Surveillance Radar System (ASR/SSR) at Yangon International Airport

Table 2.1.1 ASR/SSR Equipment Configuration at Yangon International Airport

No.	Equipment	Q'ty	Unit	Place
1	ASR/SSR Antenna	1	set	Radar site
2	ASR Transmitter	1	set	
3	ASR Receiver	2	set	
4	SSR Interrogator	2	set	
5	Local Control and Monitoring System	1	set	
6	Maintenance Display (Local)	1	set	
7	Radar Data Recording System	1	set	
8	Wave Guide	1	set	
9	Dehydrator	1	set	
10	GPS Clock Receiver	2	set	
11	Power Distribution Box	1	set	
12	Data Transmission System 1	1	set	

13	Uninterruptible Power Supply	1	set	
14	Engine Generator	1	set	
15	Radar Tower	1	set	
16	Radar Building	1	set	
17	Remote Control and Monitoring System (ASR/SSR)	1	set	ATMC
18	Maintenance Display (Remote)	1	set	Equipment Room
19	Radar Performance Monitor	1	set	
20	Data Transmission System 2	1	set	

Outline of system diagram is as shown below:

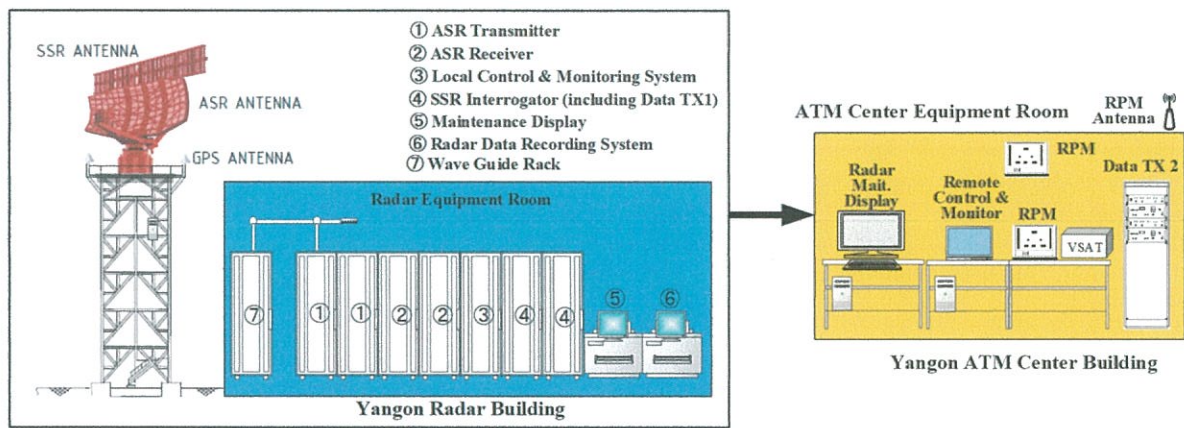


Figure 2.1.1 Yangon ASR/SSR System Diagram

## 2.1.2 Airport Surveillance Radar /Secondary Surveillance Radar System (ASR/SSR) at Mandalay International Airport

Table 2.1.2 ASR/SSR Equipment Configuration at Mandalay International Airport

No.	Equipment	Q'ty	Unit	Place
1	ASR/SSR Antenna	1	set	Radar site
2	ASR Transmitter	1	set	
3	ASR Receiver	2	set	
4	SSR Interrogator	2	set	
5	Local Control and Monitoring System	1	set	
6	Maintenance Display (Local)	1	set	
7	Radar Data Recording System	1	set	
8	Wave Guide	1	set	
9	Dehydrator	1	set	
10	GPS Clock Receiver	2	set	
11	Power Distribution Box	1	set	
12	Data Transmission System 1	1	set	
13	Uninterruptible Power Supply	1	set	



14	Engine Generator	1	set	Airport Operation Building Equipment Room
15	Radar Tower	1	set	
16	Radar Building	1	set	
17	Remote Control and Monitoring System (ASR/SSR)	1	set	
18	Maintenance Display (Remote)	1	set	
19	Radar Performance Monitor	1	set	
20	Data Transmission System 2	1	set	
21	Power Distribution Box with UPS	1	set	

Outline of system diagram is as shown below:

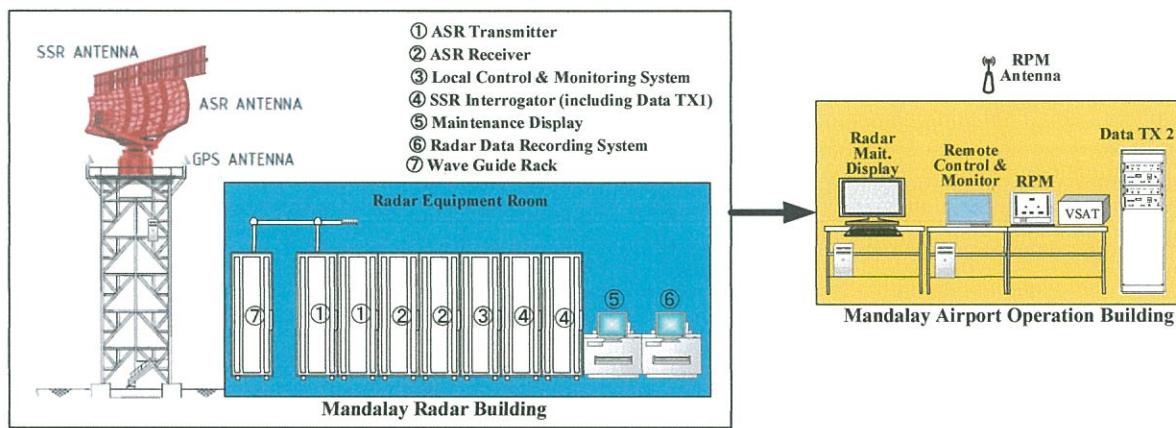


Figure 2.1.2 Mandalay ASR/SSR System Diagram

### 2.1.3 Secondary Surveillance Radar System (SSR) at Nay Pyi Taw International Airport

Table 2.1.3 SSR Equipment Configuration at Nay Pyi Taw International Airport

No.	Equipment	Q'ty	Unit	Place	
1	SSR Interrogator	2	set	Radar site	
2	Local Control and Monitoring System	1	set		
3	Maintenance Display (Local)	1	set		
4	Radar Data Recording System	1	set		
5	GPS Clock Receiver	2	set		
6	Power Distribution Box	1	set		
7	Data Transmission System 1	1	set		
10	Uninterruptible Power Supply	1	set		
11	Engine Generator	1	set		
12	Radar Tower	1	set		
13	Radar Building	1	set		
14	Remote Control and Monitoring System (SSR)	1	set		Airport Operation Building Equipment Room
15	Maintenance Display (Remote)	1	set		
16	Radar Performance Monitor	1	set		

17	Data Transmission System 2	1	set	
18	Power Distribution Box with UPS	1	set	

Outline of system diagram is as shown below:

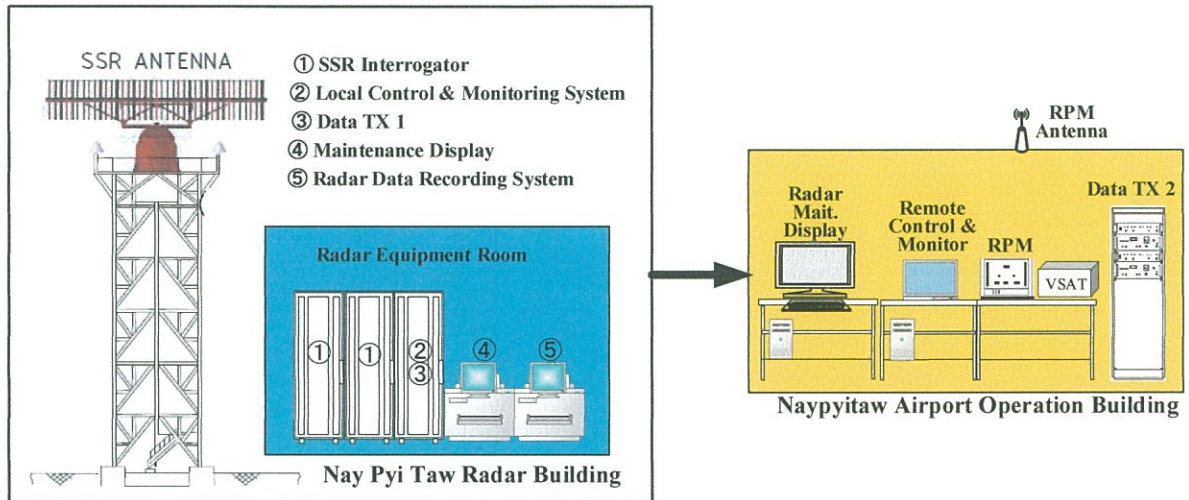


Figure 2.1.3 Nay Pyi Taw SSR System Diagram

## 2.2 ATM System

### 2.2.1 Multi Sensor Data Processing System (MSDPS)

Table 2.2.1 MSDPS Equipment Configuration

No.	Equipment	Q'ty	Unit	Place
1	Surveillance Data Processor	2	set	ATMC Equipment Room
2	Flight Data Processor	2	set	
3	Network Communication System	2	set	
4	GPS Clock Receiver	2	set	
5	Recording and Replay System	2	set	
6	Technical Monitoring and Control System	2	set	
7	Radar Data Display	1	set	
8	Flight Data Display	1	set	
9	Power Distribution Box	1	set	
10	RDD Console	2	set	ATMC
11	FDD Console	2	set	Mingaladon Approach
12	Supervisor Console	1	set	Control Unit
13	Radar Data Display	3	set	Control Unit
14	Flight Data Display	3	set	
15	RDD Console	2	set	ATMC
16	FDD Console	2	set	Mandalay Approach

17	Radar Data Display	2	set	Control Unit
18	Flight Data Display	2	set	
19	RDD Console	1	set	ATMC
20	FDD Console	1	set	Nay Pyi Taw Approach
21	Radar Data Display	1	set	Control Unit
22	Flight Data Display	1	set	
23	Tower Radar Display	1	set	Yangon Control Tower
24	Flight Data Display	1	set	
25	Tower Radar Display	1	set	Mandalay Control tower
26	Flight Data Display	1	set	
27	Tower Radar Display	1	set	Nay Pyi Taw Control Tower
28	Flight Data Display	1	set	

Outline of system diagram is as shown below:

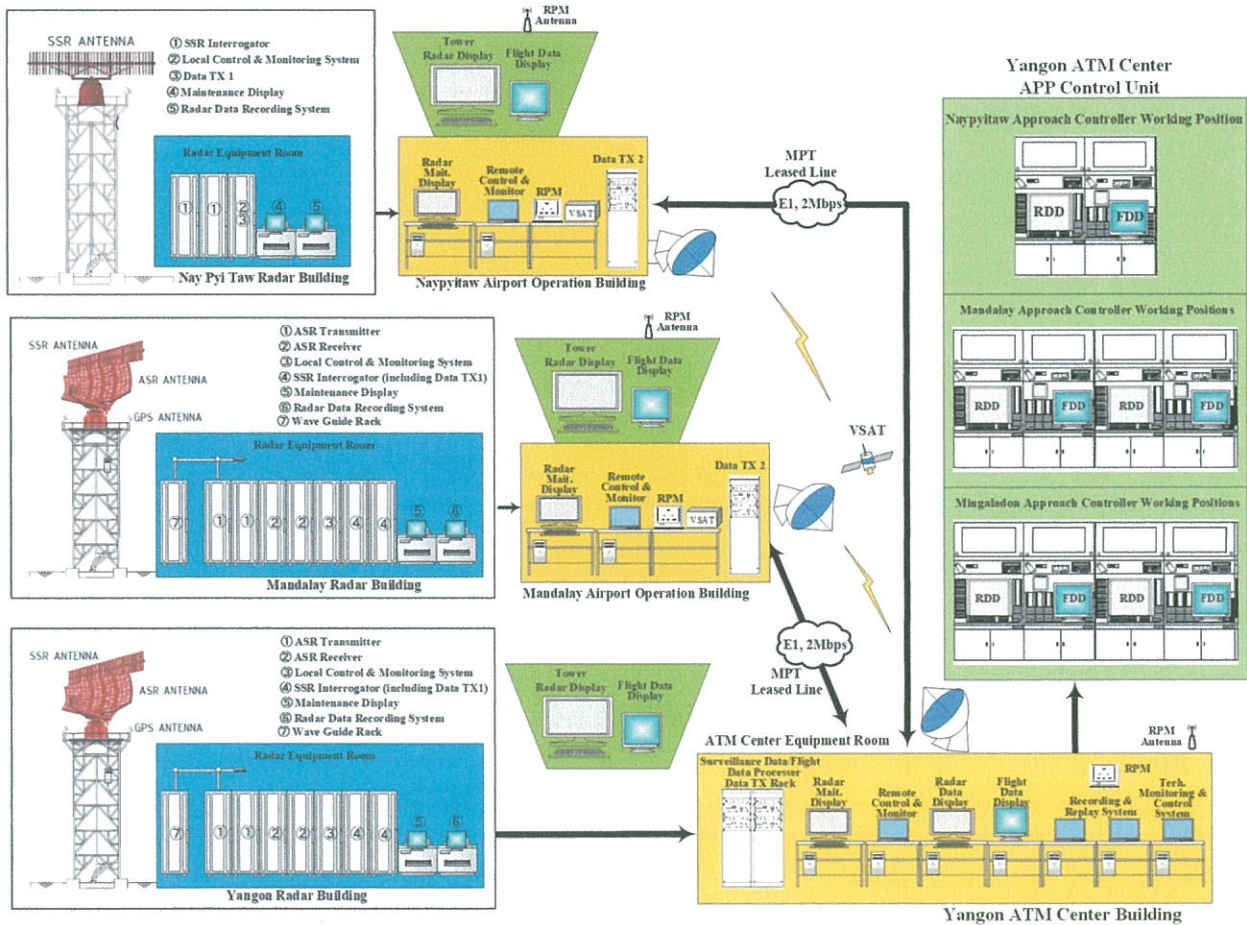


Figure 2.2.1 MSDPS System Diagram

## 2.2.2 Voice Communication Control System (VCCS)

Table 2.2.2 VCCS Equipment Configuration

No.	Equipment	Q'ty	Unit	Place
1	Voice Communication Switching Equipment	1	set	ATMC Equipment Room, APP Room,
2	Controller Working Position	11	set	
2-1	Touch Entry Device	12	ea	
2-2	Plug-In-Panel	12	ea	
2-3	Loudspeaker	24	ea	
2-4	Footswitch	12	ea	
3	Technical Monitoring and Control System	1	set	
4	Master Clock System	1	set	
4-1	Master Clock Unit	1	set	
4-2	Desk Mount Slave Clock	11	ea	
5	Voice Recorder	1	set	
6	Accessory	-	-	
6-1	Headset	24	ea	
6-2	Handset	11	ea	

Outline of the system diagram is as shown below:

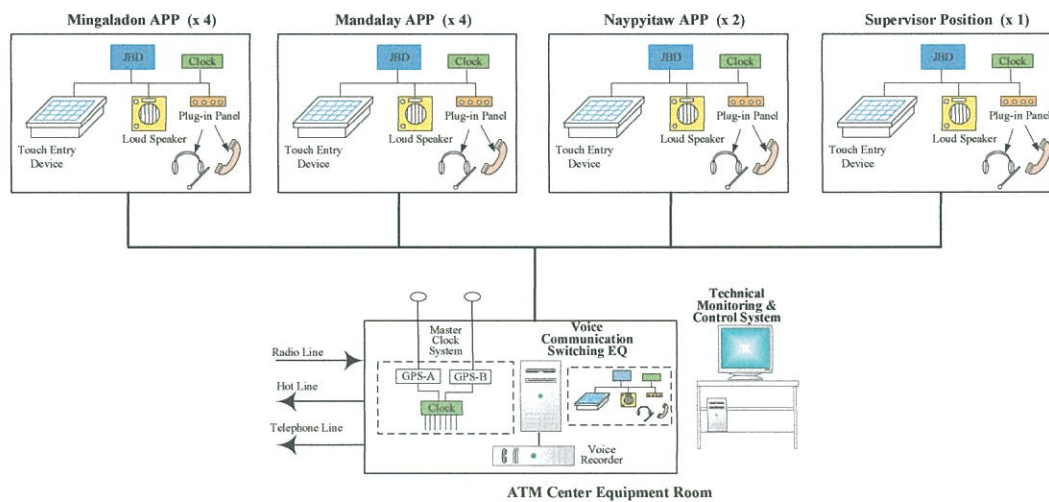


Figure 2.2.2 VCCS System Diagram

## 2.2.3 Radar Control Training Simulator System (SIM)

Table 2.2.3 SIM Equipment Configuration

No.	Equipment	Q'ty	Unit	Place
1	Surveillance Data Processor	2	set	ATMC Equipment Room
2	Flight Data Processor	2	set	

3	SIM Server	2	set	ATMC Simulator Room
4	Network Communication System	2	set	
5	GPS Clock Receiver	2	set	
6	Recording and Replay System	2	set	
7	Technical Monitoring & Control System	2	set	
8	Radar Data Display	2	set	
9	Flight Data Display	2	set	
10	Instructor / Pseudo Pilot Workstation	1	set	
11	Pseudo Pilot Workstation	1	set	
12	Voice Communication Switch	1	set	
13	Voice Communication Panel	4	set	
14	RDD Console	2	set	
15	FDD Console	2	set	

Outline of the system diagram is as shown below:

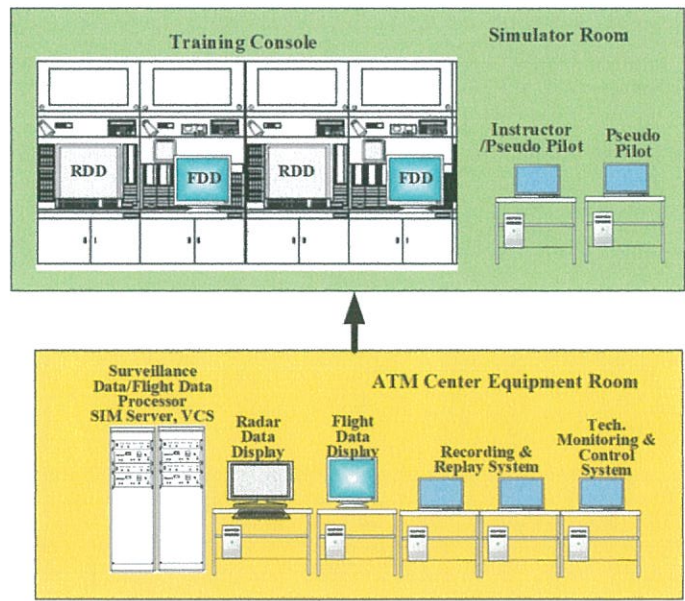


Figure 2.2.3 SIM System Diagram

### 2.3 Integration of new SSRs Data to En-route MSDPS (Top Sky-ATC) at Yangon ATMC

Radar data from new SSRs at Yangon, Mandalay and Nay Pyi Taw will be integrated into En-route MSDPS (Top Sky-ATC) by Myanmar side.

Outline of system diagram is as shown below:

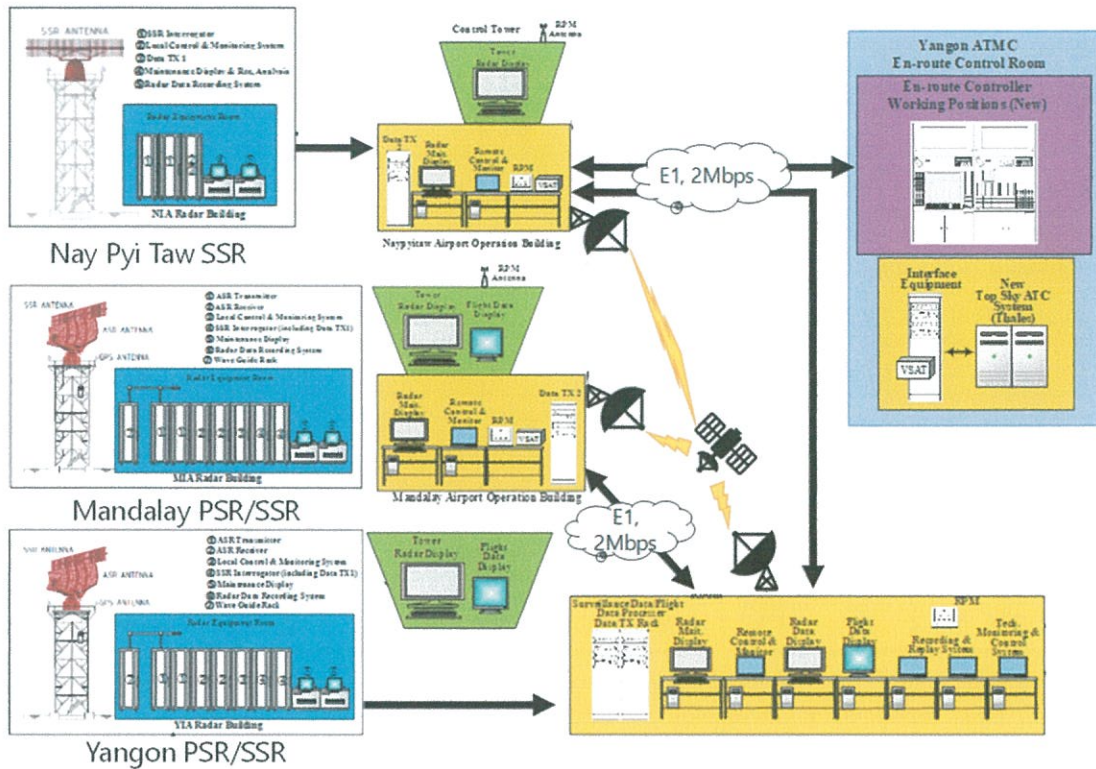


Figure 2.3.1 Integration System Diagram

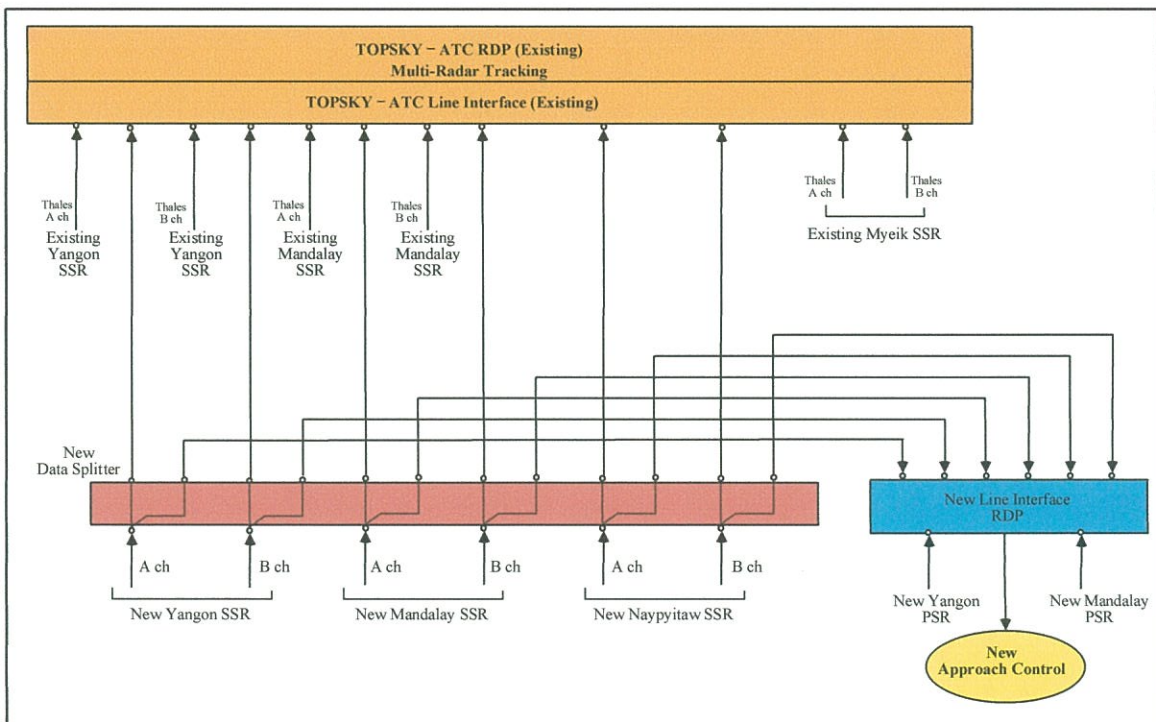


Figure 2.3.2 Radar Data Connection Diagram

## 2.4 VHF Air-Ground Communication System for Approach Control

Table 2.4.1 VHF Air-Ground Communication System Equipment Configuration

No.	Equipment	Q'ty	Unit	Place
<b>Yangon International Airport</b>				
1	VHF Air-Ground Transmitter/Receiver (main and stand-by)	2	set	Yangon ATM Center Equipment Room
2	VHF Antenna	2	set	
3	Technical Monitoring & Control System	1	set	
<b>Mandalay International Airport</b>				
1	VHF Air-Ground Transmitter/Receiver (main and stand-by)	2	set	ATC Operation Building
2	VHF Antenna	2	set	Equipment Room
<b>Naypyitaw International Airport</b>				
1	VHF Air-Ground Transmitter/Receiver (main and stand-by)	2	set	ATC Operation Building
2	VHF Antenna	2	set	Equipment Room

Outline of each system diagram is as shown below:

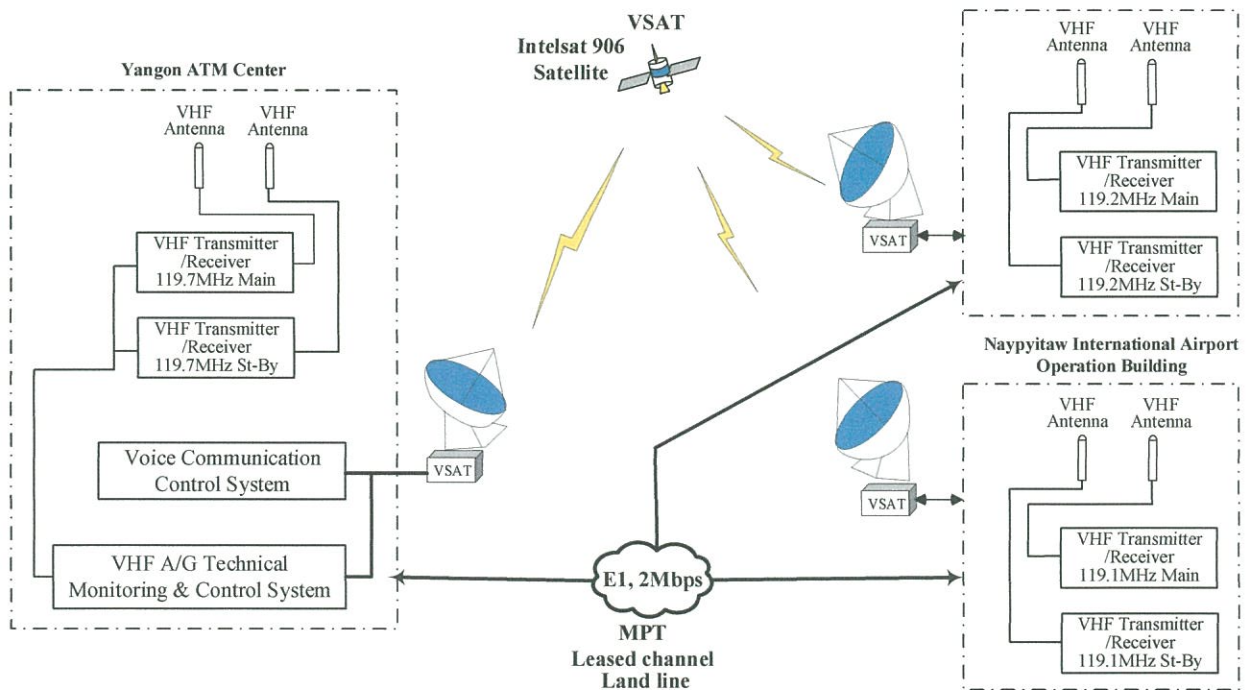


Figure 2.4.1 VHF Air-Ground Communication for Approach Control System Diagram

## 2.5 Responsibility of the Works to be implemented by the Myanmar Side Which will not be funded with the Grant

- Land clearing such as cutting trees and removing bushes for radar site.
- Construction of access road for Mandalay radar site entrance portion.
- Provision of electric power supply feeder for Radar site at three airports.

- Provision of water supply, toilet and maintenance house if necessary.
- Security fence for Radar Site for each airport will be installed by the Myanmar side.
- Radar Remote Control and Monitoring System and Maintenance Display will be installed in the Mandalay and Nay Pyi Taw Operation Building. Installation space and power supply for the equipment should be provided by the Myanmar side.
- RDD and FDD will be installed in the Control Tower for each airport. Installation space and power supply for the equipment should be provided by the Myanmar side.
- Meteorological information such as wind, QNH, temperature for approach controller working position should be provided by the Myanmar side.
- Leased landline circuit between Yangon – Mandalay and Yangon – Nay Pyi Taw
- Leased VSAT circuit between Yangon – Mandalay and Yangon – Nay Pyi Taw

## 2.6 Technical Confirmation

- Provision of Interface Control Document (ICD) of Top Sky-ATC by Myanmar side
- Assignment of ASR transmitting frequency by Myanmar side

## 3. Clarification of Collected Data and Information

The Survey Team requested further collaboration with DCA for clarification of data and information collected as well as for collection of additional data and information if such necessity arises. The Myanmar side accepted the request.

## 4. Confidentiality

Since this Technical Memorandum includes outline specifications of the equipment to be provided by the Project, both Japanese and Myanmar sides confirmed that this Technical Memorandum should be treated as confidential, taking into consideration a fair and transparent competition for the supply of the equipment.