Annex 6
G/A NO. XXXXXXX
PMR prepared on DD/MM/YY

Project Monitoring Report
on
the Project for Densification of GNSS CORS (Continuously Operating Reference System) Network and Modernization of Tidal Stations
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

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

General Information:

Project Title	The Project for Densification of GNSS CORS (Continuously Operating Reference System) Network and Modernization of Tidal Stations
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of Bangladesh: 160,892 thousand BDT

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1: Project Description

1-1 Project Objective

The purpose of the Project are to realize accuracy and efficient surveying and mapping to enhance infrastructure development, and to establish infrastructure for digitalization and advanced utilization of geospatial information.

1-2 Project Rationale

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

Overall goal of the Project is to contribute to acceleration of economic growth that can be influence the whole nation in Bangladesh.

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr 2018)	Target (Yr 2023)
The use of GNSS CORSs data	The number of users: 10 users	280 users
	The number of sectors to use GNSS CORSs data other than surveying: 2 sectors	6 sectors
Failure rate of GNSS CORSs	Yearly failure Rate: Approximately 7%	Yearly failure Rate: Approximately 3%
Covered area for RTK surveying	Covered area: 17,000km2 (12% of land area)	Covered area: 132,000 km2 (96% of land area)

Qualitative indicators to measure the attainment of project objectives

- Surveying user satisfaction (concerning necessary period for surveying, survey accuracy) will be increased.
- Geospatial information will be created efficiently.
- Advanced use of tide level (detection and/or exclusion of abnormal tide level change caused by weather/walrus) will be realized.
- Services using GNSS CORSs data such as automatic operation of machines/equipment will be enhanced.

2: Details of the Project

2-1 Location

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Components	Original *(proposed in the outline design)*	Actual
1. Permanent GNSS CORSs System	Permanent of public buildings	
2. Mobile GNSS CORSs System	SOB Mirpur Office	
3. GNSS CORSs Management System	SOB Mirpur Office and SOB Tejgaon Office	
4. Tide Gauge System	Chattogram Tidal Station and SOB Mirpur Office	

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1. Permanent GNSS CORSs System	Procurement and Installation	
2. Mobile GNSS CORSs System	Procurement	
3. GNSS CORSs Management System	Procurement and Installation	
4. Tide Gauge System	Procurement and Installation	

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	***(at the time of signing the Grant Agreement)***	
Cabinet Approval	Nov. 2018		
E/N	Dec. 2018		
G/A	Dec. 2018		
Detailed Design	Jan. 2019 – Mar. 2019		
Tender Notice	Apr. 2019		
Tender	Jun. 2019		
Procurement of Equipment	Jun. 2019 – Oct. 2020		
Project Completion Date	Nov. 2020		
Defect Liability Period	Oct. 2020 – Oct. 2021		

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

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

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2-4-3 Report on RD
See Attachment 11.

2-5 Project Cost

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

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
Equipment	1. Procurement of Equipment			
Consulting Services	2. Detail Design, Supervision			
	3. Soft Component			
Contingencies				
Total				

Note: 1) Date of estimation: June 2018.
2) Exchange rate: 1 US Dollar = JPY108.75
1BDT = JPY1.290

※This Page is closed due to the confidenciality

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1. Banking Arrangement Commission (B/A)		479	
	2. Cost for Tax Exemption		160,589	
	3. Cost for SIM		76	
			161,144	

Note: 1) Date of estimation: June 2018
2) Exchange rate: 1 US Dollar = JPY108.75
1BDT = JPY1.290

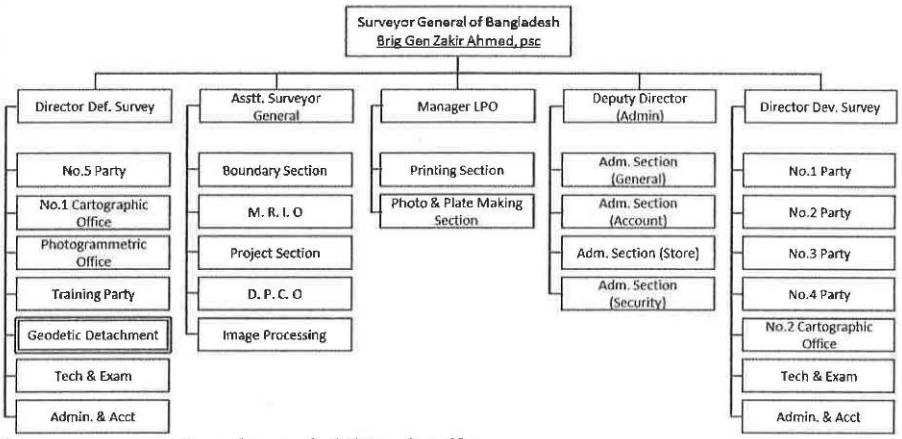
Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

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

Original *(at the time of outline design)*
name: Survey of Bangladesh
role: For the smooth progress of the Project, it shall be necessary to contact and consult closely among the Consultant, the Supplier and concerned agency/organization of the Bangladeshi side.
financial situation: There is apparently not a serious problem to secure the budget.
institutional and organizational arrangement (organogram):
Geodetic Detachment of SOB is responsible for operation and maintenance of the Project



human resources (number and ability of staff):
SOB has experienced to operate and maintain 6 GNSS CORSs by commissioning a part of actual work to a contractor. Hence, no serious problems are expected regarding operation and maintenance of the Project

Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).

- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).

- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

Procurement and installation of the equipment to be covered by the Project are planned to be implemented in/on existing building only. Undesirable impact to environment and society by the Project are considered minimum or nothing. Therefore, the Project is categorized "C" in the "Guideline for environmental and Social consideration" issued by JICA.
To implement the Project, any procedure including Environmental Impact Assessment (hereinafter referred to as "EIA") and/or Initial Environmental Examination (hereinafter referred to as "IEE") is not required.

3: Operation and Maintenance (O&M)

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3-1 Physical Arrangement
- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
SOB has basic skills, and financial and human resources enough to operate the existing GNSS CORSs. Based on those experiences and advanced skills to be obtained through technical assistance by the Project, SOB is likely to be able to carry out operation and maintenance of the new GNSS CORSs.
Operation and maintenance procedure of equipment can vary by manufacturer, therefore at first operation guidance shall be offered.

Actual *(PMR)*

3-2 Budgetary Arrangement
- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*
The following table shows the results of preliminary calculation of the costs required for operation and maintenance of the equipment to be included in the Project. Besides, the cost of repairs in the first year after completion of the Project are not included.

Operation and Maintenance Cost		First Year after Completion of the Project (thousand BDT)	Second Year Onwards (thousand BDT)
GNSS CORSs System	Periodic inspection	1,346	1,346
	Response to breakdowns	0	5,427
	Consumable parts (batteries)	0	5,736
	Communication costs	1,025	1,025
	Sub-total	2,371	13,534
GNSS CORSs Management System	Hardware maintenance costs	0	2,199
	Software maintenance cost	0	9,313
	Communication cost	840	840
	Electricity cost	388	388
	Sub-total	1,228	12,740
Tide Gauge System	Periodic inspection	30	30
	Communication cost	14	14
	Sub-total	44	44
Total		3,643	26,318

From the second year onwards the operation and maintenance cost is about 26 million BDT, which corresponds to about 6% of the 415.2 million BDT revenue budget amount of SOB in 2016-2017. The operation and maintenance cost as a percentage of the overall budget is relatively high and there is a possibility that it could become an obstacle to continuous utilization of the equipment, so it is strongly advisable that the revenue budget amount be increased.

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Actual *(PMR)*

4: Potential Risks and Mitigation Measures

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

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

Potential Risks	Assessment
1. (Description of Risk) Failure to secure the Project site and/or to obtain all permission required to implement the Project	Probability: High/Moderate/Low Impact: High/Moderate/Low Analysis of Probability and Impact: Probably is considered to be low because organization who own the target building are corporative at the time of survey. Impact is considered to be high because the installation of Permanent GNSS CORSs cannot be executed without permission. Mitigation Measures: Explain the project to all owners thoroughly Action required during the implementation stage: SOB is responsible to obtain permission. Contingency Plan (if applicable): To exclude and/or secure alternative building
2. (Description of Risk) Changing of the policy including "Digital Bangladesh" to promote the Project.	Probability: High/Moderate/Low Impact: High/Moderate/Low Analysis of Probability and Impact: Probability is considered to be low because "Digital Bangladesh" are recognized important/ irrevocable policy in Bangladesh. Impact is considered to be low because economic growth including infrastructure development needs GNSS CORSs data for smooth execution of survey even though the policy is changed. Mitigation Measures: N/A Action required during the implementation stage: N/A Contingency Plan (if applicable): N/A
3. (Description of Risk)	Probability: High/Moderate/Low

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Inhibition of Bangladeshi economic growth including infrastructure development.	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Probability is considered to be low. Impact is considered to be moderate because demand to use GNSS CORSs data will be decreased if the number of infrastructure development project is decreased.
	Mitigation Measures:
	To spread the use other than infrastructure development project
	Action required during the implementation stage:
	N/A
	Contingency Plan (if applicable):
	N/A
Actual Situation and Countermeasures	
(PMR)	

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

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

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

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

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

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

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

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

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

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

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

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Attachment 7

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

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

(Provisional Translation)

Cabinet decision on the Development Cooperation Charter

February 10, 2015

Japan's Official Development Assistance Charter, decided by the Cabinet in 1992 and revised in 2003, has been the foundation of Japan's Official Development Assistance (ODA) policy.

Currently, as it commemorates the 60th anniversary of its ODA, Japan and the international community are at a major crossroads. In this new era, Japan must strongly lead the international community, as a nation that contributes even more proactively to securing peace, stability and prosperity of the international community from the perspective of "Proactive Contribution to Peace" based on the principle of international cooperation, while continuing to adhere to the course that it has taken to date as a peace-loving nation. This is also a juncture at which Japan's ODA activities should further evolve so as to strengthen further its role as an equal partner of developing countries in the joint efforts to address challenges facing the international community.

In the international community today, a huge amount of private funding flows to the developing countries, and various actors including the private sector, local governments, and non-governmental organizations (NGOs) are involved in global activities. These actors play important roles in dealing with development challenges and promoting sustainable growth in developing countries. Under these circumstances, Japan needs to address such development challenges not only through ODA but also by mobilizing various other resources.

Based on this recognition, the Government of Japan revises the ODA Charter and hereby establishes the Development Cooperation Charter, also bearing in mind the National Security Strategy decided by the Cabinet on December 17, 2013.

For the purpose of this Charter, the term "development cooperation" refers to "international cooperation activities that are conducted by the government and its affiliated agencies for the main purpose of development in developing regions." In this connection, "development" in this Charter is used in a broader sense rather than in the narrow sense; it also encompasses such activities as peacebuilding and governance, promotion of basic human rights and humanitarian assistance.

Such development cooperation needs to enhance synergetic effects for development through strengthened collaboration with other funding and activities of the Government of Japan and its affiliated agencies such as Other Official Flows (OOFs) and United Nations Peacekeeping operations (PKOs) as well as with private funding and activities whose objective is development or which contribute to development (i.e., funding and activities of various entities such as the private sector, local governments and NGOs).

Development Cooperation Charter
-For peace, prosperity and a better future for everyone-

At present the international community is in the midst of a transformation. It is experiencing changes in the global power balance on an unprecedented scale, an expansion of international economic activity due to rapid progress in globalization and technological innovation, deepening interdependency, and the growing influence of various non-state actors. Against this background, all kinds of risks in every part of the world can have a direct negative impact on the peace, stability and prosperity of the world including Japan. These risks range from transboundary challenges such as environmental issues and climate change, water-related issues, natural disasters, food crises and hunger, energy issues, and infectious disease, threats to the peace and stability of the international community such as international terrorism, transnational organized crimes, and piracy, to humanitarian issues in fragile states, regional conflicts, and political instability. In addition, as emerging and developing countries are taking on more economic importance, economic growth in these countries will affect the course of the growth of the global economy. Inclusive, sustainable and resilient growth in these countries is thus essential for the stable growth of the global economy as a whole. Furthermore, in light of Japan's current economic and social situation, deepening its cooperative relations with the international community including the emerging and developing countries and tapping into their vigor are the keys to its own sustainable prosperity. Amid all these changes, a peaceful, stable and prosperous international community is increasingly intertwined with the national interests of Japan. To secure its national interests, it is essential for Japan, as a "Proactive Contributor to Peace" based on the principle of international cooperation, to work together with the international community including developing countries to address global challenges.

The development challenges confronting the world have also changed significantly. While many countries, notably emerging countries, achieved progress in development, even such countries are experiencing problems such as political and economic instability owing to poor governance and other factors, internal disparities, sustainability issues, and the "middle income trap." Furthermore, countries such as small island countries have particular vulnerability and other issues that have emerged which cannot be assessed by income levels alone. In addition, countries are being left behind in terms of growth due to various vulnerabilities resulting from internal conflicts and political instability as well as their geological and climate conditions. To overcome such vulnerabilities, these countries are urgently in need not only of humanitarian assistance but also securing the stable foundations of development such as peace, stability, rule of law, governance and democratization, as well as setting in motion the process of development. In addition, in context of inclusive development that leaves no one behind, it is important to ensure that a wide range of stakeholders in society including women participate in every phase of development. As such, the world is facing more diverse and complex challenges. These challenges are increasingly widespread, transcending national borders as the world is increasingly globalized. In the world faced with such difficult challenges, individual countries are required more than ever to exercise ingenuity and take action.

I. Philosophy

Bearing in mind the recognition described above, Japan will implement development cooperation, that is, "international cooperation activities conducted by the government and its

affiliated agencies for the main purpose of development in developing regions", based on the philosophy described below.

(1) Objectives of development cooperation

Japan recognizes that all peoples of the world have the right to live in peace, free from fear and want. Since 1954, when it joined the Colombo Plan, Japan has consistently sought peace and prosperity of the international community, supported the development efforts of developing countries through development cooperation that centers on its official development assistance (ODA), and made efforts to solve global issues. This embodies the basic stance of Japan to earnestly tackle challenges facing the international community as a responsible major player. Many years of Japan's steady down-to-earth efforts to this end has won the respect and confidence of the international community, which expects Japan to play a more proactive role for the peace, stability and prosperity of the international community in a way commensurate with its national capabilities.

Japan overcame a range of problems and realized a period of high economic growth and a peaceful stable society with a small economic disparity to become the first developed country in Asia. At the same time, Japan has taken advantage of its philosophy in development cooperation, experience and expertise to deliver distinctive cooperation to Asian and other countries to support their economic growth. In these processes, it has experienced many successes and failures, and has accumulated a wealth of experience, expertise and lessons learned. The experience, expertise and lessons thus learned are not limited to those from the postwar high-growth period but also those from addressing present challenges such as declining and aging population, and reconstruction after the earthquake. Such experience, expertise and lessons learned contribute to addressing development challenges facing the world today, and the international community also has high expectations in this regard.

Bearing in mind the expectations of the international community, Japan, as a responsible major player in the world, will contribute more actively and exert strong leadership in addressing challenges facing the international community - especially development challenges and humanitarian concerns. Doing so is of great significance from the perspective of solidifying the confidence that the international community has in Japan.

In today's international community, it is no longer possible for any nation to secure peace and prosperity by itself. Under such circumstances, the path Japan should take to continue developing a prosperous and peaceful society lies in a serious effort to tackle various global challenges in cooperation with the international community, including developing countries, for a peaceful, stable and prosperous international community, and, in this process, to build solid and constructive relationships with various actors in the international community. Development cooperation provides one of the most important means for Japan in its agile implementation of such diplomacy; it carries significance as an "investment for the future."

Based on this recognition, Japan will promote development cooperation in order to contribute more proactively to the peace, stability and prosperity of the international community. Such cooperation will also lead to ensuring Japan's national interests such as maintaining its peace and security, achieving further prosperity, realizing an international environment that provides stability, transparency and predictability, and maintaining and protecting an international order based on universal values.

In the present international community, various actors including private companies, local governments and non-governmental organizations (NGOs) play an increasingly important role in addressing development challenges and supporting sustained growth of developing countries. It is therefore important to mobilize a wider range of resources that are not limited to ODA. In this context, ODA, as the core of various activities that contribute to development, will serve as a catalyst for mobilizing a wide range of resources in cooperation with various funds and actors and, by extension, as an engine for various activities aimed at securing peace, stability and prosperity of the international community.

(2) Basic policies

Japan's development cooperation for the objectives described above should be based on the philosophy that has been formed over its long history and should be further developed. In this context, the directions for development cooperation are defined as basic policies below:

A. Contributing to peace and prosperity through cooperation for non-military purposes

Japan's development cooperation has contributed to peace and prosperity of the world through cooperation for non-military purposes, which is one of the most suitable modalities for international contribution. Japan has consistently followed the path of a peace-loving nation since the end of World War II. Japan's development cooperation has been highly regarded by the international community as an embodiment of the country's sincere aspirations for peace and prosperity of the international community. Japan will continue to uphold this policy and comply with the principle of avoiding any use of development cooperation for military purposes or for aggravation of international conflicts, in proactively contributing to securing peace, stability and prosperity of the international community.

B. Promoting human security

Human security - a concept that pursues the right of individuals to live happily and in dignity, free from fear and want, through their protection and empowerment - is the guiding principle that lies at the foundation of Japan's development cooperation. Japan will thus focus its development cooperation on individuals - especially those liable to be vulnerable such as children, women, persons with disabilities, the elderly, refugees and internally-displaced persons, ethnic minorities, and indigenous peoples - and provide cooperation for their protection and empowerment so as to realize human security. At the same time, Japan will make efforts so that this basic policy will be understood and accepted widely among its partner countries, thereby mainstreaming the concept even further in the international community. Likewise, from the standpoint of its people-centered approach, Japan will also proactively contribute to promoting basic human rights, including women's rights.

C. Cooperation aimed at self-reliant development through assistance for self-help efforts as well as dialogue and collaboration based on Japan's experience and expertise

In its development cooperation, Japan has maintained the spirit of jointly creating things that suit partner countries while respecting ownership, intentions and intrinsic characteristics of the country concerned based on a field-oriented approach through dialogue and collaboration. It has also maintained the approach of building reciprocal relationships with developing countries in which both sides learn from each other and grow and develop together. These are some of the good traditions of Japan's cooperation which have supported self-help efforts of developing countries and aimed at future self-reliant development. On the basis of these traditions, Japan will continue to provide cooperation aimed at developing countries'

self-reliant development by emphasizing their own initiatives and self-help efforts as well as further deepening dialogue and collaboration with them while taking advantage of Japan's experience and expertise. In these processes, Japan will attach importance to building the foundations of self-help efforts and self-reliant development such as human resources, socio-economic infrastructure, regulations and institutions. It will also go beyond waiting for requests from partner countries by focusing on dialogue and collaboration with diverse actors not limited to governments and regional agencies of these countries, including proactively presenting proposals while giving full consideration to policies, programs and institutions related to development in the country concerned.

II. Priority policies

(1) Priority issues

In line with the philosophy described above, Japan sets out the following priority issues for development cooperation, while taking note of the inter-relationships between them, in order to deal with development challenges that are becoming more diverse, complex and broadly based, and also to achieve peace, stability and prosperity of the international community.

A. "Quality growth" and poverty eradication through such growth

The world's poor population is still large in number, and reducing poverty, especially eradicating absolute poverty, is the most fundamental development challenge. Especially as regards fragile states that have not been able to grasp the opportunities for development for different reasons and as regards people in vulnerable situations, it is important to provide both assistance from a humanitarian point of view and assistance designed to set the development process in motion and overcome vulnerability.

At the same time, in order to resolve the poverty issue in a sustainable manner, it is essential to achieve economic growth through human resources development, infrastructure development and establishment of regulations and institutions as well as the growth of the private sector enabled by the aforementioned actions, which are aimed at self-reliant development of developing countries. However, such growth should not be merely quantitative in nature, given that some of the countries that have achieved a measure of economic growth face challenges such as widening disparities, sustainability issues, inadequate social development, and political and economic instability. Rather, it should be "quality growth". Such growth is *inclusive* in that the fruits of growth are shared within society as a whole, leaving no one behind. It is *sustainable* over generations in terms of consideration to, among other aspects, harmony with the environment, sustained socioeconomic growth, and addressing global warming. And it is *resilient*, able to withstand and recover from economic crises, natural disasters and other shocks. These are some of the challenges Japan has tackled in its postwar history. Japan will take advantage of its own experience, expertise and technology as well as lessons learned in order to provide assistance to realize "quality growth" and poverty eradication through such growth.

From this perspective, Japan will provide assistance necessary to secure the foundations and the driving force for economic growth. Its scope includes: the development of industrial infrastructure and industries through improvements in such areas as infrastructure, finance and trade and investment climate; sustainable cities; introduction of information and communications technology (ICT) and high technology; promotion of science, technology and innovation; research and development; economic policy; vocational training and industrial human resources development; employment creation; and the promotion of agriculture, forestry and fisheries that includes the development of food value chains. At the

same time, Japan will provide assistance necessary to promote people-centered development that supports basic human life, taking full account of the importance of human and social development. It encompasses health care, safe water and sanitation, food and nutrition, quality education for all, disparity reduction, empowerment of women, culture and sports that brings about spiritual affluence.

B. Sharing universal values and realizing a peaceful and secure society

Stable development through "quality growth" will not be achieved unless the rights of individuals are guaranteed, people can engage in economic and social activities with a sense of safety, and the society is managed equitably and stably. With a view to solidifying the foundations for such development, Japan will provide assistance so as to share universal values such as freedom, democracy, respect for basic human rights and the rule of law as well as to realize a peaceful, stable and secure society.

The establishment of the rule of law, the realization of good governance, the promotion and consolidation of democratization, and respect for basic human rights including women's rights constitute the basis for effective, efficient and stable economic and social activities, and thereby support social and economic development. They also hold the key to realizing an equitable and inclusive society including reducing disparities. Japan will thus provide the necessary assistance in such areas as: development of legal and judicial systems that involves the development of positive law and the training of legal and judicial experts including experts in the correction and rehabilitation of offenders; development of economic and social systems; improvements in governance which include the training of civil servants and institutional capacity building for anti-corruption and other purposes; development of a democratic political structure including an electoral system; and democratization process with a focus on the media and education for democracy.

Peace, stability and security are prerequisites for nation-building and development. Accordingly, Japan will comprehensively address a wide range of factors causing conflict and instability, including poverty. It will also provide seamless assistance for peacebuilding from conflict prevention, emergency humanitarian assistance in the conflict situation, and promotion of conflict termination to emergency humanitarian assistance and assistance for recovery, reconstruction, and development in the post-conflict stage. Such assistance will address a range of needs such as: humanitarian assistance for refugees and internally-displaced persons; protection and participation of women and the socially vulnerable; reconstruction of social and human capital; the restoration of governance functions based on a trusting relationship between the government and the public; the removal of landmines and unexploded ordnance and the collection of small arms; and the restoration of public order. In natural disasters and other emergencies, Japan will provide prompt assistance taking into account longer-term recovery and reconstruction. In view of the fact that threats to stability and security can hamper socio-economic development, Japan will also provide assistance to enhance capacities in developing countries such as: the capacity of law enforcement authorities including capabilities to ensure maritime safety; the capacity of security authorities including capabilities to combat terrorism and transnational organized crime including drug trafficking and trafficking in persons; and the capacity of developing countries in relation to global commons such as seas, outer space, and cyberspace.

C. Building a sustainable and resilient international community through efforts to address global challenges

Transboundary challenges facing humanity include environmental issues and climate change, water related issues, major natural disasters, infectious diseases, food issues, and energy issues. These challenges significantly affect not only developing countries but also the international community as a whole, causing damage to many people with particularly serious impact likely on the poor and other vulnerable people.

These global challenges cannot be dealt with by a single country and require united efforts at the regional level or by the international community as a whole. Taking full account of the international development goals such as the Millennium Development Goals (MDGs), the post-2015 development agenda and the discussions regarding these goals, Japan will take the lead in addressing these challenges including through participation in the formulation of international goals and guidelines and active efforts to achieve these goals. Through these efforts, Japan will seek to contribute to building a sustainable and resilient international community.

In this context, Japan will address challenges such as: actions against climate change including the creation of a low carbon society and adaptation to adverse effects of climate change; infectious diseases control; promotion of universal health coverage; mainstreaming disaster risk reduction; disaster risk reduction and post-disaster recovery measures; conservation of biodiversity and the sustainable use of resources from forests, farmlands and oceans; promotion of a sound water cycle; environmental management and other environmental-related initiatives; responses to demographic challenges including an aging population; food security and nutrition; sustainable access to resources and energy; closing the digital divide.

(2) Priority policy issues by region

In view of the increasingly diverse, complex, and broader-based development challenges and the progress in globalization in the international community today, it is necessary to implement cooperation that cater to the needs and characteristics of each region while maintaining a global perspective. Bearing in mind the priority policy issues for each region mentioned below, Japan will provide more focused cooperation in a strategic, effective and agile manner while coping flexibly with ever changing situations. In this process, attention will be paid to the increasing relevance of recent developments such as: moves toward regional integration such as establishment of regional communities; efforts to address trans-boundary issues at the regional level; efforts toward greater-area development; efforts to strengthen inter-regional connectivity; and increasing connectivity among regions. In addition, Japan will extend necessary cooperation to countries based on their actual development needs and affordability. These include countries that despite progress in development, are laden with challenges that hamper sustained economic growth, notably the so-called "middle income trap," as well as with development challenges including global challenges such as exposure to natural disasters, infectious diseases, and environmental issues and climate change; small island countries and others that are faced with special vulnerabilities despite having attained a certain level of per capita income.

Asia is a region that has a close relationship with Japan and high relevance to its security and prosperity. With this recognition, Japan will extend development cooperation to the region.

Particularly with respect to the Association of Southeast Asian Nations (ASEAN) region, Japan will support the establishment of the ASEAN Community as well as the comprehensive and sustained development of ASEAN as a whole. This will include a focus on the

development of both physical and non-physical infrastructure including that which is needed for strengthening connectivity and the reduction of disparities both within the region and within individual countries. Japan will specifically strengthen assistance to the Mekong region as well as continue its assistance to countries that have already achieved a certain level of economic growth to keep them from being caught in the "middle income trap" through assistance to promote increased productivity and technical innovations such as human resources development. At the same time, priority will be attached to assistance that raises disaster risk reduction and disaster relief capabilities and promotes the rule of law, which constitutes the basis for stable economic and social activities. Japan will also promote cooperation with ASEAN as a regional organization to support united efforts to tackle its challenges.

With respect to South Asia, Japan will support regional stability and the fulfillment of a variety of level of regional potential. This will involve cooperation for building the foundations for economic development through growth, including cooperation on improving trade and investment climate especially by developing infrastructure and strengthening connectivity in the Asian region. Japan will also extend cooperation on basic human needs such as health care, sanitation and education, and on socio-economic infrastructure development for narrowing the gap between the rich and the poor.

With respect to Central Asia and the Caucasus, Japan will support nation-building and regional cooperation for the long-term stability and sustainable development of the region and its neighboring regions, while taking into consideration the disparities within the region.

With respect to Africa, Japan will provide assistance through joint efforts of the public and the private sector through the process of the Tokyo International Conference on African Development (TICAD) so that Africa's remarkable growth in recent years based on expanding trade, investment and consumption will lead to further development for both Japan and Africa. Japan will take particular note of Africa's initiatives toward regional development and integration at the sub-regional level. Meanwhile, Africa still has countries that are prone to conflict or are burdened with an accumulation of serious development challenges. Bearing this in mind, Japan will continue to actively engage in assistance for peacebuilding and assistance to fragile states from the perspective of human security, providing necessary assistance with a view towards establishing and consolidating peace and stability, and solving serious development challenges in the region.

The Middle East is an important region not only for Japan but also for the international community as a whole in terms of peace, stability and stable energy supply. With a view to proactively contributing to the peace and stability of the region and to the coexistence and mutual prosperity of Japan and the Middle East, necessary assistance will be provided to address challenges such as peacebuilding, reducing disparity and human resources development.

With respect to Central and Eastern Europe, Japan will support the moves toward the integration of Europe, which shares universal values such as freedom, democracy, respect for basic human rights and the rule of law, by providing assistance necessary to this end.

With respect to Latin America, Japan will provide assistance to foster an environment more conducive to economic development through trade and investment among others, and to extend necessary cooperation against a backdrop of internal disparities which exist even in

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countries that have achieved considerable progress in development. Consideration will be given to the presence of ethnic Japanese ("*Nikkei*") communities in the region, which serves as a strong bond between Japan and the region.

With respect to small island countries in Oceania, the Caribbean and other regions also have vulnerabilities that are peculiar to small island countries. They are also faced with the challenge of coping with the effects of global environmental problems including: water scarcity, damage due to sea level rise and natural disasters associated with climate change. Japan will provide assistance based on individual development needs while bearing in mind the peculiarities of small island countries.

III. Implementation

(1) Implementation principles

Efforts will be made to implement development cooperation effectively and efficiently, while taking into account international discussion including on development effectiveness, so as to obtain maximum effect towards realizing the philosophy and implementing the priority policies described above. It is also necessary to give full consideration to the impacts of cooperation to the recipient countries and societies, and to the appropriateness of cooperation. Based on such considerations, Japan will implement development cooperation in accordance with the following principles.

A. Principles for effective and efficient development cooperation

(a) A more strategic approach

A more strategic approach should be taken to maximize the impact of Japan's development cooperation. In other words, it is important for the government and implementing agencies to work as one – in cooperation with diverse stakeholders – and to mobilize various resources available to Japan. It is also important to engage in the development cooperation cycle of policymaking, implementation and evaluation in an integrated manner.

On policymaking, it is necessary to fully recognize that development cooperation is one of the most important tools of Japan's foreign policy, which calls for strategic and agile responses to ever-changing international affairs. With this recognition, Japan will formulate strategic and effective policies and goals concerning development cooperation, prioritizing as appropriate, based on its foreign policy. In the process, Japan will thoroughly assess diverse factors such as: the state of affairs in the international community including developing countries; the development policies and programs of developing countries; and the strategic importance of the recipient country and the development challenges being addressed in relation to Japan. In addition, for the purpose of clarifying its development cooperation policies, thematic policies, regional policies, and country policies will be structured under this Charter.

In implementing development cooperation, Japan will enhance synergies between ODA and non-ODA finance/cooperation so as to make the most of resources of the government and its affiliated agencies. Furthermore, from the standpoint of its foreign policy and more effective and efficient development cooperation, Japan will organically combine technical cooperation, loan assistance and grant aid. It will also strive to increase the speed of implementation, improve related systems and operate them flexibly.

In the light of the importance of evaluation not only for improving effectiveness and efficiency but for accountability to the public, Japan will conduct evaluations at the policy and program/project levels and feed the results back to the decision-making and program/project

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implementation processes. Such evaluations, while focusing on outcomes, will take into account the peculiarities and conditions of the recipients. Efforts will be made to undertake evaluation from a diplomatic point of view as well.

(b) Cooperation that takes advantage of Japan's strengths

Japan's human resources, expertise, advanced technology and systems today were developed in the process of overcoming various challenges as it underwent high economic growth and rapid demographic changes. These assets can be beneficial for developing countries in addressing similar challenges, both present and future; in fact, expectations for Japan are high in this regard. In implementing development cooperation, Japan will proactively adopt proposals from various actors in the private and other sectors. It will also work with universities and research institutions to make good use of their expertise and seek out their untapped capabilities. Japan's assistance in infrastructure development will not be limited to constructing physical infrastructure. It will also address the non-physical aspects that encompass developing systems for operating and maintaining such infrastructure as well as human resources development and institution building. Such an integrated approach will enable active utilization of Japan's experience and expertise. In addition, given that Japan's distinctive characteristics such as Japanese values and occupational culture are highly regarded by the international community, it will take into account the possibility of utilizing its soft power including the Japanese language.

(c) Proactive contribution to international discussions

Japan will strive to make its development cooperation policies better understood by the international community, and for this purpose, categorize the experiences and expertise gained in its development cooperation. To ensure that Japan's policies are adequately reflected in the process of shaping the philosophy and trends in international development cooperation, Japan will proactively participate in and contribute to relevant discussions at the United Nations, international financial institutions, the Organisation for Economic Co-operation and Development (OECD), especially its Development Assistance Committee (DAC), and other international frameworks.

B. Principles for securing the appropriateness of development cooperation

So as to secure the appropriateness of its development cooperation policies and individual programs/projects and to give consideration to the various impacts of such cooperation on the recipient countries and societies, Japan's development cooperation will be provided in accordance with the principles described below, and by comprehensively taking into account developing countries' development needs and socio-economic conditions, as well as Japan's bilateral relations with each recipient country.

(a) Situation regarding consolidation of democratization, the rule of law and the protection of basic human rights

Japan will pay adequate attention to the situation in the recipient countries regarding the process of democratization, the rule of law and the protection of basic human rights, with a view to promoting the consolidation of democratization, the rule of law and the respect for basic human rights.

(b) Avoidance of any use of development cooperation for military purposes or for aggravation of international conflicts

Japan will avoid any use of development cooperation for military purposes or for aggravation of international conflicts. In case the armed forces or members of the armed forces in

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recipient countries are involved in development cooperation for non-military purposes such as public welfare or disaster-relief purposes, such cases will be considered on a case-by-case basis in light of their substantive relevance.

(c) Situation regarding military expenditures, development and production of weapons of mass destruction and missiles, export and import of arms, etc.

Japan will pay close attention to the situation in recipient countries regarding military expenditures, development and production of weapons of mass destruction and missiles, and export and import of arms, etc. This is done with a view to maintaining international peace and stability including the prevention of terrorism and the non-proliferation of weapons of mass destruction, and based on the position that developing countries should allocate their resources appropriately and preferentially for their own socio-economic development.

(d) Impact of development on the environment and climate change

In order to make development compatible with the environment and to achieve sustainable development, Japan will give thorough consideration to the impact of development on the environment and climate change, and implement development cooperation which takes full account of the environment.

(e) Ensuring equity and consideration to the socially vulnerable

In implementing development cooperation, Japan will pay full attention to the social impact and give full consideration to ensuring equity, while making efforts for participation of wide-ranging stakeholders in every phase of development cooperation, with a view to reducing disparities and in consideration of the socially vulnerable such as children, persons with disabilities, the elderly, ethnic minorities and indigenous peoples.

(f) Promoting women's participation

In the context of gender equality and greater role of women in development, Japan will encourage the participation of women at every phase of development cooperation and be more proactive in ensuring that women share equitably in the fruits of development, while giving consideration to the possible vulnerabilities of women and their special needs.

(g) Preventing fraud and corruption

It is necessary to prevent fraud and corruption in implementing development cooperation. While taking measures to encourage establishment of a compliance system by bid winners, Japan will work with recipient countries to create an environment conducive to preventing fraud and corruption, including the strengthening of governance in these countries. In this context, Japan will ensure adherence to appropriate procedures and strive to ensure transparency in the implementation process.

(h) Security and safety of development cooperation personnel

In order to ensure security and safety of development cooperation personnel, Japan will pay adequate attention to strengthening security and safety management capacity, gathering security information, taking security measures, and ensuring safety of workers in construction sites. Particularly in relation to assistance in politically unstable or unsafe areas such as assistance for peacebuilding, special security measures and arrangements will be implemented.

(2) Implementation arrangements

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In view of the increasingly diverse, complex, and wider-based development challenges as well as the increasingly diverse development actors and development-related funds, Japan will strive to improve the implementation architecture of the government and the implementing agencies, strengthen collaboration at different levels, and reinforce the foundations for sustained implementation of development cooperation.

A. Improvement of the implementation architecture of the government and the implementing agencies

In implementing its development cooperation, the government will improve collaboration among the relevant ministries and agencies, with the Ministry of Foreign Affairs serving as a hub in charge of coordinating the planning of development cooperation policies. It will also ensure close collaboration between the government, which is responsible for planning policies, and the Japan International Cooperation Agency (JICA), which is responsible for implementation. At the same time, the government and JICA will further strive to develop the capacities of these organizations as well as to improve relevant systems and institutions, while clarifying the division of their roles and responsibilities. Especially to improve the competitiveness of its development cooperation, the government and JICA will address issues such as agility, expertise, knowledge accumulation, research capacity, reinforcement of the functions of offices abroad, human resources development and arrangements for emergency humanitarian relief. Consideration will be given to the role of JICA domestic offices as a node for various actors, including companies, NGOs, local governments, universities and research institutions, and the public at large.

B. Strengthening partnerships

In the international community today, various non-governmental actors play an increasingly important role in the development of developing countries. With this recognition, collaboration between JICA and other agencies responsible for other official funds such as the Japan Bank for International Cooperation (JBIC), Nippon Export and Investment Insurance (NEXI), and the Japan Overseas Infrastructure Investment Corporation for Transport and Urban Development (JOIN) will be strengthened. The government will also enhance mutually beneficial partnerships with various actors so as to serve as a catalyst for mobilizing a wide range of resources, including the private sector.

(a) Public-private partnerships and partnerships with local governments

Official funds including ODA will continue to play an important role in the development of developing countries. However, given that private flows currently far exceed official flows into developing countries, adequate consideration should be given to the fact that activities of the private sector now serve as a powerful engine for economic growth of developing countries. In Asia, hard (physical) and soft (non-physical) basic infrastructure built with development cooperation has contributed to improving the investment climate. Development cooperation's role as a catalyst promoted private investment, which in turn has led to economic growth and poverty reduction in the recipient countries. It is important to recognize that, through these processes, Asia has developed into an important market and investment destination for Japanese private companies, and therefore, an extremely important region for the Japanese economy. In addition, experience and expertise of Japanese local governments play an increasingly significant role in addressing many of the challenges facing developing countries.

In light of the above, the government will promote development cooperation through public-private partnerships and partnerships with local governments utilizing the resources of

the private sector and local governments and promoting private-led growth, in order to support economic development of developing countries more vigorously and effectively and to enable such development to lead to robust growth of the Japanese economy. Specifically, partnerships with Japanese companies including small and medium-sized enterprises, local governments, universities and research institutions, and other actors will be strengthened in order to implement cooperation aimed at creating an environment conducive to the promotion of trade and investment among others in such areas as human resources development, development of legislation and institutions, and development of infrastructure and relevant systems from planning to implementation phases in a consistent manner.

In promoting public-private partnerships, Japan's development cooperation will seek to serve as a catalyst for expanding economic activities, while utilizing excellent technology and expertise, and ample funds of the private sector for addressing the challenges faced by developing countries. In addition, taking full account of the priority policies of development cooperation described earlier, Japan will give consideration to ensuring inclusiveness, sustainability and resilience of growth as well as promoting capacity building so that private investment that is made along with development cooperation will contribute to "quality growth" in developing countries.

(b) Coordination in emergency humanitarian assistance and international peace cooperation

In the context of increasingly severe and frequent disasters, there is plenty of scope for contribution by Japan, a country known for its disaster risk reduction. For effective implementation of disaster relief and other emergency humanitarian assistance, coordination with international organizations, NGOs and other actors that have relevant expertise will be strengthened.

In addition, Japan will continue to promote coordination with international peace cooperation activities such as UN peacekeeping operations (PKOs) to maximize their effective implementation.

(c) Partnerships with international, regional and sub-regional organizations

With their expertise, impartiality and wide networks, international organizations can implement effective and efficient cooperation in sectors or regions that are less accessible in bilateral cooperation and by taking advantage of their distinctive characteristics. Such multilateral cooperation can bring about synergies if combined with bilateral cooperation. Japan will therefore continue its proactive collaboration with international organizations in such areas as humanitarian assistance, peacebuilding, governance and global issues. In addition, in view of the role played by international organizations in shaping philosophy and trends in international development cooperation, Japan, as a responsible member of the international community, will strive to increase its influence and presence in international organizations and, by extension, the international community so that it can play a leading role in creating international norms. Furthermore, Japan will hold regular consultations with individual international organizations for policy coordination to create synergies with bilateral cooperation. Special attention will be paid to ensuring accountability to the public as regards the impacts and evaluation of development cooperation through international organizations.

Japan will also reinforce its partnerships with regional and sub-regional organizations in view of the trend towards regional integration and the importance of a transboundary approach at the regional level.

(d) Partnerships with donors, emerging countries and other actors

Like Japan, other donors have accumulated experience and expertise over many years of their development cooperation. Donor partnerships are required for greater development effectiveness. From this perspective, Japan will continue to promote partnerships with other donors in development cooperation to maximize its effectiveness, bearing in mind the perspective of its foreign policy.

In implementing development cooperation, it is also important to take advantage of expertise, human resources and their networks, and other assets that have been accumulated in the recipient countries during the many years of Japan's development cooperation. Japan's triangular cooperation involving emerging and other countries capitalizes on such assets. In view of the high regard held by the international community, Japan will continue to promote triangular cooperation.

(e) Partnerships with the civil society

Partnerships with the civil society in and outside of Japan, including NGOs, civil society organizations (CSOs) and private foundations, are important both for greater cooperation effectiveness and for the equitable and stable development of the recipient countries as they can accurately assess varying views and needs on the ground and take timely flexible actions. With this recognition, the government will strategically strengthen partnerships with NGOs/CSOs, including reinforcing their participation and collaboration in development cooperation. From this standpoint, the government will support excellent development cooperation projects of Japanese NGOs/CSOs and their capacity development. In this regard, the Ministry of Foreign Affairs and JICA will focus on developing human resources and systems in the social development sector.

The government will also encourage the participation of its people from all walks of life in development cooperation and promote utilization of their expertise in society, with a view to expanding those involved in development cooperation, including the recruitment of JICA Volunteers. In this regard, the government will provide adequate information to the public and listen to the voice of the people at all levels including suggestions regarding development cooperation.

C. Strengthening the foundations for implementation

In order for Japan's development cooperation to fulfil the required role of realizing its philosophy and implementing its priority policies, the foundations for its sustained implementation including financial and human resources must be strengthened. Necessary efforts will be made to this end while being mindful of the internationally-agreed target of increasing ODA to 0.7% of gross national income (GNI) and fully recognizing its extremely severe fiscal situation.

(a) Information disclosure and promoting understanding of the public and the international community

Development cooperation is financed by tax revenues from the public. The public's understanding and support are therefore essential to secure necessary funds for the sustained implementation of development cooperation. For this purpose, the government will strive for effective public relations on development cooperation in Japan, timely and adequate disclosure of information on implementation, evaluation and other aspects of development cooperation to the wider public in a transparent manner. The government will also provide easy-to-understand explanations on the policies, significance, outcomes and evaluation of

Japan's development cooperation by the international community among other aspects. The government will also actively engage in public information abroad as it is important to make Japan's development cooperation and its achievements better known and understood by the international community including developing countries.

(b) Promoting development education

The government will promote development education at school and various other places. The objective is for the public to develop the capacity to assess various aspects of development challenges facing the world, understand how these challenges relate to Japan, regard the challenges as their own for independent analysis, and participate in actions to address these challenges.

(c) Developing human resources and solidifying the intellectual foundations for development cooperation

Fostering human resources for development cooperation remains an important issue in the face of diversifying development challenges. In particular, promoting development cooperation in such areas as the rule of law, governance, finance and ICT calls for strengthening the institutional structure such as by training and securing the necessary human resources. The government, industry and the academia will therefore work as one to promote the training and development of globally competent human resources with specialized expertise among consultants, researchers, students, and employees at universities, private sector and NGOs/CSOs in addition to the personnel of the Ministry of Foreign Affairs and JICA. Efforts will also be made to increase opportunities for such persons to fulfill their capacity within and outside Japan and to make institutional and structural improvements.

In order to play a leading role in shaping the philosophy and trends in international development cooperation by making use of its strength, the government will also work with universities and research institutions among others to reinforce the intellectual foundations, including research capabilities to plan and disseminate development cooperation. This may take the form of joint policy research by researchers from Japan and developing countries or intellectual networking of such researchers.

(3) Reporting on the status of the implementation of the Development Cooperation Charter

The government will report the status of the implementation of the Development Cooperation Charter in the "White Paper on Development Cooperation," which is reported annually to the Cabinet.

February 10, 2015
Cabinet Decision

5 Soft Component (Technical Assistance) Plan

1. Background of the Soft Component Plan

This project involves the development of a network of Continuously Operating Reference Stations (CORSs) throughout the whole of Bangladesh, and addition of tide gauge equipment for determining the mean sea level. The purpose of this project is to enable highly accurate and efficient surveying and mapping in the whole of Bangladesh and realize efficient development of infrastructure, as well as to establish a base for digitalization and advanced usage of geospatial information, and thus to contribute to accelerating economic growth that can benefit all the people of Bangladesh. In order to achieve this purpose, the project will develop the Bangladeshi network of GNSS CORSs, add the tide gauge equipment for determining the mean sea level, and establish a system to enable these to be sustainably operated and maintained. The activities that will be carried out in this cooperation include procurement of equipment for the GNSS CORSs system installed at 75 sites (rooftop installation type at 73 sites, mobile type at 2 sites) and their control system that will be the core of the GNSS CORSs network, and the tide gauge system for measuring the change in sea level, and implementation of technical guidance (Soft Component) for establishing the system of operation and maintenance.

1-1 Background

Survey of Bangladesh (SOB) is accumulating and analyzing the data collected from the 6 GNSS CORSs installed in 2011, and distributing/providing this data to users, so they have a certain level of knowledge and experience regarding the operation and maintenance of GNSS CORSs (including data center). Operation and maintenance of tidal stations has also been carried out without any major trouble since the commencement of observations in 1993 until the present. Therefore, it can be concluded that SOB currently has a certain level of knowledge and experience regarding operation and maintenance of the equipment to be procured in this project.

However, when the existing 6 GNSS CORSs were installed, the initial settings until the commencement of operation were mainly carried out by the equipment suppliers, SOB has, therefore, not accumulated the know how up to commencement of operation, and in particular has not accumulated the technology necessary for installation of Mobile GNSS CORSs, which they will first have to deal with in this project.

For the equipment for the modern tide gauge system that is the subject of the cooperation in this project, technology transfer to SOB regarding measurement and recording of tide level data will be carried out by technical guidance from the equipment suppliers. Continuity of tidal data record is important when the tide gauge equipment is added, however SOB does not have sufficient knowledge and experience regarding the technologies of maintaining the continuity of data measured by the old and new tide gauges.

After the number of GNSS CORSs has been increased from the current 6 sites to 79 sites (excluding the 2 sites of potable type) as a result of implementation of this project, it is scheduled that in addition to the data for Single Real-time Kinematic (RTK) surveying that is currently being distributed, data for network-based RTK surveying will also be distributed. In addition, it is planned that data for network-based post-processed kinematic surveying will also be supplied, in response to the wishes of users. The distribution and supply of this data is a new business for SOB, and it is judged necessary to raise their technical capabilities as a data provider in order to properly carry out these works.

In addition, at the present time the number of users using GNSS CORSs data for surveying is extremely limited, and despite the fact that GNSS CORSs data can be used in various fields other than surveying there are no known examples of its use. Therefore, in order that the equipment procured in this project can be effectively utilized, it is necessary to promote utilization of the data distributed from the GNSS CORSs system not only in the surveying field but in other fields also. For this purpose, it is necessary that SOB acquires proper knowledge through study in advanced examples of use in Japan, etc., and communicates this to a wide range of potential users within Bangladesh. Furthermore, it is also necessary to aim for continuous acquisition of the maintenance budget of GNSS CORSs by recognizing that GNSS CORSs is indispensable as an important social infrastructure for Bangladesh.

Hence, the issue is that SOB must acquire new techniques regarding work that they have not experienced to date in order to effectively utilize the equipment to be procured in this project. In order to resolve this issue, the technical capabilities of SOB regarding operation and maintenance for the equipment shall be improved in this project through the soft component.

1-2 Issues

Against this background, the issues facing SOB after implementation of this project are as follows.

Technical Issues

Issue 1:	SOB has not accumulated the technology and knowledge in order to carry out the initial settings of the Mobile GNSS CORSs network system and SOB cannot commence and continue operation on their own.
Issue 2:	SOB does not have the technical capabilities and knowledge to ensure continuity of the tidal observation data from the new and old equipment at the tidal station.
Issue 3:	SOB does not have the experience and technical capabilities to distribute data for network-based RTK surveying and supply data for network-based post-processed kinematic surveying.
Issue 4:	SOB does not have sufficient knowledge regarding the utilization of GNSS CORSs data, and does not have the technical capabilities and experience to carry out public information activities to promote its utilization.

2. Objectives of the Soft Component

The objectives of the soft component are to "establish methods of utilizing GNSS CORSs data and accelerate their dissemination and promotion, as well as to ensure continuity of the tide observation data".

3. Results of the Soft Component

The results that should be achieved at the time of completion of the soft component are as follows.

Expected Outputs of the Soft Component

Output 1:	SOB will be capable of commencing and continuing operation of the GNSS CORSs network system including installation of the Mobile GNSS CORSs, etc.
Output 2:	SOB will be capable of ensuring continuity of the observation data at the tidal station.
Output 3:	SOB will be capable of continuously distributing data for network-based RTK surveying and suppling data for network-based post-processed kinematic surveying, to the appropriate quality.
Output 4:	SOB will be capable of promoting the utilization of GNSS CORSs data in the public and private sectors.

4. Method of Confirming the Degree of Achievement of the Outputs

The items to be confirmed regarding the degree of achievement of the outputs in the soft component and the methods of confirmation are as follows.

Degree of Achievement of the Outputs

No.	Output	Items for Confirming the Degree of Achievement	Method of Confirming the Degree of Achievement
Output 1	SOB will be capable of commencing and continuing operation of the GNSS CORSs network system including installation of the Mobile GNSS CORSs, etc.	- Is SOB capable of installing the Mobile GNSS CORSs, and carrying out inspections?	Confirm that SOB can carry out the installation and inspections by themselves, using manuals made by SOB and consultant
		- Have the initial settings of the Mobile GNSS CORSs continuous measurement system been understood?	Confirm if SOB can carry out the initial settings by themselves, using manuals made by SOB and consultant
		- Can SOB carry out coordinate analysis/determination for the Mobile GNSS CORSs, using baseline analysis software?	Confirm that SOB can carry out coordinate analysis/determination by themselves, using manuals made by SOB and consultant

Output 2	SOB will be capable of ensuring continuity of the observation data at the tidal station.	- Can SOB carry out parallel observation using the new and old tide gauge and determine the instrument error?	Confirm that SOB can carry out parallel observation and determine the instrument error by themselves, using manuals made by SOB and consultant
Output 3	SOB will be capable of continuously distributing data for network-based RTK surveying and suppling data for network-based post-processed kinematic surveying, to the appropriate quality.	- Is SOB capable of stably distributing data for network-based RTK surveying and suppling data for network-based post-processed kinematic surveying?	Confirm that SOB can distribute and supply the data by themselves, using manuals made by SOB and consultant
		- Can SOB accurately deal with inquiries from users?	Confirm that SOB can deal with inquiries from users, using manuals made by SOB and consultant
Output 4	SOB will be capable of promoting the utilization of GNSS CORSs data in the public and private sectors.	- Can SOB carry out verification of the accuracy of the data for network-based RTK surveying and set standards for accuracy that are disclosed to the users?	Confirm that SOB can prepare documents for the actual accuracy of the data and share them with the users
		- Can SOB hold seminars and technical training courses for the purpose of promotion of utilization of GNSS CORSs data in the surveying field, and convey to the participants the advantages of use of this data and its methods of use?	Confirm that SOB can prepare various kinds of documents and hold user seminars and technical training courses
		- Can SOB carry out public information activities contributing towards dissemination and promotion of utilization of the data by introducing examples in fields other than surveying?	Confirm that SOB can prepare public information or technical documents, pamphlets regarding examples of use, or other documents for use at seminars and training courses, and hold opinion exchange meetings and seminars regarding use of the data

5. Soft Component Activities (Input Plan)

5-1 Activity for each output

The technical level of SOB shall be improved through the soft component activities. The activities categorized for each output are as follows.

Activity for each output

Output 1	SOB will be capable of commencing and continuing operation of the GNSS CORSs network system including installation of the Mobile GNSS CORSs, etc.	⇒	Activity 1	Technical guidance regarding installation of the Mobile GNSS CORSs and initial settings of the system
			Activity 2	Technical guidance regarding the operation of determining coordinates using baseline analysis software
Output 2	SOB will be capable of ensuring continuity of the observation data at the tidal station.	⇒	Activity 3	Technical guidance regarding determining the instrumental error by parallel observation
Output 3	SOB will be capable of continuously distributing data for network-based RTK surveying and suppling data for network-based post-processed kinematic surveying, to the appropriate quality.	⇒	Activity 4	Technical guidance regarding distribution of observation data and dealing with users
Output 4	SOB will be capable of promoting the utilization of GNSS CORSs data in the public and private sectors.	⇒	Activity 5	Technical guidance regarding verification of accuracy of distribution data, implementing technical training courses for users, and promotion of utilization of the data
			Activity 6	Technical guidance regarding public information activities to promote the utilization and dissemination of the GNSS CORSs

5-2 Details of activities

5-2-1 Output 1: SOB will be capable of commencing and continuing operation of the GNSS CORSs network system including installation of the Mobile GNSS CORSs, etc.

Activity 1: Technical guidance regarding installation of the Mobile GNSS CORSs and initial settings of the system

SOB is the organization that will be responsible for operation of the GNSS CORSs. However, although SOB has understanding of some parts (user registration, etc.) of system operation, they do not have sufficient knowledge, capability, and techniques regarding the initial settings.

The initial settings (including delivery of a manual on the initial settings) for the network including the GNSS CORSs that will be expanded by this project will be carried out by the equipment supplier, and technology transfer will be carried out regarding the methods of day-to-day operation of the GNSS CORSs. However, although the equipment of the Mobile GNSS CORSs is delivered in this project, the installation and operation is implemented by the SOB themselves, and each time the equipment of the mobile GNSS CORSs are set up (newly established or relocated) initial setting of the GNSS CORSs is required. For this reason, it is necessary for the SOB to become familiar with the setting of the GNSS CORSs and the system initial setting, and acquire the ability to complete the system initial setting operation by SOB own.

Regarding the method of installation of the Mobile GNSS CORSs, the equipment supplier will provide guidance on the initial operation and deliver manuals regarding installation. Although the equipment supplier will check the operability of the system, it is not envisaged that they will provide guidance on technical matters. Generally, when Mobile GNSS CORSs are installed, it is necessary to take into account the installation location (natural conditions, topographical conditions, skyward angular range of view), status of nearby facilities, presence of radio wave interference, and lightning countermeasures). The SOB staff has already acquired the techniques of judging the installation locations for the GNSS CORSs, but they have no experience of installation of Mobile GNSS CORSs, and do not have the techniques of planning the arrangement of equipment taking the possibility of lightning strike into consideration. Regarding the setting criteria items of GNSS CORSs according to regional characteristics (checking the status of the surrounding facilities, presence of interfering radio waves, equipment planning considering lightning countermeasures), it is necessary to understand regional characteristics. For this reason, it was confirmed that the equipment suppliers can not deal with technical guidance and practical training related to them through interviews to the equipment manufacturers. Therefore, it is necessary the technical guidance and practical training to the SOB staff regarding checking the nearby facilities, checking for radio wave interference, and arrangement of the equipment (planning and implementation) among installation work of the Mobile GNSS CORSs.

Of the work involved in the initial settings of the system, the items for which SOB has no experience include registration of the Mobile GNSS CORSs to the system, recording of skyward angular range of view for each direction and preparation of GNSS CORSs network for real-time RTK in the data center, checking for the presence of interference of radio waves, etc., originating from the mobile telephone network or radio waves for military use by analysis of the measurement results of the Mobile GNSS CORSs for about two weeks, and checking for variations in the coordinates. In order to carry out these initial system settings, it is necessary that the technical level of the SOB staff be raised and that they become proficient in this work.

Of these work items related to installation of Mobile GNSS CORSs and initial settings of the system, the technical guidance and the on-the-job training (OJT) provided in this activity will supplement those work items (checking the status of the surrounding facilities, presence of interfering radio waves, equipment planning considering lightning countermeasures) that are not included in the guidance (including delivery of a manual) provided by the equipment supplier on the grounds that such work items will necessarily require determination of the installation location in accordance with the circumstances.

Also, an implementation guidelines document and checklist will be prepared based on the manual delivered by the equipment supplier, so that it is consistent with the content and flow of the actual operation work. Then, in order to evaluate the degree of achievement of the outputs of the activity, an agenda-setting training or a virtual reality training will be carried out at several buildings in the Dhaka area identified and selected on an experimental basis. In this training all the work relating to installation of Mobile GNSS CORSs and initial settings will be carried out as OJT, such as selection of installation locations for equipment such as antennae, receivers, routers, batteries, solar panels, etc., fixing methods, countermeasures against lightning and wind, etc. Through these OJT, the proficiency of the SOB staff in each of these work items will be increased, and it will be confirmed whether SOB can carry out installation and inspection of Mobile GNSS CORSs on their own using the manual, and whether SOB can carry out the initial settings of the GNSS CORSs measurement system on their own using the manual.

Note that one of the issue-specific training JICA Knowledge Co-Creation Program “Management and Utilization of National Control Points for Efficiency of Survey” pertains to the GNSS CORSs. However, in this program, the trainees must learn a wide variety of knowledge about the GNSS CORSs over a period of about 1.5 months, and the training does not include the techniques of initial settings of the GNSS CORSs system. Therefore, the training about initial settings shall be conducted within the framework of the soft component activities.

Input Plan

Output: SOB will be capable of commencing and continuing operation of the GNSS CORSs network system including installation of the Mobile GNSS CORSs, etc.	
Implementation year: FY 2020 (after installation of the GNSS CORSs, and delivery of the Mobile GNSS CORSs)	
Input Plan	
Current technology level	Of the work items related to the installation of the Mobile GNSS CORSs and the initial settings of the system, at present, SOB does not have sufficient technical capabilities and experience for some of these work items (registration of the mobile GNSS CORSs to the system, recording the skyward angular range of view for each direction, preparation of a GNSS CORSs network for RTK surveying, checking for radio wave interference, etc., and checking for variation in the coordinates).
Matters dealt with in the initial operation guidance, etc.	Initial operation guidance and operating guidance: Guidance and manual preparation on the series of setting methods for the system initial settings, and guidance and manual preparation for the methods of installation of Mobile GNSS CORSs (including registration of the installed GNSS CORSs onto the system, and preparation of a network with suitably selected GNSS CORSs) will be included in the initial operation guidance and operating guidance provided by the equipment supplier. JICA Knowledge Co-Creation Program: The initial setting techniques for the GNSS CORSs system are not included in the JICA Knowledge Co-Creation Program.
Necessity of the activities	In order to utilize the Mobile GNSS CORSs, it is necessary to acquire and become proficient in the appropriate installation techniques (techniques for determination of installation location taking into consideration factors such as: natural conditions, topographical conditions, and skyward angular range of view, techniques to check the status of nearby facilities, to arrange equipment, to check for the presence of radio wave interference, and lightning countermeasures). Also, before SOB commences operation on their own, it is necessary that they acquire the technical capabilities of carrying out the series of operations for the system initial settings and become proficient in this work. Some of the technical capabilities can be acquired through the initial operation guidance provided by the equipment supplier, but for acquisition of the techniques of coordinate calculation and determining the installation location of Mobile GNSS CORSs, it is necessary that proficiency in these operations be

		acquired through the soft component.
Activity content	Necessary technologies and work types	Technologies regarding installation of Mobile GNSS CORSs (checking the status of nearby facilities, checking for the presence of radio wave interference, and arrangement of equipment including lightning countermeasures, etc.) and the initial settings of the system (measurement of the provisional coordinates and their registration onto the system, checking for variation in the coordinates).
	Necessary technical-skill level	Japanese side: Comprehensive understanding and technical capabilities regarding installation of Mobile GNSS CORSs and initial settings of the system. Advanced technical capabilities regarding GNSS CORSs and Global Navigation Satellite System (GNSS). Bangladeshi side: The technical capabilities to appropriately carry out installation of the Mobile GNSS CORSs and initial settings of the system.
	Training provided for	Geodetic Detachment of SOB (engineers responsible for the GNSS CORSs 2 persons and GNSS CORSs system 2 persons)
	Implementation method	On-site technical guidance and OJT
Resources	Trainer	Japanese consultant (1 person)
	Duration	in Bangladesh: 0.83 M/M (25 days)
Types of deliverables		Preparation of Mobile GNSS CORSs installation procedures manual (including checklist) Preparation of initial system setting procedures manual (including checklist)

Schedule

Item	Period	Outline
Preparation work, introductions	1.5 days	Introductions, confirmation of details to be carried out:0.5 day Selecting appropriate sites for training regarding installation of Mobile GNSS CORSs: 0.5 day Clarification of personnel to undertake the installation of Mobile GNSS CORSs (implementation structure, number of persons, scope of responsibilities): 0.5 day
Preparation of technical training courses and draft checklist for installation of Mobile GNSS CORSs	3.0 days	Technical training regarding all the checked items, such as checking of nearby facilities, checking for the presence of radio wave interference, planning the equipment arrangement, etc.: 2.0 days

Item	Period	Outline
		Preparation of the draft checklist and confirmation of the list by SOB: 1.0 day
OJT for installation of Mobile GNSS CORSs	5.5 days	Identification of points to note regarding installation of Mobile GNSS CORSs: 0.5 day Actual practice of transport, installation, and fixing of Mobile GNSS CORSs: 3.0 days Identification of technical issues: 0.5 day Joint work with SOB for updating of draft manual (including checklist) including installation and removal of Mobile GNSS CORSs, shelter during thunderstorms, etc.: 1.5 days
Actual practice/OJT regarding initial settings of the system	4.5 days	Practice using actual data: 3.0 days Identification of the technical issues regarding the series of operations for initial settings of the system: 0.5 day Joint work with SOB for preparation and updating of draft initial system setting manual (including checklist): 1.0 days
Trial implementation, monitoring, and confirmation of the degree of achievement of the outputs	4.5 days	Carrying out trials in accordance with the manual, review by SOB, and repetitive practice: 3.5 days Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.0 day
Formulation of methods of initial settings of the system/installation of Mobile GNSS CORSs	2.0 days	Joint preparation of manual (including checklist) with SOB, and summary: 2.0 days
Traveling days	1.0 day	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated. However, since Activity 1 is in charge of the same personnel as Activity 2 and is to be carried out continuously, the movement date is one day.
Document organize	3.0 days	
Total	25 days	

Activity 2: Technical guidance regarding the operation of determining coordinates using baseline analysis software

In order to commence operation of the system, after the initial settings it is necessary to carry out the operation of determining the accurate positional coordinates of each GNSS CORS. If this operation cannot be completed, then not only will it not be possible to commence operation of the system, but determining the coordinates of the GNSS CORSs based on the coordinate system used is also an important matter regarding surveying administration in Bangladesh, it is therefore extremely important.

In order to determine the coordinates, it is necessary to carry out geographical coordinate calculation by adjusting a distance between the coordinates of the positions of the continuous observation stations (IGS stations, GNSS CORSs) of neighboring countries and the coordinates of the positions of the newly installed Bangladeshi GNSS CORSs. To calculate the coordinates it is necessary to carry out an analysis using baseline analysis software, and "Bernese GNSS Software" is the software that is generally used for this analysis. Therefore, in this project, it is necessary to carry out the analysis using the equivalent of this software for the operation of determining the coordinates of the GNSS CORSs. For determination of the coordinates of the GNSS CORSs (apart from the mobile type) introduced in this project, technical support for the coordinate analysis will be provided by the equipment supplier and the coordinate values will be calculated, but this applies to the fixed stations only. The techniques for determining the coordinates of the Mobile GNSS CORSs that is not covered by the guidance provided by the equipment supplier are to be transferred to SOB, it is therefore necessary that technical guidance be provided separately by a Japanese consultant.

Short training (5 days) in the Bernese GNSS Software is held by the developer, Bern University (Switzerland), and in the past this has been attended by 2 members of staff of SOB. SOB attempted to acquire the skills of operation of the software and analysis techniques by attendance at this short training course. However, knowledge of the concepts of GNSS, the method of least squares, crustal movement, geodetic coordinate system, etc., are essential for this course, there is a large volume of lectures and practices carried out in this short period of time, and the content of the training is advanced. Therefore, unfortunately, the SOB staff members were unable to acquire the technologies necessary for determination of the coordinates of the GNSS CORSs.

For calculation of the coordinates of the existing 6 GNSS CORSs, SOB carried out the analysis with support from the equipment supplier. However, effectively the equipment supplier took the lead in carrying out the analysis, SOB was therefore unable to achieve the necessary technical level. Subsequently they had experience using this software (Ver. 5.0), but SOB does not possess the technology for carrying out high accuracy coordinate calculations by themselves.

Therefore, it is necessary that a "baseline analysis results calculation manual" be prepared by technical guidance from a consultant proficient in the method of coordinate analysis using the software, and that technical lectures and OJT on coordinate determination work be carried out based on this manual. The content of the operation manual for the software contains not only coordinate calculation, but comprehensively covers a wide range of functions for researchers, so it is not a working level manual. Therefore, the necessary items for SOB to carry out the operation of determining the coordinates of the Mobile GNSS CORSs will be extracted from the software operation manual, and the content will be modified in accordance with the SOB capabilities and actual processing procedures. In the technical guidance (OJT), the calculation process will be carried out iteratively in accordance with the manual using the actual observation data for the SOB GNSS CORSs, to improve the capability and

proficiency of the SOB staff to calculate coordinates. As a result of these activities, not only will SOB be able to carry out by themselves the work of determining the coordinates of the Mobile GNSS CORSs after installation, but also they will become more proficient in the work of determining the coordinates so that they can carry out the work by themselves when new stations are installed.

Input Plan

<table>
<tr><td colspan="3">Output: SOB will be capable of commencing and continuing operation of the GNSS CORSs network system including installation of the Mobile GNSS CORSs, etc.</td></tr>
<tr><td colspan="3">Implementation year: FY 2020 (after installation of the GNSS CORSs, and delivery of the Mobile GNSS CORSs)</td></tr>
<tr><td colspan="3">Input Plan</td></tr>
<tr><td colspan="2">Current technology level</td><td>SOB has some experience in calculation of coordinates, and members of staff have attended training at Bern University in the use of baseline analysis software. However, at present they do not have sufficient technical capabilities and experience regarding carrying out high accuracy analysis and determination of coordinates using the latest version of the software, and it is difficult for SOB to carry out these operations by themselves.</td></tr>
<tr><td colspan="2">Matters dealt with in the initial operation guidance, etc.</td><td>Initial operation guidance and operating guidance:
The equipment supplier will carry out calculation of the coordinates for the GNSS CORSs.
JICA Knowledge Co-Creation Program:
This is a special technology, so at present it is not included in the JICA Knowledge Co-Creation Program.</td></tr>
<tr><td colspan="2">Necessity of the activities</td><td>In order to operate the Mobile GNSS CORSs, it is necessary to accurately determine the coordinates of the positions of the GNSS CORSs. Since the activities comprise high accuracy calculation of the coordinates, they must be covered by the soft component.</td></tr>
<tr><td rowspan="3">Activity content</td><td>Necessary technologies and work types</td><td>Technologies regarding analysis and determining coordinates using baseline analysis software</td></tr>
<tr><td>Necessary technical-skill level</td><td>Japanese side:
Comprehensive understanding of baseline analysis software and technical capabilities regarding the network adjustments using the coordinate system, baseline analysis, and the method of least squares.
Bangladeshi side:
The technical level to enable the operation of determining the coordinates of the newly installed GNSS CORSs, and determining the coordinates of the Mobile GNSS CORSs, and newly installed stations.</td></tr>
<tr><td>Training provided for</td><td>Geodetic Detachment of SOB (engineers responsible for</td></tr>
</table>

		GNSS CORSs system 2 persons)
	Implementation method	On-site technical guidance
Resources	Trainer	Japanese consultant (1 person)
	Duration	In Bangladesh: 0.87 M/M (26 days)
Types of deliverables		Baseline analysis software operation manual

Schedule

Item	Period	Outline
Preparation work, introductions	2.5 days	Introductions, confirmation of details to be carried out:0.5 day Collection and confirmation of data to analyze, preparation for analysis work: 1.5 days Clarification of SOB stuffs (person in charge, number of person, and the scope of responsibilities: 0.5 day
Guidance on data analysis and coordinate determination work	5.0 days	Preparation of draft manual by SOB by extracting the necessary items from the software operation manual: 3.0 days Confirmation of software operation method: 1.0 day Confirmation of the details of the original data and various types of generated data, and their storage locations, as well as formulation of rules: 1.0 day
OJT regarding data analysis and coordinate determination work	5.5 days	Actual practice in analysis using observation data and calculation of coordinates: 3.5 days Checking the calculation results: 0.5 day Tips, and joint work with SOB for updating the manual in accordance with actual operations: 1.5 days
Implementation and monitoring	6.0 days	Implementation of repetitive work in accordance with the manual: 6.0 days
Confirmation of the degree of achievement of the outputs	2.0 days	Review and explanation of the results of carrying out the work: 1.0 day Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.0 days
Formulation of methods of determining coordinates	1.0 day	Joint preparation of manual (including checklist) with SOB, and summary: 1.0 days
Traveling days	1.0 day	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated. However, since Activity 2 is in charge of the same personnel as Activity 1 and is to be carried out continuously, the movement date is one day.
Document organize	3.0 days	
Total	26 days	

5-2-2 Output 2: SOB will be capable of ensuring continuity of the observation data at the tidal station.

Activity 3: Technical guidance regarding determining the instrumental error by parallel observation

As a result of this project new measuring instruments and communication equipment will be installed at the tidal station. The equipment that is scheduled to be introduced acquires the data by a radar system that is different from the float type that is currently in use, and the data will be transmitted to the server in the SOB Mirpur Office using the mobile telephone network.

In order to determine the "Instrument Error" which is a difference arising from the characteristics of equipment of the old and new tide gauges, it is necessary to carry out observations in parallel with the new and old equipment for a certain period of time after introduction of the new equipment (envisaged to be 1 to 2 years). By providing technical guidance on the methods of comparing the observation results from the old and new equipment, and in addition to providing technical guidance on identification of the reasons for the instrument error between the new and old equipment and devising methods to deal with them after carrying out the parallel observation for a certain period of time, SOB will be able to continue carrying out the parallel observation after completion of the project, and thereafter will be capable smoothly replacing the equipment and ensuring continuity of the observed values.

Therefore, in the soft component activities relating to the tidal station in this project, technical guidance will be provided on the methods of carrying out parallel observations, and identifying the reasons for the instrument error after carrying out parallel observation for a certain period of time. As a result of these activities, SOB will cultivate the technical capabilities to carry out effectively operation and maintenance of the tidal station, with the objective of ensuring continuity of the observation data when the tide gauge is replaced.

Input Plan

Output: SOB will be capable of ensuring continuity of the observation data at the tidal station.	
Implementation year: FY 2020 (after installation of the equipment at the tidal station, and after a certain period of time of parallel observation)	
Input Plan	
Current technology level	SOB possesses the technical capabilities for operation and maintenance of the existing equipment, but they have no experience of use of the equipment to be newly introduced, and they have no experience of analysis and verification of the instrument error from parallel observations with the two types of equipment.
Matters dealt with in the initial operation guidance, etc.	Initial operation guidance and operating guidance: The equipment supplier will provide technical guidance on the methods of operation of the newly introduced equipment and provide manuals.

		JICA Knowledge Co-Creation Program: This component is not included in the JICA Knowledge Co-Creation Program.
Necessity of the activities		The operation of parallel observation itself can be covered by the initial technical guidance provided by the equipment supplier, but in order to appropriately carry out the parallel observation and ensure continuity of the observation data before and after procurement of the equipment, cultivation of technical capabilities in the soft component is essential.
Activity content	Necessary technologies and work types	The technology to enable identification of the causes of instrument error during parallel observation to be determined from the tidal station data
	Necessary technical-skill level	Japanese side: Comprehensive understanding and technical capabilities regarding parallel observation using two types of tide gauge and the adjustment of the observed values. Bangladeshi side: Technical capabilities that allow SOB to carry out efficient operation and maintenance of radar type tide gauges. Technical capabilities that allow SOB to carry out by themselves identification of the causes of instrument error by parallel observation and adjustment to ensure continuity of the observed values.
	Training provided for	Geodetic Detachment of SOB (engineers responsible for the tidal station 2 persons)
	Implementation method	On-site technical guidance
Resources	Trainer	Japanese consultant (1 person)
	Duration	In Bangladesh: 0.97 M/M (29 days)
Types of deliverables		Parallel observation manual Training materials for identification of the causes of instrument error and adjustment of the errors

Schedule

Item	Period	Outline
Technical guidance regarding the methods of comparison of the measurement results with the old and new equipment		
Preparation work for parallel observation, introductions	1.0 day	Introductions, confirmation of details to be carried out: 0.5 day Clarification of SOB stuffs (person in charge, number of person, and the scope of responsibilities: 0.5 day
Guidance on parallel observation methods	2.0 days	Confirmation of observation methods to be used: 0.5 day Preparation of draft parallel observation work manual by SOB: 1.5 days
Implementation and monitoring of parallel	6.0 days	Actual practice in parallel observation in accordance with the manual: 5.0 days (including travel times for round trip

Item	Period	Outline
observation		from Dhaka to Chattogram) Joint work with SOB for updating the manual: 1.0 day
Checking the implementation capability, and guidance to the counterpart regarding parallel observation	2.0 days	Review and explanation of the practice results: 0.5 day Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.0 day Guidance regarding parallel observations to be carried out by SOB in the future: 0.5 day
Traveling days	2.0 days	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated.
Document organize	1.0 day	
-Implementation of Parallel Observation (by SOB)-		
Technical guidance on identification of the causes of errors and devising methods for dealing with them		
Preparatory work on identification of the causes of instrument error and adjustment of observation results, and introductions	0.5 day	Introductions, confirmation of details to be carried out: 0.5 day
Guidance on identification of the causes of instrument error	2.0 days	Confirmation of instrument error, and analysis and identification of causes by consultants: 1.0 day Preparation of examples document by consultants: 1.0 day
Guidance regarding adjustment of parallel observation results	5.0 days	Confirmation of the parallel observation results and instrument error by SOB: 3.0 days (including travel times for round trip from Dhaka to Chattogram) Lectures and technical guidance regarding adjustment of parallel observation results: 2.0 days
Confirmation of the degree of achievement of the outputs, and guidance to the counterpart regarding adjustment of observation results	2.5 days	Review and explanation of parallel observations: 0.5 day Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.5 days Guidance regarding parallel observations and adjustment of the observed values to be carried out by SOB in the future: 0.5 day
Formulation of tidal observation methods	2.0 days	Joint preparation of manual (including checklist) with SOB: 1.5 days Compilation of technical documents: 0.5 day
Traveling days	2.0 days	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated.
Document organize	1.0 day	
Total	29 days	

5-2-3 Output 3: SOB will be capable of continuously distributing data for network-based RTK surveying and suppling data for network-based post-processed kinematic surveying, to the appropriate quality.

Activity 4: Technical guidance regarding distribution of observation data and dealing with users

SOB is currently collecting/analyzing data from the existing 6 GNSS CORSs, and distributing data for single RTK surveying use to the public. The majority of the users only use the GNSS CORSs data for the large cities Dhaka and Chattogram, and the number of users is not very large, so at the present time the system can be operated without major problems in the GNSS CORSs system or complaints from the users. However, as a result of this project the number of GNSS CORSs will be increased to 81, and data distributed/supplied for network-based RTK surveying and for network-based post-processed kinematic surveying will be added. Therefore, SOB will be required to spend much time and effort setting new software, dealing with inquiries from users and troubleshooting that have never happened before.

It is necessary that data for network-based RTK surveying prepared by complex analytical processing by software be distributed in real time. And also it is necessary that data for network-based post-processed kinematic surveying be stored on the server for a certain period of time after analysis processing, in order to be extracted and supplied in accordance with the requests of users. This distribution and supply of data is new work for SOB, for which SOB stuffs do not possess the technologies and experience which is required to carry out these work now. However, distribution and supply of this data is the key to achieving the outputs of this project, therefore, it is required for SOB to have a level of technology that allows them to sufficiently carry out these operations. In addition, in order to be able to respond to the problems and to the large number of inquiries that are expected to arrive from the users, it will be necessary that the SOB staff understand the flow of everything ranging from receipt of data while the GNSS CORSs system and its management system are operating, through to distribution and supply of data, and dealing with users. Specifically, it is necessary to prepare a manual that documents system operating procedures, troubleshooting, response to users (including methods of using the data distributed and supplied, methods of using the equipment for network-based RTK surveying, surveying accuracy, points to note during use, FAQ, etc.) as much as possible within the extent envisaged, based on the manuals delivered by the equipment supplier and documents prepared based on interviews with data distribution service providers in Japan. It is also necessary that a portion of the manual is prepared to be shared with users as a User Manual. As a result, it is expected that SOB will accumulate technology and knowledge regarding the operation of the system, and in addition the capabilities of the SOB staff to deal with users will be improved.

Technical guidance regarding the basic settings and operations of the software for distribution and supply of the GNSS CORSs data and supply of the manuals will be carried out by the equipment supplier. On the other hand, technical guidance regarding dealing with preparation of operation

manual, inquiries from users, dealing with system problems, and preparation of manuals for sharing with users in connection with operation of the GNSS CORSs system will not be carried out by the equipment supplier, it is therefore necessary that technical support be provided by a consultant possessing the techniques of dealing with users, dealing with problems, and preparation of manuals regarding these.

Therefore, in this Activity 4, the consultant will provide lectures and OJT regarding system operation, dealing with users, and troubleshooting, and then SOB will jointly prepare a system operation manual and a user manual for the system users. The system operation manual will be prepared by identifying and updating the parts necessary for actual operation of the system, based on the manuals delivered by the equipment supplier. In the case of the user manual, information will be collected in advance by interviews with data distribution service providers in Japan, and after preparation of a draft "User Manual", it will be amended and updated in accordance with the actual operation of the system. As outputs of this activity, the "System Operation Manual" and the "User Manual" will be prepared in order to enable SOB to carry out system operation and deal with users, as well as to provide in-house technical training to new members of staff, and the technical capabilities of SOB in this regard will be cultivated.

Input Plan

Output: SOB will be capable of continuously distributing data for network-based RTK surveying and suppling data for network-based post-processed kinematic surveying, to the appropriate quality.	
Implementation year: FY 2020 (after the initial settings of the GNSS CORSs continuous measurement system and the coordinate determination have been completed)	
Input Plan	
Current technology level	There is no technical capabilities and experience regarding data distribution/supply for network-based RTK surveying and network-based post-processed kinematic surveying. Also, there is a lack of experience in dealing with users (preparation of manuals, etc.).
Matters dealt with in the initial operation guidance, etc.	Initial operation guidance and operating guidance: Technical guidance regarding data distribution and supply will be included in initial operation guidance and operating guidance provided by the equipment supplier, but dealing with problems regarding system operation, responding to inquiries from users, and preparation of manuals for users will not be covered by these guidance services. JICA Knowledge Co-Creation Program: The basic concepts of distribution and post-processing of data and an overview of the technologies involved in the data distribution are included, but specific distribution procedures and methods and dealing with users are not included in the JICA Knowledge Co-Creation Program.
Necessity of the activities	The technologies for distributing data for network-based

		RTK surveying and supplying data for network-based post-processed kinematic surveying are essential for both the service suppliers and users in order to appropriately deal with the users of the GNSS CORSs. Technical guidance regarding data distribution and supply will be carried out in the initial operation guidance by the equipment supplier, but guidance for proficiency in system operation and for dealing with users will not be carried out, so it is necessary that technical guidance be carried out in the soft component to enable stable data distribution and supply to be carried out, and efficient utilization of the equipment that has been introduced.
Activity content	Necessary technologies and work types	Technical capabilities for distributing data for network-based RTK surveying and supplying data for network-based post-processed kinematic surveying.
	Necessary technical-skill level	Japanese side: Comprehensive technical capabilities regarding system operation from data generation to distribution/supply, and knowledge and experience of troubleshooting and dealing with users. Bangladeshi side: Technical level that enables them to distribute/provide data to the level that satisfies the users. Acquisition of the methods of appropriately dealing with the occurrence of problems and dealing with inquiries from users.
	Training provided for	Geodetic Detachment of SOB (engineers responsible for the GNSS CORSs / GNSS CORSs system 3 persons)
	Implementation method	On-site technical guidance
Resources	Trainer	Japanese consultant (1 person)
	Duration	In Bangladesh: 0.67 M/M (20 days)
Types of deliverables		System Operation Manual, User Manual

Schedule

Item	Period	Outline
Preparation work, introductions	1.5 days	Introductions (lectures on specifications of data distributed /supplied): 1.0 day Clarification of SOB stuffs (person in charge, number of person, and the scope of responsibilities: 0.5 day
OJT regarding system operation Preparation of draft manual	4.5 days	Actual practice of system operation in accordance with the initial operation guidance: 1.0 day Identification of anticipated inquiries from users and problems in connection with technical issues: 0.5 day Joint preparation of draft operation manual with SOB by reference to the manuals from the equipment supplier: 2.0 days Joint preparation of draft user manual with SOB based on

Item	Period	Outline
		the information from the Japanese data distribution service providers: 1.0 day
Guidance regarding system operation, dealing with users, and troubleshooting	3.0 days	Technical guidance for system operation, dealing with anticipated inquiries from users, and troubleshooting: 2.0 days Joint work with SOB for updating the draft operation manual prepared as described above: 1.0 day
Joint preparation of the User Manual	2.0 days	Study of methods of use of the distributed/supplied data, methods of using equipment for network-based RTK surveying, survey accuracy, points to note regarding use, and FAQs: 1.0 day Joint work with SOB for updating the draft User Manual prepared as described above:1.0 days
Implementation and monitoring	3.0 days	Repetitive practice in operation of the system in accordance with the manuals: 2.0 days Practice in monitoring of the system: 1.0 day
Confirmation of the degree of achievement of the outputs, provision of guidance for the counterpart	2.0 days	Review and explanation of the operation: 0.5 day Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.0 day Guidance regarding updating the manuals after commencement of operation: 0.5 day
Traveling days	2.0 days	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated.
Document organize	2.0 days	
Total	20 days	

5-2-4 Output 4: SOB will be capable of promoting the utilization of GNSS CORSs data in the public and private sectors.

Activity 5: Technical guidance regarding verification of accuracy of distribution data, implementing technical training courses for users, and promotion of utilization of the data

Utilization of the data for network-based RTK surveying generated with the GNSS CORSs system and its management system introduced in this project has an extremely important role as an output of this project. Gaining the trust of the users by maintaining the quality of the distributed data at or above a certain level and announcing to users it is indispensable for increasing the number of users of the GNSS CORSs data.

The theoretical accuracy of the data for network-based RTK surveying distributed by SOB is indicated on the system at the stage that the data was generated, but it differs from the accuracy of the actual operation of the data for RTK surveying. At the commencement of distribution of data, it is necessary for SOB to publicize to the users the accuracy of the survey results obtained using the actual data distributed. For this purpose, it is necessary that SOB carry out the operation of verification of

accuracy and summarize the results. Also, when there is a delay in transmission of the GNSS CORSs data or when a problem arises in the data received from the GNSS CORSs due to a fault in the GNSS CORSs itself, the accuracy of the data distributed is deteriorated. For continuation of utilization of the data, it is important to envisage in advance how to carry out verification of the reduction in accuracy due to a fault in a GNSS CORSs or a delay in the data, and how to deal with the occurrence of reduction in accuracy in terms of operation.

There is no technical difficulty for SOB to carry out the surveying operations for verification of the surveying accuracy, but they do not have experience of carrying out network-based RTK surveying and verifying its accuracy, therefore, they have no techniques for determining the patterns for carrying out verification of accuracy and summarizing the verification results. Also, the equipment supplier will not carry out verification of accuracy and will not provide technical guidance regarding it.

In addition, it is necessary to promote to the surveying industry the utilization of the outputs of this project, namely the data distributed and supplied by SOB, by making the users in the surveying field familiar with the advantages of using each type of surveying data distributed or supplied by SOB after implementation of this project, and its verified accuracy standards, etc.

At the present time, the number of users of the single RTK surveying data distributed by SOB is extremely limited, apart from SOB itself and users in cadastral surveying. It is considered that one of the reasons for this is because to date SOB have not actively carried out promotion of its use, so the users have not understood the advantages of use of this distributed data.

Therefore, in this project, technical guidance on verification of accuracy and summarizing the results by SOB will be provided as a soft component by a consultant proficient and experienced in the techniques of verification of the accuracy of surveying work. In the accuracy verification, the expected survey accuracy and the conditions for achieving this accuracy (number and type of satellites used, number of measurements, data acquisition interval, and distance of GNSS CORSs) will be verified by several (assuming 12) patterns, and a public document on the accuracy standards will be produced. In addition, technical guidance will be provided by the consultant to enable SOB to hold seminars for decision-makers in user organizations of the field of surveying, and to hold technical training courses for practitioners in the user organizations of the field of surveying. Participating users are assumed to be surveying engineers of public offices, private surveyors, and private enterprises dealing with surveying technicians. In this seminar, SOB will introduce some cases of utilization of GNSS CORSs data in surveying field, results of accuracy verification of each surveying method, and procedure of using GNSS CORSs data, etc. to participants. In this activity, consultant will carry out the technical guidance regarding the study of examples of use to be introduced to the users at the seminars, the preparation of a technical document to be released to the public, and demonstrations of actual surveying work. Technical guidance will also be provided regarding the technical

explanations to be given by SOB staff to the users participating in the technical training courses, and preparation of documents for practical training, etc.

As outputs of this activity, SOB will cultivate the technical capabilities that enable SOB to verify the actual accuracy of network-based RTK surveying for disclosure to users, and to carry out in the future accuracy verification work and summarizing the results on their own. Moreover, SOB will be capable of smoothly holding user seminars and technical training courses in the surveying field, and promoting the use of the GNSS CORSs data in the surveying field.

Input Plan

Output: SOB will be capable of promoting the utilization of GNSS CORSs data in the public and private sectors.	
Implementation year: FY 2020 (after verification of the accuracy of the data distributed for network-based RTK surveying)	
Input Plan	
Current technology level	Seminars and technical guidance regarding the use of the distributed data have been carried out many times, but SOB has no experience of network-based RTK surveying, accuracy verification, summarizing the results, and technical guidance on this matter.
Matters dealt with in the initial operation guidance, etc.	Initial operation guidance and operating guidance: Guidance regarding implementation of network-based RTK surveying will be provided by the equipment supplier, but technical guidance regarding accuracy verification will not be provided. JICA Knowledge Co-Creation Program: This component is not included in the JICA Knowledge Co-Creation Program.
Necessity of the activities	For continuity and promotion of use of the system, it is necessary to verify the contents (accuracy) of the service, and provide data with appropriate quality to the users. SOB will be capable of carrying out the network-based RTK surveying during the verification work as a result of the initial operation guidance, but it is necessary to provide technical support via the soft component for investigation of the patterns of accuracy verification and summarizing the results. Also, it is necessary to familiarize the users in the surveying field with the content of the service, the accuracy, and the effects of use, in order that the distributed and supplied data will be utilized. SOB are capable of making presentations at seminars and providing technical guidance regarding the use of the distributed data on their own, but it is necessary that support be provided via the soft component for study of the content of the seminars and the techniques of network-based RTK surveying.

Activity content	Necessary technologies and work types	Technology for accuracy verification of the data for network-based RTK surveying and promotion of the utilization of the distributed and supplied data for various types of surveying
	Necessary technical-skill level	Japanese side: The technology for implementing network-based RTK surveying accuracy verification. Comprehensive understanding and technical capabilities regarding the use of the distributed data for surveying and accuracy standards. Bangladeshi side: The technical level to enable network-based RTK surveying and accuracy verification work to be carried out by themselves, and to enable appropriate responses to be taken against deterioration in accuracy of the distributed data. Knowledge and understanding regarding the holding seminars and technical training courses relating to the distributed data. The technical level to enable demonstrations and technical guidance to be carried out.
	Training provided for	Geodetic Detachment of SOB (engineers responsible for the GNSS CORSs / GNSS CORSs system 3 persons)
	Implementation method	On-site technical guidance
Resources	Trainer	Japanese consultant (1 person)
	Duration	In Bangladesh: 1.20 M/M (36 days)
Types of deliverables		Document on the actual accuracy values of network-based RTK, documents for user seminars and technical training courses

Schedule

Item	Period	Outline
Planning and preparation	4.0 days	Study and confirmation of the contents, objectives, and policy for the work to be implemented for verification of accuracy: 1.0 day Study and confirmation of the contents, objectives, and policy for the work to be implemented for seminars: 1.0 day Formulation of verification work plan: 1.0 day Plan for holding user seminars and technical training courses, and preparation of detailed plan: 1.0 day
Implementation of accuracy verification work and technical guidance	12.0 days	Technical guidance regarding implementation by SOB of accuracy verification work taking into consideration the various patterns and deterioration in accuracy due to problems: 12.0 days (1 day x 12 patterns)
Summary of the results of the accuracy verification	4.0 days	Verification and considerations regarding the results of the accuracy verification: 3.0 days (4 patterns per day) Summarizing the accuracy and surveying conditions and

Item	Period	Outline
		preparation of documents for disclosure to users by SOB: 1.0 day
Technical guidance regarding holding seminars	4.0 days	Technical guidance regarding examples of use, advantages, survey accuracy, and methods of use for presentation at user seminars: 1.5 days Technical guidance regarding demonstrations of network-based RTK surveying: 1.0 day Preparation of presentation materials for seminars by SOB: 1.5 days
Technical guidance regarding technical training courses	4.0 days	Technical guidance regarding technical documents and methods of use of data for presentation at technical training courses: 1.5 days Technical guidance regarding implementation of network-based RTK surveying practical training: 1.0 day Preparation of materials for technical training courses by SOB: 1.5 days
Confirmation of the degree of achievement of the outputs, provision of guidance for the counterpart	2.0 days	Review and explanation: 0.5 day Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.0 day Recommendations for activities to promote the utilization of the GNSS CORSs data after commencement of operation: 0.5 day
Traveling days	1.0 day	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated. However, since Activity 5 is in charge of the same personnel as Activity 6 and is to be carried out continuously, the movement date is one day.
Document organize	5.0 days	
Total	36 days	

Activity 6: Technical guidance regarding public information activities to promote the utilization and dissemination of the GNSS CORSs

In countries that already have GNSS CORSs including Japan, the use in various fields other than "survey field" is increasing, in addition to utilization in the "surveying field" which is the original use field of GNSS CORSs. In the future, it will be expected to increase the use other than the surveying field of GNSS CORSs and expand the field of use worldwide.

Even in Bangladesh, the number and density of GNSS CORSs will increase dramatically after implementation of this project. Therefore, it is assumed that the range of utilization in various fields other than the surveying field will be expanded and the demand will also increase for GNSS CORSs data distributed / provided by SOB in the future. In particular, in Bangladesh, a major agricultural country, it is expected to promote IT agriculture by automatic operation of agricultural machines. Besides that, in order to cover the demand for the enormous infrastructure development in the future, it

is essential to make work in the construction projects more efficient, and real-time position measurement of a mobile object such as construction machinery is considered to be indispensable technology. In Bangladesh, where various new technologies are adopted from developed countries and technological innovation is being pursued, the dissemination activities which will be implemented immediately after the installation of GNSS CORSs to potential users other than the field surveying and the dissemination and promotion of utilization will greatly contribute to wide utilization of GNSS CORSs data that is a result of this project and ensure the sustainability of the result of this project.

At present, the users (and methods of use) envisaged by SOB include those engaged in surveying work as a part of infrastructure development, etc., cadastral surveying work, control point surveying work, and preparation of topographic maps by SOB, etc., which is not significantly different from the conventional use of control points. On the other hand, by using GNSS CORSs data it is possible to measure positions to high accuracy in real time, therefore, it is expected that GNSS CORSs data will be widely utilized in fields other than surveying. Examples of such fields include various types of navigation system, automatic operation of agricultural machinery, use of information technology for construction with construction machinery, surveys of obstacles around railways and roads using mobile mapping systems (MMS), determination of the positions for driving piles in rivers and in ports, etc., distribution and inventory management, early detection and prediction of landslides, measurement of crustal movements, etc.

Therefore, in the soft component, technical guidance by the consultant will be provided regarding public information activities for dissemination and promotion, such as holding seminars, publishing pamphlets, etc., to promote the utilization of GNSS CORSs data in fields other than surveying.

Furthermore, in the latter part of the soft component, a promotion seminar will be held that involves stakeholders in the field expected to be utilized other than surveying, and the opinion exchange meetings with potential users that have interest in the utilization of GNSS CORSs data at the seminar and SOB will be held supported by the consultant, and the technical guidance for presentation / explanation material creation and examination of technical issues will be carried out by the consultant.

The promotion seminar and individual opinion exchange meetings are held in sets. The seminar will be assumed to include the Ministry of Agriculture, Ministry of Housing and Public Works, Ministry of Environment and Forests, Ministry of Civil Aviation and Tourism, Ministry of Communications, Ministry of Land, Ministry of Power, Energy and Mineral Resources and research departments in these fields and related private companies etc. In addition, opinion exchange meetings will be held with users who showed interest in utilizing GNSS CORSs data at the seminar, and the outline of GNSS CORSs data, examples of utilization in the field other than surveying in Japan, advanced cases expected to be utilized in the future, etc. will be introduced in the meetings. Examples of concrete utilization to be introduced at the seminar assume the "GNSS navigation system for agriculture" utilized in Hokkaido, the ICT civil engineering work of "i-Construction" undertaken by the Ministry of

Land, Infrastructure and Transport, and the real time vehicle operation management system etc. Examples of utilization of automobiles in vehicles, disaster prevention fields and tourism fields will be introduced as examples of future utilization. SOB will conduct seminars and opinion exchange meetings about three times a year after the project, including this activity, and promote the dissemination of results of this project. However, since SOB stuffs have no experience of carrying out these activities and do not have sufficient technical skills related to document preparation, presentation, demonstration, and facilitation, so the consultant will conduct the technical guidance on the first seminar and the subsequent meetings for exchange of opinions (in the 4 fields assumed). Subsequent promotion activities will be implemented independently by SOB staffs based on the knowledge and ability gained in this technical guidance.

Moreover, at the seminar held in this activity, a demonstration on the real-time position measurement of mobile object (such as vehicles) indispensable for highly utilizing the GNSS CORSs data will be carried out. Participants will be able to have an concrete image of utilization of GNSS CORSs data by looking that accurate position information can be obtained by a GNSS receiver placed on a mobile object (assuming a vehicle), and a great effect will be expected in the promotion of utilization.

As a result of this activity, SOB will continue to carry out public information activities in a wide range of fields after completion of the project, and further expansion of the fields in which the GNSS CORSs data is utilized will lead to recognition of the GNSS CORSs system introduced in this project as important social infrastructure in Bangladesh and this will ensure the sustainability of the result of this project.

Input Plan

Output: SOB will be capable of promoting the utilization of GNSS CORSs data in the public and private sectors.	
Implementation year: FY 2020 (towards the end of the project)	
Input Plan	
Current technology level	There is no sufficient knowledge of utilization of the distributed data in fields other than surveying. Also SOB has no experience of dissemination, promotion, and public information activities to promote the utilization of data in these fields.
Matters dealt with in the initial operation guidance, etc.	Initial operation guidance and operating guidance: Guidance will not be provided. JICA Knowledge Co-Creation Program: This component is not included in the JICA Knowledge Co-Creation Program.
Necessity of the activities	In order to promote the utilization and dissemination of the distributed and supplied data, it is necessary to inform the potential users in fields other than surveying of the methods of utilization (including actual examples of use). At present, SOB has no knowledge of the utilization of the GNSS

		CORSs data in fields other than surveying, so it is necessary to provide technical support in the soft component.
Activity content	Necessary technologies and work types	Techniques of public information activities for promotion of the utilization and dissemination of data
	Necessary technical-skill level	Japanese side: Comprehensive understanding and technical capabilities regarding the utilization of GNSS CORSs data and public information activities. Bangladeshi side: Capabilities of preparation of public information and technical documents, and holding meetings and seminars for exchange of opinions.
	Training provided for	Geodetic Detachment of SOB (engineers responsible for the GNSS CORSs / GNSS CORSs system 3 persons)
	Implementation method	On-site technical guidance
Resources	Trainer	Japanese consultant (1 person)
	Duration	In Bangladesh: 0.80 M/M (24 days)
Types of deliverables		Public information and technical documents, pamphlets with examples of use, documents for holding exchange of opinion meetings and seminars

Schedule

Item	Period	Outline
Planning and preparation	3.0 days	Study of the policy for the public information activities regarding use of the data: 1.0 day Plan for preparation of public information documents and technical documents: 1.0 day Preparation of plans for exchange of opinion meetings and seminars, schedule planning: 1.0 day
Technical guidance regarding preparation of public information and technical documents	6.5 days	Introduction of examples of use in a wide range of fields: 1.0 day Preparation of public information documents, technical documents, pamphlets with examples of use by SOB: 4.5 days (1.5 days x 3 items) Technical guidance relating to preparation of documents, and their modification: 1.0 day
Technical guidance regarding holding exchange of opinion meetings and seminars regarding use of the data	5.0 days	Preparation of documents required for holding exchange of opinion meetings by SOB: 1.0 day Preparation of documents required for holding seminars to promote data utilization by SOB: 1.0 day Technical guidance regarding the above-mentioned documents and joint correction with SOB: 1.0 day Technical guidance regarding practical training of RTK surveying (including mobile real-time measurement): 2.0

Item	Period	Outline
		days
Support for holding exchange of opinion meetings and seminars regarding use of the data	3.0 days	Attendance at and technical support for holding exchange of opinion meetings and seminars regarding use of the data: 3.0 days
Confirmation of the degree of achievement of the outputs, provision of guidance for the counterpart	2.5 days	Review and explanation of the exchange of opinion meetings and data utilization seminars: 1.0 day Confirmation of the degree of achievement of outputs (e.g. can SOB carry out the operation on their own?): 1.0 day Recommendations for public information activities for the GNSS CORSs data after commencement of operation: 1.0 day
Traveling days	1.0 day	One day is from Japan to Bangladesh, One day is from Bangladesh to Japan, total of 2 days is anticipated. However, since Activity 6 is in charge of the same personnel as Activity 5 and is to be carried out continuously, the movement date is one day.
Document organize	3.0 days	
Total	24 days	

6. Procurement of Implementation Resources for the Soft Component

There are no organizations or institutions in Bangladesh possessing the expert knowledge required to implement the soft component of this project: initial settings of the GNSS CORSs network system, data distribution and supply, utilization of the GNSS CORSs data in each field, and tidal observation data. The soft component in this project will be implemented by Japanese consultants, in order to utilize Japanese technologies in these fields.

Participants of each activity from the Bangladesh side will be determined from stuffs of SOB geodetic department (13 people) according to the technical field by the executing agency SOB. The minimum number of participants of each activity shall be as described in the input plan above. The consultant will be able to accept more personnel if SOB can assign more. However, in order to effectively convey the contents of technical guidance to participants, the maximum number of participants in each activity is assumed to be 4 or 5 persons.

7. Implementation Schedule of the Soft Component

The soft component activities relating to Output 1 from initial settings of the GNSS CORSs network system until commencement of operation (Activity 1, Activity 2) will be implemented after delivery of the equipment for the GNSS CORSs system and its management system, and commissioning and the initial operation guidance by the equipment supplier.

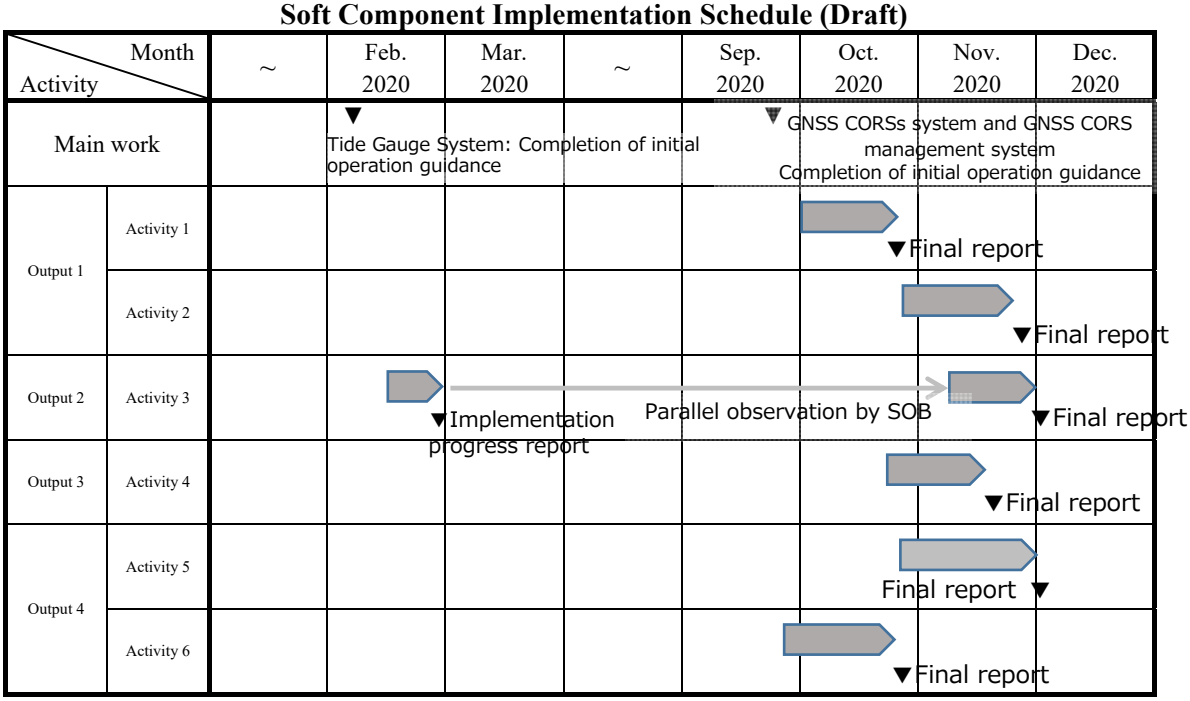
The soft component activities relating to Output 2 for the tidal station (Activity 3) will be carried out on two occasions: after installation of the equipment for the tide gauge system, and after parallel observation for a certain period of time.

The soft component activities for Output 3 relating to distribution and supply of data from the GNSS CORSs system (Activity 4) will be implemented after commissioning and the initial operation guidance by the equipment supplier have been completed, the same as for Output 1.

The soft component activities for Output 4 relating to the utilization of the GNSS CORSs data will be carried out in the final period of this project.

The implementation schedule for each of these activities is as shown below, and the detailed action plan is as previously described.

Soft Component Implementation Schedule (Draft)



8. Deliverables of the Soft Component

The soft component deliverables will be as follows.

Soft Component Deliverables (Draft)

Activity		Deliverable
Activity 1	Technical guidance regarding installation of the Mobile GNSS CORSs and initial settings of the system	Initial system setting procedures manual Mobile GNSS CORSs installation procedures manual
Activity 2	Technical guidance regarding the operation of determining coordinates using baseline analysis software	Long baseline analysis software operation manual

Activity		Deliverable
Activity 3	Technical guidance regarding determining the instrumental error by parallel observation	Training materials for identification of the causes of instrument error and adjustment of the errors
Activity 4	Technical guidance regarding distribution of observation data and dealing with users	System Operation Manual User Manual
Activity 5	Technical guidance regarding verification of accuracy of distribution data, implementing technical training courses for users, and promotion of utilization of the data	Document on the actual accuracy values of network-based RTK Documents for user seminars and technical training courses
Activity 6	Technical guidance regarding public information activities to promote the utilization and dissemination of the GNSS CORSs	Public information and technical documents Pamphlets with examples of use Documents for holding exchange of opinion meetings and seminars
All activities	Progress Report on Implementation of the Soft Component (Activity 3 only, Japanese language version) Final Report (English language version) Final Report (Japanese language version) Document to enable the status of implementation of activities to be checked (including photographs taken in Bangladesh, etc.) Results of questionnaire among members of staff of the counterpart organization and local residents	

9. Approximate Costs of the Soft Component

The approximate cost estimation for the activities of soft component is as follows.

Soft Component Approximate Costs (Unit: Yen)

Item	Amount	Notes
Direct personnel costs		Total work in Bangladesh 5.33 M/M
Direct expenses		No local outsourcing
Overhead costs		
Total		※This Page is closed due to the confidenciality

10. Roles and Responsibilities of the Government of Bangladesh

In order to achieve the objectives of the soft component, it is necessary that the Bangladeshi side continuously implement the activities and actions in the following items.

- SOB members of staff shall continuously and actively participate in the training courses or programs, seminars, etc., held in the soft component.
- SOB shall bear the cost of the expenses associated with SOB members of staff necessary for

participation in each of the activities of the soft component (local activity costs, transportation costs, daily allowances and accommodation costs, etc.).

- SOB members of staff shall carry out the operation and maintenance of each item of equipment in accordance with the updated manuals and checklists prepared in the soft component.
- SOB members of staff shall carry out parallel tidal observations using the old and new tide gauge for an appropriate period of time at the tidal station, and save the measurement records.
- When seminars or training courses on the usage of the GNSS CORSs data are held, SOB shall prepare an appropriate list of participating candidates or invite new members to join the seminars or training courses, and shall bear the cost of the venue and costs associated with running the courses.
- The SOB members of staff that have received the training within the framework of the soft component shall continue to be involved in the operation and maintenance work of the GNSS CORSs and GNSS CORSs system for a certain period of time.

6 Other Relevant Data

Result of Site Condition Survey

(1/4)

No.	Name_of_Station	Name of Site	Division	District	Survey Date	Stories	Height (m)
01	Barguna	Polytechnic Institute	Barisal	Barguna	28-Feb	5	15.24
02	Barisal	Barisal Passport Office	Barisal	Barisal	28-Mar	4	12.20
03	Bhola	Sarkari Shishu Paribar(Balika)	Barisal	Bhola	7-Mar	5	16.77
04	Char fashion	Govt. Tafnal Baret Model multilateral High School (TB High School)	Barisal	Bhola	8-Mar	4	13.42
05	Patuakhali	Sarkari Shishu Paribar (Balika) new	Barisal	Patuakhali	1-Mar	5	15.24
06	Alikadam	Matamohoree Bhabon, Alikadam Cantonment	Chattogram	Bandarban	28-Mar	5	15.24
07	Bandarban	Bandarban Govt. women's College	Chattogram	Bandarban	2-Mar	3	10.06
08	Brahmanbaria	Police Fari (New Building)	Chattogram	Brahmanbaria	3-Apr	5	15.24
09	Chandpur	Chandpur Circuit House	Chattogram	Chandpur	15-Mar	3	9.15
10	Banshkhali, Chattogram	Banshkhali Adarsho High School	Chattogram	Chattogram	28-Feb	4	12.20
11	Chattogram	Chattogram Port Authority Girls High School and College	Chattogram	Chattogram	28-Feb	6	20.12
12	Sitakundu	Shadek Mastan Govt. Primary School	Chattogram	Chattogram	19-May	2	6.10
13	Comilla	Alekjan Memorial High School (New Building)	Chattogram	Comilla	27-May	3	9.15
14	Laksam	Laksam Model Pilot High School	Chattogram	Comilla	20-May	3	9.15
15	Teknaf	Fire Service & Civil Defence	Chattogram	Cox's bazar	1-Mar	2	6.10
16	Cox's bazar	Meteorological Observatory Office	Chattogram	Cox's bazar	1-Mar	3	9.15
17	Feny	Roads & Highway Department	Chattogram	Feny	1-Apr	3	9.15
18	Khagrachari	Primary Training Institute (PTI), PTI Women hostel	Chattogram	Kagrachari	26-Feb	4	12.20
19	Dighinala	Meteorological Observatory Office	Chattogram	Kagrachari	27-Feb	2	6.71
20	Hatia	Sukh Char U.P. Banga Bandhu High School, Cyclone Shelter (2-storied building)	Chattogram	Noakhali	6-Mar	2	6.10
21	Noakhali	Zilla Register Office	Chattogram	Noakhali	1-Apr	4	12.20
22	Rangamati	Education Office	Chattogram	Rangamati	17-May	4	12.20
23	Dhamalcot	Resident-2, Survey of Bangladesh	Dhaka	Dhaka	11-Feb	6	19.00
24	Faridpur	Computer Science Engineering Building, Engineering Collage	Dhaka	Faridpur	28-Feb	5	15.24
25	Gazipur	Horticulture Research Center building (HRC), Bangladesh Agricultural Research Institute (BARI)	Dhaka	Gazipur	4-Mar	4	14.62
26	Shreepur (Gazipur)	New building of Upazila Parisad (Upazilla Nirbahi Office)	Dhaka	Gazipur	4-Apr	4	12.20
27	Gopalganj	Fisheries Polytechnic Institute, Academic Building	Dhaka	Gopalganj	24-May	4	12.20
28	Kishoreganj	Shishu Paribar	Dhaka	Kishoregonj	4-Apr	5	15.24
29	Madaripur	Department of Youth Development (Juba Unnayn (Mohila Hostel))	Dhaka	Madaripur	25-Feb	5	15.24
30	Manikganj	Technical training center (TTC)	Dhaka	Manikganj	28-Feb	4	14.62
31	Munshiganj	Diabetes Hospital (New) Munshiganj	Dhaka	Munshiganj	1-Mar	6	22.00
32	Norsingdi	Shishu Academy Building	Dhaka	Norsingdi	26-Feb	5	18.28
33	Rajbari	Department of Youth Development	Dhaka	Rajbari	1-Mar	6	18.29
34	Tangail	Primary Training Institute	Dhaka	Tangail	5-Apr	2	6.10

(2/4)

No.	Name_of_Station	Design Year	Construction Year	Deference Stories from Approval	Renovation plan in future	Structure Damage	Generator on Roof Top	Access	Objective hinder for CORS	3G	Security	Suitable/Not for installation
01	Barguna	2006	2007	none	none	none	none	OK	none	OK	OK	Suitable
02	Barisal	2013	2015	none	none	none	none	OK	none	OK	OK	Suitable
03	Bhola	2015	2017	none	none	none	none	OK	none	OK	OK	Suitable
04	Char fashion	2013	2015	none	none	none	none	OK	none	OK	OK	Suitable
05	Patuakhali	-	2018	none	none	none	none	OK	none	OK	OK	Suitable
06	Alikadam	2015	2017	none	none	none	none	OK	none	OK	OK	Suitable
07	Bandarban	2000	2008	none	none	none	none	OK	none	OK	OK	Suitable
08	Brahmanbaria	2016	2017	less	none	none	none	OK	none	OK	OK	Suitable
09	Chandpur	2013	2013	none	none	none	none	OK	none	OK	OK	Suitable
10	Banshkhali, Chattogram	2015	2016	none	none	none	none	OK	none	OK	OK	Suitable
11	Chattogram	2013	2017	none	none	none	none	OK	none	OK	OK	Suitable
12	Sitakundu	2001	2001	none	none	none	none	OK	none	OK	OK	Suitable
13	Comilla	2013	2015	none	none	none	none	OK	none	OK	OK	Suitable
14	Laksam	2014	2015	none	none	none	none	OK	none	OK	OK	Suitable
15	Teknaf	2011	2013	none	none	none	none	OK	none	OK	OK	Suitable
16	Cox's bazar	2012	2015	none	none	none	none	OK	none	OK	OK	Suitable
17	Feny	2008	2008	none	none	none	none	OK	none	OK	OK	Suitable
18	Khagrachari	2012	2017	none	none	none	none	OK	none	OK	OK	Suitable
19	Dighinala	2014	2014	none	none	none	none	OK	none	OK	OK	Suitable
20	Hatia	2013	2014	none	none	none	none	OK	none	OK	OK	Suitable
21	Noakhali	2008	2009	none	none	none	none	OK	none	OK	OK	Suitable
22	Rangamati	2001	2005	none	none	none	none	OK	none	OK	OK	Suitable
23	Dhamalcot	2009	2015	none	none	none	none	OK	none	OK	OK	Suitable
24	Faridpur	2014	2016	none	none	none	none	OK	none	OK	OK	Suitable
25	Gazipur	1995	1997	none	none	none	none	OK	none	OK	OK	Suitable
26	Shreepur (Gazipur)	2014	2016	none	none	none	none	OK	none	OK	OK	Suitable
27	Gopalganj	2016	2017	none	none	none	none	OK	none	OK	OK	Suitable
28	Kishoreganj	2004	2005	none	none	none	none	Hatch	none	OK	OK	Suitable
29	Madaripur	-	1995	none	none	small	none	OK	none	OK	OK	Suitable
30	Manikganj	2010	2017	none	none	none	none	OK	none	OK	OK	Suitable
31	Munshiganj	2016	2018(April)	none	none	none	none	OK	none	OK	OK	Suitable
32	Norsingdi	2013	2018	none	none	none	none	OK	none	OK	OK	Suitable
33	Rajbari	2016	2018	none	none	none	none	OK	none	OK	OK	Suitable
34	Tangail	2017	2018	none	none	none	none	OK	none	OK	OK	Suitable

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No.	Name_of_Station	Name of Site	Division	District	Survey Date	Stories	Height (m)
35	Bagerhat	Institute of Marine technology (IMT), Mohila Hostel	Khulna	Bagerhat	20-Feb	6	18.29
36	Mongla, Bagerhat	Chalna Bandar Model High School	Khulna	Bagerhat	18-Mar	4	12.20
37	Chuadanga	Technical Training Center	Khulna	Chuadanga	19-Mar	5	15.24
38	Jessore	Jessore New MM collage science building	Khulna	Jessore	23-May	4	12.20
39	Jhenaidah	Jhenaidah Polytechnic Institute	Khulna	Jhenaidah	27-Feb	5	15.24
40	Koyra, Khulna	Koyra Modinabad Model High School (Cyclone Shelter Building)	Khulna	Khulna	9-Mar	5	15.24
41	Kustia	Public Library	Khulna	Kustia	2-Apr	3	9.15
42	Meherpur	Primary Training Institute	Khulna	Meherpur	26-Feb	6	18.29
43	Narail	Narail Technical Training Center (TTC), Dormitory Building	Khulna	Narail	4-Mar	4	12.20
44	Satkhira	Technical Training Center	Khulna	Satkhira	8-Mar	5	15.24
45	Fulbaria (Mymensingh)	Fulbaria Pilot High School (New building)	Mymensingh	Fulbaria	25-Feb	3	10.98
46	Phulpur (Mymensingh)	Phulpur Degree College	Mymensingh	Mymensingh	20-Feb	4	14.60
47	Netrakona	Bangladesh Meteorological Department (Dormitory building)	Mymensingh	Netrokona	7-Mar	2	7.31
48	Khaliajuri (Netrakona)	Zilla Porishad Dak Banglow	Mymensingh	Netrokona	5-Apr	2	6.10
49	Sherpur	Roads & Highway Department	Mymensingh	Sherpur	22-Feb	3	11.00
50	Bogra	Deputy Commissioner Office	Rajshahi	Bogra	21-May	3	9.15
51	Chapai Nawabganj	Chapai Nawabganj Polytechnic Institute	Rajshahi	Chapai Nawabganj	25-Feb	5	15.24
52	Panchbibi	Fire Service & Civil Defence	Rajshahi	Joypurhat	6-Mar	2	7.62
53	Naogaon	Technical Training Center (TTC)	Rajshahi	Naogaon	5-Mar	4	12.19
54	Porsha (Naogaon)	Muktizoddha Complex	Rajshahi	Naogaon	7-Mar	3	9.15
55	Natore	BADC Building	Rajshahi	Natore	22-Feb	3	9.15
56	Pabna	Pabna Passport Office	Rajshahi	Pabna	1-Apr	3	9.15
57	Rajshahi	Higher Secondary Teachers' Training Institute (Hostel)	Rajshahi	Rajshahi	19-Feb	5	15.24
58	Sirajganj	NID Bhaban	Rajshahi	Sirajganj	14-Feb	3	9.15
59	Tarash	Upazilla Health Complex	Rajshahi	Sirajganj	14-Feb	3	9.15
60	Dinajpur	Islamic Foundation & Imam Training Center	Rangpur	Dinajpur	25-Feb	6	18.29
61	Gaibandha	Youth Development Department	Rangpur	Gaibandha	26-Feb	5	15.24
62	Kurigram	Technical Training Center (TTC)	Rangpur	Kurigram	28-Feb	4	12.19
63	Lalmonirhat	Youth Development Department	Rangpur	Lalmonihat	27-Feb	5	15.24
64	Patgram (Lalmonihat)	Fire Service & Civil Defence	Rangpur	Lalmonihat	1-Mar	2	7.62
65	Nilphamari	Youth Development Department	Rangpur	Nilphamari	15-Feb	6	19.00
66	Panchagarh	Youth Development Department	Rangpur	Panchagarh	20-Feb	5	15.24
67	Rangpur	Cotton Research Center	Rangpur	Rangpur	14-Feb	4	12.20
68	Thakurgaon	Youth Development Department	Rangpur	Thakurgaon	22-Feb	5	15.24
69	Habiganj	Deputy Commissioner Office	Sylhet	Habiganj	15-Mar	4	12.20
70	Moulovibazar	Mukijoddha Complex	Sylhet	Moulovibazar	23-May	3	9.15
71	Sunamganj	Bangladesh Nutrition Research Institute	Sylhet	Sunamganj	27-May	3	9.15
72	Kanaighat, Sylhet	Kanaighat Upazila Parishad New Building	Sylhet	Sylhet	24-May	4	12.20
73	Sylhet	Building-3, Deputy Commissioner Office	Sylhet	Sylhet	13-Feb	4	12.20

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No.	Name_of_Station	Design Year	Construction Year	Deference Stories from Approval	Renovation plan in future	Structure Damage	Generator on Roof Top	Access	Objective hinder for CORS	3G	Security	Suitable/Not for installation
35	Bagerhat	2015	2016	none	none	none	none	OK	none	OK	Consider	Suitable
36	Mongla, Bagerhat	2015	2017	none	none	none	none	OK	none	OK	OK	Suitable
37	Chuadanga	2012	2014	less	none	none	none	OK	none	OK	OK	Suitable
38	Jessore	1997	1997	none	none	none	none	OK	none	OK	OK	Suitable
39	Jhenaidah	2003	2005	none	none	none	none	OK	none	OK	OK	Suitable
40	Koyra, Khulna	2013	2016	none	none	none	none	OK	none	OK	OK	Suitable
41	Kustia	2015	2017	none	none	none	none	OK	none	OK	OK	Suitable
42	Meherpur	2013	2015	none	none	none	none	OK	none	OK	OK	Suitable
43	Narail	2009	2015	none	none	none	none	OK	none	OK	OK	Suitable
44	Satkhira	2014	2017	none	none	none	none	OK	none	OK	OK	Suitable
45	Fulbaria (Mymensingh)	2013	2017	none	none	none	none	OK	none	OK	OK	Suitable
46	Phulpur (Mymensingh)	2004	2011	none	none	none	none	OK	none	OK	OK	Suitable
47	Netrakona	2012	2014	none	none	none	none	OK	none	OK	OK	Suitable
48	Khaliajuri (Netrakona)	-	2000	none	none	none	none	OK	none	OK	OK	Suitable
49	Sherpur	2008	2015	none	none	none	none	OK	none	OK	OK	Suitable
50	Bogra	2002	2002	none	none	none	none	OK	none	OK	OK	Suitable
51	Chapai Nawabganj	2006	2008	none	none	none	none	OK	none	OK	OK	Suitable
52	Panchbibi	1998	2006	none	none	none	none	OK	none	OK	OK	Suitable
53	Naogaon	2015	2018	none	none	none	none	OK	none	OK	OK	Suitable
54	Porsha (Naogaon)	2014	2015	none	none	none	none	OK	none	OK	OK	Suitable
55	Natore	2014	2015	none	none	none	none	OK	none	OK	OK	Suitable
56	Pabna	2014	2016	none	none	none	none	OK	none	OK	OK	Suitable
57	Rajshahi	1997	1999	none	none	none	none	OK	none	OK	OK	Suitable
58	Sirajganj	2012	2014	less	none	none	none	OK	none	OK	OK	Suitable
59	Tarash	2012	2014	none	none	none	none	OK	none	OK	OK	Suitable
60	Dinajpur	2007	2010	none	none	none	none	OK	none	OK	OK	Suitable
61	Gaibandha	2003	2006	none	none	none	none	OK	none	OK	OK	Suitable
62	Kurigram	2012	2015	none	none	none	none	OK	none	OK	OK	Suitable
63	Lalmonirhat	2003	2006	none	none	none	none	OK	none	OK	OK	Suitable
64	Patgram (Lalmonihat)	2000	2002	none	none	none	none	OK	none	OK	OK	Suitable
65	Nilphamari	2011	2017	none	none	none	none	OK	none	OK	OK	Suitable
66	Panchagarh	2003	2006	none	none	none	none	OK	none	OK	OK	Suitable
67	Rangpur	2014	2018	none	none	none	none	OK	none	OK	OK	Suitable
68	Thakurgaon	1996	1998	none	none	none	none	OK	none	OK	OK	Suitable
69	Habiganj	1995	1995	none	none	none	none	OK	none	OK	OK	Suitable
70	Moulovibazar	2012	2014	none	none	none	none	OK	none	OK	OK	Suitable
71	Sunamganj	2017	2018	none	none	none	none	OK	none	OK	OK	Suitable
72	Kanaighat, Sylhet	2017	2018	none	none	none	none	OK	none	OK	OK	Suitable
73	Sylhet	2003	2006	none	none	none	none	OK	none	OK	OK	Suitable

7 References

No	Title	Type	Original /Copy	Issuing Institution	Year
1	Statistical Bulletin Bangladesh	Document	Copy	Bangladesh Bureau of Statistics	2017
2	SOB Organization Chart (ORG-1985-Up-date-ICT_B-1-1)	Document	Copy	Survey of Bangladesh	
3	Meteorological Data in Bangladesh 1) Temperature, 2) Humidity , 3) Precipitation, 4) Disaster history, 5) Wind velocity	Raw Data	Copy	Bangladesh Meteorological Department Climate Division	2018
4	Bangladesh Customs Tariff	Document	Copy	Bangladesh Customs	2017
5	Bangladesh National Frequency Allocation Plan (NFAP) in the Frequency Range 9kHz to 275GHz	Document	Copy	Bangladesh Telecommunication Regulatory Commission (BTRC)	2010
6	Final Acts WRC-15, World Radio communication Conference, Geneva, 2015	Document	Copy	International Telecommunication Union (ITU)	2016
7	Price Schedule for Goods (Maintenance for CORSs)	Document	Copy	Arneeb Enterprise	2016
8	SOB CORS Maintenance Services Report	Document	Copy	Trimble Europe EV	2011
9	Application for using CORS data	Document	Copy	CORS data User	2016-2018
10	Data Collection and Processing	Document	Copy	HYDROLOGY, Bangladesh Water Development Board	2018
11	e-Tender Notice-02/2017-2018	Document	Copy	Department of Hydrography, Bangladesh Inland Water Transport Authority (BIWTA)	2017
12	Sea Level Rise along the Coast of Bangladesh	Document	Copy	Department of Hydrography, Bangladesh Inland Water Transport Authority (BIWTA)	
13	Map of water level gauges	Document	Copy	Department of Hydrography, Bangladesh Inland Water Transport Authority (BIWTA)	2017

No	Title	Type	Original /Copy	Issuing Institution	Year
14	Assessment of Sea Level Rise on Bangladesh Coast through Trend Analysis	Document	Copy	Department of Environment Ministry of Environment and Forests	2016