

Appendices

Appendix 1. Member List of the Study Team

(1) Preparatory Survey (1) Team

Mr. Hiroyuki TOMITA	Team Leader	Senior Representative, Bangladesh Office, Japan International Cooperation Agency (JICA)
Mr. Kota KATSUMATA	Project Planning and Management	Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Yoshihisa UCHIDA	Chief Consultant/Meteorological Radar Planning/Operation & Maintenance	Japan Weather Association (JWA)
Mr. Hiroyuki INOMATA	Meteorological Radar Facility Planning	International Meteorological Consultant Inc. (IMC)
Mr. Toshihide ENDO	Communication Equipment Planning	International Meteorological Consultant Inc. (IMC)
Mr. Soshi IWATA	Procurement Planning/Cost Estimate/Construction Planning	Japan Weather Association (JWA)
Mr. Yoshiyuki YAGIRI	Natural Conditions Survey	International Meteorological Consultant Inc. (IMC)

(2) Preparatory Survey (2) Team

Mr. Hiroyuki TOMITA	Team Leader	Senior Representative, Bangladesh Office, Japan International Cooperation Agency (JICA)
Mr. Hideaki MATSUMOTO	Project Planning and Management	Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Yoshihisa UCHIDA	Chief Consultant/Meteorological & Flood Disasters Prevention Planning	Japan Weather Association (JWA)
Mr. Hiroyuki INOMATA	Meteorological Radar Facility Planning	International Meteorological Consultant Inc. (IMC)
Mr. Yoshiyuki YAGIRI	Natural Conditions Survey	International Meteorological Consultant Inc. (IMC)

Appendix 2. Study Schedule

Preparatory Survey 1

Schedule	Governmental Member				Consultant Member			
	Mr. Hiroyuki TOMITA	Mr. Kota KATSUMATA	Mr. Yoshihisa UCHIDA	Mr. Hiroyuki INOMATA	Mr. Toshihide ENDO	Mr. Soshi IWATA	Mr. Yoshiyuki YAGIRI	
	2014	Team Leader	Project Planning and Management	Chief Consultant/Meteorological Radar Planning/Operation & Maintenance Planning	Meteorological Radar Facility Planning	Communication Equipment Planning	Procurement Planning / Cost Estimation / Construction Planning	Natural Conditions Survey
1	24 Mar	Mon				Tokyo→Bangkok		Tokyo→Bangkok
2	25 Mar	Tue				Bangkok→Dhaka Discussion with JICA Bangladesh Office		Bangkok→Dhaka Discussion with JICA Bangladesh Office
3	26 Mar	Wed				Discussion with BMD		Discussion with BMD
4	27 Mar	Thu				Visit to local contractors for requesting a cost estimate of Topographic and Geotechnical Survey, Data Collection, Study for Unit Price of Construction Materials		Visit to local contractors for requesting a cost estimate of Topographic and Geotechnical Survey, Data Collection, Study for Unit Price of Construction Materials
5	28 Mar	Fri				Site Survey at Rangpur Meteorological Radar Observation Station		Site Survey at Rangpur Meteorological Radar Observation Station
6	29 Mar	Sat				Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station)		Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station)
7	30 Mar	Sun				Site Survey at Existing Dhaka Radar Observation Station (IDB)		Site Survey at Existing Dhaka Radar Observation Station (IDB)
8	31 Mar	Mon				Site Survey at BMD Storm Warning Centre (SWC)		Site Survey at BMD Storm Warning Centre (SWC)
9	1 Apr	Tue			Tokyo→Bangkok	Site Survey at BMD Meteorological Briefing Room in the Hazrat Shahjalal International Airport (Dhaka)	Tokyo→Bangkok	Site Survey at BMD Storm Warning Centre (SWC)
10	2 Apr	Wed			Bangkok→Dhaka Discussion with BMD, Site Survey at Existing Dhaka Radar Observation Station (IDB), Discussion with JICA Bangladesh Office	Site Survey at BMD Storm Warning Centre (SWC), Discussion with JICA Bangladesh Office	Bangkok→Dhaka Discussion with BMD, Site Survey at Existing Dhaka Radar Observation Station (IDB), Discussion with JICA Bangladesh Office	Discussion with BMD, Discussion with JICA Bangladesh Office
11	3 Apr	Thu				Site Survey at BMD Storm Warning Centre (SWC) and Meteorological Briefing Room in the the Hazrat Shahjalal International Airport (Dhaka)		
12	4 Apr	Fri				Data Collection, Internal Meeting		
13	5 Apr	Sat			Discussion with a Local Contractor for Topographic and Geotechnical Survey	Study for Unit Price of Construction Materials, Data Collection	Discussion with a Local Contractor for Topographic and Geotechnical Survey	Study for Unit Price of Construction Materials, Data Collection
14	6 Apr	Sun		Tokyo→Singapore→Dhaka		Discussion with BMD		Data Collection, Topographic and Geotechnical Survey Follow-up
15	7 Apr	Mon		Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station), Discussion with JICA Bangladesh Office, Internal Meeting	Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station), Discussion with JICA Bangladesh Office, Internal Meeting	Discussion with BMD	Study for Unit Price of Construction Materials, Data Collection	Discussion with JICA Bangladesh Office, Internal Meeting
16	8 Apr	Tue		Discussion with BMD	Discussion with BMD	Discussion with Bangladesh Telecommunication Regulatory Commission (BTRC)	Study for Unit Price of Construction Materials, Data Collection	Discussion with BMD
17	9 Apr	Wed		Discussion with BMD, Site Survey at Existing Dhaka Radar Observation Station (IDB)	Discussion with BMD, Site Survey at Existing Dhaka Radar Observation Station (IDB)	Discussion with Bangladesh Telecommunications Company Ltd. (BTCL)	Study for Unit Price of Construction Materials, Data Collection	Discussion with BMD
18	10 Apr	Thu	Finalization of Minutes of Discussions, Report to JICA Bangladesh Office	Finalization of Minutes of Discussions, Report to JICA Bangladesh Office Dhaka→Singapore	Finalization of Minutes of Discussions, Report to JICA Bangladesh Office	Discussion with BMD, Discussion with Bangladesh Telecommunications Company Ltd. (BTCL)	Discussion with BMD, Study for Transportation	Finalization of Minutes of Discussions, Report to JICA Bangladesh Office
19	11 Apr	Fri		Singapore→Tokyo		Site Survey at Rangpur Meteorological Radar Observation Station		Data Collection at BMD Storm Warning Centre (SWC)
20	12 Apr	Sat				Site Survey at Rangpur Meteorological Radar Observation Station, Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station)		Data Collection, Internal Meeting
21	13 Apr	Sun			Discussion with BMD	Study for Unit Price of Construction Materials, Data Collection	Discussion with BMD	Study for Unit Price of Construction Materials, Data Collection
22	14 Apr	Mon			Discussion with Bangladesh Telecommunication Regulatory Commission (BTRC)	Data Collection, Discussion with BMD	Discussion with Bangladesh Telecommunication Regulatory Commission (BTRC)	Discussion with BMD, Study for Transportation
23	15 Apr	Tue			Discussion with BMD		Dhaka→Bangkok	Discussion with BMD
24	16 Apr	Wed			Discussion with BMD		Bangkok→Tokyo	Discussion with BMD
25	17 Apr	Thu			Discussion with BMD			Dhaka→Bangkok
26	18 Apr	Fri			Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station)			Bangkok→Tokyo
27	19 Apr	Sat				Data Collection, Internal Meeting		
28	20 Apr	Sun				Discussion with BMD, Courtesy call on Ministry of Defence (MOD)		
29	21 Apr	Mon				Discussion with BMD		
30	22 Apr	Tue				Discussion with BMD, Report to JICA Bangladesh Office		
31	23 Apr	Wed				Dhaka→Bangkok		
32	24 Apr	Thu				Bangkok→Tokyo		

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Appendix 2. Study Schedule

Preparatory Survey 2

Schedule			JICA Member		Consultant Member		
			Mr. Hiroyuki TOMITA	Mr. Hideaki MATSUMOTO	Mr. Yoshihisa UCHIDA	Mr. Hiroyuki INOMATA	Mr. Yoshiyuki YAGIRI
			Team Leader	Project Planning and Management	Chief Consultant/Project Effect Evaluation/Operation & Maintenance	Meteorological Radar Facility Planning	Natural Conditions Survey
2014							
1	8 Sep	Mon			Tokyo→Bangkok		
2	9 Sep	Tue			Bangkok→Dhaka Discussion with BMD, Discussion with JICA Bangladesh Office		
3	10 Sep	Wed			Discussion with BMD, Explanation of Draft Final Report		
4	11 Sep	Thu		Tokyo→Singapore→Dhaka	Discussion with BMD, Explanation of Draft Final Report		
5	12 Sep	Fri		Site Survey at Rangpur Meteorological Radar Observation Station, Discussion with Rangpur City Corporation, Discussion with Power Development Board (Rangpur)	Site Survey at Rangpur Meteorological Radar Observation Station, Discussion with Rangpur City Corporation, Discussion with Power Development Board (Rangpur)		Tokyo→Bangkok
6	13 Sep	Sat		Site Survey at Rangpur Meteorological Radar Observation Station, Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station), Discussion with Gazipur City Corporation	Site Survey at Rangpur Meteorological Radar Observation Station, Site Survey at Joydevpur (Dhaka Meteorological Radar Observation Station), Discussion with Gazipur City Corporation		Bangkok→Dhaka
7	14 Sep	Sun	Discussion about Minutes of Discussion with BMD, Explanation of Draft Final Report, Finalization of Minutes of Discussions with BMD, Discussion with Power Development Board (Dhaka Head Office)		Discussion about Minutes of Discussion with BMD, Explanation of Draft Final Report, Finalization of Minutes of Discussions with BMD, Discussion with Power Development Board (Dhaka Head Office)		Data Collection at BMD Storm Warning Centre (SWC)
8	15 Sep	Mon	Discussions with BMD, Discussion with Ministry of Defence, Discussion with Rajdhani Unnayan Kartripakkha: RAJUK (Capital City Development Authority)		Discussions with BMD, Discussion with Ministry of Defence, Discussion with Rajdhani Unnayan Kartripakkha: RAJUK (Capital City Development Authority)		Data Collection at BMD Storm Warning Centre (SWC)
9	16 Sep	Tue	Discussions with BMD, Discussion with Local Government Division, Ministry of Local Government, Rural Development & Cooperation		Discussions with BMD, Discussion with Local Government Division, Ministry of Local Government, Rural Development & Cooperation		Data Collection at BMD Storm Warning Centre (SWC)
10	17 Sep	Wed	Discussions with BMD, Report to Embassy of Japan and JICA Bangladesh Office Dhaka→Singapore		Discussions with BMD, Report to Embassy of Japan and JICA Bangladesh Office, Data Collection, Discussion with BMD		Data Collection at BMD Storm Warning Centre (SWC)
11	18 Sep	Thu		Singapore→Tokyo	Dhaka→Bangkok		Data Collection, Discussion with BMD
12	19 Sep	Fri			Bangkok→Tokyo		Data Collection
13	20 Sep	Sat					Data Collection
14	21 Sep	Sun					Data Collection, Discussion with BMD
15	22 Sep	Mon					Dhaka→Bangkok
16	23 Sep	Tue					Bangkok→Tokyo

Appendix 3. List of Parties Concerned in the Recipient Country

- **Ministry of Defense (MOD)**

Mr. Kazi Habibul Awal	Secretary
Mr. Md. Moazzem Hossain	Joint Secretary
Mr. Md. Shamimuzzaman	Senior Assistant Chief

- **Local Government Division, Ministry of Local Government, Rural Development & Cooperation**

Mr. Ashoke Madhab Roy	Additional Secretary
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- **Bangladesh Meteorological Department (BMD)**

Dhaka Head Office

Mr. Md. Shah Alam	Director
Mr. Shamsuddin Ahamed	Deputy Director (Storm Warning Centre)
Mr. Md. Muzammel Haque Tarafder	Deputy Director (Engineering)
Mr. Ahmed Arif Rashid	Senior Mechanical Engineer (Planning Division)
Mr. Md. Abdul Matin	Senior Communication Engineer (Storm Warning Centre)
Ms. Ayesha Khatun	Assistant Director (Storm Warning Centre)
Mr. S.M. Mahmudul Huq	Meteorologist (Storm Warning Centre)
Mr. Md. Shadekul Alam	Meteorologist (Storm Warning Centre)
Mr. S.M. Quamrul Hassan	Meteorologist (Storm Warning Centre)
Mr. Md. Rashaduzzaman	Meteorologist (Storm Warning Centre)
Mr. Md. Abdur Rahman Khan	Meteorologist (Storm Warning Centre)
Mr. Md. Bazlur Rashid	Meteorologist (Storm Warning Centre)
Mr. Md. Abul Kalam Mallik	Meteorologist (Storm Warning Centre)
Ms. Taslima Imam	Meteorologist (International Meteorological Division)
Ms. Nawma Batem	Meteorologist (Climate Division)
Mr. Md. Akram Hossain	Meteorological Assistant (Climate Division)
Mr. Debashish Chakraborty	Senior Observer (Climate Division)

Dhaka Meteorological Radar Observation Station

Mr. Md. Abdul Hannan	Assistant Electronic Engineer
Mr. Md. Jasim Uddin	Electronic Assistant

Rangpur Meteorological Radar Observation Station

Mr. Md. Atikur Rahman	Meteorologist
Mr. Mohammed Ali	Electronic Assistant
Mr. Abdus Subhan	Electronic Assistant
Mr. Nurunnabi Paiker	Electronic Assistant
Mr. Nur Mohammed	Electronic Assistant
Mr. Md. Mozaharul Islam	Mechanic-II

Mr. Md. Mahaful Islam

Mechanic-II

Joydebpur Agro-Meteorological Observatory

Mr. Md. Jalal Uddin

Assistant

BMD Meteorological Briefing Room in Hazrat Shah Jalal International Airport (Dhaka)

Mr. Md. Abdur Rahman

Assistant Director

Mr. Md. Nurul Karim

Meteorologist

- **Bangladesh Telecommunications Company Limited (BTCL)**

Mr. Md. Shafique Hossain Siddique

Divisional Engineer (Telex & Technical)

Mr. Abu Zafar Md. Ahasanul Hoque

Assistant Divisional Engineer (ITMC)

- **Bangladesh Telecommunication Regulatory Commission (BTRC)**

Mr. M.A. Taleb Hossain

Director (Licensing)

- **Gazipur City Corporation**

Mr. Md. Akbar Hossain

Superintending Engineer (Acting Chief Engineer)

Mr. Kabir Al Asad

Chief Conservancy Officer

Mr. A. B. M. Siddiqur Rahaman

Executive Engineer

Mr. Md. Abdul Matin

Executive Engineer

AKM Harunur Rashid

Executive Engineer

Mr. Md. Ashraf Hossain

Assistant Engineer

Mr. Md. Moinul Islam

Town Planner

- **Rangpur City Corporation**

Mr. Md. Ruhul Amin Khan

Chief Executive Officer (Deputy Secretary)

Mr. Md. Emdad Hossain

Superintending Engineer

Mr. Md. Azam Ali

Executive Engineer

Mr. Md. Ruhul Amin Khan

Executive Officer

Mr. Nazrul Islam

Town Planner

- **Power Development Board (Dhaka Head Office)**

Mr. K. M. Hassan

Member (Distribution)

- **Power Development Board (Rangpur)**

Mr. Z. M. Golam Mahboob

Executive Engineer, Sale and Distribution-1

- **Rajdhani Unnayan Kartripakkha: RAJUK (Capital City Development Authority)**

Mr. Sheikh Abdul Mannan

Member (Planning), Joint Secretary

Mr. Md. Ashraf Islam

Deputy Director (Town Planning)

Appendix4-1. Minutes of Discussions

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROJECT FOR ESTABLISHMENT OF METEOROLOGICAL RADAR SYSTEM
IN
DHAKA AND RANGPUR
IN
THE PEOPLE'S REPUBLIC OF BANGLADESH

In response to a request from the Government of the People's Republic of Bangladesh (hereinafter referred to as "Bangladesh"), the Government of Japan decided to conduct the Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Establishment of Meteorological Radar Systems in Dhaka and Rangpur (hereinafter referred to as "the Project") and entrusted the Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Hiroyuki Tomita, Senior Representative of the JICA Bangladesh Office, and was scheduled to stay in the country from March 25th to April 23rd 2014.

The Team held discussions with the officials concerned of the Government of Bangladesh and conducted a field survey at the Survey areas.

In the course of discussions and field survey, both parties confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Preparatory Survey Report.

Dhaka, June 2nd, 2014

Hiroyuki Tomita
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Mahbubur Rahman
Deputy Secretary
Economic Relations Division
Ministry of Finance
The People's Republic of Bangladesh

Md. Shah Alam
Director
Bangladesh Meteorological Department
The People's Republic of Bangladesh

Md. Shamimuzzaman
Senior Assistant Chief
Ministry of Defence
The People's Republic of Bangladesh

ATTACHMENT

1. Objective of the Project

Both sides agreed that the objective of the Project is to improve and strengthen the capabilities of forecasting and issuance of warnings for severe meteorological phenomena by establishment of the meteorological radar system in Dhaka and Rangpur.

2. Contents of the Inception Report

The Team submitted and explained the Inception Report to the Bangladesh Meteorological Department (hereinafter referred to as "BMD"). BMD agreed and accepted the contents of the Inception Report.

3. Project Title

Both sides agreed to the Project Title as "the Project for Establishment of Meteorological Radar Systems in Dhaka and Rangpur".

4. Project Sites

Both sides confirmed that the project sites are Capital & Suburb Territory Radar Observation Station in Joydevpur (hereinafter referred to as "Joydevpur"), BMD Rangpur Observatory (hereinafter referred to as "Rangpur"), Storm Warning Centre of BMD Head Office in Dhaka (hereinafter referred to as "SWC") and Dhaka International Airport. The locations of the sites are shown in Annex 1.

5. Items requested by BMD

Through discussions between the Team and BMD, the requested components were confirmed as shown in Annex 2.

6. Responsible and Implementing Agency

The responsible and implementing agencies for the Project are as follows.

Responsible Agency: Ministry of Defence (MoD)

Implementing Agency: Bangladesh Meteorological Department (BMD)

The Organization Chart is shown in Annex 3.

Both sides agreed that BMD will assign "Project Director" who has ample experience with the Japan's Grant Aid Project and the Technical Cooperation Project between JICA and BMD for smooth implementation of the Project until completion of the Project.

7. Japan's Grant Aid Scheme

7-1 The Bangladesh side understood the Japan's Grant Aid Scheme explained by the Team, as described in Annex 4. The Bangladesh side also understood the procedures of the Japan's

Grant Aid from the application of a request to follow-up of the Project as illustrated in Annex 5.

7-2 The Bangladesh side will take the necessary measures, as described in Annex 6, for smooth implementation of the Project, as the condition for the Japan's Grant Aid to be implemented.

8. Schedule of the Survey

8-1 The Team will proceed for further surveys in Bangladesh until the end of April 2014.

8-2 Based on the Survey, the Team will conduct analysis in Japan such as designing, cost estimation, etc. until the end of August 2014.

8-3 Based on a result of the Survey, the Team will prepare the draft preparatory survey report in English and dispatch a mission in order to explain its contents to the Bangladesh side in September 2014.

8-4 Based on a result of the Survey, the Team will finalize the report and send it to the Bangladesh side around January 2015.

9. Undertakings to be taken by the Bangladesh side

Both sides confirmed that the Bangladesh side shall complete the following undertakings shown in accordance with the implementation schedule of the Project;

- (1) To provide the Team with available relevant data, information and materials necessary for the execution of the Survey;
- (2) To provide furnished rooms with computers, photocopies and internet facilities for the Team;
- (3) To prepare the answers for the Questionnaire presented by the Team;
- (4) To assign full-time counterparts to the Team during their stay in Bangladesh, to play the following roles as the coordinator to the Team;
 - To make the appointments, set up the meetings with the authorities, departments and all other organizations whatever the Team intends to visit.
 - To attend all the site surveys and any other visiting place with the Team and to make any convenience on accommodation, working room, adequate transportation, getting the permissions if required, etc.
 - To assist and to advise the Team for their collection of data and information as much as possible.
- (5) To take any measures deemed necessary to secure the safety of the members of the Team;
- (6) To ensure necessary budget for the estimated cost as follows for smooth implementation of the Project.
 - To handle duty (Tax) exemption procedures (payment of Custom Duty Value Added Tax: CDVAT), provide requisite legal and/or administrative documentations for customs clearance to customs broker/forwarder to be employed by the Contractor and make payment of all demurrage and internal transportation (if required) required at the port of disembarkation for the materials and equipment imported for the Project.

- To exempt goods of Japanese and other foreign nationals from internal taxes (VAT) and other fiscal levies which may be imposed by the Government of Bangladesh with respect to their supply (products) and services under the signed contracts.
 - To obtain necessary permissions from the relevant agencies for the construction of the Radar Tower Buildings in the Joydevpur and Rangpur Radar Observation Stations.
 - To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) along with electric poles/wires, etc. from the main supply line to the proposed site for the Joydevpur and Rangpur Radar Tower Buildings before installation of equipment.
 - To install the required step-down transformer as well as service entrance connections for the commercial power supply at Joydevpur and Rangpur Radar Tower Buildings before installation of equipment.
 - To obtain the required frequency for Joydevpur meteorological radar system (the existing frequency of Rangpur meteorological radar system is utilized for a new radar system) by end of December 2014.
 - To obtain the required VSAT user license from the Bangladesh Telecommunication Regulatory Commission (BTRC) for the use of satellite communication for the meteorological data satellite communication system (VSAT) to be installed by end of December 2014.
 - To establish the Internet Protocol Virtual Private Network (IP/VPN) between the BMD Storm Warning Centre (SWC) and the Joydevpur Radar Observation Station as a backup data communication link before installation of equipment.
 - To ensure transport for the counterparts and to shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, accommodation, etc.
- (7) To ensure necessary staff shown in Annex 7 for Joydevpur and Rangpur Meteorological Radar Observation Stations.

10. Other relevant issues

10-1 Environmental and Social Considerations

The Bangladesh side promised to clear necessary procedures for environmental and social considerations and obtain a necessary approval by relevant authorities before commencement of the procurement in accordance with the relevant guidelines in Bangladesh, including Environmental Impact Assessment (EIA), if required.

10-2 Necessary Budget and Adequate Number of Specialized Staff for Operation and Maintenance

Necessary budget and adequate number of specialized staff for operation and maintenance of the Project after the completion of the Project will be estimated through the Survey. The Bangladesh side promised to ensure necessary budget and staff for proper operation and maintenance.

10-3 Confidentiality of the Project

The Team explained that the preparatory survey report to be prepared at the end of the Survey shall be disclosed to the public in principle in Japan. However, the Team also explained that a confidential part which might affect bidding process such as cost estimation should be kept undisclosed until the bidding has been completed.

10-4 Tax Exemption

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in Bangladesh which is to be arisen from the Project activities shall be ensured by BMD. BMD shall take procedures necessary for tax exemption at their responsibility, or keep budget to reimburse upon VAT receipts.

10-5 Approval of the Executive Committee for the National Economic Council (ECNEC)

For allocation of the required budget above, the Project Proposals (Technical Project Proposal and Development Project Proposal) for the Project to be prepared by the BMD and to submit through the Ministry of Defence so that the Project Proposals shall be approved by the Competent Authorities / ECNEC prior to the commencement of the Project.

10-6 Government Registration

After the completion of the Project, the BMD shall apply to the authorities to register all of the equipment and facilities of the project as government property for a budget (to cover operations, maintenance and salary expenses) to be included in the Government budget.

- Annex 1: Project Sites
- Annex 2: Items Requested by BMD
- Annex 3: Organization Chart of BMD
- Annex 4: JAPAN'S GRANT AID
- Annex 5: Flow Chart of JAPAN'S GRANT AID Procedure
- Annex 6: Major Undertakings to be taken by Each Government
- Annex 7: Necessary Staff for Joydevpur and Rangpur



Project Sites



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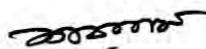
Items Requested by BMD

Table: Items requested by BMD

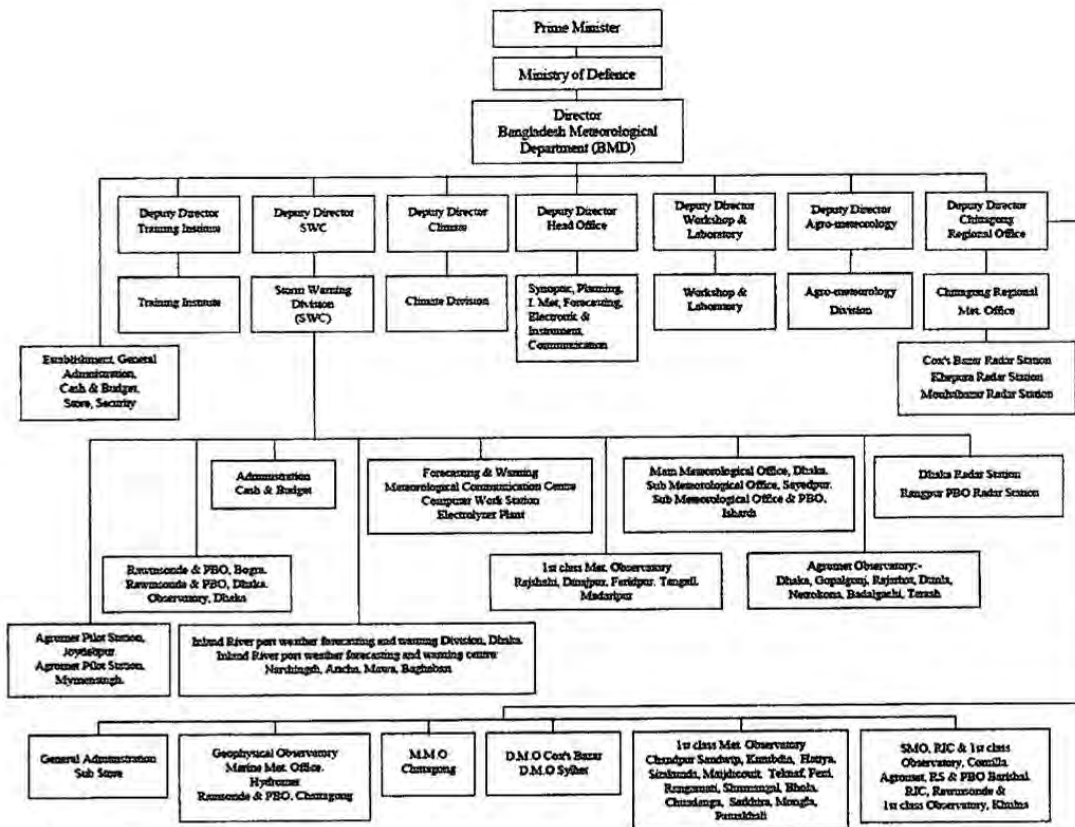
Component / Site	SWC	Joydevpur (New Dhaka Radar Observation Station)	Rangpur	Dhaka International Airport *
Procurement and Installation of Equipment				
S-Band Doppler Pulse Compression Solid State Radar System including Isolation Transformer, Power Supply Capacitor, Power Back-up System, Lightning System Measuring Equipment and Spare Parts	-	1	1	-
Meteorological Rader Data Display System	2	1	1	1
Meteorological Data Satellite Communication System (VSAT)	-	1	-	-
Modification of the existing Meteorological Data Satellite Communication System (Hub VSAT System)	1	-	-	-
Construction of Radar Tower Building				
Radar Tower Building	-	1	1	-

* Hazrat Shah Jalal International Airport, Dhaka






Organization Chart of BMD



- D.M.O : Dependent Meteorological Office
- SMO : Supplementary Meteorological Office
- RIC : Regional Inspection Centre
- PBO : Pilot Balloon Observatory
- RS : Regional Station

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JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as “the GOJ”) is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and 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. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

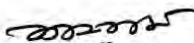
- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as “the G/A”)
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document 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 country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme 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 a outline design of the Project.
- Estimation of costs of the Project.



The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever 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 organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered 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 appropriateness of the Project.

3. Japan's Grant Aid Scheme

(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 country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

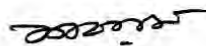
In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.



(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

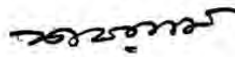
b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

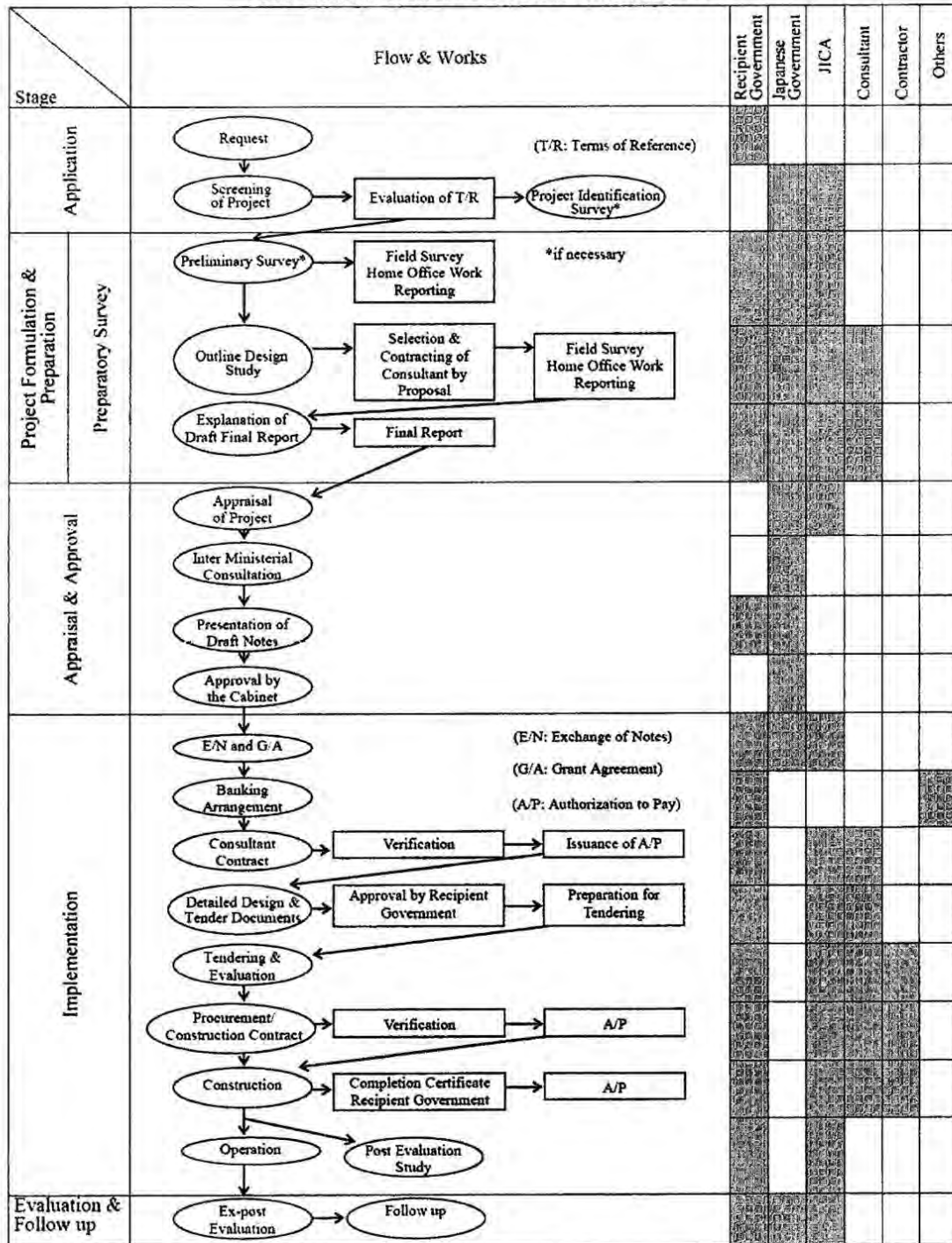
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.



Flow Chart of JAPAN'S GRANT AID Procedure



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Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure necessary land for the implementation of the Project and to clear the sites		●
2	To construct the following facilities		
	i) The building	●	
	ii) The gates and fences in and around the sites		●
	iii) The parking lot	●	
	iv) The road within the site	●	
	v) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	i) Electricity		
	a. The distributing power line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	ii) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	iii) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
	iv) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	v) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	vi) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country		
	i) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	ii) Internal transportation from the port of disembarkation to the project site	(●)	(●)*
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
6	To accord Japanese physical persons and / or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	i) Advising commission of A/P		●
	ii) Payment commission		●
10	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

* Internal transportation to the sites where Japanese nationals cannot enter due to the security situation would be covered by the Bangladesh Side.

Annex 7

Necessary Staff for Joydevpur and Rangpur

Table: Current and Required Number of Staff after the Project Completion

Engineers/Staff	Current Man Power	Proposed Man Power	Current Man Power	Proposed Man Power
	Existing Dhaka Meteorological Radar Observation Station	Dhaka (Joydepur) Meteorological Radar Observation Station	Existing Rangpur Meteorological Radar Observation Station	Rangpur Meteorological Radar Observation Station
Senior Electronic Engineer	0	1	0	1
Electronic Engineer	0	1	0	1
Assistant Electronic Engineer	2	2	1	2
Assistant Communication Engineer	0	1	0	1
Assistant Meteorologist	0	1	0	1
Electronic Assistant	6	6	3	6
Foreman	0	1	0	1
Mechanic- II	2	2	0	2
MLSS (Peon)	1	1	0	1
Guard	4	5	4	5
Gardener	0	1	0	1
Sweeper	0	1	0	1
Total	15	23	8	23

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Appendix4-2. Minutes of Discussions


MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY
ON THE PROJECT FOR ESTABLISHMENT OF METEOROLOGICAL RADAR
SYSTEM IN DHAKA AND RANGPUR
IN THE PEOPLE'S REPUBLIC OF BANGLADESH

In response to a request from the Government of the People's Republic of Bangladesh (hereinafter referred to as "Bangladesh"), the Government of Japan decided to conduct the Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Establishment of Meteorological Radar Systems in Dhaka and Rangpur (hereinafter referred to as "the Project") and entrusted the survey to Japan International Cooperation Agency (hereinafter referred to as "JICA"). JICA sent the Preparatory Survey Team for the Inception Report, which is headed by Mr. Hiroyuki Tomita, Senior Representative of JICA Bangladesh Office, from March 25 to April 23, 2014. The said Preparatory Survey Team held discussions with the officials concerned of the Bangladesh and conducted a field survey at the survey area. In the course of discussions and field survey, both parties confirmed the main items and the Minutes of Discussions signed on June 2, 2014.

According to the Minutes of Discussions above, JICA conducted series of field survey and discussion among related organizations, and finally prepared the draft report of the Survey. In order to explain and consult with Bangladesh Meteorological Department (hereinafter referred to as "BMD") on the components of the draft report, JICA sent the Draft Report Explanation Team (hereinafter referred to as "the Team"), headed by Mr. Hiroyuki Tomita, Senior Representative of JICA Bangladesh Office JICA from September 9 to 22, 2014.

As a result of the discussions, both parties confirmed the items described on the attached sheets.

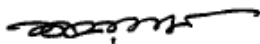
Dhaka, September 25, 2014



Hiroyuki Tomita
Leader
Preparatory Survey Team
Japan International Cooperation Agency



Monoranjan Biswas
Deputy Secretary
Economic Relations Division
Ministry of Finance
The People's Republic of Bangladesh



Md. Shah Alam
Director
Bangladesh Meteorological Department
The People's Republic of Bangladesh



Md. Shamimuzzaman
Senior Assistant Chief
Ministry of Defence
The People's Republic of Bangladesh

ATTACHMENT

1. Components of the Draft Report

BMD agreed and accepted in principle the components of the Draft Report explained by the Team. The components of the Project are shown in Annex-1. JICA will finalize the Final Report according to the comments from BMD.

2. Tentative Schedule of the Project

The Team explained and BMD agreed the tentative implementation schedule as shown in Annex-2.

3. Confidentiality of the Project

3-1 Detailed Specifications

Both sides confirmed all the information related to the Project including technical specifications and drawings and other technical information shall not be released to any other party(ies) before the signing of all the Contract(s) for the Project.

3-2 Project Cost Estimate

The Team explained the estimated project cost to be borne by the Government of Japan as attached in Annex-3

BMD agreed to allocate necessary budget in order to bear requested undertakings as shown in Annex-3 and Annex-4. The Team also explained that these cost estimations are subject to change since they are provisional and need to be examined further.

Both sides agreed that the Project Cost Estimate should never be duplicated in any form nor disclosed to any other part(ies) before the signing of all the Contract(s) for the Project. This confidentiality of the estimated project cost is necessary to ensure fairness of the tender procedure.

4. Undertakings by Bangladesh

Both sides confirmed that following necessary measures as well as measures mentioned in Annex-4 shall be undertaken by BMD for the implementation of the Project.

5. Confirmation of the issues discussed at the last mission

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5-1 Necessary permissions construction of the Radar Tower Buildings

Both sides confirmed that the Bangladesh side shall obtain necessary permissions from the relevant agencies for the construction of the Radar Tower Buildings in the Dhaka (Joydevpur) and Rangpur Radar Observation Stations before signing of the Contract.

5-2 Power supply for the Radar Tower Buildings

Both sides confirmed that the Bangladesh side shall arrange the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) along with a step-down transformer as well as service entrance connections, electric poles/wires, a power meter, etc. required for operation of the Dhaka (Joydevpur) and Rangpur Radar Tower Buildings from the main power grid to the Dhaka (Joydevpur) and Rangpur Radar Observation Stations before the commencement of the equipment installation work.

5-3 Frequency for the Meteorological Radar Systems

Both sides confirmed that the existing frequency of the Dhaka (Joydevpur) and Rangpur meteorological radar system will be utilized to new radar system. BMD agreed to complete all the required procedures in Bangladesh by the finalization of the tender documents.



5-4 VSAT user license

Both sides confirmed that Bangladesh side shall obtain the required satellite communication (Very Small Aperture Terminal: VSAT) system user license of the Bangladesh Telecommunication Regulatory Commission (BTRC) and space segment for the VSAT at BMD Dhaka (Joydevpur) Radar Observation Station by the commencement of the equipment installation work.

5-5 Internet Protocol Virtual Private Network (IP/VPN): Digital Data Network (DDN)

Both sides confirmed that the Bangladesh side shall establish the Digital Data Network (DDN) between BMD Storm Warning Centre (SWC) and the Dhaka (Joydevpur) Radar Observation Station as a backup data communication link by the commencement of the equipment installation work. In addition, Bangladesh side agreed to upgrade the data transmission speed of 64kbps to 128kbps for the existing DDN between the SWC at BMD Head Office and BMD Meteorological Briefing Room in the Hazrat Shah Jalal International Airport (Dhaka) by the commencement of the equipment installation work.

5-6 Staff arrangement

 2   

The Team strongly recommended upgrading the Electronic and Instrument Division and establishing the central control and overall maintenance of the radar network (5 meteorological radar observation systems) and remote weather monitoring equipment such as automatic weather observation system & rain gauge, etc. by the responsible personnel of the Electronic and Instrument Division in accordance with Annex-5.

In addition, the Team explained about the required budget and staff for operation and maintenance of the radar tower buildings and the equipment to be supplied under the Project, and the Bangladesh side agreed to ensure the required budget and staff for the Dhaka (Joydevpur) and Rangpur Meteorological Radar Observation Stations.

5-7 Environmental and Social Considerations

The Bangladesh side explained that there is no necessary procedure for environmental and social considerations to the Project.

5-8 Tax Exemption

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in Bangladesh which is to be arisen from the Project activities shall be ensured by BMD. BMD promised to take procedures necessary for tax exemption at their responsibility, or keep budget to reimburse upon VAT receipts.

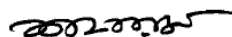
5-9 Schedule of the Project and Approval of the Executive Committee for the National Economic Council (ECNEC)

The Team explained that cabinet approval for the part of detail design will be scheduled in December 2014 and the part of construction, equipment, supervision and soft component will be scheduled in April 2015.

The Bangladesh side promised that the Project Proposals (Technical Project Proposal: TPP and Development Project Proposal: DPP) for the Project shall be prepared by BMD and submitted through the Ministry of Defence so that the Project Proposals shall be approved by the Competent Authorities/ECNEC prior to the commencement of the Project.

5-10 Government Registration

After the completion of the Project, BMD shall apply to the authorities to register all of the equipment and facilities of the project as government property for a budget (to cover operations, maintenance and salary expenses) to be included in the Government budget.

 3







6. Height Restriction of Building

The Team strongly recommended that BMD shall request RAJUK, Rangpur City Corporation and Gajipur City Corporation for considering the construction height up to 12 storied buildings within 5 km radius from the radar tower in order to ensure appropriate radar observation.

In addition, if required, BMD shall request the respective ministries through the Ministry of Defence to resolve the issues.

- Annex-1: Components of the Project
- Annex-2: Tentative Implementation Schedule
- Annex-3: Project Cost Estimation
- Annex-4: Major Undertakings to be taken by Government of Bangladesh
- Annex-5: Necessary Staff for the Electronic and Instrument Division

Related Document to the Minutes of Discussions: Draft Report of the Preparatory Survey

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Components of the Project

Table : Components of the Project

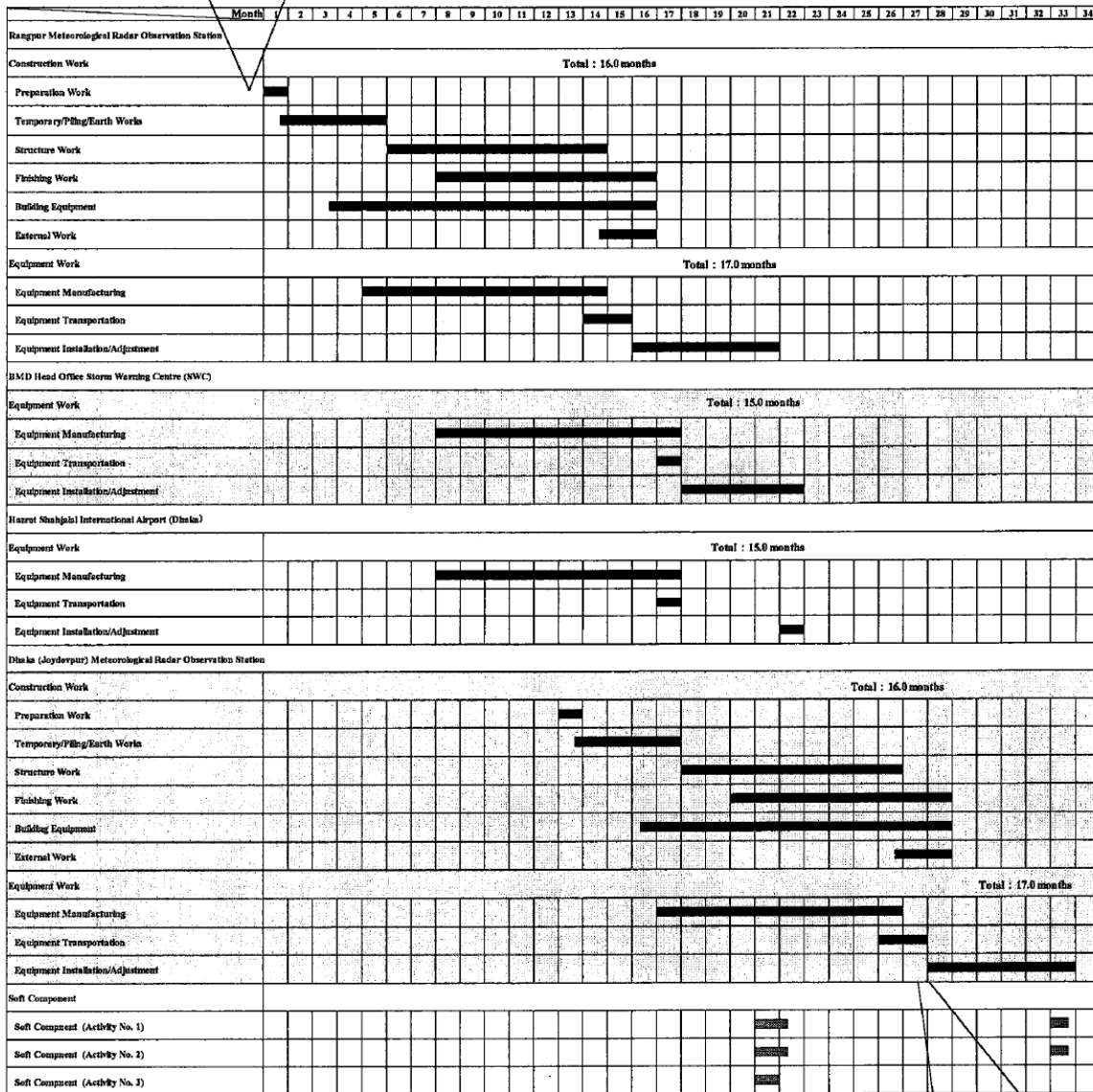
Component	BMD Joydevpur Observatory (Dhaka Radar Observation Station)	BMD Rangpur Observatory (Rangpur Radar Observation Station)	Storm Warning Centre (SWC) at BMD Head Office	BMD Meteorological Briefing Room in Hazrat Shah Jalal International Airport (Dhaka)
Procurement and Installation of Equipment				
S-Band Doppler Pulse Compression Solid State Radar System including Isolation Transformer, Power Supply Capacitor, Power Back-up System, Lightning System Measuring Equipment and Spare Parts	1	1	-	-
Meteorological Radar Data Display System	1	1	1	1
Meteorological Data Satellite Communication System (VSAT)	1	1	-	-
Modification of the existing Meteorological Data Satellite Communication System (Hub VSAT System)	-	-	1	-
Construction of Radar Tower Building				
Radar Tower Building	1	1	-	-
Technical Training	Initial operation guidance in the contract of manufacturer			
Soft Component				




Tentative Implementation Schedule

Dead Line of Frequency for the Meteorological Radar Systems: by the finalization of the tender documents

Dead Line of Permissions Construction of the Radar Tower Buildings: before signing of the Contract



Dead Line of Power supply for the Radar Tower Buildings: before the commencement of the equipment installation work

Dead Line of VSAT user license: by the commencement of the equipment installation work

Dead Line of Establishment of the Digital Data Network (DDN): by the commencement of the equipment installation work

Annex-2 - 1

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Project Cost Estimation

1. Project Cost to be borne by Japan's Grant Aid

This item is closed due to confidentiality

2. Project Cost to be borne by BMD

Total Project Cost: 455,280,000 Taka (approx. 600 Million JP Yen)

Table: Estimated Capital Cost to be borne by BMD

No.	Items	Capital Cost (Taka)
1	To handle duty (Tax) exemption procedures (payment of Custom Duty Value Added Tax : CDVAT), provide requisite legal and/or administrative documentations for customs clearance to customs broker/forwarder to be employed by the Contractor and make payment of all demurrage required at the port of disembarkation for the materials and equipment imported for the Project.	247,100,000 245,600,000 (CDVAT: 30% of the equipment & transport cost) + 1,500,000 (Demurrage)
2	To exempt goods of Japanese and other foreign nationals from internal taxes (VAT) and other fiscal levies which may be imposed by the Government of Bangladesh with respect to their supply (products) and services under the signed contracts.	96,900,000 15% of the Local Portion of the Direct & Indirect Building Construction Cost
3	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.	60,400,000 3% of the Total Project Cost
4	To obtain necessary permissions from the relevant agencies for the construction of the Radar Tower Buildings in the Dhaka (Joydevpur) and Rangpur Radar Observation Stations.	300,000
5	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) along with electric poles/wires, etc. from the main supply line to the proposed site for the Dhaka (Joydevpur) and Rangpur Radar Tower Buildings.	2,000,000
6	To install the required step-down transformer as well as service entrance connections for the commercial power supply at the Dhaka (Joydevpur) and Rangpur Radar Tower Buildings.	10,000,000
7	To provide incidental facilities, such as telephone lines and internet provision, for the Dhaka (Joydevpur) and Rangpur Radar Tower Buildings.	1,500,000
8	To undertake incidental outdoor works such as a guard shed, gardening, fencing, gates, boundary walls of the respective offices and exterior lightings and to renovate the existing building in the Joydevpur Observatory.	22,500,000
9	To renovate the existing gates, boundary walls, exterior lightings and Rangpur radar tower building and to shift the existing observation field in the Rangpur Observatory.	9,000,000

Annex-3 - 1

10	To obtain the required frequency for the Dhaka (Joydevpur) meteorological radar system (the existing frequency of Rangpur meteorological radar system is utilized for a new radar system).	500,000
11	To obtain the required VSAT user license from the BTRC for the use of satellite communication for the meteorological data satellite communication system (VSAT) to be installed.	380,000
12	To establish the Internet Protocol Virtual Private Network (IP-VPN) between the SWC at BMD Head Office and the Joydevpur Radar Observation Station as a backup data communication link.	200,000
13	To ensure transport for BMD personnel and to shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, accommodation, etc.	4,500,000
Total		455,280,000

Applied Exchange Rate: US\$ 1 = 103.76 JP Yen, 1 Taka = 1.32 JP Yen

3. Recurrent Cost to be borne by BMD

Table: Recurrent Cost of Dhaka (Joydevpur) Meteorological Radar Observation

Recurrent Cost of Dhaka (Joydevpur) Meteorological Radar Observation Station

Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks	
1	Antenna	Cross (16kg/cm. For AZ/EL)	1	0	0	0	0	18,300	0	0	0	0	21,300	Every 5 years
		Tuning bolt (For AZ/EL)	2	0	0	0	0	0	0	0	16,800	0	0	Every 8 years
2	Antenna controller	AC fan	3	0	0	0	0	0	0	0	0	45,200	0	Every 10 years
3	Transmitter	AC fan	36	0	0	0	0	0	0	0	0	0	361,700	Every 10 years
4	Receiver	AC fan	3	0	0	0	0	0	0	0	0	45,200	0	Every 10 years
5	Product Modem	CD for data storage (30kbytes/lot)	2	2,900	3,100	3,200	3,400	3,500	3,700	3,900	4,100	4,300	4,500	
6	Printer	Printer ink cartridge	2	5,200	5,500	5,800	6,100	6,400	6,700	7,000	7,400	7,700	8,100	
		Paper (50kbytes/lot)	4	1,300	1,500	1,300	1,400	1,500	1,500	1,600	1,700	1,800	1,900	
7	Power Supply Capacitor	AC fan	3	0	0	0	0	0	0	0	0	0	45,200	Every 10 years
		Asseter	6	0	0	0	0	0	0	0	0	0	104,300	Every 10 years
8	Diesel Engine Generator	Oil seal	2	0	3,000	3,100	3,200	3,300	3,400	3,500	4,000	4,200	4,400	Every 1 year
		Filter	2	0	0	11,500	0	12,700	0	14,000	0	15,500	0	Every 3 years
		Battery for engine start	2	0	0	0	0	0	15,200	0	0	0	18,600	Every 3 years
Sub total (BDT)			9,300	12,900	24,900	14,200	45,800	30,800	30,300	34,000	33,500	662,300		

Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks	
1	Electricity charge		652,762	683,400	719,670	751,654	793,436	833,118	874,764	918,502	966,427	1,011,648	*1	
2	Fuel cost	Fuel consumption of DEO	124,938	131,185	137,744	144,631	151,883	159,456	167,429	175,800	184,590	193,810	*2	
3	Water supply charge		0	0	0	0	0	0	0	0	0	0	*3	
4	Special maintenance	System break-up by manufacturer's engineer	1	0	0	516,800	0	0	667,700	0	0	773,000	*4	
5	Radeco	Cracking repair	1	16,400	17,300	18,100	19,000	20,000	21,000	22,000	23,100	24,300	25,500	
6	Post-control	Estimating verification	1	14,800	15,500	16,300	17,100	18,000	18,900	19,800	20,800	21,900	23,000	
Sub total (BDT)			824,900	849,385	1,468,614	896,385	963,299	1,700,164	1,083,993	1,178,200	1,968,217	1,234,968		
Total (BDT)			918,200	962,285	1,493,614	962,685	1,026,099	1,730,964	1,114,293	1,172,200	2,001,717	1,917,268		
Total (JPY)			97,096,215	11,154,131	19,999,349	11,272,577	11,377,643	18,317,221	11,491,691	11,846,213	22,679,676	22,666,424		

Estimate of annual electricity charge

Annual power consumption (kWh) 75,709
 Annual power consumption by commercial power (90%) 68,138
 Annual power consumption by DEO (10%) 7,571
 Annual fuel consumption (Liter) 1,895

Fuel consumption of DEO = 0.25 Liter/kWh

Electrical charges = 0.52 BDT/kWh

Fuel cost = 62.50 BDT/Liter

Exchange rate = 0.947 BDT/JPY

*1 Annual electricity charge of commercial power (BDT) 652,762

*2 Annual fuel cost of DEO (BDT) 124,938

*3 Annual water supply charge (BDT) 0

*4 Inflation: 5% per year considered

Annex-3 - 2

Table: Recurrent Cost of Rangpur Meteorological Radar Observation Station

Recurrent Cost of Rangpur Meteorological Radar Observation Station

Estimated Recurrent Cost														
Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks	
1	Antenna	Cross (16kg/cm, For AZ/EL)	1	0	0	0	0	18,200	0	0	0	0	23,200	Every 5 years
		Timing belt (For AZ/EL)	2	0	0	0	0	0	0	0	0	16,800	0	Every 8 years
2	Antenna controller	AC fan	3	0	0	0	0	0	0	0	0	0	43,200	Every 10 years
3	Transmitter	AC fan	24	0	0	0	0	0	0	0	0	0	361,700	Every 10 years
4	Receiver	AC fan	3	0	0	0	0	0	0	0	0	0	45,200	Every 10 years
5	Product Monitor	CD for data storage (20shots/1set)	2	2,900	3,100	3,200	3,400	3,500	3,700	3,900	4,100	4,300	4,500	
6	Printer	Printer ink cartridge	2	5,200	5,900	5,800	6,100	6,400	6,700	7,000	7,400	7,700	8,100	
		Paper (500sheets/1set)	4	1,200	1,300	1,300	1,400	1,500	1,500	1,600	1,600	1,700	1,800	
7	Power Supply Capacitor	AC fan	3	0	0	0	0	0	0	0	0	0	45,200	Every 10 years
		Arrestor	6	0	0	0	0	0	0	0	0	0	104,300	Every 10 years
8	Diesel Engine Generator	Oil seal	2	0	3,000	3,100	3,300	3,500	3,600	3,800	4,000	4,200	4,400	Every 1 year
		Filter	2	0	0	11,500	0	12,700	0	14,000	0	15,500	0	Every 2 years
		Battery for Engine start	2	0	0	0	0	0	15,300	0	0	0	18,600	Every 5 years
Sub total (BDT)				9,300	12,900	24,900	14,200	45,800	30,800	30,300	34,000	33,500	662,300	

Others													
Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1	Electricity Charge		589,017	618,468	649,391	681,861	715,954	751,752	789,339	828,804	870,244	913,759	*1
2	Fuel cost	Fuel consumption of DEQ	112,728	118,364	124,283	130,497	137,022	143,873	151,066	158,620	166,551	174,878	*2
3	Water supply charge		0	0	0	0	0	0	0	0	0	0	*3
4	Special maintenance	System break-up by manufacturer's engineer	0	0	0	0	0	0	667,700	0	0	773,000	0 For 5 days at site
5	Redone	Caulking repair	16,400	17,300	18,100	19,000	20,000	21,000	22,000	23,100	24,300	25,500	
6	Pest-control	Exterminating vermination	14,800	15,300	16,300	17,100	18,000	18,900	19,800	20,800	21,900	23,000	
Sub total (BDT)			732,945	769,632	1,384,874	848,458	890,976	1,403,225	982,205	1,031,324	1,085,997	1,137,137	
Total (BDT)			742,245	782,832	1,099,774	863,658	934,776	1,634,021	1,012,509	1,064,324	1,089,497	1,790,437	
Total (JPY)			8993,638	91,047,866	91,887,248	91,184,830	91,284,051	92,187,460	91,385,428	91,426,139	92,529,447	92,498,888	

Estimate of annual electricity charge
 Annual power consumption (kWh) 68,316
 Annual power consumption by commercial power (90%) (kWh) 61,484
 Annual power consumption by DEQ (10%) (kWh) 6,832
 Annual fuel consumption (Liter) 1,708

Fuel consumption of DEQ = 0.25 Liter/kWh
 Electrical charges = 9.58 BDT/kWh
 Fuel cost = 66.00 BDT/Liter
 Exchange rate = 0.747 BDT/JPY

*1 Annual electricity charge of commercial power (BDT) 589,017
 *2 Annual fuel cost of DEQ (BDT) 112,728
 *3 Annual water supply charge (BDT) 0
 *4 Inflation: 5%/year considered

Table: Recurrent Cost of BMD Head Office

Recurrent Cost of BMD Head Office

Estimated Recurrent Cost													
Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
Storm Warning Centre (SWC)													
1	Product Monitor	CD for data storage (20shots/1set)	2	2,900	3,100	3,200	3,400	3,500	3,700	3,900	4,100	4,300	4,500
2	Printer	Printer ink cartridge	4	10,500	11,000	11,500	12,100	12,700	13,400	14,000	14,700	15,500	16,200
		Paper (500sheets/1set)	10	3,400	3,500	3,700	3,900	4,100	4,300	4,500	4,700	5,000	5,200
3	Compact UPS	Battery	9	0	0	66,000	0	0	76,400	0	0	88,400	0 Every 3 years
4	3kVA UPS	Battery	1	0	0	123,600	0	0	143,100	0	0	165,600	0 Every 3 years
Meteorological Briefing Room in Hazrat Shahjalal International Airport													
1	Compact UPS	Battery	3	0	0	22,000	0	0	25,500	0	0	29,500	0 Every 3 years
Sub total (BDT)				16,800	17,600	230,000	19,400	20,300	266,400	22,400	23,500	308,300	25,000
Others													
Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1	Electricity Charge		164,738	172,975	181,624	190,705	200,240	210,232	220,763	231,803	243,393	255,363	*1
2	Fuel cost	Fuel consumption of Existing DEQ	14,916	15,662	16,445	17,267	18,130	19,037	19,989	20,988	22,038	23,140	*2
3	Communication charge	IP-VPN, Jopy dopur - Dhaka (SWC)	1	56,400	59,300	62,200	65,300	68,600	72,000	75,600	79,400	83,400	87,500
4	Frequency License Fee	for Joydepur Satellite Communication	1	200,000	210,000	220,500	231,500	243,100	255,300	268,000	281,400	295,500	310,300
Sub total (BDT)			436,054	457,917	480,769	504,772	530,070	556,589	584,354	613,591	644,331	676,503	
Total (BDT)			482,884	478,837	710,769	834,172	880,370	922,989	686,754	637,091	982,631	703,403	
Total (JPY)			6606,230	636,896	9951,098	9791,703	9736,774	91,101,726	9812,284	9852,866	91,275,276	9940,399	

Estimate of annual electricity charge
 Annual power consumption of Storm Warning Centre (SWC) (kWh) 13,608
 Annual power consumption of Meteorological Briefing Room in Hazrat Shahjalal International Airport (kWh) 4,493
 Total annual power consumption (kWh) 18,101
 Annual power consumption by commercial power (95%) (kWh) 17,196
 Annual power consumption by DEQ (5%) (kWh) 965
 Annual fuel consumption (Liter) 226

Fuel consumption of DEQ = 0.25 Liter/kWh
 Electrical charges = 9.58 BDT/kWh
 Fuel cost = 66.00 BDT/Liter
 Exchange rate = 0.747 BDT/JPY

*1 Annual electricity charge of commercial power (BDT) 164,738
 *2 Annual fuel cost of DEQ (BDT) 14,916
 *3 Inflation: 5%/year considered

Annex-3 - 3

Major Undertakings to be taken by Government of Bangladesh



Table: Major Undertakings to be done by BMD under Implementation of the Project

No.	Items
General Items	
1	To undertake all necessary institutional and juridical procedures in Bangladesh.
2	To undertake the Environmental Impact Assessment procedures in Bangladesh, if required.
3	To handle duty (Tax) exemption procedures (payment of Custom Duty Value Added Tax : CDVAT), provide requisite legal and/or administrative documentations for customs clearance to customs broker/forwarder to be employed by the Contractor and make payment of all demurrage required at the port of disembarkation for the materials and equipment imported for the Project.
4	To provide necessary working spaces with Internet Connection at BMD Head Office for the Consultant and the Contractor for the implementation of the Project.
5	To accord Japanese and other foreign nationals including their dependent/s (if any), whose services may be required in connection with the supply of products and services under the signed contracts, such facilities as may be necessary for their entry into Bangladesh and stay therein for the smooth and uninterrupted performance of their work (i.e. to secure the Multiple Visa for more than 1 year including its extension/s required by the recipient country in connection thereof).
6	To exempt goods of Japanese and other foreign nationals from internal taxes (VAT) and other fiscal levies which may be imposed by the Government of Bangladesh with respect to their supply (products) and services under the signed contracts.
7	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.
8	To bear all the expenses, other than those to be borne by the Japan's Grant Aid, necessary for the implementation of the Project.
9	To ensure the security of the whole Project site/s and of the Japanese and other foreign nationals assigned to the Project prior to the commencement of and during Project implementation.
For the Construction of the Radar Tower Buildings	
10	To clear, level and reclaim the land prior to the commencement of construction work.
11	To secure sufficient spaces at the respective Project site/s for temporary facilities such as a contractor's office, workshop, building materials storage, etc. needed for the construction work.
12	To obtain necessary permissions from the relevant agencies for the construction of the Radar Tower Buildings in the Dhaka (Joydevpur) and Rangpur Radar Observation Stations.
13	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) along with electric poles/wires, etc. from the main supply line to the proposed site for the Dhaka (Joydevpur) and Rangpur Radar Tower Buildings.
14	To install the required step-down transformer as well as service entrance connections for the commercial power supply at the Dhaka (Joydevpur) and Rangpur Radar Tower Buildings.
15	To provide incidental facilities, such as water supply, telephone lines and internet provision, for Dhaka (Joydevpur) and Rangpur Radar Tower Buildings.
16	To provide temporary facilities for the availability or accessibility of electricity, water, etc. for the construction work.
17	To undertake incidental outdoor works such as a guard shed, gardening, fencing, gates, boundary walls and exterior lightings and to renovate the existing building in the Joydevpur Observatory.
18	To renovate the existing gates, boundary walls, exterior lightings and Rangpur radar tower building and to shift the existing observation field in the Rangpur Observatory.
19	To ensure transport for BMD personnel and to shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, accommodation, etc.
For Installation Work of the Equipment	
20	To remove and relocate the existing facilities if available for the installation of the equipment, if necessary.
21	To provide and allocate secure temporary storage area/room for the materials, tools and equipment needed during the installation process.

Annex-4 - 1

Handwritten signatures and initials, including a large signature on the left, a smaller signature in the middle, and the number '76' on the right.

22	To obtain the required frequency for the Dhaka (Joydevpur) meteorological radar system (the existing frequency of Rangpur meteorological radar system is utilized for a new radar system).
23	To obtain the required VSAT user license from the Bangladesh Telecommunication Regulatory Commission (BTRC) for the use of satellite communication for the meteorological data satellite communication system (VSAT) to be installed.
24	To ensure the required space segment for the use of satellite communication for the meteorological data satellite communication system (VSAT) at BMD Dhaka (Joydevpur) Radar Observation Station.
25	To establish the Internet Protocol Virtual Private Network (IP/VPN) between the SWC at BMD Head Office and the Joydevpur Radar Observation Station as a backup data communication link.
26	To ensure the data transmission speed of 128kbps for the existing Digital Data Network (DDN) between the SWC at BMD Head Office and BMD Meteorological Briefing Room in the Hazrat Shah Jalal International Airport (Dhaka).
27	To set up new assigned IP addresses in the computing equipment supplied under the Project.
28	To secure ample and strategically located space/s at the existing facilities (the SWC at BMD Head Office and BMD Meteorological Briefing Room in the Hazrat Shah Jalal International Airport (Dhaka)) for the installation of the equipment (PC terminals and peripherals) to be supplied under the Project.
29	To ensure transport for BMD personnel and to shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, accommodation, etc.
After the completion of the Project	
30	To renovate the existing gates, boundary walls and exterior lighting in and around the sites as if and when required.
31	To assign the required staff for the smooth operation and maintenance of the equipment.
32	To procure the required spare parts and consumables for the smooth operation and maintenance of the equipment.
33	To provide adequate maintenance of the Radar Tower Building constructed under the Project so that they may function long lasting and effectively.
34	To properly operate and maintain, and also effectively utilize the facilities constructed and the equipment procured/installed under the Project.
35	To allocate the necessary budget for the smooth conduct of meteorological radar observation and forecasting works.
36	To take necessary steps for creating proposed new posts and recruiting the required man power immediately after the Project Completion.
37	To periodically update all the operation/antivirus/application software(s).



 28.

Annex-4 - 2

Table: Current and Required Number of Staff for the Electronic and Instrument Division after the Project Completion

Engineers/Staff	Current Man Power	Proposed Man Power after the Project Completion
Deputy Director (Electronic and Instrument)	0	1
Senior Electronic Engineer	1	1
Senior Mechanical Engineer	0	1
Electronic Engineer	1	1
Mechanical Engineer	1	1
Assistant Electronic Engineer	1	1
Assistant Communication Engineer	0	1
Assistant Meteorologist	1	1
Electronic Assistant	1	3
Chemist	1	1
Mechanical Assistant	1	1
Senior Observer	1	1
Mechanic- Grad II	1	1
Laboratory Attendant	1	1
MLSS (Peon)	1	1
Total	12	17



 [Signature] 2022/02/15

 [Signature] 26.

Appendix 5 Soft Component Plan

Soft Component Plan

<Background of the Soft Component Plan>

Bangladesh is located in the delta area consisting of three major rivers, the Ganges River, the Brahmaputra River and the Meghna River, and majority of the national land is situated in low-lying areas below altitudes of 10m. The upper river basin of these three major rivers is one of the highest rainfall areas in the world. During the monsoon season, a large amount of rain water, falling in the upper basin, flows into Bangladesh causing extensive floods. Bangladesh is also subject to other meteorological disasters such as storms invading from the northwest, called “Nor’wester,” tornadoes and tropical cyclones approaching from the Bay of Bengal; as a result, the country is considered as one of the most disaster-prone countries in the world. In recent years, the massive flood in 2004 (Estimated total cost: 2.2 billion US dollars) and Cyclone “Sidr” in 2007 (Death and missing: about 140,000 persons, Estimated total cost: 2.3 billion US dollars) caused unimaginable and immense damages in the country which led to a significant setback in the socio-economic activities of the whole country.

There are five meteorological radar systems in Bangladesh established under the grant aid of Japan which are able to monitor meteorological phenomena occurring around the country and in the borders shared with neighboring countries. The Bangladesh Meteorological Department (hereinafter referred to as the “BMD”) prepares weather forecasts/warnings based on the data collected from surface weather observation and upper air observation as well as from these five meteorological radar systems. In order to predict possible disaster risks and adopt the appropriate countermeasures, the timely provision of highly accurate meteorological forecasts/warnings to the public is fundamental. The meteorological radar observation network plays an important role in the realization of this goal.

However, with regard to the existing Dhaka and Rangpur meteorological radar systems, they are dysfunctional or out of operation due to aging as nearly 15 years have passed since their establishment. In addition, the procurement of spare parts from the manufacturer has become difficult. The Dhaka meteorological radar system is still operational with the maintenance, repair and overhaul done by the BMD engineers. However, it cannot fully perform its observation operation capacity since it is now in a critical condition wherein the radar detection area became narrower due to a reduction in transmission power. The Rangpur meteorological radar system, on the other hand, proved to be impossible to resume operation as a result of a re-examination done by the BMD and JICA experts of the Technical Cooperation Project in 2012 despite repeated recovery works.

The Dhaka meteorological radar system, which is located in the center of Bangladesh and is able to cover about 80 % of the national land, plays a major role in disaster prevention in the Dhaka Capital Territory

and the aviation security of the international airport. The role of the Rangpur meteorological radar system is to monitor storms invading from the northwest called Nor'wester and precipitation in the Meghalaya Mountains and the foot of the Himalayan Mountains which results in higher levels of flooding. It is an urgent task to replace both radar systems and develop these facilities since they are extremely important for the mitigation of damages caused by natural disasters in Bangladesh.

Given the situation indicated above, the key objective of the Project is the effective mitigation of the devastation caused by natural disasters through the re-strengthening of the radar observation network of the five meteorological radar systems in Bangladesh through the replacement of the existing Dhaka and Rangpur meteorological radar systems with state-of-the-art S-band Doppler pulse compression solid state radar systems.

Unfortunately, none of the BMD's technical staff have the practical experience in operating a digital meteorological radar system which is planned to be procured under the Project as the existing Dhaka and Rangpur meteorological radar systems are of the analog type. For the smooth operation and maintenance of the digital S-Band Doppler Pulse Compression Solid State Radar Systems, for the dissemination of high accuracy medium range weather forecasts to be prepared through weather guidance to the public, and for the assurance of the required sustainability of the project outcomes, the implementation of the technology transfers in the soft component mentioned below (soft component schedule is indicated in the Implementation Schedule attached hereunder) is required.

<Soft Component Target>

To enable the BMD to independently and appropriately operate the Meteorological Doppler Radar Systems.

<Soft Component Indicators>

Soft Component Indicators are as follows.

Table 1: Soft Component Indicators

No.	Item	Output	Objectively Verifiable Indicators	Means of Verification
1	Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery and Major Fault Countermeasures	Acquisition of technical know-how on appropriate inspection, adjustment, minor fault finding, remedy and recovery.	Inspection, adjustment, minor fault finding, remedy and recovery, and major fault countermeasures (a. routine maintenance using measuring instruments and tools, b. practice of replacing spare parts into the actual system and the subsequent confirmation of system operation, c. practice of remedy, recovery and major fault countermeasures: distributing information to the Consultant and the manufacturer and receiving technical advice) are carried out appropriately by the BMD.	<ul style="list-style-type: none"> Confirmation of proficiency through 1) routine maintenance using measuring instruments and tools; 2) practice of replacing spare parts into the actual system and the subsequent confirmation of system operation; 3) practice of minor fault finding, remedy and recovery; and 4) major fault countermeasures. Technical interviews

2	Prompt and Appropriate Meteorological Doppler Radar Operation and Maintenance utilizing the Meteorological Radar System Manual Summary and the Meteorological Radar System Maintenance & Management Record Book	Technical knowledge acquisition of prompt and appropriate meteorological Doppler radar operation and maintenance	Meteorological Doppler radar operation and maintenance utilizing the meteorological radar system manual summary and the meteorological radar system maintenance & management record book are implemented promptly and appropriately.	<ul style="list-style-type: none"> Evaluation of the frequency of usage of the meteorological Doppler radar system manual summary. Confirmation of indication (daily, weekly, monthly) in the meteorological radar system maintenance & management record book and through technical interviews
3	Meteorological Radar Observation in accordance with the Sequence & Schedule for Intensity Mode and Doppler Mode Sequence & Schedule	Appropriate meteorological radar operation.	Meteorological radar observation is implemented according to the radar observation sequence & schedule for Intensity Mode and Doppler Mode.	Confirmation of meteorological radar observation in accordance with the sequence & schedule for Intensity Mode and Doppler Mode in order to appropriately understand weather phenomena and to utilize the observed radar data for forecast operation.

<Means of Verification for Outputs Achievement>

Means of verification for outputs achievement of the Soft Component are indicated in the Table 1 attached above.

<Scheduled Activities of Soft Component>

Scheduled Activities of Soft Component are as follows.

Table 2: Scheduled Activities of Soft Component

Output	Required Technique and Field	Current Technique and Required Technique Level	Target Group	Means of Implementation	Source of Implementation	Product
1. Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery, and Major Fault Countermeasures	An engineer capable of meteorological radar adjustment and fault finding.	Since engineers in the BMD have practical experience of adjusting and fault finding in an analog meteorological radar system, it is imperative that the BMD engineers should acquire the capability of adjusting and fault finding in a digital meteorological radar system.	Indicated in the table below	Routine maintenance using measuring instruments and tools.	<First> Expert Consultant on meteorological radar adjustment and fault finding: 1.20 man-months. (Period of Technology Transfer in Bangladesh: 36days) Direct Support <Second> Expert Consultant on meteorological radar adjustment and fault finding: 0.77 man-months. (Period of Technology Transfer in Bangladesh: 23days) Direct Support	Manual on routine maintenance using measuring instruments and tools.
				Practice of replacing spare parts into the actual system and the subsequent confirmation of system operation.		Manual on replacing spare parts into the actual system and the subsequent confirmation of system operation.
				Practice of countermeasure, minor fault finding, remedy and recovery.		Manual on fault finding, remedy and recovery.
				Practice of major fault countermeasures.		Manual on major fault countermeasures.
2. Preparation of Meteorological Doppler Radar	An engineer capable of meteorological radar	Since engineers in the BMD have practical experience of operating and	Indicated in the table below	Discussion with the BMD engineers. Selection of the most important points from	<First> Expert Consultant on meteorological radar operation and	Meteorological Doppler radar system manual summary Meteorological radar

System Manual Summary and Meteorological Radar System Maintenance & Management Record Book	operation and maintenance.	maintaining an analog meteorological radar system, it is imperative that the BMD engineers should obtain the capability of operating and maintaining a digital meteorological radar system according to the meteorological Doppler radar system manual summary and the meteorological radar system maintenance & management record book.		the meteorological Doppler radar system manual.	maintenance: 1.20 man-months (Period of Technology Transfer in Bangladesh: 36 days) Direct Support <Second> Expert Consultant on meteorological radar operation and maintenance: 0.77 man-months. (Period of Technology Transfer in Bangladesh: 23 days) Direct Support	system maintenance & management record book → Date and time of occurrence of system failure/trouble → Cause/s of system failure/trouble (abnormal noise, part degradation, etc.) → Repair procedures implemented → Name and quantity of replaced parts → Name of engineer/s who perform/s the repair /troubleshooting
				Production of the meteorological Doppler radar system manual summary.		
				Production of the meteorological radar system maintenance & management record book.		
				Utilization of the meteorological Doppler radar system manual and the meteorological radar system maintenance & management record book by the BMD engineers.		
3. Preparation of the Sequence & Schedule for Intensity Mode and Doppler Mode	An engineer who can identify Clutter and Blind Area by using radar observation data and prepare a sequence & schedule for meteorological radar observation which is suited to the weather phenomena in Bangladesh	Since engineers in the BMD have no practical experience of CAPPI observation due to no CAPPI function in the existing analog meteorological radar system, it is imperative that the BMD engineers should obtain the capability of preparation of sequences & schedules for meteorological radar observation.	Indicated in the table below	Discussion with the BMD engineers and lecture.	Expert Consultant on meteorological radar observation: 1.03 man-month (Period of Technology Transfer in Bangladesh: 31 days) Direct Support	Sequence & Schedule for Intensity Mode and Doppler Mode
				Identification of Clutter of meteorological radar system and Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degrees).		
				Preparation of Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degrees).		
				Preparation of Sequence & Schedule for Intensity Mode and Doppler Mode.		
				Implementation of radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.		

Table 3: Target Personnel in the BMD for the Technology Transfer in the Soft Component (Technology Transfer of No. 1 & 2)

Engineers/Staff	BMD Head Office (including Storm Warning Centre: SWC)	Dhaka (Joydepur) Meteorological Radar Observation Station	Rangpur Meteorological Radar Observation Station
Senior Electronic Engineer	1	0	0
Electronic Engineer	1	0	0
Assistant Electronic Engineer	2	2	1
Assistant Communication Engineer	4	0	0
Electronic Assistant	5	6	3
Foreman	3	0	1
Mechanic- II	3	2	0

Table 4: Target Personnel in the BMD for the Technology Transfer in the Soft Component (Technology Transfer of No. 3)

Engineers/Staff	BMD Head Office	Dhaka (Joydepur)	Rangpur Meteorological
-----------------	-----------------	------------------	------------------------

	(including Storm Warning Centre: SWC)	Meteorological Radar Observation Station	Radar Observation Station
Senior Electronic Engineer	1	0	0
Electronic Engineer	1	0	0
Assistant Meteorologist	10	0	2

Details of each activity schedule are as follows.

<First Activity after the completion of the Rangpur Meteorological Radar System Installation Work>

Table 5: Details of the First Activity Schedule of the Soft Component

	Activity No. 1	Activity No. 2	Activity No. 3	
Date	Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery, and Major Fault Countermeasure	Meteorological Doppler Radar System Manual Summary and Meteorological Radar System Maintenance & Management Record Book	Preparation of Sequence & Schedule for Intensity Mode and Doppler Mode	
1	Departure from Japan	Departure from Japan	Departure from Japan	
2	Arrival in Dhaka Fri.(Holiday)	Arrival in Dhaka Fri.(Holiday)	Arrival in Dhaka Fri.(Holiday)	
3	Dhaka→Rangpur Sat.(Holiday)	Dhaka→Rangpur Sat.(Holiday)	Preparatory Work	
4	Preparatory Work at Rangpur Meteorological Radar Tower Building	Preparatory Work at Rangpur Meteorological Radar Tower Building	Discussion with the forecasters and engineers of the BMD Storm Warning Center (SWC) and lecture.	
5	Practice of routine maintenance using measuring instruments and tools. Production of operation and maintenance manual.	Discussion with the BMD engineers. Selection of the most important points from meteorological Doppler radar system manual.	Identification of Clutter of meteorological radar system and Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degrees).	
6				
7				
8				
9	Fri.(Holiday)	Fri. (Holiday)	Fri. (Holiday)	
10	Sat.(Holiday)	Sat. (Holiday)	Sat. (Holiday)	
11	Production of operation and maintenance manual.	Production of meteorological Doppler radar system manual summary (Draft). Production of meteorological radar system maintenance & management record book (Draft).	Preparation of Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degrees).	
12	Practice of replacement of spare parts to actual system and confirmation of system operation. Production of operation and maintenance manual.		Preparation of Sequence & Schedule for Intensity Mode and Doppler Mode (Draft).	
13			Implementation of radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.	
14			Fri.(Holiday)	Fri. (Holiday)
15				
16	Production of operation and maintenance manual.	Production of meteorological Doppler radar system manual summary (Draft).	Review of Sequence & Schedule for Intensity Mode and Doppler Mode (Draft).	
17	Practice of minor fault finding, remedy and recovery. Production of operation and maintenance manual.	Utilization of the meteorological Doppler radar system manual (Draft) and the meteorological radar system maintenance & management record book (Draft) by the BMD engineers.	Implementation of radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.	
18				
19				
20				
21	Fri.(Holiday)	Fri. (Holiday)	Fri. (Holiday)	
22	Sat.(Holiday)	Sat. (Holiday)	Sat. (Holiday)	
23	Production of operation and maintenance manual.	Review of the Meteorological Doppler radar system manual summary (Draft) and the Meteorological radar system maintenance & management record book (Draft).	Completion of Radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.	
24	Practice of major fault countermeasure Review of training by the BMD. Production of operation and maintenance manual.	Utilization of the meteorological Doppler radar system manual and the meteorological radar system maintenance & management record book by the BMD engineers.	Production of Soft Component Completion Report.	
25				
26				
27				
28	Rangpure→Dhaka Fri. (Holiday)	Rangpure→Dhaka Fri. (Holiday)	Departure from Dhaka	
29	Sat.(Holiday)	Sat. (Holiday)	Arrival in Japan	
30	Production of Soft Component	Production of Soft Component		
31				
32				

33	Completion Report.	Completion Report.
34	Technical discussion with the BMD	Technical discussion with the BMD
35	Departure from Dhaka	Departure from Dhaka
36	Arrival in Japan	Arrival in Japan

<Second Activity after the completion of the Dhaka (Joydepur) Meteorological Radar System Installation Work>

Table6: Details of the Second Activity Schedule of the Soft Component

	Activity No. 1	Activity No. 2
Date	Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery, and Major Fault Countermeasure	Meteorological Doppler Radar System Manual Summary and Meteorological Radar System Maintenance & Management Record Book
1	Departure from Japan Fri. (Holiday)	Departure from Japan Fri. (Holiday)
2	Arrival in Dhaka Preparatory Work Sat. (Holiday)	Arrival in Dhaka Preparatory Work Sat. (Holiday)
3	Preparatory Work at Dhaka (Joydepur) Meteorological Radar Tower Building	Preparatory Work at Dhaka (Joydepur) Meteorological Radar Tower Building
4	Practice of routine maintenance using measuring instruments and tools. Production of operation and maintenance manual (refer to Rangpur one).	Discussion with the BMD technicians. Selection of the most important points from meteorological Doppler radar system manual.
5		
6		
7	Practice of replacement of spare parts to actual system and confirmation of system operation. Production of operation and maintenance manual (refer to Rangpur one).	
8	Fri.(Holiday)	Fri. (Holiday)
9	Sat.(Holiday)	Sat. (Holiday)
10	Practice of replacement of spare parts to actual system and confirmation of system operation. Production of operation and maintenance manual (refer to Rangpur one).	Production revision of meteorological Doppler radar system manual summary for Rangpur.
11		Production revision of meteorological radar system maintenance & management record book for Rangpur.
12	Practice of minor fault finding, remedy and recovery. Production of operation and maintenance manual (refer to Rangpur one).	Review of the Meteorological Doppler radar system manual summary (Revised) and the Meteorological radar system maintenance & management record book (Revised).
13		
14		
15	Fri.(Holiday)	Fri. (Holiday)
16	Sat.(Holiday)	Sat. (Holiday)
17	Practice of major fault countermeasure Review of training by the BMD.	Utilization of the meteorological Doppler radar system manual and the meteorological radar system maintenance & management record book by the BMD engineers.
18	Production of operation and maintenance manual (refer to Rangpur one).	
19	Production of Soft Component Completion Report.	Production of Soft Component Completion Report.
20		
21	Technical discussion with the BMD.	Technical discussion with the BMD.
22	Departure from Dhaka	Departure from Dhaka
23	Arrival in Japan	Arrival in Japan

<Procurement Method of Soft Component Implementation Resources>

Implementation Resources are procured based on the direct support of Japanese consultants who are in charge of equipment procurement for the Project. The reasons are presented below.

- Personnel with advanced technique and knowledge of weather services and meteorological radar system is necessary.
- Personnel as indicated above usually belongs to weather organizations which actually conduct weather services.
- Personnel who has similar experience to the proposed technology transfer is required.

<Implementation Schedule>

The implementation schedule of the whole Project and soft component is indicated in the following table. The soft component is planned to be implemented during the adjustment stage after the installation of the meteorological radar system and before the completion of the Project.

Table7: Implementation Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34							
Rangpur Meteorological Radar Observation Station																																									
Construction Work	Total : 16.0 months																																								
Preparation Work	■																																								
Temporary/Piling/Earth Works		■	■	■	■	■	■	■																																	
Structure Work						■	■	■	■	■	■	■	■	■	■	■																									
Finishing Work																																									
Building Equipment																																									
External Work																																									
Equipment Work	Total : 17.0 months																																								
Equipment Manufacturing																																									
Equipment Transportation																																									
Equipment Installation/Adjustment																																									
BMD Head Office Storm Warning Centre (SWC)																																									
Equipment Work	Total : 15.0 months																																								
Equipment Manufacturing																																									
Equipment Transportation																																									
Equipment Installation/Adjustment																																									
Hazrat Shahjalal International Airport (Dhaka)																																									
Equipment Work	Total : 15.0 months																																								
Equipment Manufacturing																																									
Equipment Transportation																																									
Equipment Installation/Adjustment																																									
Dhaka (Joydevpur) Meteorological Radar Observation Station																																									
Construction Work	Total : 16.0 months																																								
Preparation Work																																									
Temporary/Piling/Earth Works																																									
Structure Work																																									
Finishing Work																																									
Building Equipment																																									
External Work																																									
Equipment Work	Total : 17.0 months																																								
Equipment Manufacturing																																									
Equipment Transportation																																									
Equipment Installation/Adjustment																																									
Soft Component																																									
Soft Component (Activity No. 1)																																									
Soft Component (Activity No. 2)																																									
Soft Component (Activity No. 3)																																									

<Soft Component Product>

Soft Component Products are as follows.

Table8: Soft Component Products in Technology Transfer

Product Name		Submission Time	No. of Pages
Implementation report on 1) routine maintenance using measuring instruments and tools, 2) practice of replacing spare parts into the actual system and the subsequent confirmation of system operation, 3) practice of minor fault finding, remedy and recovery, and 4) major fault countermeasure.		After Technology Transfer	20
Meteorological Doppler radar system manual summary			30
Meteorological radar system maintenance and management record book			10
Radar observation sequence & schedule for Intensity Mode and Doppler Mode			10
Output Name	Content	Submission Time	No. of Pages
Soft Component Completion Report	<ul style="list-style-type: none"> • Scheduled Activities and Actual Achievement • Scheduled Outputs and Achievement • Factors which influence Achievement of Outputs • Recommendation • Outputs 	Completion of Soft Component	50

<Obligations of the Recipient Country>

Obligations of the BMD for the implementation of Soft Component are as follows.

- 1) Manpower Development
 - a) Continuous recruitment of human resources for the next generation.
 - b) Development of more qualified technical personnel through training and other related manpower development programs.
- 2) Longer Life Span of the Equipment procured and the Radar Tower Building constructed under the Project
 - a) Regularly secure the necessary budget for the efficient operation and maintenance of the systems and building equipment, and the procurement of requisite spare parts and consumables for all the equipment to be supplied under the Project.
 - b) Ensure protection of the building, equipment and facilities against theft and vandalism.

The BMD will be able to implement the above obligations through its organizational and personnel capabilities. Most especially, the “continuous recruitment of human resources for the next generation” is of vital concern. It is imperative for the BMD to become self-reliant in technical areas such as the operation and maintenance of radar systems. Hence, it is essential that it puts forth continued efforts to recruit and fill vacancies, thereby, promoting technology transfer across all staff levels from the assistant personnel to the engineer(s).

Appendix 6. References

No	Name of References	Original/Copy/ Digital File	Publisher	Data of Publication
1	Bangladesh Building Code	Digital File	Housing and Building Research Institute	2012