

資 料 1

JICA 調査団員・氏名

資料1 調査団員・氏名

第一次現地調査

No.	担当	氏名	組織名				
1	団長	井上 陽一	独立行政法人国際協力機構	地球環境部	防災グループ	防災第一チーム	企画役
2	協力企画	川守田 智	独立行政法人国際協力機構	地球環境部	防災グループ	防災第一チーム	
3	業務主任／洪水予警報／運営維持管理	東 靖	日本工営株式会社				
4	副業務主任／水文／自然条件調査	菱沼 志朗	日本工営株式会社				
5	水文観測機材・レーダー機材計画	進士 悦行	日本工営株式会社（個人）				
6	通信機器計画	勝亦 俊弘	日本工営株式会社				
7	土木設計／施工計画／積算（土木）	森寄 成宏	日本工営株式会社				

第二次現地調査

No.	担当	氏名	組織名				
1	業務主任／洪水予警報／運営維持管理	東 靖	日本工営株式会社				
2	副業務主任／水文／自然条件調査	菱沼 志朗	日本工営株式会社				
3	水文観測機材・レーダー機材計画	進士 悦行	日本工営株式会社（個人）				
4	通信機器計画	勝亦 俊弘	日本工営株式会社				
5	土木設計／施工計画／積算（土木）	森寄 成宏	日本工営株式会社				
6	調達計画／機材計画／積算	土屋 敬郎	日本工営株式会社				

第三次現地調査

No.	担当	氏名	組織名				
1	団長	植木 雅浩	独立行政法人国際協力機構	地球環境部	防災グループ	防災第一チーム	課長
2	協力企画	川守田 智	独立行政法人国際協力機構	地球環境部	防災グループ	防災第一チーム	
3	業務主任／洪水予警報／運営維持管理	東 靖	日本工営株式会社				
4	副業務主任／水文／自然条件調査	菱沼 志朗	日本工営株式会社				
5	水文観測機材・レーダー機材計画	進士 悦行	日本工営株式会社（個人）				

資 料 2

調 査 行 程

資料2 調査行程

第一次現地調査

日付(2017年)		JICA		コンサルタント			
		井上	川守田	真	養沼	進士	勝亦
							森等
3月	13月	マニラ到着					
	14火	PAGASAへの表敬訪問					
	15水	午前：HMDとの協議、午後：カガヤン・デ・オロへ移動					
	16木	MPRSDとの協議、CDO-CDRRMDとの協議					
	17金	現地調査					
	18土	現地調査					
	19日	マニラへ移動					
	20月	PAGASAとの協議議事録の協議		マニラ到着			
	21火	協議議事録の署名、帰国		JICAフィリピン事務所(セキュリティブリーフィング)			
	22水			調査準備	PAGASAとの協議		
	23木			カガヤン・デ・オロへ移動			
	24金			MPRSDとの協議、CDO-CDRRMDとの協議			マニラ到着
	25土			調査準備			カガヤン・デ・オロへ移動
	26日			調査準備			
	27月			現地調査	現地調査		現地調査
	28火			現地調査	現地調査		現地調査
	29水			現地調査	電波伝送試験の準備		現地調査
	30木			現地調査	現地調査		現地調査
	31金			現地調査	電波伝送試験		現地調査
4月	1土			現地調査	電波伝送試験		現地調査
	2日			資料作成			
	3月			現地調査	電波伝送試験		現地調査
	4火			現地調査	電波伝送試験		現地調査
	5水			現地再委託調査説明会の開催	電波伝送試験		現地再委託調査説明会の開催
	6木			資料作成	現地調査		現地調査
	7金			資料作成	現地調査		現地調査
	8土			現地調査	資料作成		現地調査
	9日			資料作成			
	10月			NIAとの協議、DPWHとの協議	電波伝送試験		NIAとの協議、DPWHとの協議
	11火			CDO-CDRRMDとの協議、現地調査	電波伝送試験		CDO-CDRRMDとの協議、現地調査
	12水			マニラへ移動	MPRSDとの協議、DPWHとの協議		MPRSDとの協議、DPWHとの協議
	13木			帰国	資料作成		資料作成
	14金				資料作成、MPRSDとの協議		マニラへ移動
	15土				現地調査	資料作成	帰国
	16日				資料作成		
	17月				現地再委託契約	電波伝送試験	
	18火				現地調査	電波伝送試験	
	19水				現地調査	電波伝送試験	
	20木				現地調査、DENR CENROとの協議	電波伝送試験	
	21金				MPRSDとの協議	電波伝送試験	
	22土				資料作成		
	23日				再委託業者との打ち合わせ	資料作成	
	24月				MPRSDへの協議		
	25火				マニラへ移動		
	26水				JICAフィリピン事務所との協議、PAGASAとの協議		
	27木				帰国		

第二次現地調査

日付(2017年)		コンサルタント					
		東	菱沼	進士	勝亦	森崙	土屋
5月	10 水	マニラ到着					マニラ到着
	11 木	JICAフィリピン事務所(セキュリティブリーフィング)、PAGASAとの協議	PAGASAとの協議				JICAフィリピン事務所(セキュリティブリーフィング)、PAGASAとの協議
	12 金	PAGASAとの協議	カガヤン・デ・オロヘ移動				資料収集
	13 土	資料作成	MPRSDとの協議				資料作成
	14 日	資料作成					資料作成
	15 月	PAGASAとの協議	現地再委託調査の監視	現地調査		マニラ到着	資料収集、PAGASAとの協議
	16 火	カガヤン・デ・オロヘ移動	現地再委託調査の監視	DICT、PLDT、CAAPとの協議		カガヤン・デ・オロヘ移動	カガヤン・デ・オロヘ移動
	17 水	現地調査	DENR-Xとの協議、NIAとの協議	BUESCOとの協議、CDO-CDRRMDとの協議		現地調査	BUESCOとの協議、CDO-CDRRMDとの協議
	18 木	資料作成	現地調査			資料作成	現地調査
	19 金	ステークホルダー会議	資料作成				
	20 土	MPRSDとの協議	現地再委託調査の監視	資料作成			
	21 日	資料作成					
	22 月	資料作成		現地調査、PLDTとの協議		資料作成	現地調査、PLDTとの協議
	23 火	NEDAとの協議	NEDAとの協議	MPRSDとの協議、CDO-CDRRMDとの協議		NEDAとの協議	MPRSDとの協議、CDO-CDRRMDとの協議
	24 水	資料作成			マニラへ移動	現地調査	
	25 木	資料作成			帰国	資料作成	
	26 金	MPRSDとの協議	資料作成			MPRSDとの協議	資料作成
	27 土	資料作成				資料作成	
	28 日	資料作成				資料作成	
	29 月	現地調査	CDO-CDRRMDとの協議	マニラへ移動		現地調査	マニラへ移動
	30 火	資料作成	現地再委託調査の監視	帰国		資料作成	PAGASAとの協議
	31 水	資料作成、MPRSDとの協議	NIAとの協議			資料作成、MPRSDとの協議	資料収集
6月	1 木	CDO-CDRRMDとの協議				CDO-CDRRMDとの協議	資料収集
	2 金	DPWHとの協議	現地再委託調査の監視			DPWHとの協議	資料収集
	3 土	マニラへ移動				マニラへ移動	資料作成
	4 日	資料作成	帰国			資料作成	
	5 月	資料作成				帰国	資料収集
	6 火	資料作成					資料収集
	7 水	PAGASAとの協議、JICAフィリピン事務所との協議					資料収集
	8 木	帰国					帰国

第二次現地調査(補足調査1)

日付(2017年)		コンサルタント	
		東	森崙
10月	9 月	マニラ到着	
	10 火	JICAフィリピン事務所(セキュリティブリーフィング)、カガヤン・デ・オロヘ移動	
	11 水	CDO-CDRRMDとの協議、カガヤン・デ・オロ市City Engineeringとの協議	
	12 木	現地調査	
	13 金	カガヤン・デ・オロ市City Engineeringとの協議	
	14 土	MPRSDとの協議	
	15 日	資料作成	
	16 月	DPWHとの協議	
	17 火	資料作成	
	18 水	DPWHとの協議	
	19 木	カガヤン・デ・オロ市City Engineeringとの協議	
	20 金	NIAとの協議	
	21 土	DPWHとの協議	
	22 日	資料作成	マニラへ移動
	23 月	NCIPとの協議	資料作成
	24 火	MPRSDとの協議	
	25 水	マニラへ移動	資料作成
	26 木	PAGASAとの協議、JICAフィリピン事務所との協議	資料作成
	27 金	JICAフィリピン事務所との協議	資料作成
	28 土	帰国	

第二次現地調査(補足調査2)

日付(2018年)		コンサルタント	
		東	
1月	18 木	マニラ到着、PAGASAとの協議	
	19 金	JICAフィリピン事務所(セキュリティブリーフィング)、カガヤン・デ・オロヘ移動	
	20 土	MPRSDとの協議	
	21 日	資料作成	
	22 月	DPWHとの協議、MPRSDとの協議	
	23 火	マニラへ移動、PAGASAとの協議、JICAフィリピン事務所との協議	
	24 水	帰国	

第三次現地調査

日付(2018年)		JICA		コンサルタント	
		植木	川守田	東	菱沼
2月	18 日			マニラ到着	
	19 月	マニラ到着		資料作成	マニラ到着
	20 火	PAGASAとの概略設計案に関する協議			
	21 水	PAGASAとの概略設計案に関する協議			
	22 木	PAGASAとの概略設計案に関する協議、討議議事録への署名			
	23 金	帰国		資料作成	
	24 土			帰国	

資 料 3

関係者(面会者)リスト

資料3 関係者（面会者）リスト

フィリピン気象天文庁 (PAGASA)	
Dr. Vicente B. Malano	長官
Dr. Landrico U. Dalida Jr.	副長官（運用サービス部門）
Eng'r. Roy A. Badilla	部長代理（水文気象部）
Ms. Oye Pagulayan	気象専門家（水文気象部）
Mr. Socrates F. Paat, Jr.	気象専門家（水文気象部）
Eng'r. Berlin Mercado	課長代理（水文機材課）
Mr. Anthony Joseph R. Lucero, M.Sc.	前所長代理（ミンダナオPAGASA地方管区）
Ms. Anianita R. Fortich	所長代理（ミンダナオPAGASA地方管区）
Mr. Victor B. Flores Jr.	気象専門家（ミンダナオPAGASA地方管区）
Mr. Jose P. Frivaldo, Jr.	気象専門家（ミンダナオPAGASA地方管区）
Ms. Hannah Lorraine R. Salvador	気象専門家（ミンダナオPAGASA地方管区）
カガヤン・デ・オロ市災害リスク削減管理局 (CDO-CDRRMD)	
Mr. Allan A. Rorcadilla	局長代理
Mr. Mario Verner S. Monsanto	オブザーバー
Ms. Cindy S. Sabanal	課長代理（水文機材課）
バウンゴン町災害リスク削減管理局 (Baungon-MDRRMD)	
Ms. Nenita Navarez	局長代理
Mr. George Magana	職員
タラカグ町災害リスク削減管理局 (Talakag-MDRRMD)	
Mr. Rey Dan Gayao	局長代理
リボナ町災害リスク削減管理局 (Libona-MDRRMD)	
Ms. Luz Eduria	局長代理
公共事業道路省 第10管区 (DPWH, Region X)	
Engr. Arthur M. Cupay	部長（計画設計部）
Engr. Andy Sosa	プロジェクト執行室長
Engr. Aldrin S. Albano	エンジニア
Engr. Saivan R. Valendez	エンジニア
国家灌漑庁 第10管区 (NIA, Region X)	
Mr. Jimmy L. Apostol	管区所長
Mr. Remeglo B. Ang	部長（エンジニアリング部）
国家経済開発庁 第10管区 (NEDA, Region X)	
Engr. Leon M. Dacanay, Jr., CESO III	管区所長
Engr. Jaime H. Pacampara	エンジニア
環境天然資源省 第10管区 (DENR, Region X)	
Ms. Agnes A. Dejoras	課長（調査・地図作成）
Mr. Leonard R. Buted	所長代理（タラカグ事務所）
市民防衛局 第10管区 (OCD, Region X)	
Ms. Josephine M. Lumacang	職員
情報通信技術省 第10管区 (DICT, Region X)	
Engr. Philip Vicerra	センター長代理（ネットワークオペレーションセンター）
カガヤン・デ・オロ市エンジニアリング事務所 (Cagayan de Oro City Engineer's Office)	
Mr. Lailane P. Dolores	エンジニア
フィリピン民間航空庁 ラギンディガン国際空港事務所 (CAAP, Area Office, Laguindingan Airport)	
Engr. Jose G. Budiongan	エンジニア
ブキドノン第二電力会社 (BUSECO)	
Mr. Mike Fallarcuna	部長（計画部）
Mr. Rey-ann a. Baul	部長代理（エンジニアリング・技術サービス部）

資 料 4

討 議 議 事 録

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Flood Forecasting and Warning System for Cagayan de Oro River
Basin

In response to the request from the Government of the Republic of the Philippines (hereinafter referred to as “GoP”) through Philippine Atmospheric Geophysical and Astronomical Services Administration (hereinafter referred to as “PAGASA”), Japan International Cooperation Agency (hereinafter referred to as “JICA”) dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as “the Team”) of the Project for Improvement of Flood Forecasting and Warning System for Cagayan de Oro River Baimsin (hereinafter referred to as “the Project”) to the Republic of the Philippines (hereinafter referred to as “the Philippines”), headed by Mr. Yoichi Inoue, Acting Director of Disaster Risk Reduction Team 1, Global Environment Department, from 13th March to , 28th April 2017. The Team held a series of discussions with the officials of the GoP and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Quezon City, 21st March 2017



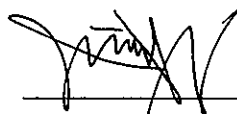
Yoichi Inoue

Leader

Preparatory Survey Team

Japan International Cooperation Agency(JICA)

Japan



VICENTE B. MALANO, PhD MNSA

Administrator

Philippine Atmospheric, Geophysical, and

Astronomical Services (PAGASA)

The Republic of the Philippines

ATTACHMENT

1. Objective of the Project

The objective of the Project is to mitigate damages by flood in Cagayan de Oro River Basin through improvement of Flood Forecasting Warning System (FFWS) in the River Basin, thereby contributing to sustainable development in the Region.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Flood Forecasting and Warning System for Cagayan de Oro River Basin”, which was changed from the original title “the Preparatory Survey for the Project for Developing Flood Forecasting and Warning System for Cagayan de Oro River Basin”.

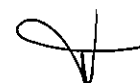
3. Project site

Both sides confirmed that the site of the Project is in Cagayan de Oro River Basin, which is shown in Annex 1.

4. Responsible authority for the Project

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

- 4-1. The PAGASA will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in Annex 2.
- 4-2. The line ministry of the Executing Agency is the Department of Science and Technology (hereinafter referred to as “DOST”).



5. Items requested by the Government of the Philippines

The Philippines side requested items as follows.

Table 1: Items requested by GoP

	Component	Items	Quantity
1	Establishment of Hydro-meteorological observation stations	(1) Pure rain gauges	7 sites
		(2) water level sensors combined with rain gauges	6 sites
2	Establishment of X-band radars	(3) X-band radar/s	1-2 sets
3	Establishment of telecommunication network	(4) Dedicated radio communication network from Hydro-meteorological stations to Cagayan de Oro River Basin Flood Forecasting and Warning Center (hereinafter referred to as "CDO-RBFFWC")	1 set
		(5) Dedicated radio communication network from CDO-RBFFWC to Cagayan de Oro City Disaster Risk Reduction and Management Office (hereinafter referred to as "CDO-CDRRMO")	1 set
		(6) Repeater Station	1 set
4	Establishment of visualization system to display the monitored/observed data	(7) Display at the CDO-RBFFWC	1 set
		(8) Launch of web-based data monitoring of water level and rainfall intensity for Local Government Unit and other related agencies	1 set
5	Soft Component	(9) Training on Operation and Maintenance of the FFWS	1 set
		(10) Training on information dissemination of flood warnings	1 set
		(11) Training on the Operation and Maintenance of the Monitoring Equipment	1 set

Items and quantity are subject to change through the Survey.

5-2. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan (hereinafter referred to as “GoJ”). The final scope of the Project will be decided by the GoJ.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Philippine side agreed that the procedures and basic principles and basic principles of Japanese Grant as described in Annex 3 shall be applied to the Project. As for the monitoring of the implementation of the Project, JICA requires the Philippine side to submit the Project Monitoring Report, the form of which is attached as Annex 4.

6-2. The Philippine side agreed to take the necessary measures, as described in Annex 5, for smooth implementation of the Project. The contents of the Annex 5 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report. The contents of Annex 5 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7-1. The Team will proceed with further survey in the Philippines until 28th April 2017.

7-2. JICA will dispatch the 2nd Preparatory Survey mission in the beginning of May 2017.

7-3. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to the Philippines in order to explain its contents around the beginning of September 2017.

7-4. If the contents of the draft Preparatory Survey Report is accepted and the undertakings for the Project are fully agreed by the Philippines side, JICA will finalize the Preparatory Survey Report and send it to the Philippines around late September.

7-5. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Philippines side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010).



8-2. The Project is categorized as “C” from the following considerations:

Not located in a sensitive area, nor has it sensitive characteristics, nor falls it into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

8-3. The Philippines side explained that Environmental Compliance Certificate (hereinafter referred to as “ECC”) is required for this project. Both sides confirmed that the Philippines side will obtain ECC based on the information given by the Team by the end of October 2017.

9. Other Relevant Issues

9-1. Ownership and Responsibility, Operation and Maintenance

Both sides confirmed that PAGASA will take ownership and responsibility of the equipment to be procured in the Project. The Japanese side explained that necessary budget and number of staff for operation and maintenance of the Project after the completion of the Project will be estimated through the Survey. The Philippines side promised to allocate necessary budget and staff for proper and effective operation and maintenance of the equipment.

9-2. Purpose of missions

The Japanese side explained the purpose of missions as follows;

(1) The 1st Preparatory Survey Mission

To collect data and hold meetings with relevant organizations for outline design, to confirm necessary number and candidate locations of hydro-meteorological observation stations and to implement radio wave propagation test for the X-band radar stations, hydro-meteorological observation stations and repeater station.

(2) The 2nd Preparatory Survey Mission

To implement the topographical survey and the geotechnical survey and to explain and discuss on draft outline of the Project (items to be procured, locations of X band radar, repeater station and hydro-meteorological observation stations.)

(3) The Draft Report Explanation Mission

To explain on a draft Preparatory Survey Report including necessary budget and number of staff for operation and maintenance as well as undertakings by the Philippine side for implementation of the Project.



9-3. Data communication

Both sides confirmed that following data communication system will be applied for the Project.

Table 2: Data communication for FFWS in Cagayan de Oro River Basin

Section	Means of Data Communication	Obligation
Hydrological Observation Stations - CDO-RBFFWC	Dedicated radio communication network	The Japanese side
X-Band Radars – CDO-RBFFWC	Dedicated radio communication network or Dedicated internet communication network or Satellite communication network	The Japanese side
CDO-RBFFWC – CDRRMO	Dedicated radio communication network or Dedicated internet communication network	The Japanese side
CDO-RBFFWC – PAGASA Quezon City Central Office	Internet communication network or Satellite communication network	PAGASA/the Japanese side

9-4. Flood Forecast and Warning Protocol

Both sides confirmed that Mindanao PRSD/Cagayan de Oro River Basin Flood Forecasting and Warning Center will share warning and information with following agencies

- CDO-CDRRMO
- Office of Civil Defense (hereinafter referred as “OCD”) Cagayan de Oro Office
- Department of Public Works and Highways (here in after referred to as “DPWH”) Cagayan de Oro Office
- PAGASA Weather Division Quezon City Central Office

Both sides also confirmed that flood warning provided by PAGASA is disseminated to the local residents by CDO-CDRRMO and CDO-CDRRMO will utilize various means including existing dissemination systems of CDO-CDRRMO and Mindanao PAGASA Regional Service Division (hereinafter referred to as “PRSD”) for dissemination of flood forecast and warning developed by the Project.

9-5. Flood warning criteria based on water levels

For the purpose of capacity development of PAGASA Hydrometeorological Division (hereinafter referred to as “HMD”) and CDO-RBFFWC on integral data management and utilization for Flood Forecast and Warning System, JICA’s Technical cooperation project “Project for Strengthening Capacity of Integrated Data Management of Flood Forecasting and Warning (PAGASA-JFReeDAM)” has been implemented since July 2016. This PAGASA-JFReeDAM project will establish flood warning criteria based on water levels in Cagayan de Oro River basin in July 2017, and it will be applied to this flood warning system by the Project.

9-6. Necessary permissions for implementation of the Project

Both sides agreed to identify necessary permissions and its necessary application period for implementation of the Project during the 1st Preparatory Survey Mission and all permissions should be cleared before tender notice at latest.

Both sides also agreed that permissions for 1) use of the lands for installation of equipment, 2) allocation of radio frequencies for the dedicated radio communication and X-band radar have to be acquired by the end of August 2017 with evidential documents and it is the condition for dispatch of the Mission for Explanation of Draft Outline Design scheduled in the beginning of September 2017.

The both sides also agreed that PAGASA will coordinate with relevant authorities for radio transmission test scheduled in March 2017.

9-7. Hydro-meteorological observation stations

The both sides confirmed that locations of Hydrological observation stations will be decided according to following criteria;

- (1) Security, acquisition of and access to the Sites are secured
- (2) There will be no problems for radio transmission
- (3) Availability of land can be confirmed by the end of August 2017
- (4) Other technical conditions

The Team will further survey and have discussions with the Philippine side. The both sides also confirmed that number of hydrological stations is subject to change according to technical necessity and will be discussed as well as candidate locations during the 1st Preparatory Survey Mission period.

9-8. X-band radar/s stations

Likewise, the both sides confirmed that locations of X-band radar/s stations will be determined to comply with the following criteria;



- (1) Security, acquisition of and access to the Sites are secured (access by a car is preferable due to the expected operation and maintenance works)
- (2) Availability of commercial power (essential)
- (3) There will be no problems for radio transmission
- (4) Availability of land can be confirmed by the end of August 2017
- (5) Other technical conditions

Both sides agreed that rain gauges will be installed as long as they can be distributed to upstream area, however, if it is difficult to find the suitable sites in upstream area, the X-band radar/s will be installed in order to monitor precipitation in upstream area of Cagayan de Oro river basin, and precipitation data acquired by X-band radar/s will be incorporated with dataset for this FFWS. In such case, both sides confirmed that PAGASA will secure the permission to use land for the installation of X-band radar/s.

9-9. Construction schedule of CDO-RBFFWC

Both sides confirmed that construction works of CDO-RBFFWC will be completed by September 2018.

9-10. Exemption of Taxes and Duties

Both sides confirmed that in accordance with Japanese Grant aid scheme the Philippine side ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be borne by its designated authority without using the Grant; Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract.

9-11. Confidentiality of the Project

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

9-12. Undertakings of the Philippine side for the Survey

As a response to the request by the Team, the Philippine side agreed to arrange counterpart personnel for the survey and to provide promptly necessary data and information relevant to the Project for the smooth implementation of the survey.



Annex 1 Project Site

Annex 2 Organization Chart

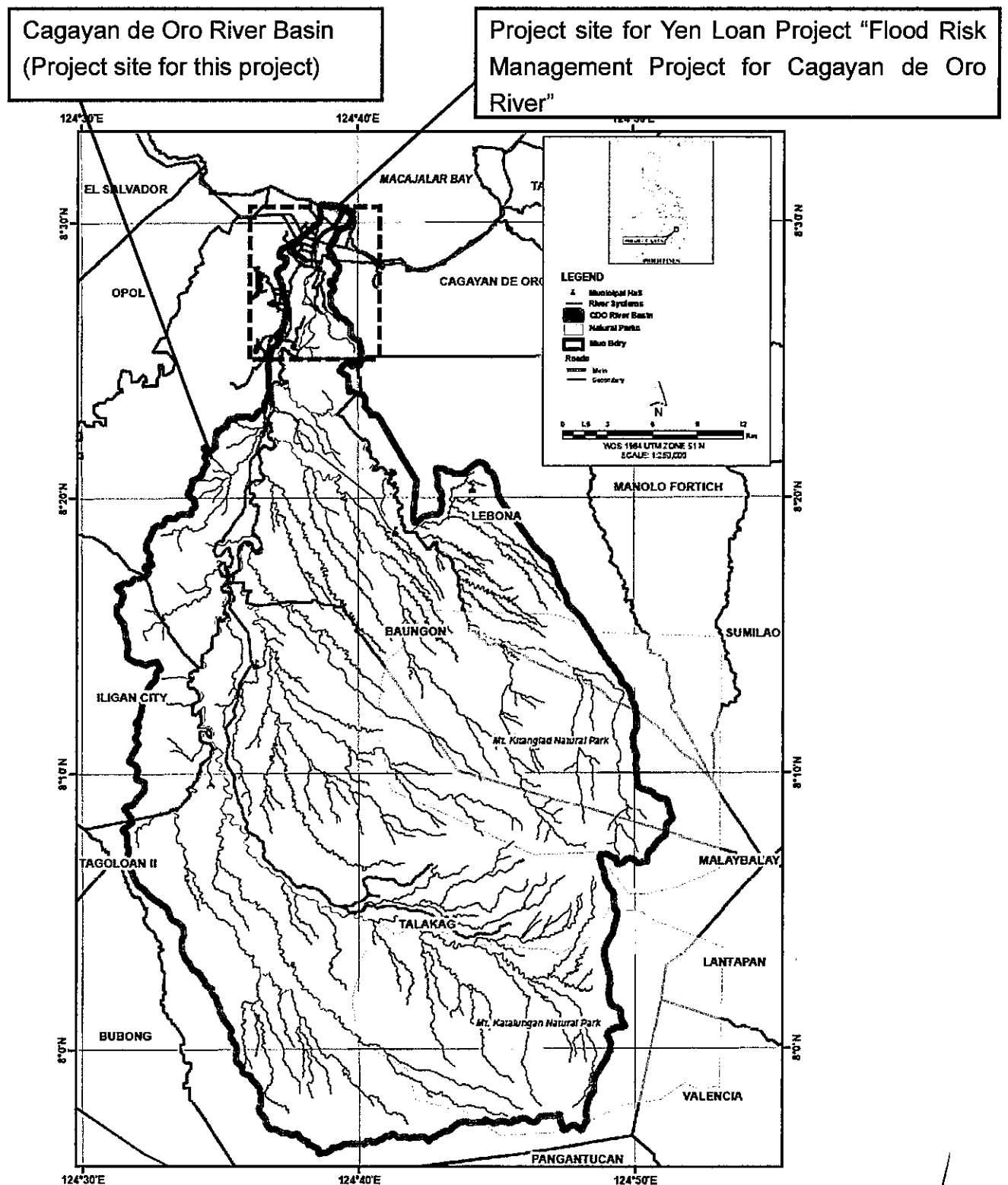
Annex 3 Japanese Grant

Annex 4 Project Monitoring Report (template)

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



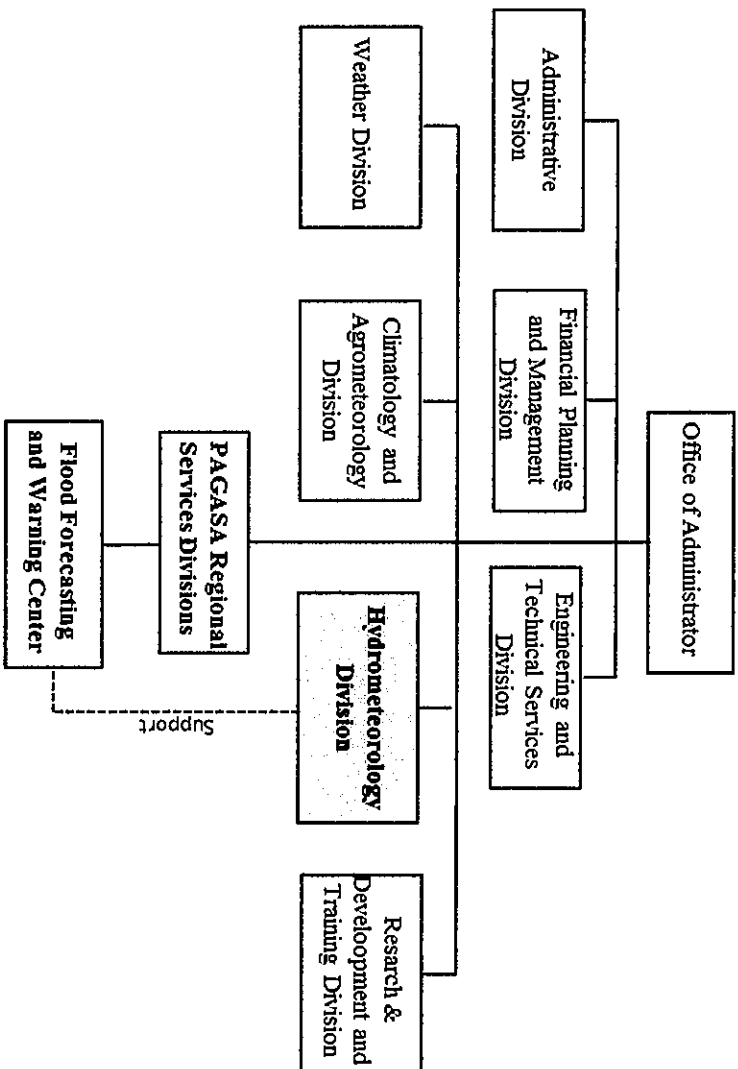
Project for Improvement of Flood Forecasting and Warning System for Cagayan de Oro
River Basin Map



Organization chart

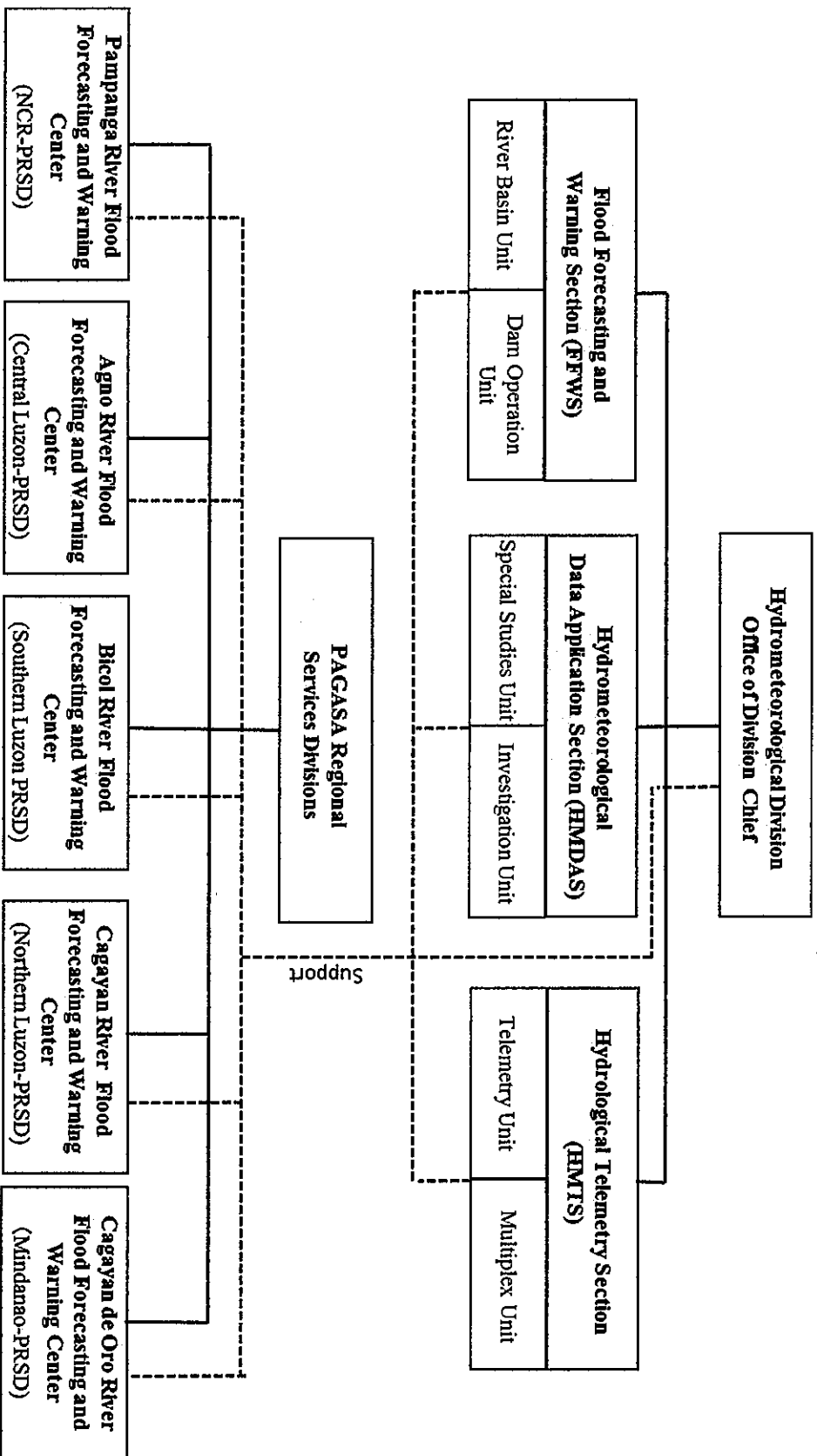
Annex 2

PAGASA Organization Chart

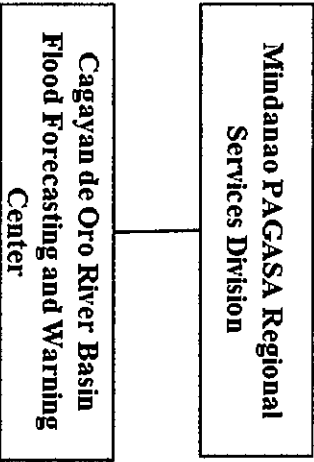


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PAGASA HMD Organization Chart



Mindanao PRSD and Cagayan de Oro River Basin Flood Forecasting and Warning System Organization Chart



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JAPANESE GRANT

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

1. Procedures of Project Grants

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

(1) Preparation

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

(2) Appraisal

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

(3) Implementation

Exchange of Notes

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

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

- Agreement concluded between JICA and the Recipient

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

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

Construction works/procurement

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

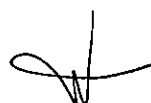
(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

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

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.
- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

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

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

(2) Selection of Consultants

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

(3) Result of the Survey

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

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”)




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

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

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

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

4) Selection of Consultants

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

5) Eligible source country

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

6) Contracts and Concurrence by JICA

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

7) Monitoring

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



8) Safety Measures

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

9) Construction Quality Control Meeting

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

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

(2) Ex-post Monitoring and Evaluation Stage


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

(3) Others

1) Environmental and Social Considerations

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

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



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

3) Proper Use

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

4) Export and Re-export

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



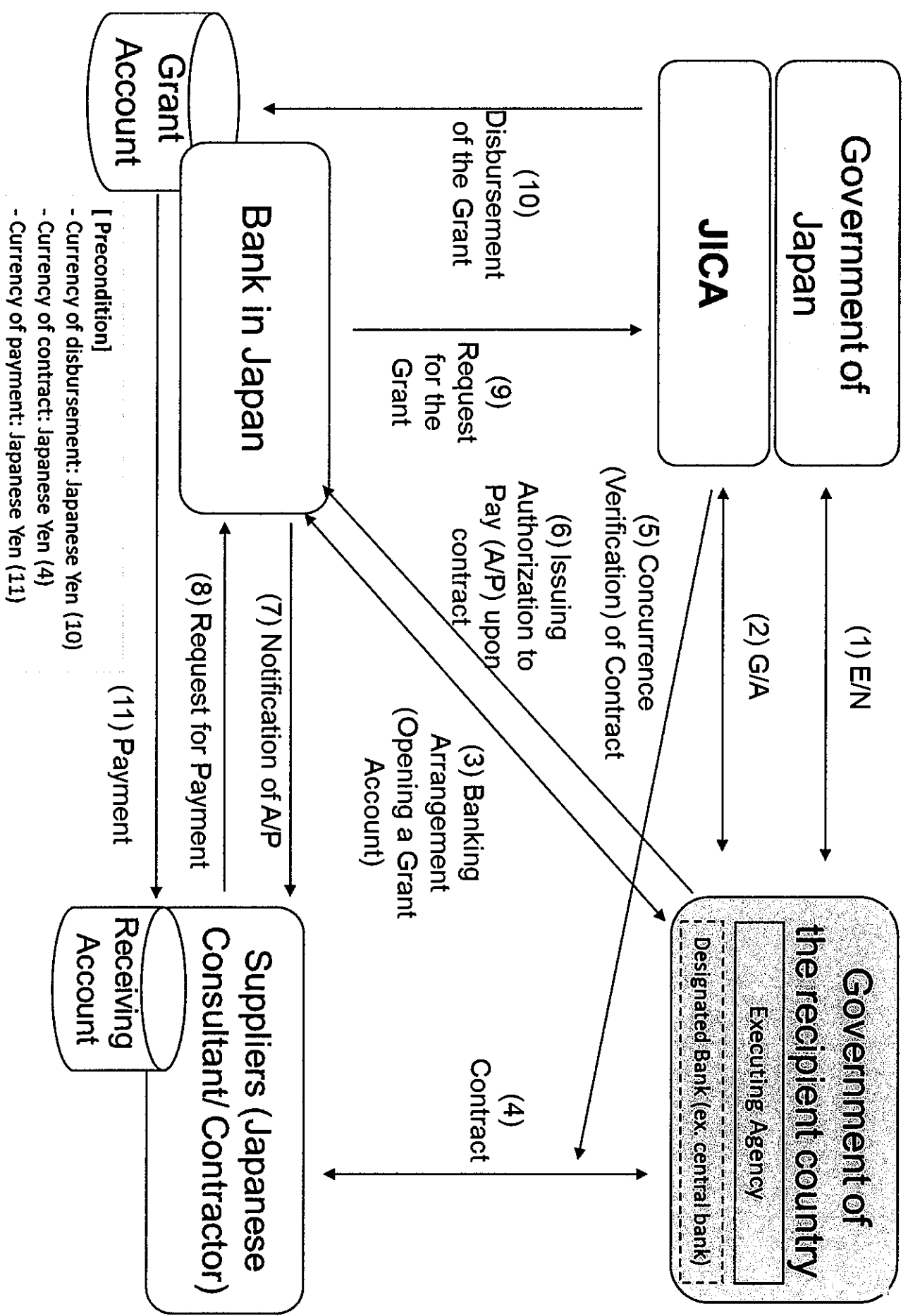
PROCEDURES OF JAPANESE GRANT

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

notes:

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

Financial Flow of Japanese Grant (A/P Type)



Project Monitoring Report
on
Project Name
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	Person in Charge (Designation)	_____
	Contacts	_____
	Address:	_____
	Phone/FAX:	_____
	Email:	_____
Line Ministry	Person in Charge (Designation)	_____
	Contacts	_____
	Address:	_____
	Phone/FAX:	_____
	Email:	_____

General Information:

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

1: Project Description

1-1 Project Objective

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1-2 Project Rationale

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

--

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives

Indicators	Original (Yr)	Target (Yr)

Qualitative indicators to measure the attainment of project objectives

--

2: Details of the Project

2-1 Location

Components	Original (proposed in the outline design)	Actual
1.		

2-2 Scope of the work

Components	Original* (proposed in the outline design)	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

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

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

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2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

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

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

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

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

	1.			

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

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

(PMR)

2-6 Executing Agency

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

Original (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

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

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

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

Original (at the time of outline design)

Actual (PMR)

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

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

4: Potential Risks and Mitigation Measures

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

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

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

	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

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

5-1 Overall evaluation

Please describe your overall evaluation on the project.

--

5-2 Lessons Learnt and Recommendations

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

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

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

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Attachment

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



Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price $C=A \times B$	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)





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%)	



Major Undertakings to be taken by the Government of the Philippines

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

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open bank account (B/A)	within 1 month after the signing of the G/A			
2	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract			
3	To secure and clear the following lands 1) Project sites for X-Band Radars (1-2 sites) 2) Project sites Repeater stations (1-2 sites) 3) project sites for Hydro-meteorological observation stations 4) Sufficient space for temporary facilities such as a constructor's office, workshop, building material storage, etc. needed for the work	before notice of the bidding document			
4	To obtain the planning, zoning, building permit	before notice of the bidding document			
5	To obtain necessary permission for the use of following radio frequencies 1) Dedicated Radio communication network 2) X band radar	before notice of the bidding document			

(2) During the Project Implementation

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

	4) Furniture and Equipment General furniture	1 month before completion of the installation			
11	To take necessary measure for safety construction - traffic control - rope off	during the installation			
12	To provide necessary working spaces with Internet Connection for the implementation of the Project.				
13	To undertake incidental outdoor works such as a guard shed, gardening, fencing, gates, boundary walls and exterior lightings and to renovate the existing buildings and facilities in Observation Stations.	during the Project			
14	To ensure transport for the personnel and to shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, accommodation, etc.	during the Project			
15	To obtain the required frequencies for radar systems.	before notice of the tender document			

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To procure the required spare parts and consumables for the smooth operation and maintenance of the Equipment.	After completion of the installation			
2	To assign the required staff for the smooth operation and maintenance of the Equipment.	After completion of the installation			
3	To provide adequate maintenance of the observation stations and the Radar Tower Buildings constructed under the Project so that they may function long lasting and effectively.	After completion of the installation			
4	To effectively utilize the the Equipment procured/installed under the Project.	After completion of the installation			
5	To allocate the necessary budget for the smooth conduct of meteorological radar observation and forecasting works.	After completion of the installation			

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

NO	Items	Deadline	Amount (Million Japanese Yen)*
1	To install facility and provide equipment		
	1) To conduct the following transportation		
	a) Marin (Air) transportation of the products from Japan to the recipient country b) Internal transportation from the port of disembarkation to the project site		
	2) To provide equipment with installation and commissioning		
2	To implement detailed design, bidding support and procurement supervision (Consulting Service)		
	Total		XXX

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

Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Flood Forecasting and Warning System for Cagayan de Oro River
Basin
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between Philippine Atmospheric Geophysical and Astronomical Services Administration (hereinafter referred to as "PAGES") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 21st March 2017 and in response to the request from the Government of the Republic of the Philippines (hereinafter referred to as "GoP") dated 26th July 2017, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Improvement of Flood Forecasting and Warning System for Cagayan de Oro River Basin (hereinafter referred to as "the Project").

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

Quezon City, February 22nd 2018

榎本雅浩

Mr. Masahiro Ueki

Leader

Preparatory Survey Team

Japan International Cooperation Agency

Japan



Vicente B. Malano, PhD MNSA

Administrator

Philippine Atmospheric, Geophysical and
Astronomical Services (PAGASA)

The Republic of the Philippines

ATTACHMENT

1. Contents of the Draft Report

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

2. Project Site

Both sides confirmed that the site of the Project is in Cagayan de Oro River Basin, which is shown in Annex 1.

3. Cost estimate

Both sides confirmed that the cost estimate including the contingency described in the Draft Report is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

4. Confidentiality of the cost estimate and technical specifications

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

5. Timeline for the project implementation

The Team explained to the GoP side that the expected timeline for the project implementation is as attached in Annex 2.

6. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The GoP side will be responsible for the achievement of agreed key indicators targeted in year 2023 and shall monitor the progress based on those indicators.

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[Quantitative indicators]

Indicator		Baseline (2017)	Target (2023)
Hydrological observation density	Mesh size for rainfall observation (size of the catchment area / number of rain gauges, or spatial resolution of radar rain gauge) (km ²)	105 km ²	0.022 km ²
	The number of water level gauges	8	15
Missing hydrological data ratio (%)		84.2 %	within 5%

[Qualitative indicators]

- Lives of residents in the river basin will be saved by the appropriate flood forecasting and warning
- Sharing real time hydrological data observation both PAGASA and Cagayan de Oro City Disaster Risk Reduction and Management Office helps Efficient disaster response system
- Stable data transmission will be enhanced by dedicated communication network
- Flood forecasting particularly urban flooding by PAGASA will be improved by increasing the density of rainfall observations.

7. Technical assistance (“Soft Component” of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, following technical assistance is planned under the Project.

- Capacity development for operation and maintenance of flood forecasting and warning system by PAGASA
- Capacity development for flood forecasting with stage correlation method
- Capacity development for X-band radar data analysis technique
- Capacity development for communication with disaster information sharing system by PAGASA and other organizations engaged in disaster risk reduction

The GoP side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

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8. Undertakings of the Project-

Both sides confirmed the undertakings of the Project as described in Annex 3. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1. (2) 5 of Annex 3, both sides confirmed that such customs duties, internal taxes and other fiscal levies include VAT, commercial tax, income tax and corporate tax, which shall be clarified in the bid documents by PAGASA during the implementation stage of the Project.

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

Both sides also confirmed that the Annex 3 will be used as an attachment of Grant Agreement (hereinafter referred to as G/A).

9. Monitoring during the implementation

The Project will be monitored by PAGASA as the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 4. The timing of submission of the PMR is described in Annex 3.

10. Project completion

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

11. Ex-Post Evaluation

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

12. Items and measures to be considered for the smooth implementation of the Project

Both sides confirmed the items and measures to be considered for the smooth implementation of the Project as described as follows.

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12-1. Operation and Maintenance plan of the Project

The Team explained Operation and Maintenance plan of the Project as described in the Draft Report. The GoP side understood its necessity and agree to take necessary action to implement operation and maintenance plan. Both sides proposed two options. One is to assign personnel and acquire necessary spare parts. And the other is outsourcing maintenance of radar facilities. PAGASA will choose whichever cheaper one. Final estimation of Operation and Maintenance cost will be described in the final report.

The both side confirmed that soft component will support capacity development of the Philippine side in terms of Operation and Maintenance of the Project. Details of the soft component are also described in the Draft Report.

12-2. Necessity of maintenance

The Team explained that accuracy of observation data from data collection equipment could be guaranteed by proper operation and maintenance of data collection equipment by users. Both sides confirmed that following maintenance works are indispensable to keep good accuracy and performance of data collection equipment and the Flood Forecasting and Warning System:

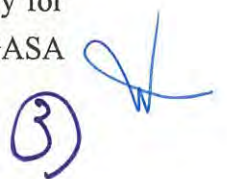
- Annual calibration, regular inspections, and special inspections after flood events are required for rain gauges, water level gauges and X-Band radars
- Preservation of suitable environment (for example removing obstacles such as trees) around data collection equipment and direct communication network
- Continuation of the flood discharge observation
- Updating rating curves in river channels

12-3. Budget and staff allocation for the operation and maintenance of the Project

The GoP side explained that 2 hydrologists are already assigned in Cagayan de Oro River Flood Forecasting and Warning Center (CDO-RFFWC), and 1 Hydrologist and 1 telecommunication engineer will be assigned in addition once the PAGASA Modernization Act is approved.

The Team explained that at least two tele-communication engineers who will be engaged in Operation and Maintenance works for the telemetry are required as written in Draft Report apart from the existing staff in CDO-RFFWC.

As a conclusion of the discussion, the GoP side shall assign staff necessary for the operation and maintenance as follows regardless of approval of PAGASA



Modernization Act.

(The number of personnel)				
Year	Now	2018	2019	2020
Hydrologist	2	2	2	3
Telecom Engineer	0	1	2	2
Total	2	3	4	5

The Team explained that the budget for the operation and maintenance of the Project as written in Draft Report. The GoP side shall allocate the budget for the operation and maintenance.

12-4. Construction of CDO-RFFWC building

The Team explained that the construction of CDO-RFFWC should be completed before the installation of equipment for monitoring devices such as displays and telemetry receiving device due to following reasons..

- There is not enough space for monitoring devices in Mindanao PAGASA Regional Service Division (MPRSD) Office
- Future reinstallation is not easy, that may cause service disruption

The GoP side shall complete the construction of CDO-RFFWC by the end of September 2018 thus solving above-mentioned concerns.

12-5. Rehabilitation of existing flood forecasting and warning system

The Team explained that existing flood warning system shall be rehabilitated by PAGASA for following reasons.

- Providing flood warning system before the completion of the project
- Ensuring the redundancy of the flood forecasting and warning

GoP side agreed the necessity of rehabilitation of existing flood forecasting and warning system by the end of June 2018 and shall take necessary action.

12-6. Security

The team explained that JICA is strengthening safety measures after the Battle of Marawi and Martial law in Mindanao. PAGASA will cooperate with JICA for security information collection and necessary security measures for project. The team also explained that security escort(s) such as police and/or military is required in accordance with JICA security measure. The GoP side agreed to

provide security escort(s) as undertaking of Philippines side by collaborating with Philippines National Police and Armed Forces of the Philippines. PAGASA will assign at least 1 guard for 24 hours to each X-Band radar station. PAGASA will also coordinate with local government unit/police/military to ensure security of the X-Band radar sites.

13. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the GoP side around end of March 2018.

14. Environmental and Social Considerations

14-1. General Issues

14-1-1. Environmental Guidelines and Environmental Category

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

15. Other Relevant Issues

15-1. Disclosure of Information

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

15-2. Water Supply to the X-Band radar stations

Both sides confirmed that collecting facility for rain water will be provided at the X-band radar stations. In addition, bottled water will be supplied by PAGASA for drinking. If there is possibility to take water from commercial water supply, PAGASA will install the water supply pipeline from the source to the sites.

15-3. Control room in CDO-RFFWC

Both sides confirmed that control room will be provided within the second floor of CDO-RFFWC.

15-4. Display system in HMD

Both sides agreed that information from Cagayan de Oro River Basin shall also be displayed in the same monitor of the Pampanga, Agno, Bicol and Cagayan (PABC) system with switching of video signal.

Annex 1 Project Site

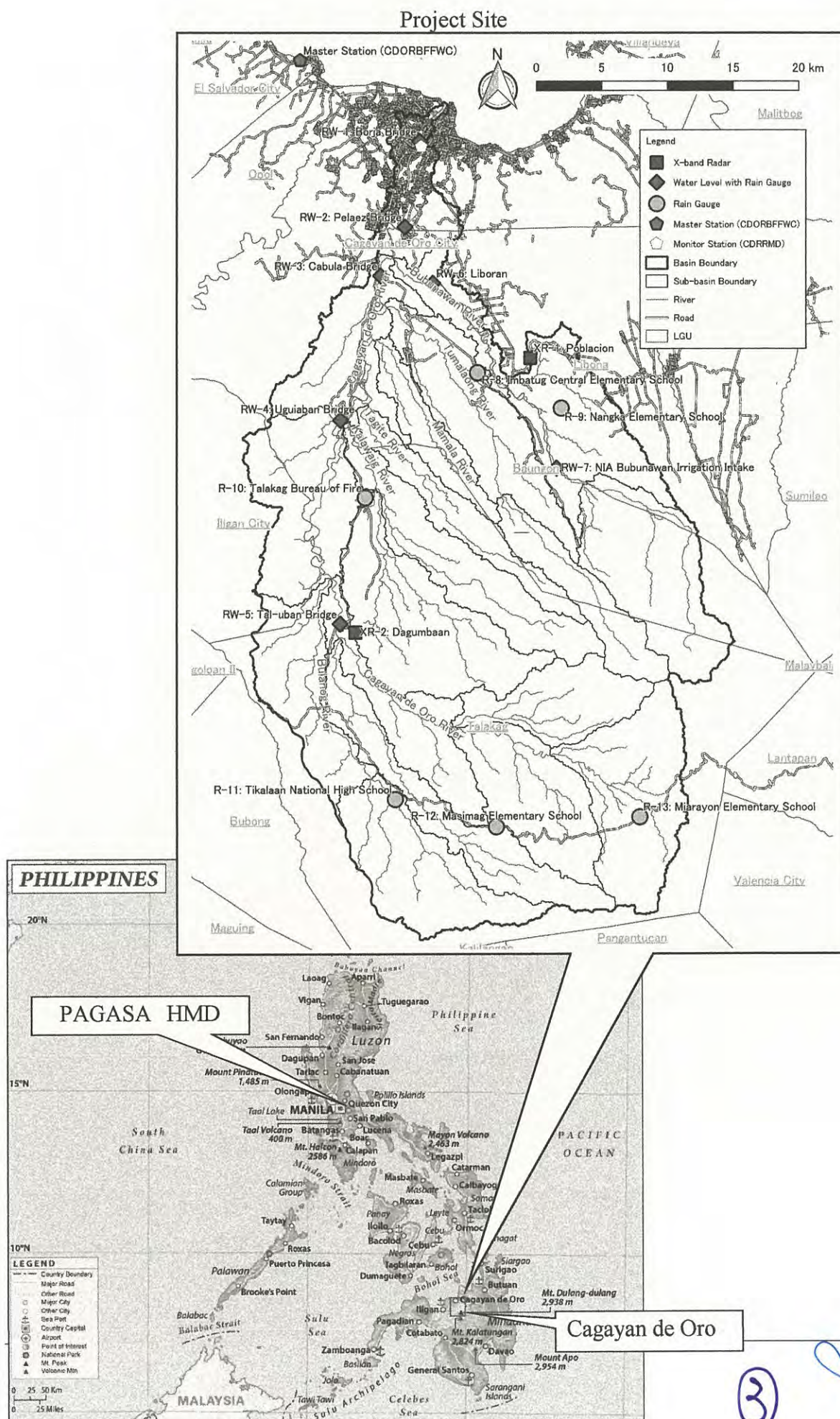
Annex 2 Project Implementation Schedule

Annex 3 Major Undertakings to be taken by the Government of GoP

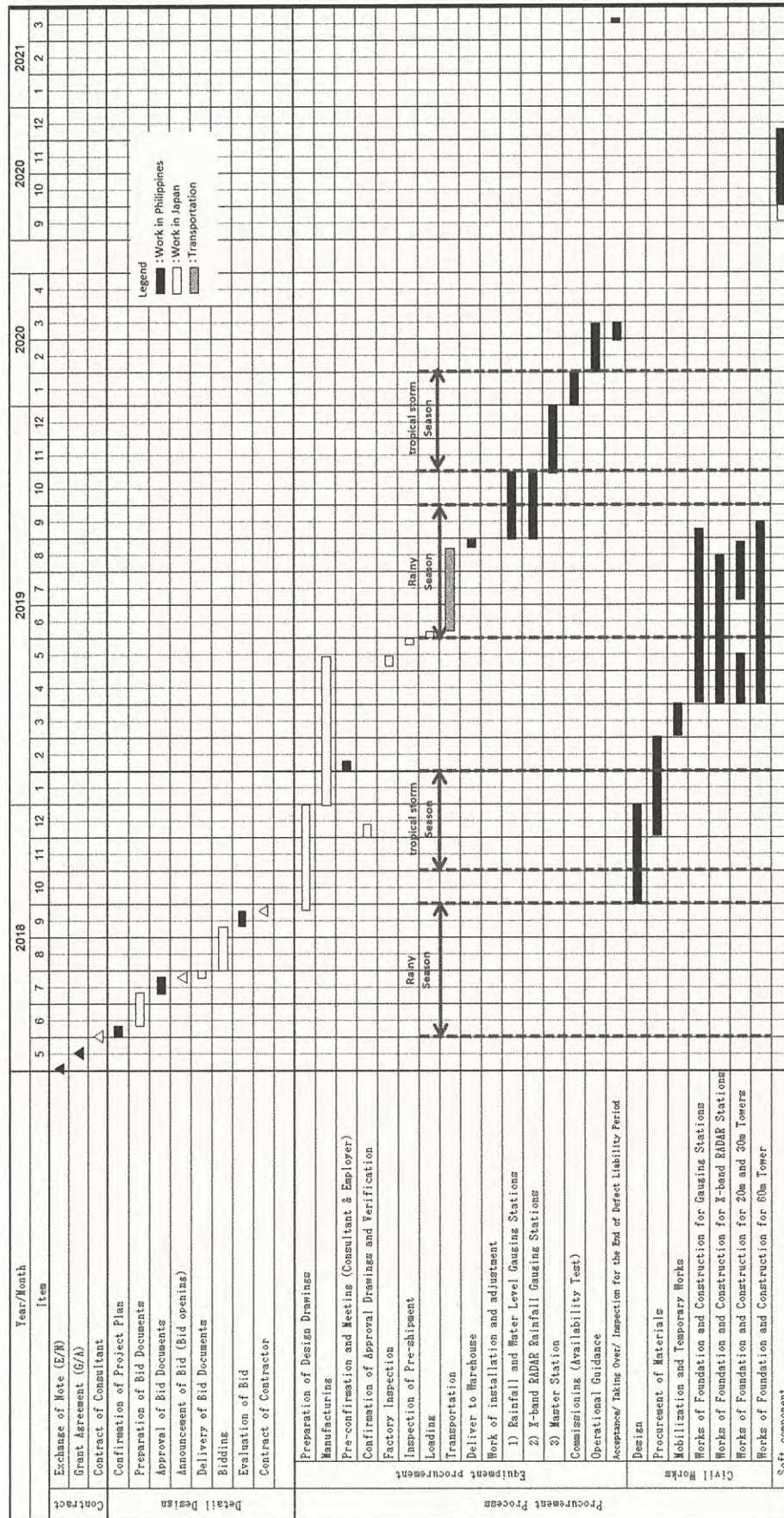
Annex 4 Project Monitoring Report (template)

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Project Implementation Schedule



Major Undertakings to be taken by the GoP

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

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open bank account (B/A)	within 1 month after the signing of the G/A	PAGASA in coordination with DOF		
2	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract	PAGASA		
3	To secure and clear the following lands 1) Project sites for X-Band Radars/Repeater station (2 sites) 2) project sites for Hydro-meteorological observation stations (13 sites) 3) Sufficient space for temporary facilities such as a constructor's office, workshop, building material storage, etc. needed for the work	before notice of the bidding document	PAGASA	80,000 (PHP)	
4	To obtain necessary permission for the use of following radio frequencies 1) Dedicated Radio communication network X band radars	before notice of the bidding document	PAGASA		
5	2) To obtain necessary permission from National Commission for Indigenous People (NCIP)	before notice of the bidding document	PAGASA		
6	To obtain necessary height clearance from Civil Aviation Authority for following towers X-Band radars (2 sites) CDO-RFFWC	before notice of the bidding document	PAGASA		
7	To obtain agreement with DPWH for building structures in the river channel	before notice of the bidding document	PAGASA		
8	To obtain agreement with DepEd for land use	before notice of the bidding document	PAGASA		
9	To obtain agreement with NIA for land use	before notice of the bidding document	PAGASA		
10	To obtain Certificate of Non-Coverage from DENR	before notice of the bidding document	PAGASA		
11	To obtain installation Permission of X-band radar from DOH and FAD to show no negative impact to health	before the notice of the bidding document	PAGASA		
12	To assign at least one technical personnel in charge of repairing/maintenance of flood forecasting and warning system in Cagayan de Oro/Tagoloan river flood forecasting and warning center	by June 2018	PAGASA		

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(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after the signing of the contract(s)	PAGASA		
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A		PAGASA	1,366,181 (PHP)	
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)			
	2) Payment commission for A/P	every payment			
3	To ensure acquisition of necessary customs clearance for the prompt unloading at ports of disembarkation in recipient country and to assist the Supplier(s) with internal transportation therein	during the Project	PAGASA		
4	To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	PAGASA		
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be borne by its designated authority without using the Grant.	during the Project	PAGASA	20,303,284 (PHP)	
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project such as land acquisition.	during the Project	PAGASA		
7	1) To submit Project Monitoring Report (ANNEX 4) after each work under the contract(s) such as shipping, hand over, installation and operational training using Annex 4	within one month after completion of each work	PAGASA		
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	PAGASA		
8	To submit a report concerning completion of the Project	within six months after completion of the Project	PAGASA		
9	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	before start of the installation	PAGASA		
	1) Electricity The distributing line to the site	before the installation of radar equipment and communication facilities	PAGASA		
	2) Furniture and Equipment General furniture	1 month before completion of	PAGASA		

		the installation			
10	To subscribe IP-VPN	during and after the installation of the equipment	PAGASA		
11	To assist necessary measure for safety construction done by barangay police - traffic control - rope off	during the installation	PAGASA		
12	To arrange security escort(s) such as police and/or military according to JICA security measure	during the Project	PAGASA		
13	To cooperate security information collection with JICA	during the Project	PAGASA		
14	To provide necessary working spaces with Internet Connection for the implementation of the Project.	during the Project	PAGASA		
15	To ensure transport for the personnel and to shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, accommodation, etc.	during the Project	PAGASA		
16	To complete construction of Cagayan de Oro/Tagoloan river flood forecasting and warning center	by September 2018	PAGASA	7,938,630.13 (PHP)	
17	To obtain the planning, zoning, building permit from LGUs	before the mobilization and temporary works	PAGASA		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To procure the required spare parts for the smooth operation and maintenance of the Equipment.	After the warranty period	PAGASA		
2	To procure the required consumables for the smooth operation and maintenance of the Equipment.	After completion of the installation	PAGASA		
3	To assign the required staff for the smooth operation and maintenance of the Equipment.	After completion of the installation	PAGASA		
4	To provide adequate maintenance of the observation stations and the Radar Tower Buildings constructed under the Project so that they may function long lasting and effectively.	After completion of the installation	PAGASA		
5	To effectively utilize the equipment procured/installed under the Project.	After completion of the installation	PAGASA		
6	To allocate the necessary budget for the smooth conduct of meteorological radar observation and forecasting works.	After completion of the installation	PAGASA		

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

NO	Items	Deadline	Amount (Million Japanese Yen)*
1	To install facility and provide equipment 1) To conduct the following transportation a) Marine (Air) transportation of the products from Japan to the recipient country b) Internal transportation from the port of disembarkation to the project site 2) To provide equipment with installation and commissioning	during the Project	
2	To implement detailed design, bidding support and procurement supervision (Consulting Service)		
3	Contingencies		
	Total		

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

3)

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<p><u>Project Monitoring Report</u></p> <p>on</p> <p><u>Project Name</u></p> <p><u>Grant Agreement No. XXXXXXXX</u></p> <p>20XX, Month</p>
--

Organizational Information

Signer of the G/A (Recipient)	<div style="border-bottom: 1px solid black; margin-bottom: 5px;"></div> Person in Charge (Designation)
	Contacts <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Address: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Phone/FAX: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Email: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div>
Executing Agency	<div style="border-bottom: 1px solid black; margin-bottom: 5px;"></div> Person in Charge (Designation)
	Contacts <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Address: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Phone/FAX: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Email: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div>
Line Ministry	<div style="border-bottom: 1px solid black; margin-bottom: 5px;"></div> Person in Charge (Designation)
	Contacts <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Address: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Phone/FAX: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div> Email: <div style="border-bottom: 1px solid black; margin-bottom: 2px;"></div>

General Information:

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

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1: Project Description

1-1 Project Objective

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1-2 Project Rationale

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

--

1-3 Indicators for measurement of "Effectiveness"

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

2: Details of the Project

2-1 Location

Components	Original (proposed in the outline design)	Actual
1.		

2-2 Scope of the work

Components	Original* (proposed in the outline design)	Actual*
1.		

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)	

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

--

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

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

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

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

2-5-2 Cost borne by the Recipient

Components			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.			

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

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

(PMR)

2-6 Executing Agency

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

Original (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

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

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

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

Original (at the time of outline design)

Actual (PMR)

3-2 Budgetary Arrangement

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

Original (at the time of outline design)

Actual (PMR)

4: Potential Risks and Mitigation Measures

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

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

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

3

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

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

5-1 Overall evaluation

Please describe your overall evaluation on the project.

--

5-2 Lessons Learnt and Recommendations

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

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

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

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Attachment

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



Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

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

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

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

Items of Specified Materials		1st 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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-
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Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

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

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資 料 5

ソフトコンポーネント計画書

国際協力機構

フィリピン共和国
カガヤン・デ・オロ川洪水予警報システム
改善計画準備調査

ソフトコンポーネント
計画書

平成 30 年 1 月

日本工営株式会社

フィリピン国
カガヤン・デ・オロ川洪水予警報システム
改善計画準備調査

ソフトコンポーネント計画書(案)

目 次

1. ソフトコンポーネントを計画する背景	1
2 ソフトコンポーネントの目標.....	2
3 ソフトコンポーネントの成果.....	2
4 成果達成度の確認方法	2
5 ソフトコンポーネントの活動(投入計画)	5
6 ソフトコンポーネントの実施リソースの調達方法	6
7 ソフトコンポーネントの実施工程	6
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1. ソフトコンポーネントを計画する背景

カガヤン・デ・オロ川流域では、台風センドンによる死者 1,250 人、被災者 117 万人という甚大な被害を受けて、JICA は、「洪水リスク管理事業（カガヤン・デ・オロ川）準備調査」（2014 年）にて、マスタープランを策定した。当マスタープランでは、円借款事業「洪水リスク管理事業（カガヤン・デ・オロ川）」（2015 年 3 月 L/A 調印）で実施中の構造物対策に加え、非構造物対策の優先プロジェクトの一つとして、洪水予警報システムの整備が提案されている。

また、フィリピン全域の洪水予警報能力の向上を目的とした技術協力プロジェクトである「洪水予警報の統合データ管理能力強化プロジェクト：以下、技プロと称する」（2019 年 9 月終了予定）では、カガヤン・デ・オロ川をパイロット地域としている。技プロの活動では、気象水文データの品質管理、保管能力の強化、カガヤン・デ・オロ川における H-Q カーブ及び警戒水位案の作成洪水警報発令訓練などが実施されている。

係る状況の下、「カガヤン・デ・オロ川洪水予警報システム改善計画」（以下、本事業と称する）は、カガヤン・デ・オロ川流域における PAGASA の洪水予警報システムを改善することにより、カガヤン・デ・オロ川流域における洪水被害の軽減を図り、もって当国の安定的な経済発展に寄与することを目的としている。

本事業では、雨量、水位観測施設用の局舎建設、機材（水位雨量観測局、雨量観測局、X バンドレーダー雨量観測局、FFWS 監視局、無線設備など）の設置及び機材納入業者による初期操作指導や維持管理方法の指導等が実施される。ただし、これらの指導は機材の基本的な使い方にとどまる。本事業で目標としている洪水予警報能力の向上は一時的なものではなく継続的に発揮されるべきものであり、運営維持管理を適切に実施していくことが重要である。よって、運営維持管理を適切に実施されるために更なる指導が必要である。

技プロは、カガヤン・デ・オロ川流域の洪水予警報システムの運用・維持管理能力の向上を目的とした活動はあるが、本事業にて導入されるシステムの構築が完了していない 2019 年 9 月に終了予定であり、カガヤン・デ・オロ川流域において、本事業の洪水予警報システム及び計測データを使用した技術移転が実施できない状況である。

よって、本事業のソフトコンポーネントでは、更なる運営維持管理能力の向上を促すために、技術プロジェクトでは実施できなかった本事業により構築された洪水予警報システムの実機及び実データを使用した運営維持管理に関する技術移転を目的とする。実機及び実測データを使用することにより、受講者の機材・システムや計測データに対する知識や技術力の習熟を図るとともに、より現場運用に即した運営維持管理の技術習得が期待される。

2 ソフトコンポーネントの目標

1 章において言及した背景から、目標を以下のように設定する。

- 現地職員（MPRSD に技プロ計画に従い配属される）と関連機関の担当職員（CDO-CDRRMD など）が、本事業にて設置される洪水予警報システムの運営維持管理を適切に実施し、洪水予警報が継続的に運用される
- 防災関連機関（CDO-CDRRMD, OCD, DPWH, LGU）による防災情報提供が活性化される

3 ソフトコンポーネントの成果

ソフトコンポーネントによる成果を下記に示す。

- ① PAGASA 及び防災関連機関の管理技術者の洪水予警報システム運営維持管理能力の向上
- ② 水位相関法を利用した洪水予測能力の向上
- ③ X バンドレーダー雨量計の観測データの解析技術の習得
- ④ PAGASA 及び防災関連機関（CDO-CDRRMD, OCD, DPWH, LGU）の管理技術者による防災情報提供システムに必要な情報の伝達技術の習得

また、上記成果が達成されることにより、本事業により設置された観測施設およびデータ伝送施設が適切に運用・維持管理がなされ、PAGASA と CDO-CDRRMD においてリアルタイムなデータ共有が可能となり、急激な状況変化に対して迅速な対応が可能となる。その結果として、カガヤンデ・オ・オロ川流域の洪水災害軽減に寄与する。

4 成果達成度の確認方法

本事業のソフトコンポーネントの成果達成度の確認項目及び確認方法を表-1 に示す。

表-1 ソフトコンポーネントの成果と達成度の確認項目/確認方法

成果	達成度の確認項目	達成度の確認方法
① PAGASA 及び防災関連機関の管理技術者の洪水予警報システム運営維持管理能力の向上	1. 洪水予警報に必要な情報の種類、精度、収集タイミングを理解し運用できる 2. 洪水予警報システムの運営・維持管理を実施できる技術力と判断力がある 3. 予警報発令基準の設定方法を理解し、妥当性確認することができる	左記の項目について、研修時の習熟度を、インタビュー及び研修後のアンケートにより確認する。

成果	達成度の確認項目	達成度の確認方法
② 水位相関法を利用した洪水予測能力の向上	<ol style="list-style-type: none"> 1. 既往の水文データに加え、本システムにより観測された水文データを整理・分析し、流域の洪水流出特性を理解し、運用できる。 2. 水位相関法の技術を理解した上で、水位相関式を作成する観測所を選定し、観測された洪水位データを用いて水位相関式を適切に作成できる。また、必要に応じて、水位相関式の修正・更新ができる。 3. 水位相関式をシステムに実装し、リアルタイム観測水位を用いた水位相関法による洪水予測の一連の手順を理解し、運用できる。 	
③ X バンドレーダー雨量計の観測データの解析技術の習得	<ol style="list-style-type: none"> 1. レーダー観測データから流域平均雨量の計算ができる。 2. レーダー観測データの処理及び観測雨量と地上観測雨量での比較による精度確認方法を理解し、運用できる。 	
④ PAGASA 及び防災関連機関の管理技術者による防災情報提供システムに必要な情報の伝達技術の習得	<ol style="list-style-type: none"> 1. 必要な情報の提供方法や連携方法を理解し運用できる 2. 情報提供システムの内容を理解し運用できる 3. 実地訓練を計画・実施することができる 	

5 ソフトコンポーネントの活動（投入計画）

ソフトコンポーネントの活動（投入計画）を表-4に示す。また、各項目に対する日程表を7章の実施工程表に示す。

表-4 ソフトコンポーネント投入計画

成果	必要な技術・業種	現状の技術水準と必要とされる技術水準	成果品	実施方法	実施リソース
成果① PAGASA及び防災関連機関の管理技術者の洪水予警報システムの運営維持管理能力の向上	洪水予警報システムの運営管理技術を有する技術者	自動化されたテレメータと監視システム運用・管理の経験は乏しく、それらシステムの継続的な運営維持管理技術を修得する必要がある。	● 研修資料（運営維持管理・防災情報システム手順書） ● 達成度確認結果	洪水予警報システムを実用した以下の研修を実施 ● 洪水予警報システム運用維持に関する研修(2日) ● 情報管理方法に関する研修(3日) ● 予警報発令基準の確認・検証に関する研修(3日)	洪水予警報システム技術者： -国内：8日 -現地：8日（滞在11日）
成果② 水位相関法に関する技術の向上	水位相関法の知識を有している技術者	水位相関法の基礎知識は技術協力プロジェクトで習得されると想定されるが、実際に洪水予警報には当該知識の応用が求められる。	● 研修資料（水位相関法による洪水予警報と警報発令基準手順書） ● 達成度確認結果	洪水予警報システムにより取得された実データによる以下の研修を実施 ● 流域洪水流出特性に関する水文データの研修(3日) ● 水位相関法に関する研修(5日) ● 洪水予測に関する研修(5日) ● 評価(2日)	水文技術者： -国内：8日 -現地：15日（滞在23日）
成果③ Xバンドレーダー雨量計の観測データの解析に関する技術の習得	Xバンドレーダー雨量計の運用を担当する技術者	フィ国において、Xバンド雨量レーダーを組み込んだ洪水予警報システムは初めてであり、本装置の継続的な運営維持管理技術を修得する必要がある。	● 研修資料(Xバンド雨量レーダーデータ解析手順書) ● 達成度確認結果	洪水予警報システムを実用した以下の研修を実施 ● 流域平均雨量の算出に関する研修(5日) ● 観測データ（データの基本処理、蓄積データの利活用方法、地上観測雨量との比較方法等）に関する研修(5日) ● 評価(2日)	Xバンド雨量レーダーシステム技術者： -国内：8日 -現地：12日（滞在20日）
成果④ PAGASA及び防災関連機関の管理技術者による防災情報提供システムに必要な情報の伝達技術の習得	防災情報提供システムの伝達技術に関する技術者を有する者	洪水情報提供システムの伝達技術はある程度蓄積されているが、継続的な運用に関する技術を修得する必要がある。	● 研修資料（運営維持管理・防災情報システム手順書） ● 達成度確認結果	洪水予警報システムを実用した以下の研修を実施 ● 情報提供及び連携方法に関する研修(2日) ● 運用訓練(2日) ● 評価(2日)	防災情報提供システム技術者： -国内：成果1に含む -現地：6日（滞在9日）

本無償事業のソフトコンポーネントによる技術支援に必要と考えられる受講者数を表-5に示す。

表-5 技術支援の受講対象数

所属機関名称	担当業務	人数		対象成果 No.
		責任者	担当	
PAGASA（気象天文 庁）	運営維持管理	1名	4名	①
	水理・水文技術者	1名	2名	②
	レーダーデータ管理技術	1名	2名	③
CDRRMD（カガヤン・ デ・オロ市防災リスク 削減管理委員会）	運営維持管理	1名	2名	①
	防災情報伝達に携わる管理 技術者	1名	3名	④
LGU 防災リスク削減 管理委員会（3市）＊	運営維持管理	各1名	各2名	①
	情報伝達技術に携わる管理 技術者	各1名	各2名	④
公共事業道路省 （DPWH）	情報伝達技術に携わる管理 技術者	1名	2名	④
国家灌漑庁（NIA）	情報伝達技術に携わる管理 技術者	1名	2名	④

＊3市：Libona, Talakag, Baungon

6 ソフトコンポーネントの実施リソースの調達方法

以下理由により本邦コンサルタントにより直接実施することが適切であると考えます。

- 本事業で設置される X バンドレーダー雨量計を含んだ洪水予警報システムは本邦調達で計画されており、本ソフトコンポーネントはそれら機材の実用且つ取得されたデータを使用した研修等を計画している。そのため、本邦で調達される機材やデータ処理を扱う技術力及び指導できる知識力が必要であり、このようなコンサルタントの現地調達は困難である。
- PAGASA には可搬型 X バンドレーダー雨量計はあるものの、固定型の同装置は導入されていないため、固定型に対する運用維持管理に関する知識を有した技術力が必要であり、このようなコンサルタントの現地調達は困難である。
- 上記技術者と密接な連携を構築しながら、本邦調達機材で構成される洪水予警報としてのシステム運用及び防災情報提供システムの運用維持管理に関する技術力及び知識が必要であり、このようなコンサルタントの現地調達は困難である。
- また、既存パンパンガ・アグノ川の洪水予警報システムは、日本の無償資金協力事業で導入されており、それらの導入経験を有したコンサルタントが経験を活用することにより、効率的且つ有用な技術移転が可能と考える

7 ソフトコンポーネントの実施工程

本体事業によるシステム完成後に技術支援を実施するが、実際の実施時期は各職員が多忙となる雨季を避けるものとする。なお、データがある程度蓄積された後に実施することを想定している。

図-1 実施工程表

暦年 月	2020年																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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8 ソフトコンポーネントの成果品

ソフトコンポーネントの成果品は以下のとおりである。

- (ア) 運営維持管理・防災情報システムに関する手順書（研修資料）
- (イ) 水位相関法による洪水予警報と警報発令に関する手順書（研修資料）
- (ウ) X バンドレーダー雨量計データ解析手順書（研修資料）
- (エ) 運営維持管理・防災情報システム手順書（研修資料）
- (オ) アンケート調査表結果（達成度確認結果）
- (カ) 活動記録の写真
- (キ) JICA へ提出する完了報告書

9 相手国側の責務

本ソフトコンポーネント及び無償資金協力事業の目標達成のためには、洪水予警報情報を発信する **PAGASA** のみならず、防災削減活動を司る防災関連機関（**CDRRMD**, **OCD**, **DPWH**, **LGU** など）からの協力と継続的な活動が不可欠である。

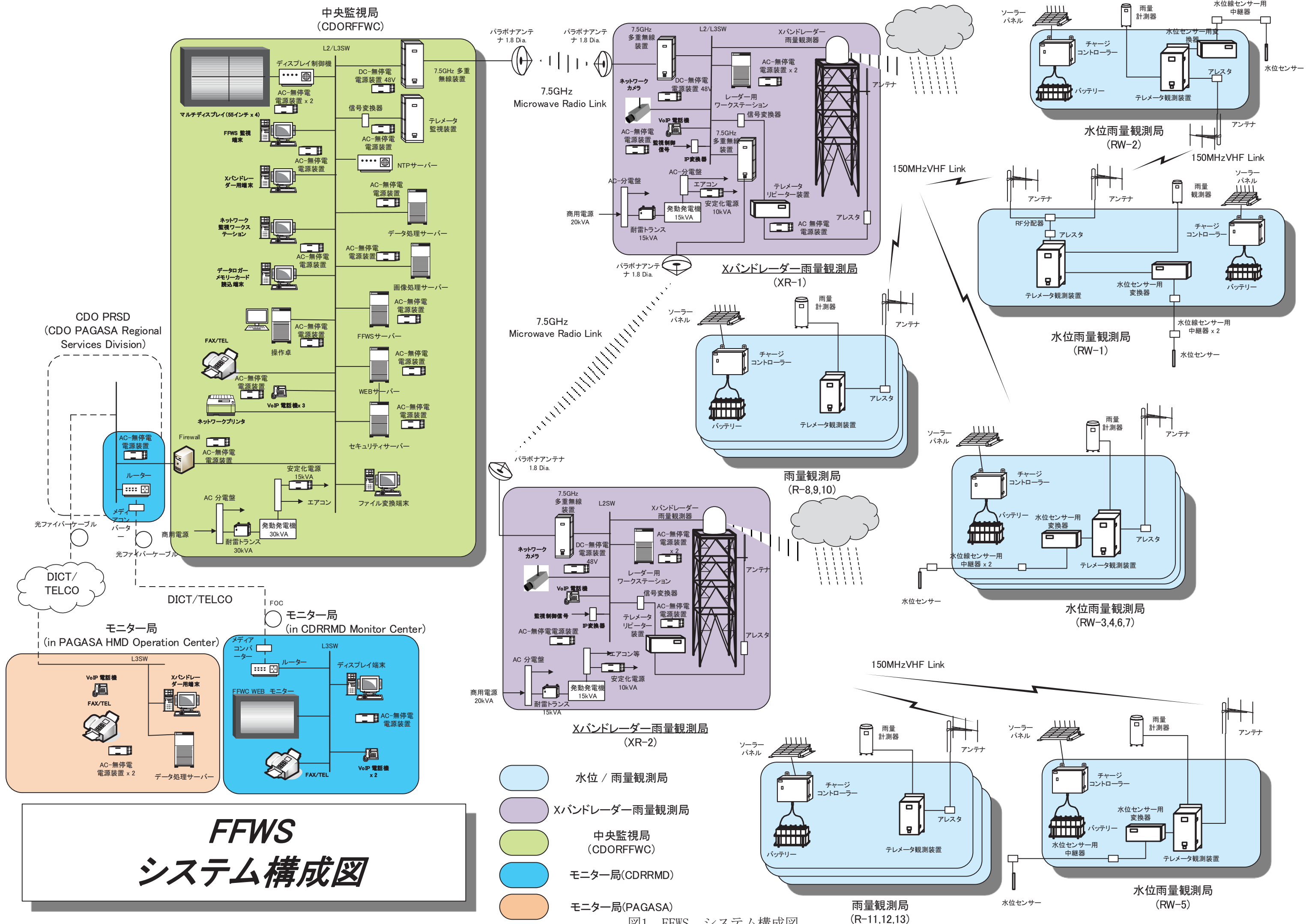
そのため、各機関の役割をお互いに理解し、連携を密にして防災削減活動の継続的な活動が重要である。以下の向上を目標として活動を継続していく必要がある。

- (ア) レーダー雨量データの河川管理や防災活動への利活用
- (イ) リードタイムの設定（**CDRRMD** の管轄）
- (ウ) 洪水予測と予警報発令基準（判りやすい洪水予警報情報の確立）
- (エ) 避難訓練

以上

資料 6

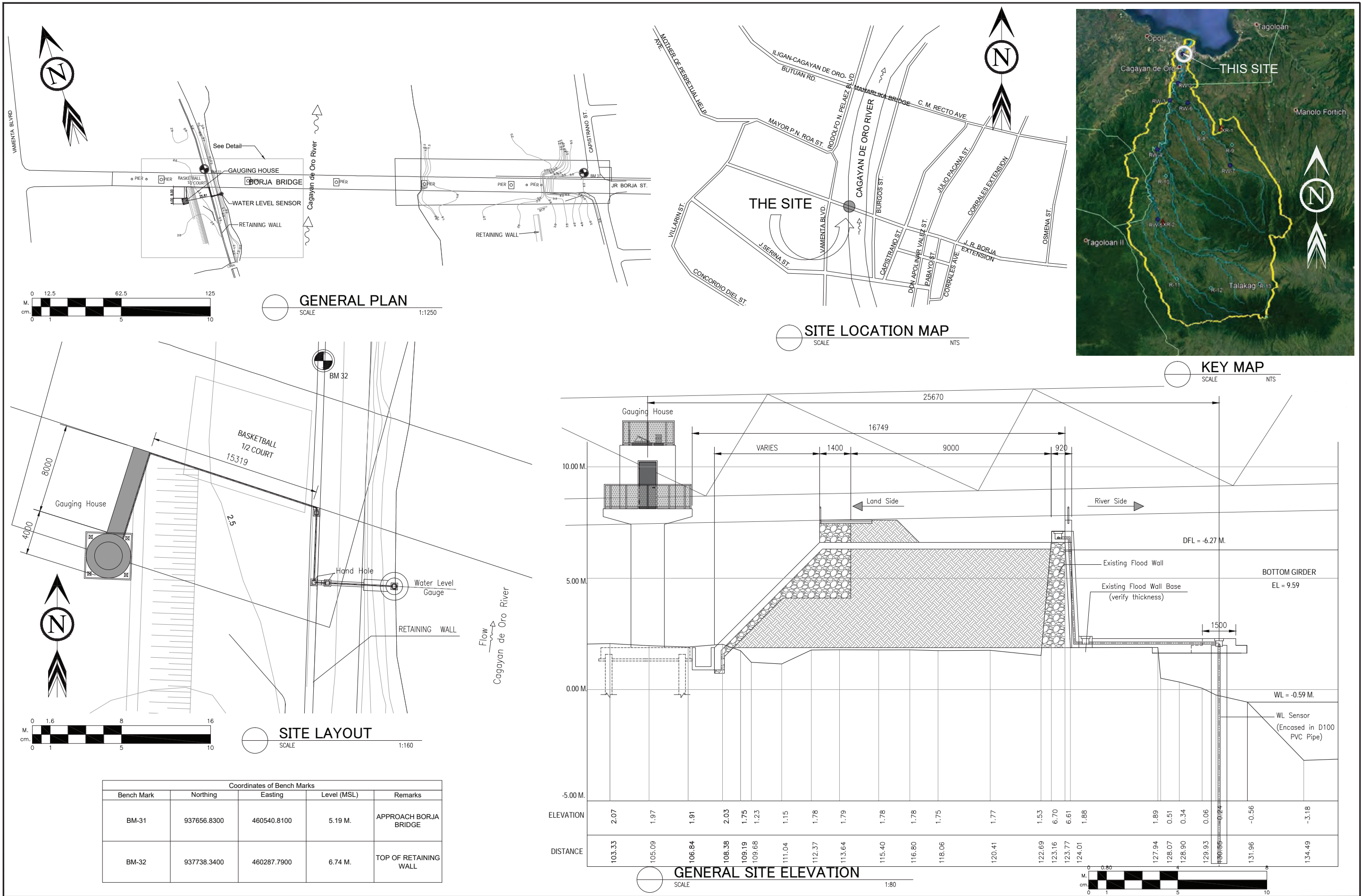
概略設計図



FFWS システム構成図

- 水位 / 雨量観測局
- Xバンドレーダー雨量観測局
- 中央監視局 (CDORFFWC)
- モニター局(CDRRMD)
- モニター局(PAGASA)

図1 FFWS システム構成図



			PROJECT NAME AND LOCATION:		PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION		NIPPON KOEI CO., LTD. TOKYO, JAPAN		SHEET CONTENTS :		DATE :	-
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN		RECOMMENDED BY: --		DESIGNED BY: --		RW-1 BORJA BRIDGE		SCALE :	-
					APPROVED BY: VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA		CHECKED BY: YASUSHI AZUMA JICA Study Team Leader		GENERAL PLAN, SITE LOCATION, KEY MAP, SITE LAYOUT & GENERAL SITE ELEVATION		UNIT :	-
MARK			DETAILS		DATE:		DATE:				DRAWING NO :	
REVISIONS			DATE								CVL-SA-1	

図2 水位雨量観測局 (RW-1)

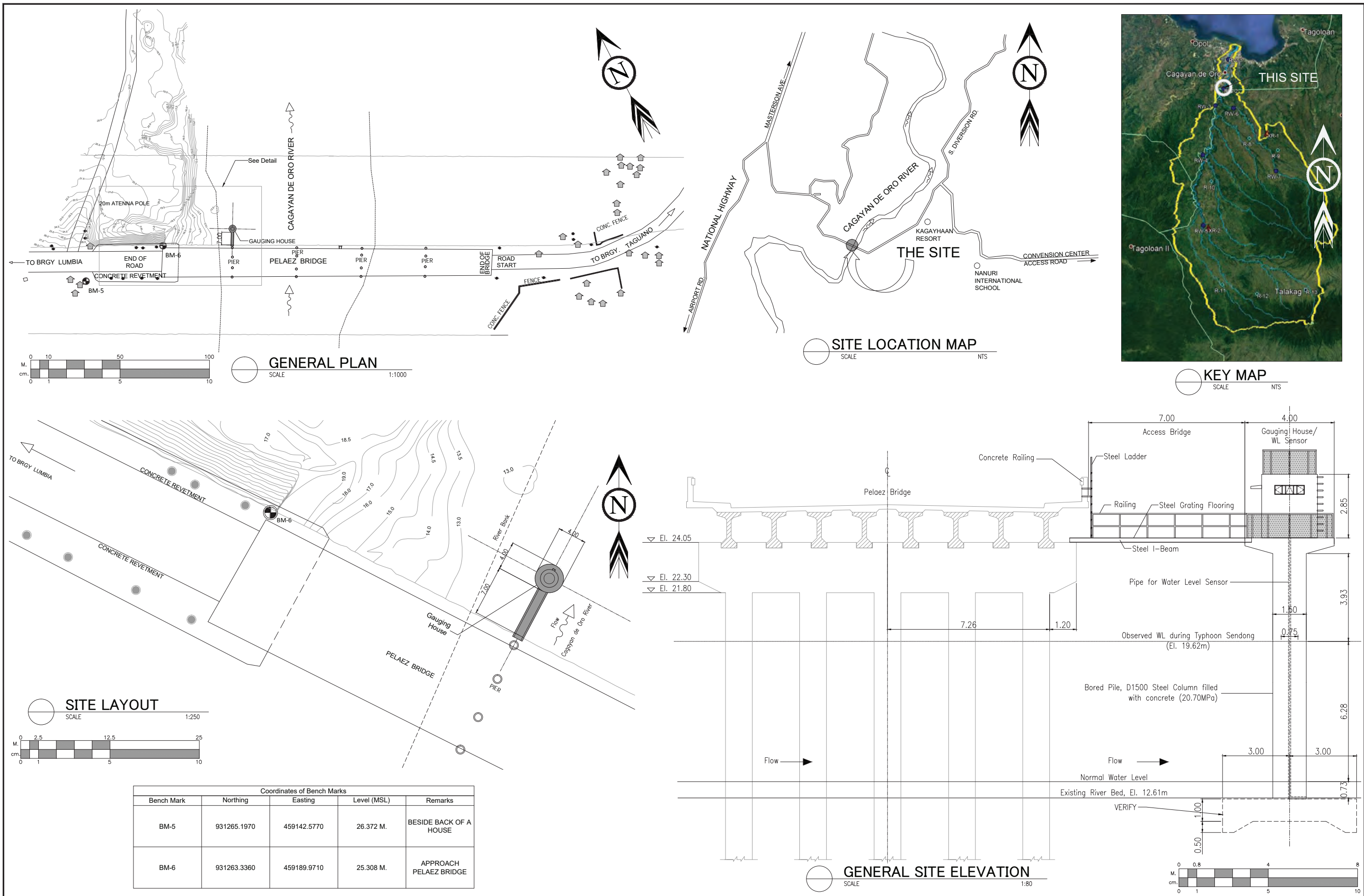
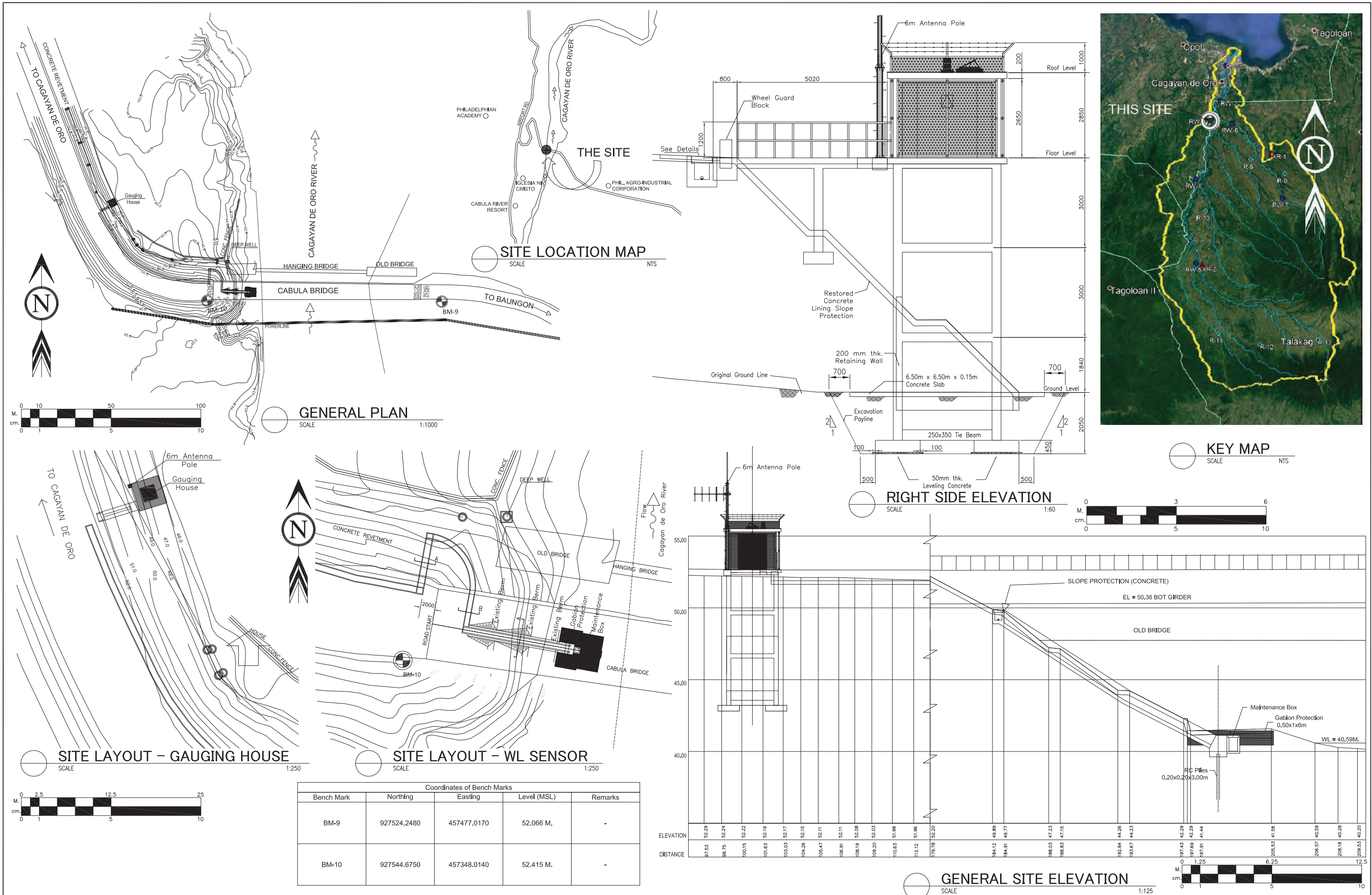
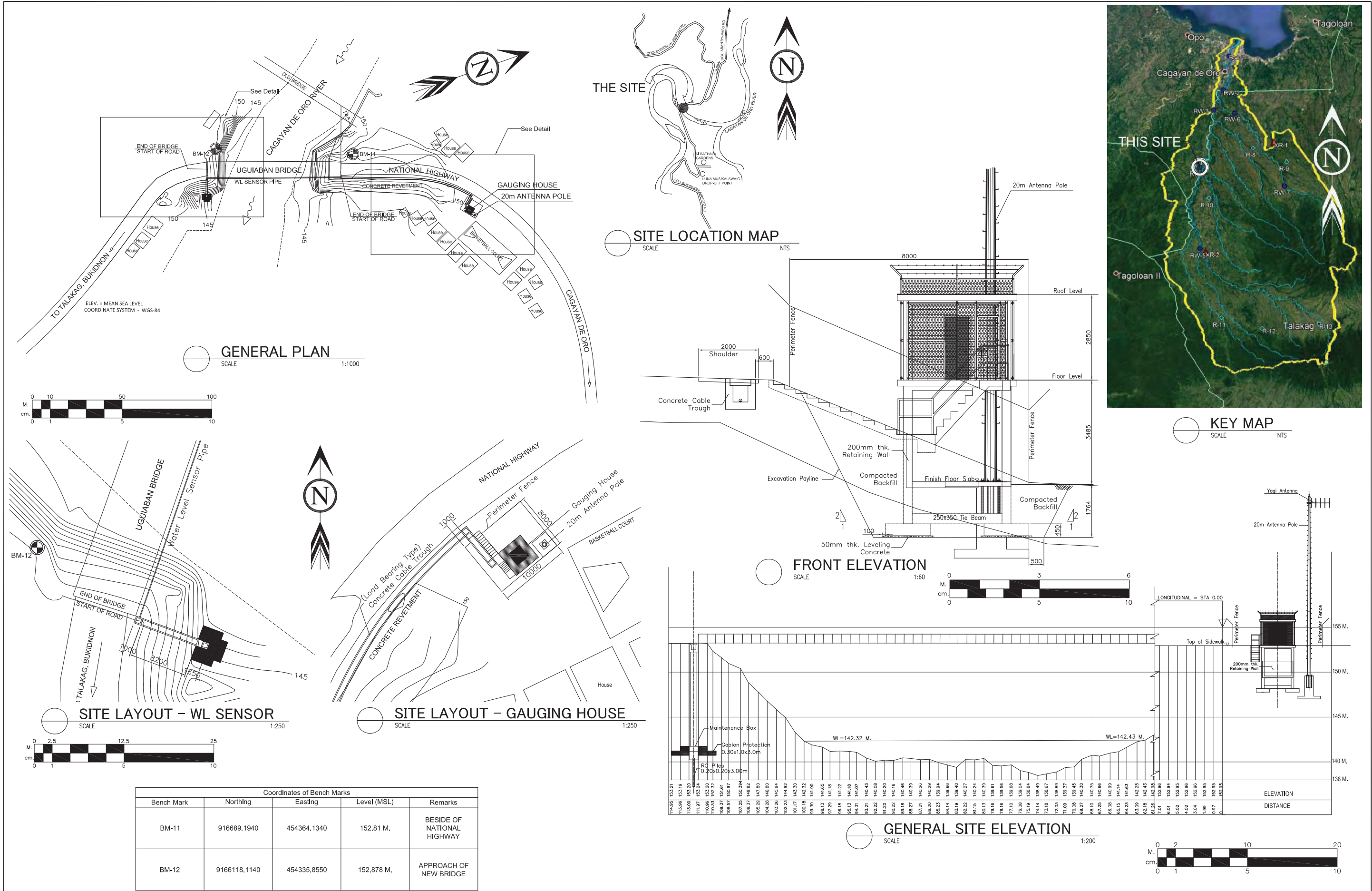


図3 水位雨量観測局 (RW-2)



			PROJECT NAME AND LOCATION:		PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION		NIPPON KOEI CO., LTD. TOKYO, JAPAN		SHEET CONTENTS :		DATE :	-
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN		RECOMMENDED BY:		APPROVED BY:		DESIGNED BY:		CHECKED BY:	-
					Office-In-Charge Mindanao PRSD		VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA		CIVIL ENGINEER		YASUSHI AZUMA JICA Study Team Leader	SCALE :
					DATE:		DATE:		DATE:		DATE:	UNIT :
												DRAWING NO :
												CVL-SC-1

図4 水位雨量観測局 (RW-3)





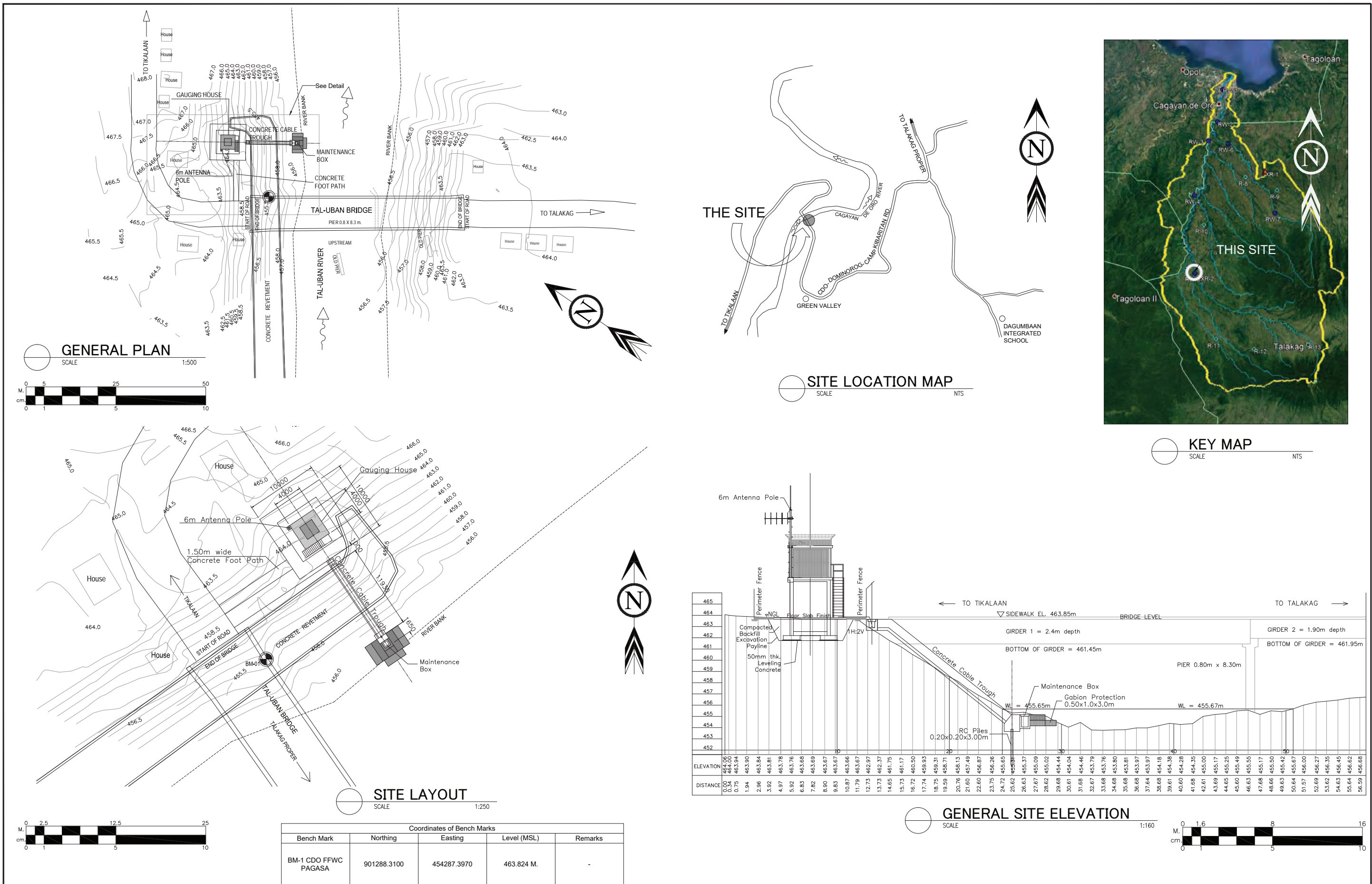
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			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN	RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	RW-4 UGUIABAN BRIDGE	SCALE :	-
MARK	DETAILS	DATE		-- Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	-- CIVIL ENGINEER	YASUSHI AZUMA JICA Study Team Leader	GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION	UNIT :	-
REVISIONS				DATE:	DATE:	DATE:	DATE:	DRAWING NO :	CVL-SD-1	

図5 水位雨量観測局 (RW-4)



			PROJECT NAME AND LOCATION:		PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION		NIPPON KOEI CO., LTD. TOKYO, JAPAN		SHEET CONTENTS :		DATE :	-
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN		RECOMMENDED BY:		APPROVED BY:		DESIGNED BY:		SCALE :	-
					Office-in-Charge Mandanao PRSD		VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA		CIVIL ENGINEER		UNIT :	-
					DATE:		DATE:		DATE:		DRAWING NO :	CVL-SE-1
MARK			DETAILS						GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION			
REVISIONS												
			DATE									

図6 水位雨量観測局 (RW-5)

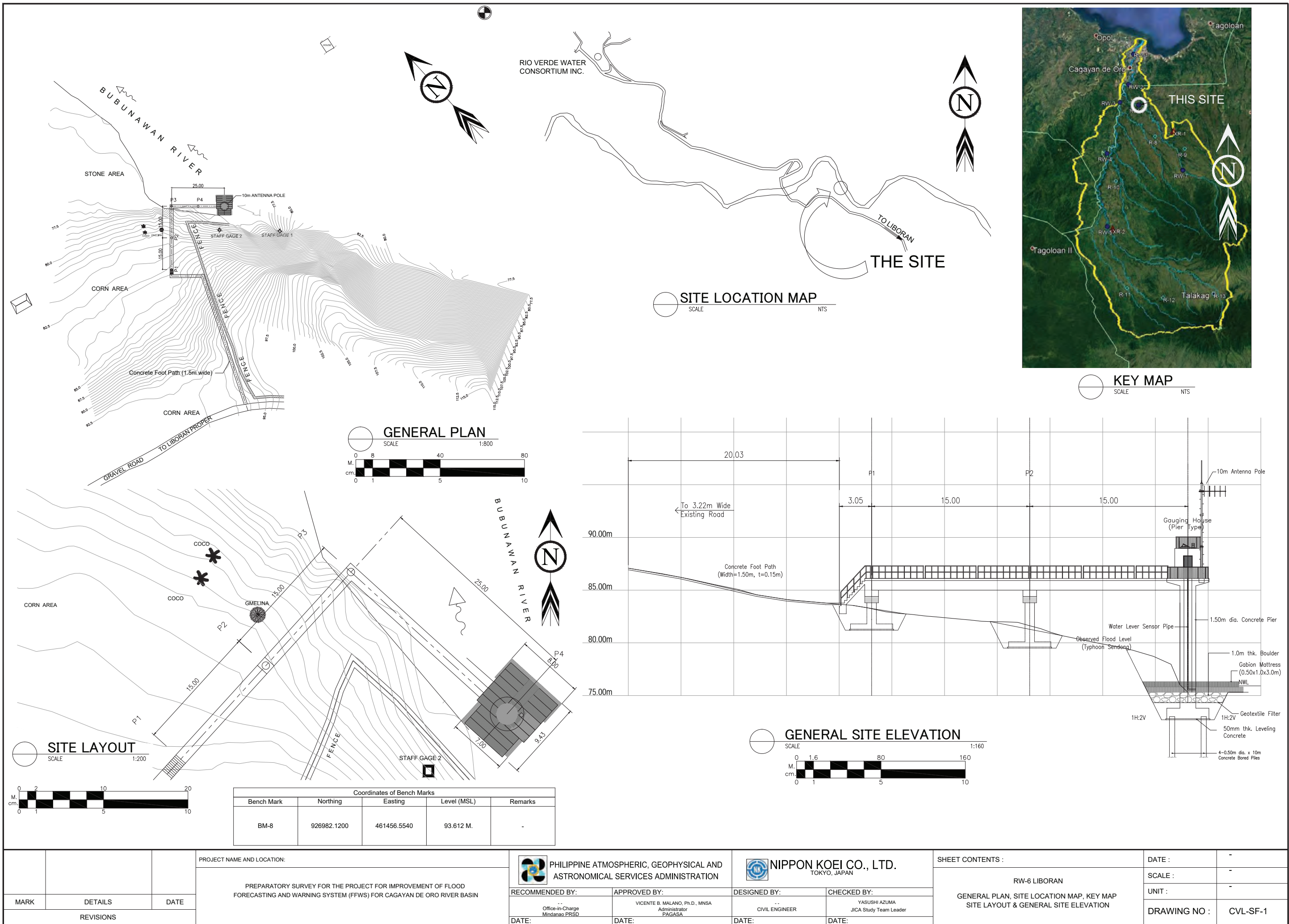
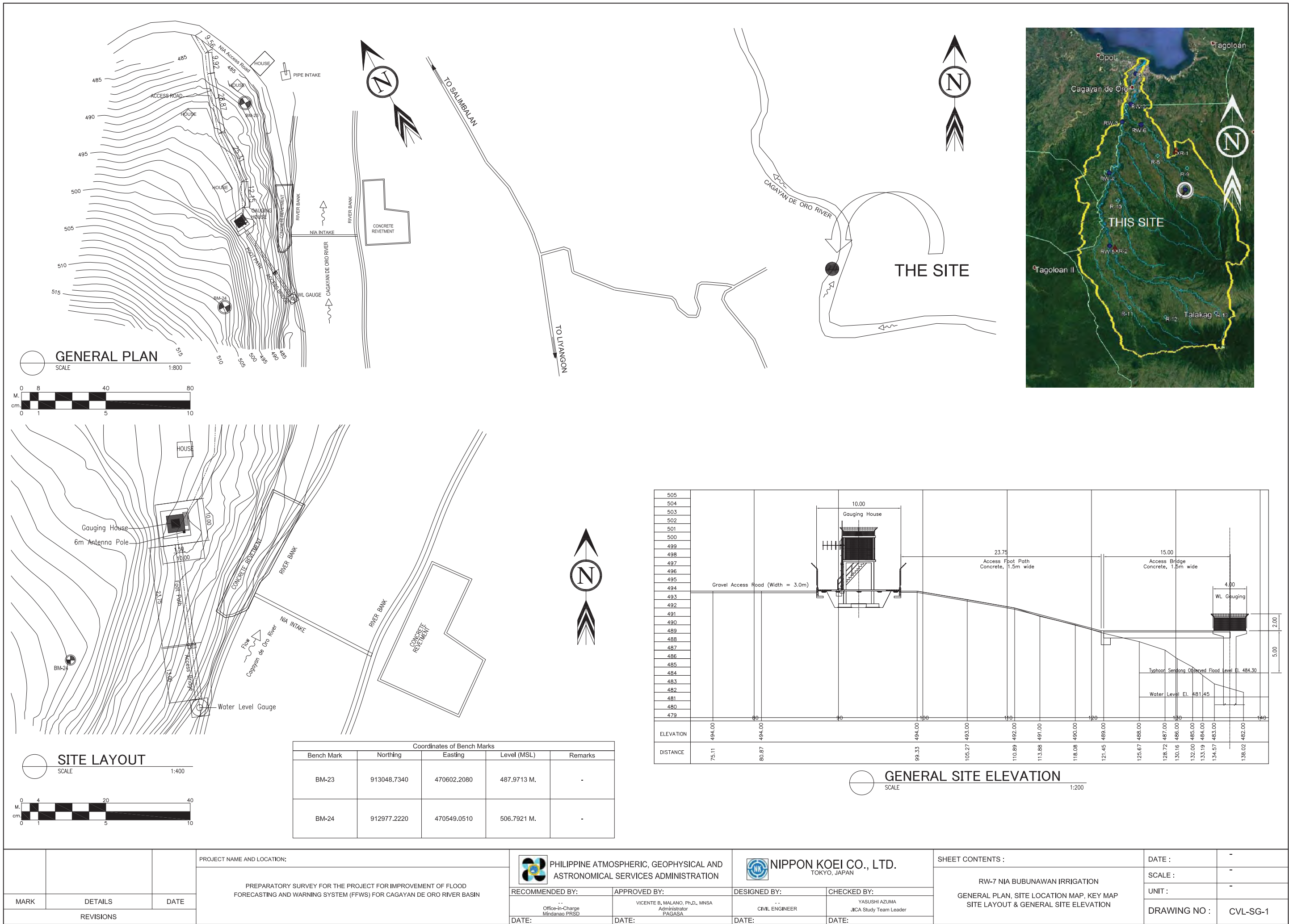
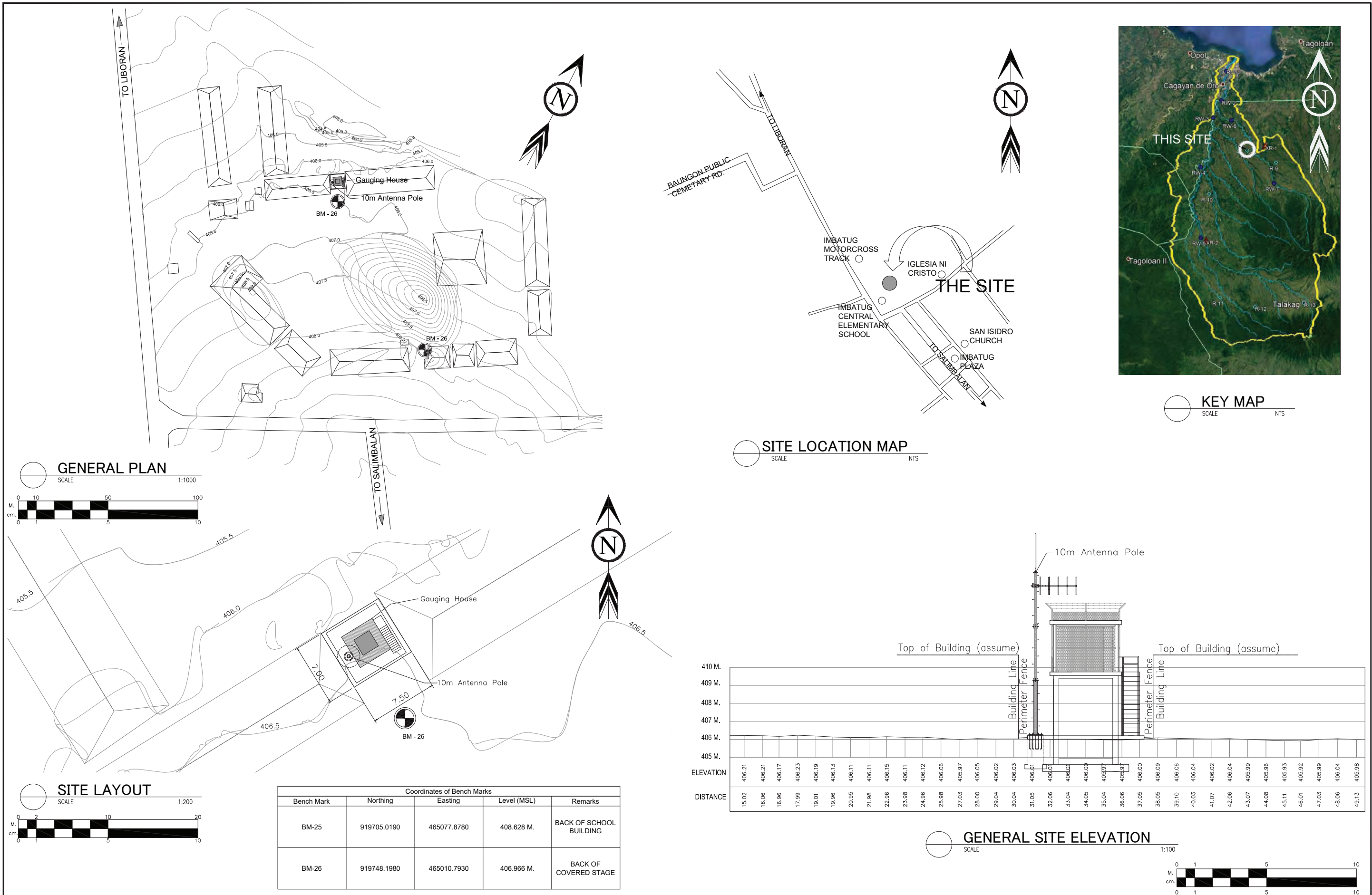


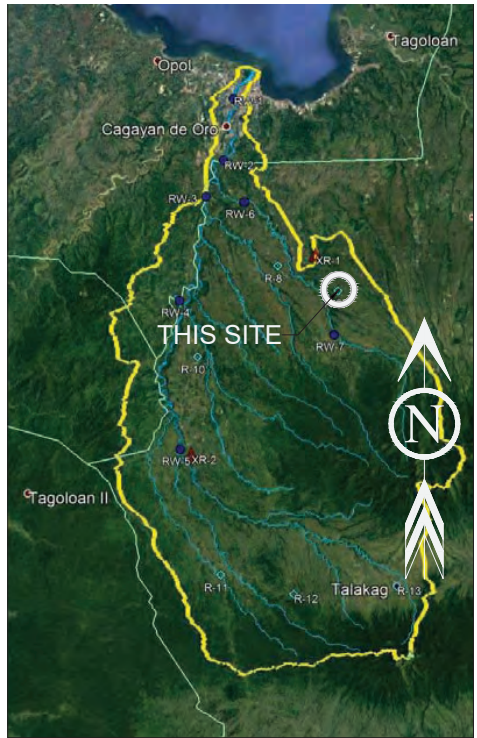
図7 水位雨量観測局 (RW-6)





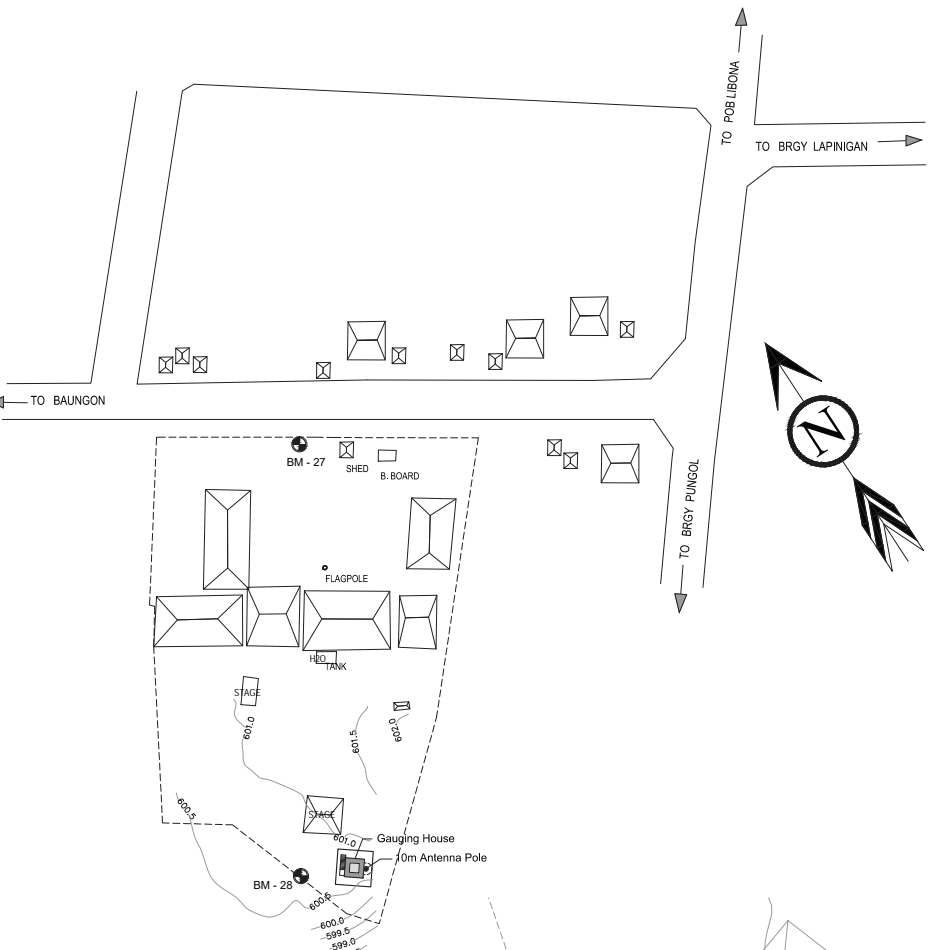
			PROJECT NAME AND LOCATION:		PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION		NIPPON KOEI CO., LTD. TOKYO, JAPAN		SHEET CONTENTS :		DATE :	-
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN		RECOMMENDED BY: -- Office-in-Charge Mindanao PRSD		APPROVED BY: VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA		DESIGNED BY: -- CIVIL ENGINEER		CHECKED BY: YASUSHI AZUMA JICA Study Team Leader	
MARK	DETAILS	DATE			DATE:		DATE:		GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION		SCALE :	-
REVISIONS											UNIT :	-
											DRAWING NO :	CVL-SH-1

図9 雨量観測局 (R-8)

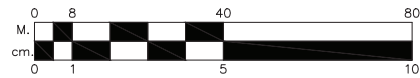


KEY MAP
SCALE NTS

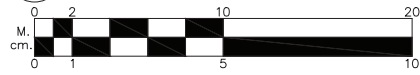
SITE LOCATION MAP
SCALE NTS



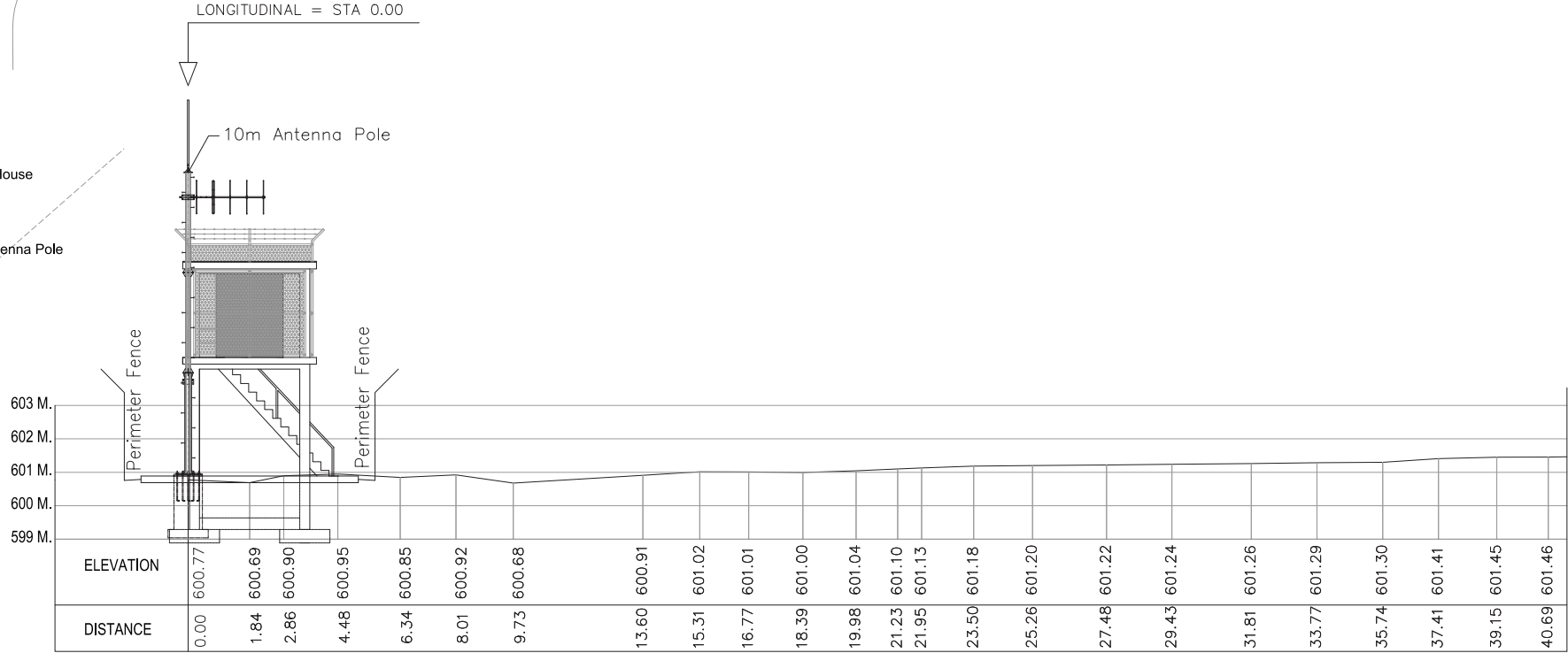
GENERAL PLAN
SCALE 1:800



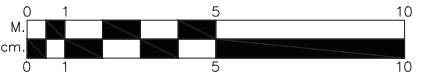
SITE LAYOUT
SCALE 1:200



Coordinates of Bench Marks				
Bench Mark	Northing	Easting	Level (MSL)	Remarks
BM-27	917602.8450	471029.0880	601.001 M.	RIGHT SIDE OF GATE
BM-28	917526.2020	470979.2930	600.938 M.	BACK OF COVERED STAGE



GENERAL SITE ELEVATION
SCALE 1:100





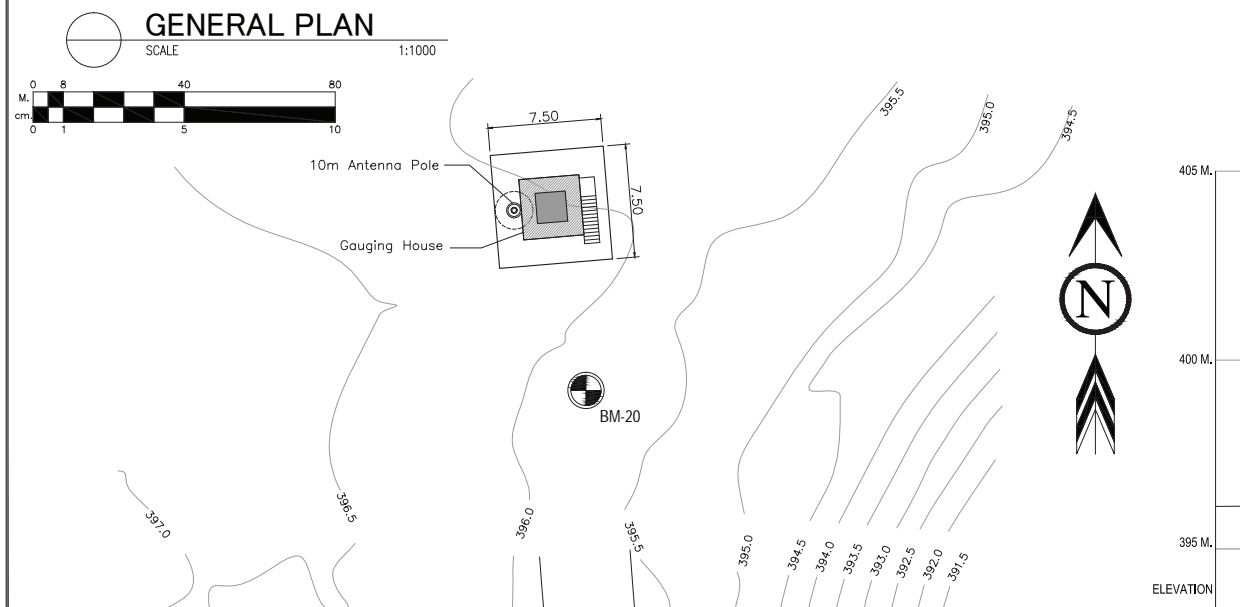
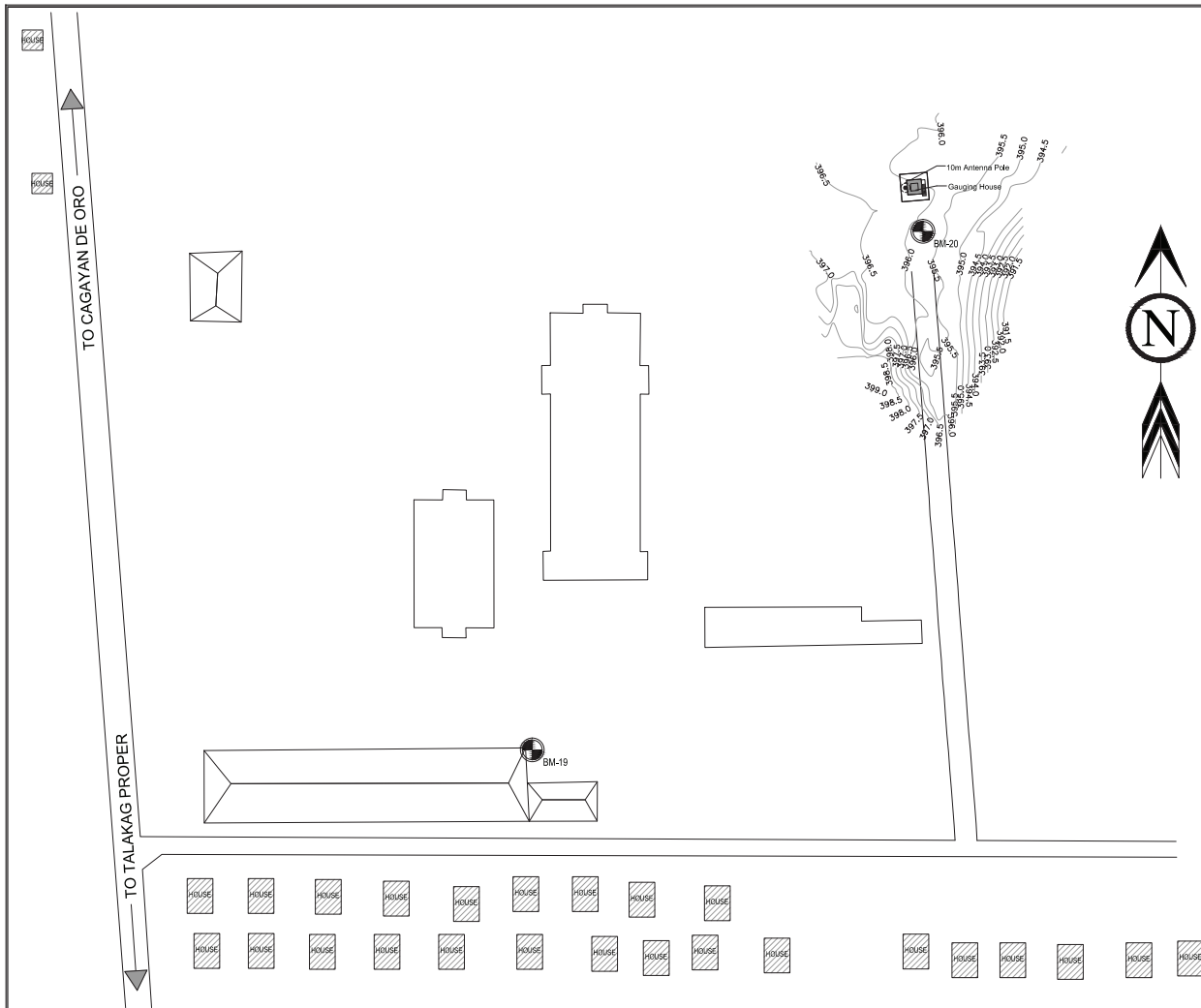
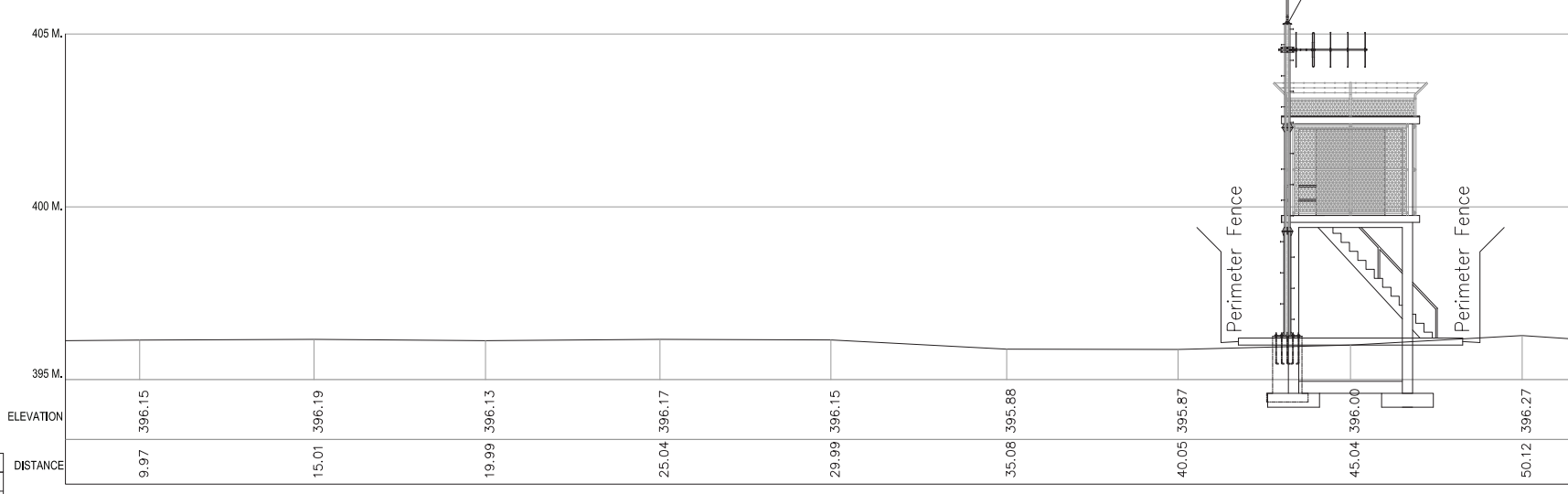
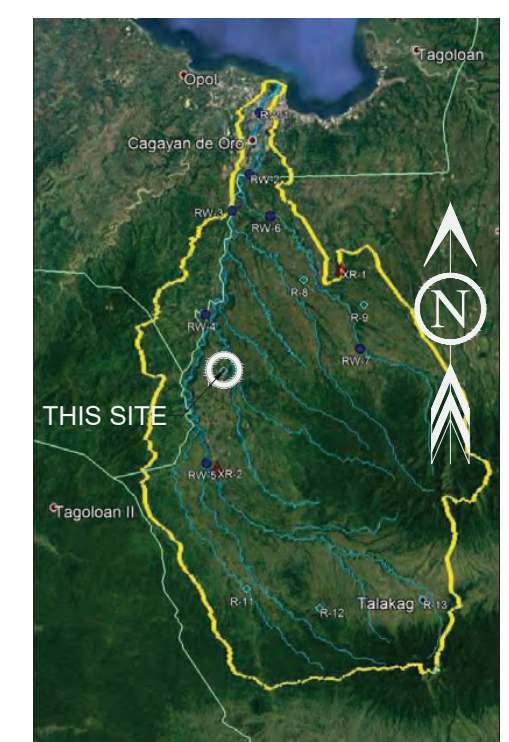
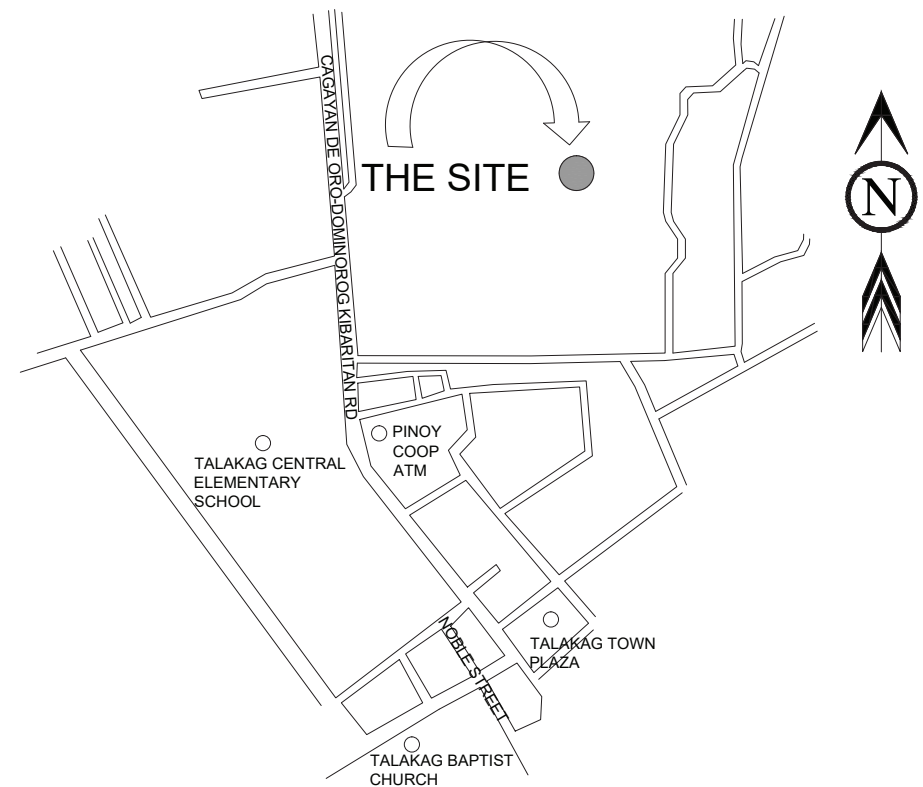
			PROJECT NAME AND LOCATION:		 PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION	 NIPPON KOEI CO., LTD. TOKYO, JAPAN	SHEET CONTENTS :		DATE :	-
MARK	DETAILS	DATE	PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN	R-9 NANGKA ELEMENTARY SCHOOL GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION			SCALE :	-		
				UNIT :			-			
REVISIONS					RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	DRAWING NO :	CVL-SI-1
					- - Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	- - CIVIL ENGINEER	YASUSHI AZUMA JICA Study Team Leader		
					DATE:	DATE:	DATE:	DATE:		

図10 雨量観測局 (RW-9)



Coordinates of Bench Marks				
Bench Mark	Northing	Easting	Level (MSL)	Remarks
BM-19	910639.6450	456104.1150	395.913 M.	-
BM-20	910781.5220	456210.9040	391.904 M.	-



GENERAL SITE ELEVATION

SCALE 1:100

A graphic scale bar is located at the bottom right of the page. It consists of a horizontal line with alternating black and white rectangular segments. Below the line, there are two sets of markings. The top set is labeled 'M.' (meters) and has markings at 0, 1, and 5. The bottom set is labeled 'cm.' (centimeters) and has markings at 0, 1, and 5. The bar is used to provide a visual reference for the scale of the drawing.



			PROJECT NAME AND LOCATION:	<div><div></div><div>PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION</div></div>	<div><div></div><div>NIPPON KOEI CO., LTD. TOKYO, JAPAN</div></div>	SHEET CONTENTS :	DATE :	-		
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN	RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	R-10 TALAKAG BUREAU OF FIRE GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION	SCALE :	-
MARK	DETAILS	DATE		Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	CIVIL ENGINEER	YASUSHI AZUMA JICA Study Team Leader		UNIT :	-
REVISIONS				DATE:	DATE:	DATE:	DATE:		DRAWING NO :	CVL-SJ-1

図11 雨量観測局 (R-10)





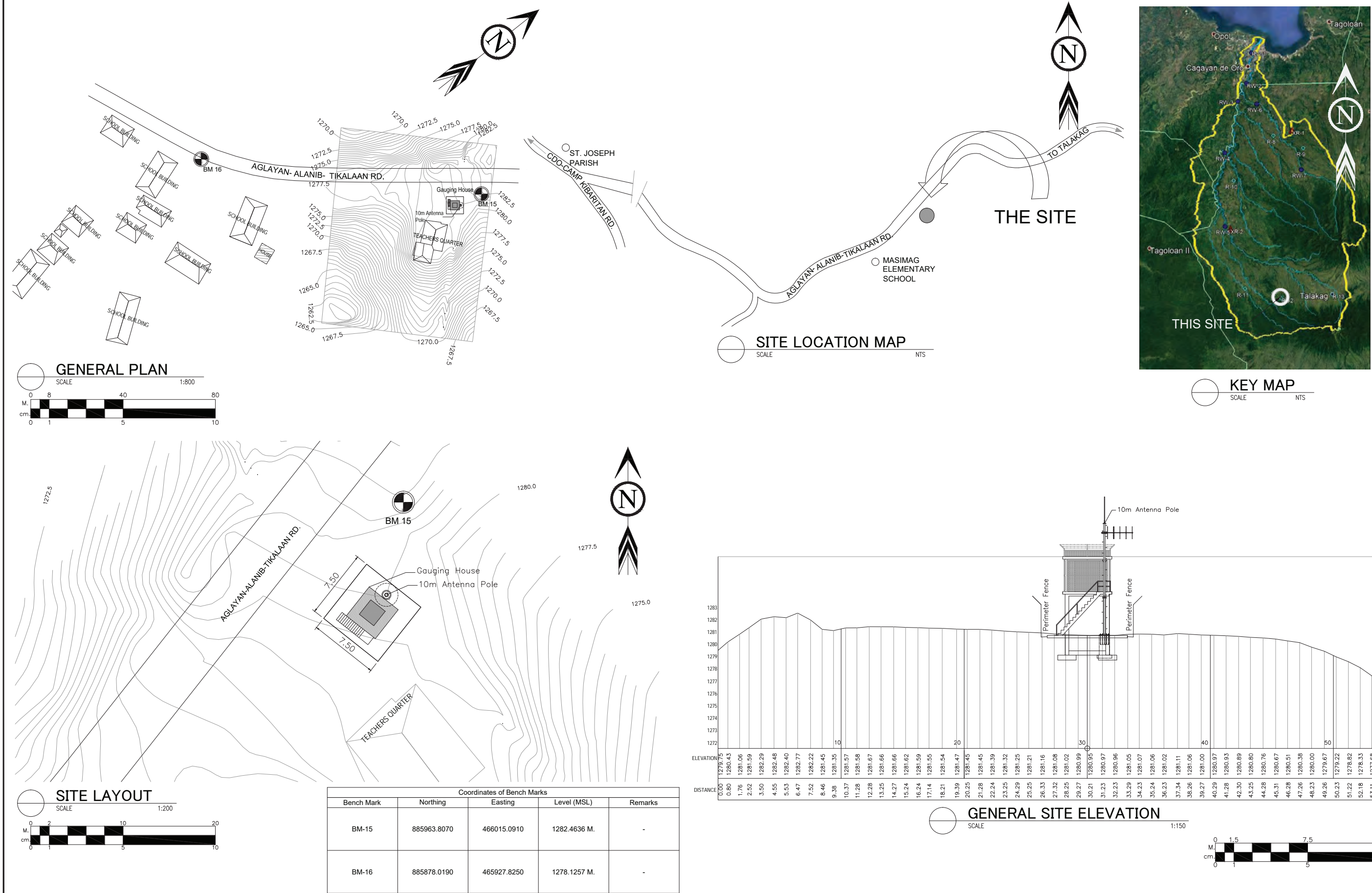
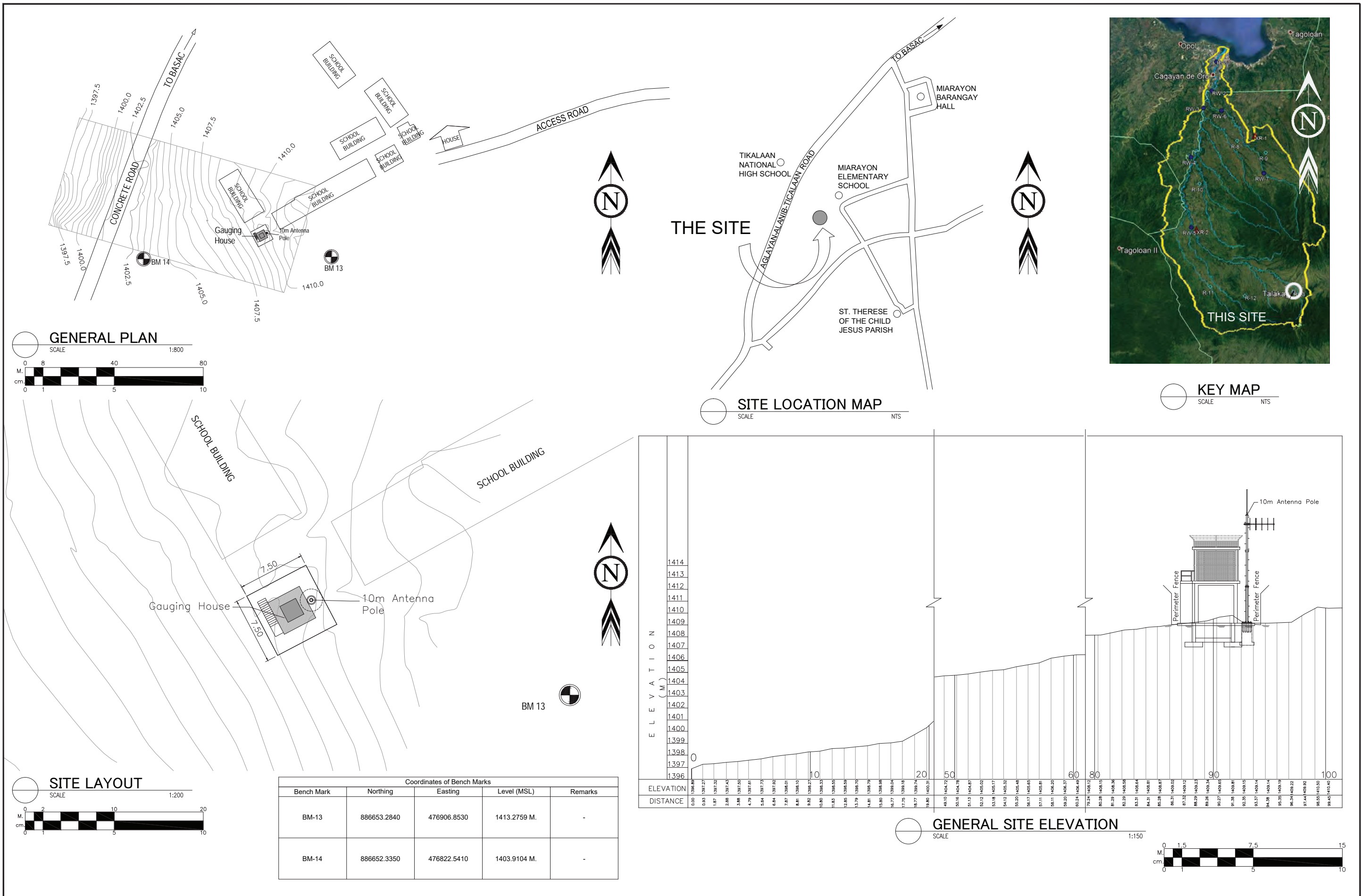
			PROJECT NAME AND LOCATION:	<div><div></div><div>PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION</div></div>	<div><div></div><div>NIPPON KOEI CO., LTD. TOKYO, JAPAN</div></div>	SHEET CONTENTS :	DATE :	-		
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN	RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	R-11 TIKALAAAN NATIONAL HIGH SCHOOL GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION	SCALE :	-
MARK	DETAILS	DATE		Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	CIVIL ENGINEER	YASUSHI AZUMA JICA Study Team Leader		UNIT :	-
REVISIONS				DATE:	DATE:	DATE:	DATE:		DRAWING NO :	CVL-SK-1

図12 雨量観測局 (R-11)



			PROJECT NAME AND LOCATION:		PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION		NIPPON KOEI CO., LTD. TOKYO, JAPAN		SHEET CONTENTS :		DATE :	-
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN		RECOMMENDED BY: Office-in-Charge Mindanao PRSD		APPROVED BY: VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA		DESIGNED BY: CIVIL ENGINEER		CHECKED BY: YASUSHI AZUMA JICA Study Team Leader	
MARK			DETAILS		DATE				R-12 MASIMAG ELEMENTARY SCHOOL GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION		SCALE :	-
REVISIONS											UNIT :	-
											DRAWING NO :	CVL-SL-1

図13 雨量観測局 (R-12)





			PROJECT NAME AND LOCATION:	 PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION	 NIPPON KOEI CO., LTD. TOKYO, JAPAN	SHEET CONTENTS :	DATE :	-		
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN	RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	R-13 MIARAYON ELEMENTARY SCHOOL GENERAL PLAN, SITE LOCATION MAP, KEY MAP SITE LAYOUT & GENERAL SITE ELEVATION	SCALE :	-
MARK	DETAILS	DATE		Office in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	CIVIL ENGINEER	YASUSHI AZUMA JICA Study Team Leader		UNIT :	-
REVISIONS				DATE:	DATE:	DATE:	DATE:		DRAWING NO :	CVL-SM-1

图14 雨量観測局 (R-13)

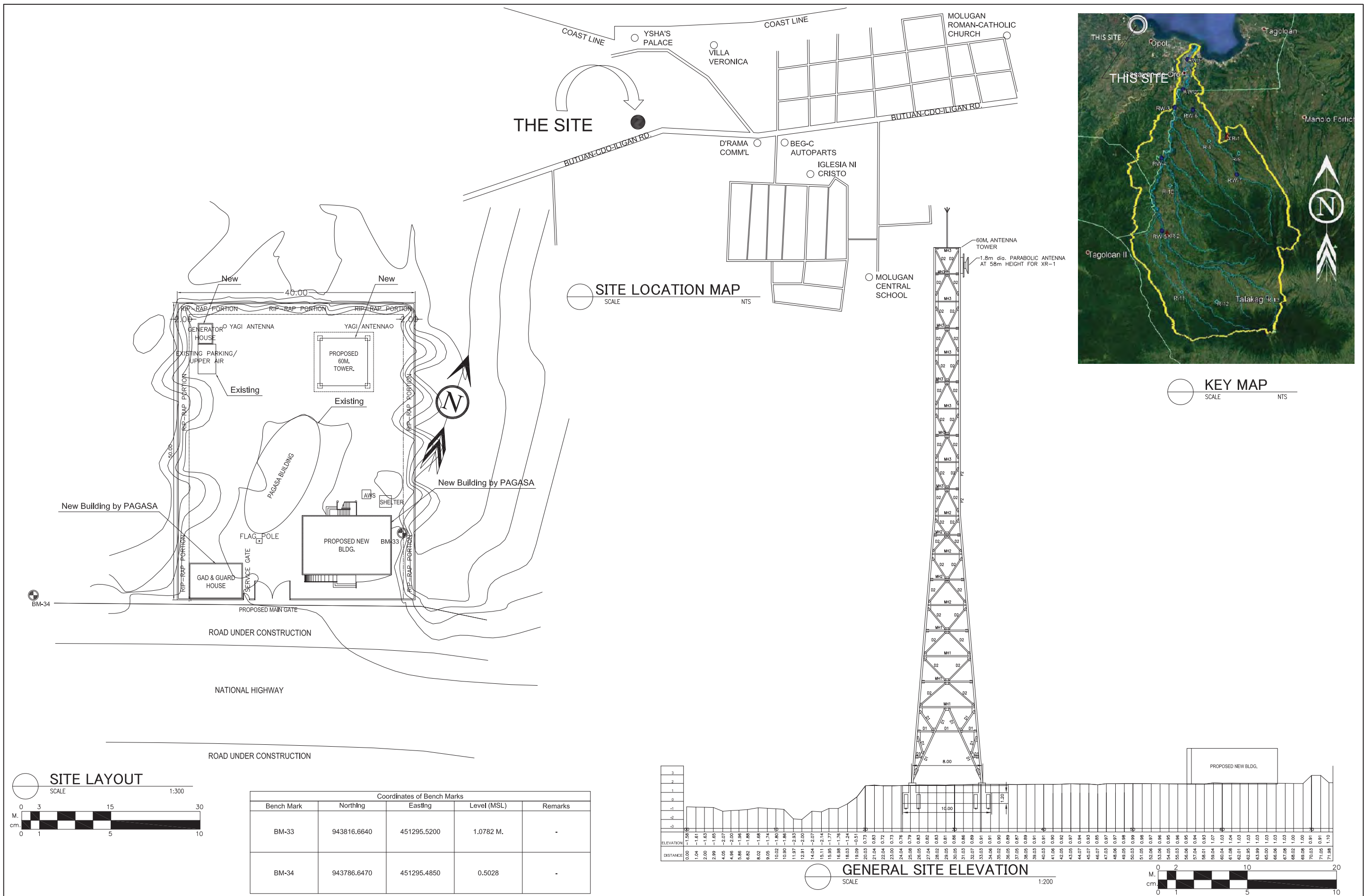
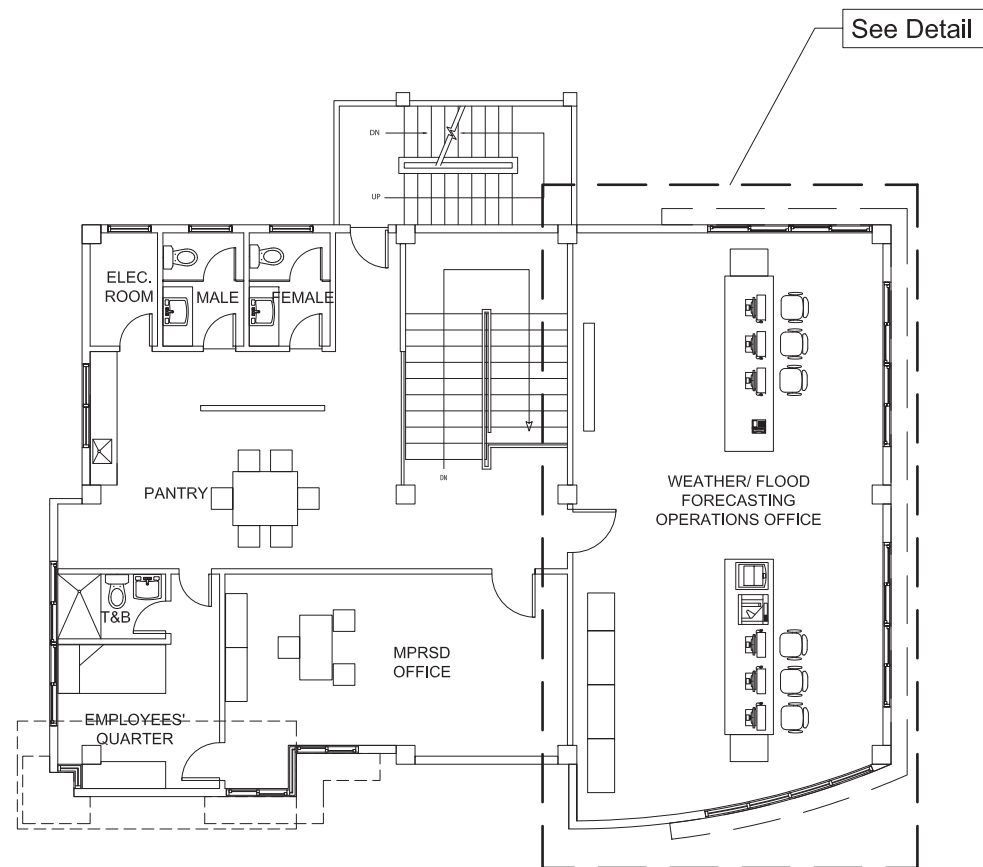
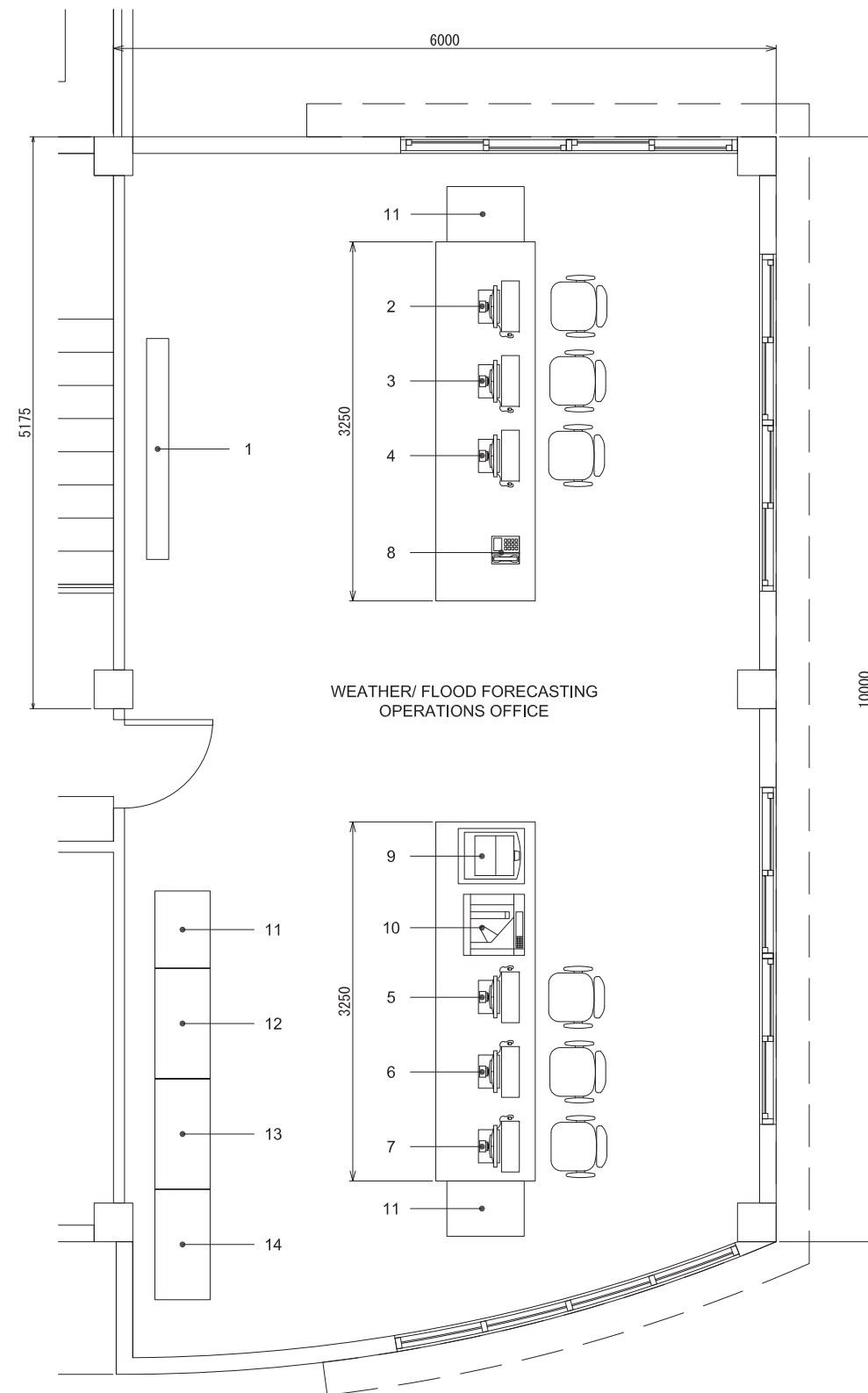
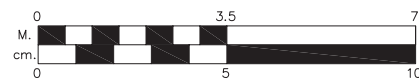


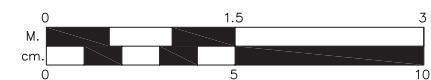
図17 中央監視局 (MS)



SECOND FLOOR PLAN
SCALE 1:70



EQUIPMENT LAYOUT
SCALE 1:30



LEGEND:

- 1 Display (50 in. Monitor x4)
- 2 FFWS Display Terminal
- 3 X-Band Radar Terminal
- 4 Operating Console
- 5 Network Monitor Terminal
- 6 Data Logger Memory Card Reader
- 7 File Converter
- 8 VoIP TEL
- 9 Network Printer
- 10 FAX / TEL
- 11 AC UPS
- 12 Server Rack
- 13 Telemetry Controller
- 14 7.5GHz IP Radio



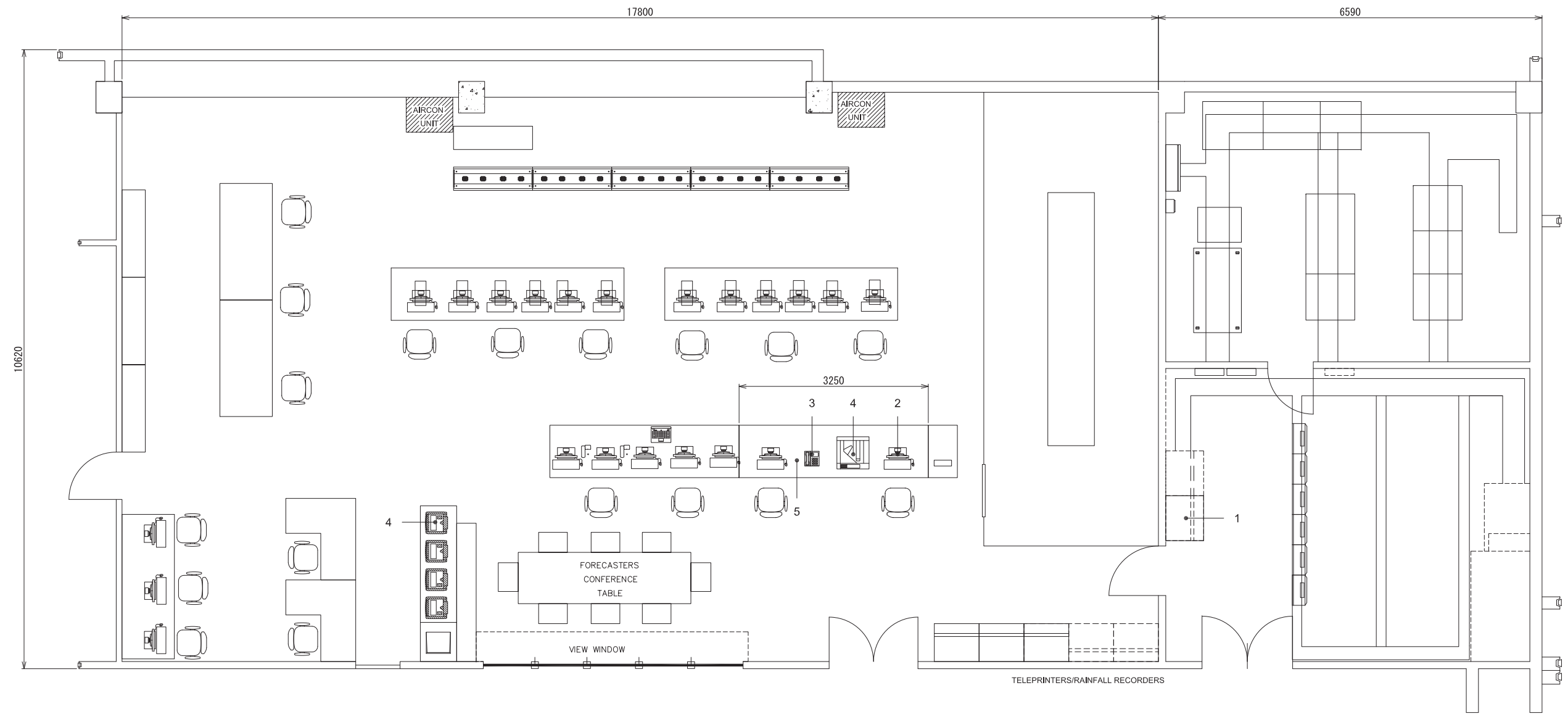
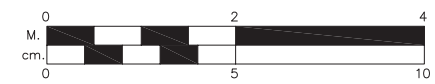
			PROJECT NAME AND LOCATION:		 PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION	 NIPPON KOEI CO., LTD. TOKYO, JAPAN	SHEET CONTENTS :		DATE :	-		
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN				CDO-RFFWC EQUIPMENT LAYOUT		SCALE :	-		
MARK	DETAILS	DATE			RECOMMENDED BY:	APPROVED BY:			DESIGNED BY:	CHECKED BY:	UNIT :	-
		REVISIONS			-- Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA			-- CIVIL ENGINEER	-- PROJECT MANAGER	DRAWING NO :	-
					DATE:	DATE:	DATE:	DATE:				

図18 中央監視局（MS）機器レイアウト



EQUIPMENT LAYOUT
SCALE 1 : 40



LEGEND:

- 1 RAW Data Processing Server
- 2 X-Band Radar Terminal
- 3 VoIP TEL
- 4 FAX / TEL
- 5 AC UPS (Under Table)



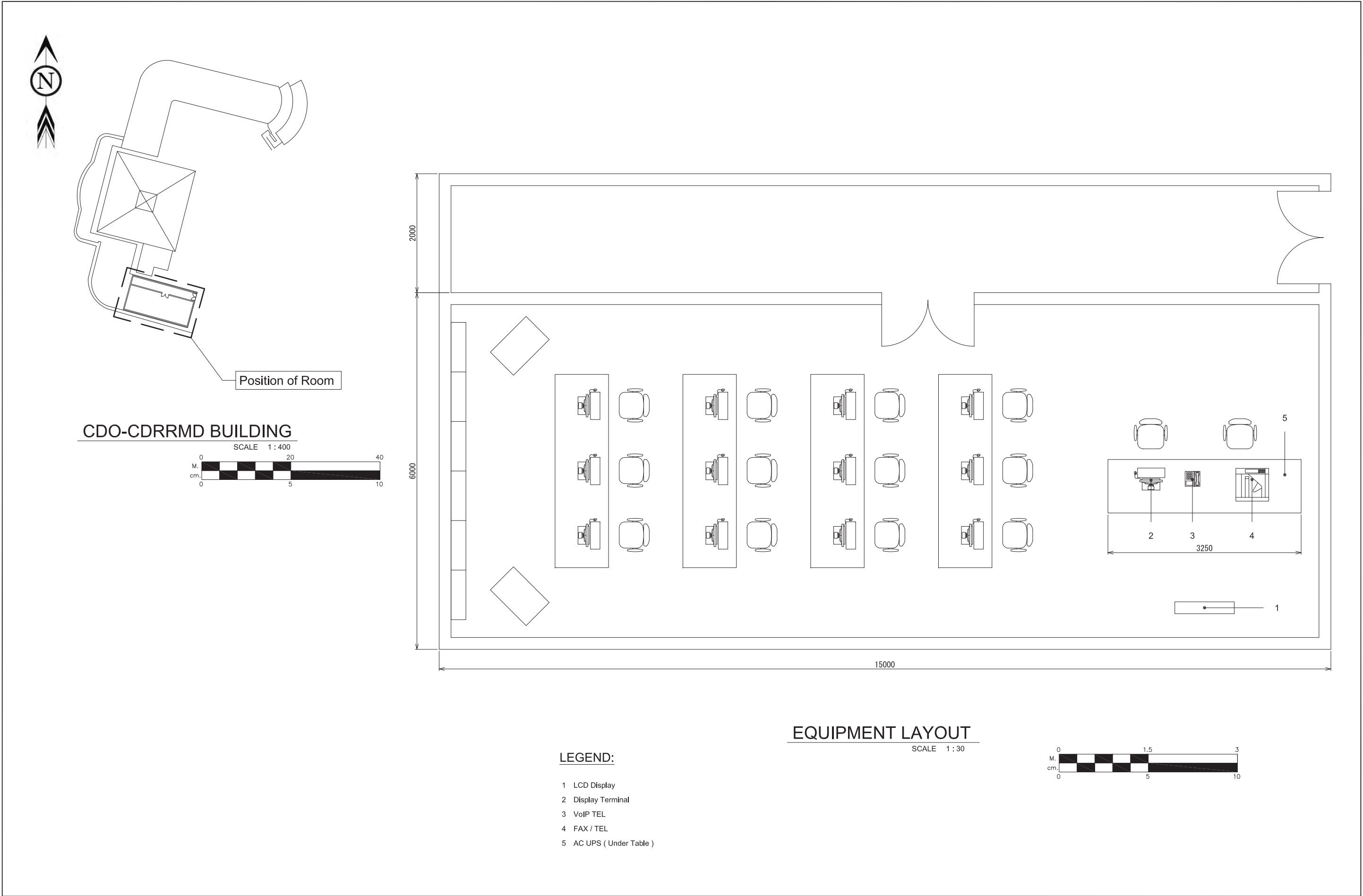
			PROJECT NAME AND LOCATION:	<div><div></div><div>PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION</div></div>	<div><div></div><div>NIPPON KOEI CO., LTD. TOKYO, JAPAN</div></div>	SHEET CONTENTS :		DATE :	-	
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN	RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	PAGASA HMD EQUIPMENT LAYOUT	SCALE :	-
				Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	CIVIL ENGINEER	PROJECT MANAGER		UNIT :	-
MARK	DETAILS	DATE		DATE:	DATE:	DATE:	DATE:		DRAWING NO :	-
REVISIONS										

図19 モニター局（PAGASA HMD）機器レイアウト





			PROJECT NAME AND LOCATION:		 PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION	 NIPPON KOEI CO., LTD. TOKYO, JAPAN	SHEET CONTENTS :		DATE :	-
			PREPARATORY SURVEY FOR THE PROJECT FOR IMPROVEMENT OF FLOOD FORECASTING AND WARNING SYSTEM (FFWS) FOR CAGAYAN DE ORO RIVER BASIN				CDO-CDRRMD EQUIPMENT LAYOUT		SCALE :	-
MARK	DETAILS	DATE			RECOMMENDED BY:	APPROVED BY:	DESIGNED BY:	CHECKED BY:	UNIT :	-
					Office-in-Charge Mindanao PRSD	VICENTE B. MALANO, Ph.D., MNSA Administrator PAGASA	CIVIL ENGINEER	PROJECT MANAGER	DRAWING NO :	-
REVISIONS					DATE:	DATE:	DATE:	DATE:		

図20 モニター局（CDO-CDRRMD）機器レイアウト