

ANNEX 5: Monitoring Sheet

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PROJECT MONITORING SHEET

Project Title : Development of a Comprehensive Disaster Resilience System and
Collaboration Platform in Myanmar

Version of the Sheet: Ver.1 (Term: April, 2015 - April, 2020)

Name: Kimiro Meguro

Title: Chief Advisor

Submission Date: 30 April 2016

I. Summary

1 Progress

1-1 Progress of Inputs : **As planned.**

1-2 Progress of Activities : **As planned**

1-3 Achievement of Output : **As planned**

1-4 Achievement of the Project Purpose : **As planned**

1-5 Changes of Risks and Actions for Mitigation : **No major change.**

1-6 Progress of Actions undertaken by JICA : **As planned**

1-7 Progress of Actions undertaken by Yangon Technological University: **As planned**

1-8 Progress of Environmental and Social Considerations (if applicable) : **None**

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable) : **None**

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.) : **No major issue**

2 Delay of Work Schedule and/or Problems (if any)

2-1 Detail : **The purchase of some equipment has been delayed**

2-2 Cause : **Exporting process took unexpectedly long time**

2-3 Action to be taken : **will try to process as quickly as possible**

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of●●,etc.) : **Group leaders from Japan side**

3 Modification of the Project Implementation Plan

3-1 PO : **No major change**

3-2 Other modifications on detailed implementation plan : **No major change**

(Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HDQs. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

4 Preparation of Yangon Technological University toward after completion of the Project : We have started to discuss with various stakeholders in the government and NPOs regarding the social implementation of the research outcome and will continue to do so.

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar **Period of Project:** 5 years **Version 1**

Target Group: Direct: 13 faculty members of Yangon Technological University (YTU), Indirect: Ministries in charge of disaster management and, **Dated 18, September, 2015**

local governments, major infrastructure and residents in target area **Project Site:** Republic of the Union of Myanmar (Bago River Basin and Yangon)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal YTU further develops the scenario analysis systems by its Research Centre for Urban Safety	At least 1 suggestion based on the result of the updated scenario analysis is submitted to relevant governmental departments mainly by YTU's Research Centre for Urban Safety	<ol style="list-style-type: none"> 1 Updated and improved database 2 Documents submitted 	Budget and personnel of YTU is maintained		
Project Purpose YTU understands in use of scenario analysis systems to assess Myanmar's future disaster vulnerability	<ol style="list-style-type: none"> 1 At least 20 research papers related to the project, which are submitted by mainly YTU during the project period, are accepted by international journals 2 Suggestions based on the result of the scenario analysis are submitted to relevant governmental departments 	<ol style="list-style-type: none"> 1 Papers submitted to journal papers 2 Suggestion documents submitted 			
Outputs 1 Development of physics model to evaluate disaster vulnerability	1-1 Recent flood events simulated by the developed hydrological and hydraulic model	1-1 Database: hydro-climate, water, and river environment			

PM Form 3-2 PDM (Monitoring Sheet II)

Annex 1

<p>2 Development of scenario analysis system for assessing future disaster vulnerability</p> <p>3 Support to establish Research Centre for Urban Safety in YTU to sustain and enhance research activities and human resource development</p> <p>4 Development of integrated disaster response system including infrastructure maintenance management with adequate technologies</p>	<p>1-2 Building damage grade estimated at certain earthquake</p> <p>1-3 Daily people movement simulated by the model</p> <p>2-1 Assessment of water-related disaster vulnerability</p> <p>2-2 Assessment of earthquake vulnerability</p> <p>3-1 Establishment of Research Centre for Urban Safety in YTU</p> <p>3-2 Educational program to foster specialists</p> <p>3-3 Establishment of consortium among government, academia, and industry</p> <p>4-1 Tutorial for integrated disaster response system</p> <p>4-2 Guideline proposed on improved infrastructure management and maintenance system</p>	<p>1-2 Database: infrastructures, buildings, and topographical information</p> <p>1-3 Database: traffic and crowd flow</p> <p>2-1 Flood inundation map</p> <p>2-2 Earthquake vulnerability map</p> <p>3-1 Approval document</p> <p>3-2 Data / record kept in relevant organizations</p> <p>3-3 Articles of incorporation</p> <p>4-1 Contents of the tutorial</p> <p>4-2 Proposal documents</p>	<p>Data gathering conditions in Yangon related to building vulnerability was understood based on field surveys and interviews to YCDC and experts: structural types, construction year. The dataset of building height in Yangon City was obtained by spatial analysis based on satellite imagery. Regional differences, which will be significant factor to assess earthquake vulnerability, is investigated by field surveys and Google Earth observation.</p>
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Activities	Inputs	Pre-Conditions
<p>(1-1) Develop hydrological and flood inundation model of study area (1-1-1) Gather information and data in river, hydro-climate and water resource management and build integrated database (1-1-2) Build hydrological and flood inundation model in the target river basin for flood vulnerability assessment</p> <p>(1-2) Build earthquake vulnerability evaluation method and earthquake vulnerability map of study area (1-2-1) Collect land use, population, buildings, infrastructures, and topographical information in study area (1-2-2) Investigate damage by past earthquakes in Myanmar</p> <p>(1-3) Develop study area's urban development model (1-3-1) Analyse collected geo-spatial data and develop urban expansion simulation by cellular automaton model (1-3-2) Collect and accumulate aggregated mobile phone base station usage data and probe vehicle GPS data (1-3-3) Project traffic and people movement with people activity model</p> <p>(2-1) Assess characteristics of water-related disaster vulnerability</p>	<p>The Japanese Side as written in the R/D</p> <p>The Myanmar Side as written in the R/D</p>	<p>→</p> <p><Issues and countermeasures> (1-2-1) We found that there is no comprehensive or suitable statistic data for building vulnerability. Then elaborate field surveys to understand building characteristics in some districts such as CBD are necessary. Also we recognized some gaps between Myanmar and Japanese side to proceed the project, so we will open a lecture-series including workshops to understand the building characteristics in Yangon and to share research procedures</p>
<p>(2-1-1) Conduct climate change analysis in local scale (2-1-2) Investigate land use change in the target river basin (2-1-3) Assess river runoff and vulnerability to water-related disasters based on scenarios with climate change and urban development</p> <p>(2-2) Assess characteristics of earthquake disaster vulnerability (2-2-1) Examine possible scenario patterns with proper input and algorithm (2-2-2) Assess vulnerability to earthquake based on scenarios</p> <p>(3-1) Support establishment of Research Centre for Urban Safety in YTU</p> <p>(3-2) Develop educational program to foster experts (3-2-1) Observe current education program at YTU and MTU and examine a trial of YTU's educational program (3-2-2) Introduce YTU's education program</p> <p>(3-3) Establish consortium among government, academia, and industry (3-3-1) Coordinate functions with MES (3-3-2) Identify expected role of consortium</p>		

<p>(4-1) Develop disaster response system (4-1-1) Analyse disaster management plan of central government and investigate needs on the system (4-1-2) Analyse disaster management plan of local government and investigate citizens' needs on disaster information</p> <p>(4-2) Propose improved infrastructure management and maintenance system, and technology for Myanmar (4-2-1) Review management and maintenance system, and technology of Infrastructures, especially road and bridges, in Myanmar (4-2-2) Propose improved management and maintenance system (4-2-3) Apply and propose inspection and monitoring method for infrastructures and buildings with adequate retrofit technology for damaged infrastructure (4-2-4) Disseminate technology information</p>			
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Output 4.2: Propose improved infrastructure management and maintenance system, and technology for Myanmar		Plan	Actual
4-2-1	Review management and maintenance system, and technology of infrastructures, especially road and bridges, in Myanmar		
4-2-2	Propose improved management and maintenance system		
4-2-3	Apply and propose inspection and monitoring method for infrastructures and buildings with adequate retrofit technology for		
4-2-4	Disseminate technology information		

Duration / Phasing	Year	2016				2017				2018				2019				Remarks	Issue	Solution
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV			
Monitoring Plan																				
Monitoring																				
Joint Coordination Committee	Plan																			
	Actual																			
Set-up the Detailed Plan of Operation	Plan																			
	Actual																			
Submission of Monitoring Sheet	Plan																			
	Actual																			
Monitoring Mission from Japan	Plan																			
	Actual																			
Joint Monitoring	Plan																			
	Actual																			
Post Monitoring	Plan																			
	Actual																			
Reports/Documents																				
	Plan																			
	Actual																			
Project Completion Report																				
	Plan																			
	Actual																			
Public Relations																				
	Plan																			
	Actual																			
	Actual																			

PROJECT MONITORING SHEET

Project Title : Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar

Version of the Sheet: Ver.1 (Term: April, 2016- September, 2016)

Name: Kimiro Meguro

Title: Chief Advisor

Submission Date: 19 Oct. 2016

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Input by Japanese side

(a) Dispatch of experts

The Japanese side has dispatched project researchers consisting of 6 sub-groups.

Details are as shown in Table 1.

Table 1: List of dispatched researchers

Period	Group name	No.*1	Place of Visit	Purpose(main)
31 Mar. – 8 Apr.	Building/DM	10	Yangon	Workshop, meeting
6 Apr. – 8 Apr.	Infrastructure	1	Yangon	Bridge survey, meeting
1 May – 4 May	Transport&Mobility	4	Yangon	Bus location survey, meeting
15 May – 24 May	Building	4	Yangon	Workshop, meeting
18 May – 21 May	Infrastructure	2	Yangon, Mandalay	Bridge survey, meeting
21 May – 25 May	Water	3	Yangon	Meeting, Conference
29 Jun. – 7 July	Building	3	Yangon	Meeting
7 July – 11 July	Water	2	Yangon, Bago	River survey, meeting
6 July – 8 July	Infrastructure	1	Yangon, Nay Pyi Taw	Meeting
12 July – 14 July	GIS	1	Yangon	Lecture, meeting
15 July – 18 July	Building	2	Yangon	Building Survey
26 July – 29 July	Building	3	Yangon	Workshop
1 Aug. – 5 Aug.	Transport&Mobility	2	Yangon	Bus location survey, meeting
15 Aug. – 18 Aug.	Disaster Management	1	Yangon	Interview
18 Aug. – 23 Aug.	Water	5	Yangon, Bago	River survey, meeting
21 Aug. – 23 Aug.	Infrastructure	2	Yangon, Patheingyi	Bridge survey, meeting
4 Sep. – 15 Sep.	Transport&Mobility	2	Yangon, Nay Pyi Taw	Bus location survey, JCC

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7 Sep. – 11 Sep.	Building	3	Yangon	Meeting, Building survey
11 Sep. – 18 Sep.	All groups	10	Yangon, Nay Pyi Taw	JCC, meeting
21 Sep.- 25 Sep.	Water	1	Yangon, Bago	River survey, meeting
28 Sep. - 30 Sep.	Transport&Mobility	1	Yangon	Bus location survey

*1: Project members only

(b) Training Course in Japan

Training course “Establishment of database for Disaster Management Platform” was conducted in Japan from 1st June to 21st June 2016. Trainees are as shown in Table 2-A. Feedback workshop was held at YTU in 28th June 2016 after completion of training course.

Table 2-A: List of trainees

	Name	Title	Department
1	Zin Naung Htun	Associate Professor	Department of Civil Engineering
2	Sao Hone Pha	Associate Professor	Department of Electronic Engineering
3	Pwint	Associate Professor	Department of Architecture
4	Kyaw Zin Lat	Lecturer	Department of Engineering Geology

Transport and Mobility Group invited 4 members of YTU to Tokyo from 9th May to 29th May 2016 mainly for programming training and observing transport system/situation in Japan. Invited members are as shown in Table 2-B.

Table 2-B: List of invitees

	Name	Title	Department
1	Daw Kyaing	Lecturer	Department of Civil Engineering
2	Aye Hnin Hnin Naing	PhD Student	''
3	Moe Myint Moe	Master Student	''
4	Thein Aye Zin	Master Student	''

(c) Provision of equipment

The Japanese side has provided equipment for project office and research activities as shown in Table 2. The total costs of equipment are approximately 305,000 US\$.

Table 3: List of equipment for provision

No.	Items	Unit	Unit Price	Sub total
1	Database system (computer, web server, etc)	1	1,198,400JPY	1,198,400JPY
2	3D Scanner	1	44,500US\$	44,500US\$
3	Printer	1	2,985US\$	2,985US\$

4	Portable Dynamic Measurement Strain System	3	533,600JPY	1,600,800JPY
5	Reinforcement bar-detecting machine	1	1,852,000JPY	1,852,000JPY
6	Electric resistance meter for concrete	1	1,130,000JPY	1,130,000JPY
7	Ultrasonic tester	1	1,720,000JPY	1,720,000JPY
8	Schmidt hammer	5	108,000JPY	540,000JPY
9	Infrared thermal camera	1	2,122,200JPY	2,122,200JPY
10	iPhone	5	535,000MMK	2,675,000MMK
11	IRI calculation	1	239,760JPY	239,760JPY
12	Micro-tremor meter	1	3,402,000JPY	3,402,000JPY
13	Hydro/meteorological sensors	9	10,984,212JPY	10,984,212JPY
14	Desktop PC (with UPS & 2TB HD)	20	1,128US\$	22,560US\$
15	Microsoft Office	20	Included in No.14	Included in No.14
16	Antivirus Software	16	4US\$	64US\$
17	Video camera	1	445US\$	445US\$
18	Projector	1	599US\$	599US\$

(d) Local cost for the activity of Japanese experts

The Project has spent local cost for the activity of Japanese experts such as airfare, travel allowance, vehicle, and so on.

(2) Input by Myanmar side

(a) Assignment of project members

The Myanmar side has assigned project leaders and members for 6 sub-groups as shown in Annex "List of project members". Project Coordinator is also assigned as for additional duty.

(b) Project space with necessary equipment

YTU has provided project office including Mini Lecture Room facilities and Researchers' office attached with infrastructure, facilities for RS/GIS Laboratory and research center with basic furniture such as table, chair and steel locker. Internet environment for those offices was set up by the end of September 2016.

(c) Running expenses for Project space

YTU has covered cost for utility such as electricity and water for Project space.

(d) Expenses for received equipment within Myanmar

YTU has spent a cost for received equipment within Myanmar such as transportation cost from Yangon Airport to YTU, storage fee at custom office and agent fee for custom clearance.

(e) Coordination with DTPC on the arrangement for obtaining permission from concerned authorities in installing received equipment

YTU has coordinated with DTPC for obtaining permission for receiving equipment such as import license, tax exemption letter and special order.

(f) Coordinate with DTPC on travel permit for Japanese Experts

YTU has coordinated with DTPC for obtaining multiple re-entries VISA for Japanese experts.

1-2 Progress of activities

1-2-1 Activities for overall project planning and management

The Project has been carrying out activities based on PDM and Plan of Operation revised on September 2015. Summary of activities from October 2015 to September 2016 and planned activities for next 1 year was reported and approved by JCC Committee members during 2nd JCC meeting on 13th September 2016.

1-2-2 Activities for Output 1

- Water related-disaster group gathered information and data in Bago river, and is developing hydrological and hydraulic model. This group clarified the tidal influenced in the Bago river basin and found that a micro-tidal estuary is 6 meters in spring tide, and 2 meters in neap tide. Next, full measurements in the confluence of Bago-Yangon rivers were conducted at two times including video monitoring and water level measurement. In addition, typhoon Komen was simulated in WRF model. Field trip was conducted on 20th to 22nd, Aug.2016, to investigate and interview with local people about the flooding due to the tidal effect of Sittaung river to the drainage system in the Bago river basin. Trouble-shooting of the weather station sever was also performed in networking problem at Zaungtu Weir site.
- LULC map from 1970s to 2010s, DTM and DBM map are completed in Geospatial technology group. In addition, urban expansion prediction was performed in Yangon city with several time series
- Infrastructure management group has been collecting information of the locations of bridges at Yangon city and has been monitoring and analyzing bridge condition in Yangon (Twan Tay Bridge & Tha Khyut Bridge with installed inclinometer to propose cost-effective and simple monitoring method to MOC.
- Earthquake-related disaster group has been collecting information of buildings (structure, location, height etc) in Yangon city. To collect the information of buildings, field survey and visit to company have been conducted.
- Transportation and mobility group has been collecting mobile phone CDR data from MPT to develop real-time people flow system. In addition, this group has been developing bus location system. Monitoring system has been completed, already.

1-2-3 Activities for Output 2

- Water related disaster group has been producing flood inundation map by numerical modeling and remote sensing.
- Earthquake-related disaster group created a preliminary version of earthquake vulnerability map. In addition, this group developed fragility functions based on push over analysis.

1-2-4 Activities for Output 3

- The building for the research centre for urban safety has been constructed.
- Geo-spatial technology group has created educational program.
- The Project is preparing to hold the first meeting for consortium establishment.

1-2-5 Activities for Output 4

- Disaster management group has been investigating a disaster response system in Myanmar. This group held a kick-off meeting on April 2016, and had a discussion with government ministries that might be related to disaster management.

1-3 Achievement of Output

It remains to be seen at later stage of the project.

1-4 Achievement of Project Purpose**1-4-1 Papers submitted to international journal**

6 sub-groups are planning to submit papers 3-5 each to international journals by the end of the Project. Following papers were submitted / announced in journals/conferences.

Table 4: List of Published/announced papers

Title	Author	Group	Name of journal/conference	Date
Modeling urban expansion in Yangon, Myanmar using Landsat time series and stereo Geoeye images] Tanakorn Sritarapipat, Wataru Takeuchi	GIS	International Symposium on Remote Sensing (ISRS): Jeju, Korea	Apr. 2016
			Earth Environ. Sci. 37 012056 doi:10.1088/1755-1315/37/1/012056.	2016
Field Survey for Regional Seismic Vulnerability Assessment in Yangon, Myanmar,	Murao, O	Building	Proceeding of the 2016 Annual Meeting of Architectural Institute of Japan, 1117-1118, Fukuoka, Japan,	Aug.2016

1-4-2 Research theme for project members

List of research theme is as shown in Table 5.

Table 5: List of research theme

Name/Group	Dept. / University	Academic Year	Theme
Seemanta Sharma	Civil Eng.	D2 student	Development of river basin hydrological model with

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Bhagabati	UTOKYO		DIAS and workbench
Genki Kawamura	Civil Eng. UTOKYO	M2 student	Data collection for “Water and Watershed Management” and system conceptual design
Masahiro Kanbara	Civil Eng. UTOKYO	M2 student	Data collection for “Water and Watershed Management” and system conceptual design
Naruhiko Shirai	System Design & Management KEIO Univ.	M2 student	Requirements analysis for centralized disaster response system and development and evaluation of “verification and validation method”
Shin Yonehara	Civil Eng. UTOKYO	M1 student	Data collection for “Water and Watershed Management” and system conceptual design
Shouta Seto	Civil Eng. UTOKYO	M1 student	Data collection for “Water and Watershed Management” and system conceptual design
Takuma Usuda	Architecture UTOKYO	M2 student	Estimation of Building stories in Yangon based on Digital Boundary Module (DBM)
Toshiki Sasaki	Civil Eng. UTOKYO	M2 student	Investigation of infrastructure management system
Ryousuke Takahashi	Civil Eng. UTOKYO	M1 student	Investigation of infrastructure management system
Tanakorn Sri Tarapiapat	RS/GIS UTOKYO	PhD Candidate	Modeling urban expansion with regard to disaster vulnerability in Yangon, Myanmar
Nuntikorn Kitratporn	RG/GIS UTOKYO	M1 student	Structure-from-Motion (SfM) 3D Point Cloud for Bridge Inclination Assessment
Water-related Disaster	YTU	-	Development of Flood Inundation Map for Bago River
			Flood Risk Assessment for Bago River Basin
			Flood Simulation using WEB-DMH model for Bago River
			Flood Simulation using IFAS Model for Bago River
			Study on Tide Effect of Bago River
Earthquake-related Disaster <Land use and urban Planning>	YTU	-	A New Methodology for Monitoring Urban Growth to Direct a Safer Future Development of Yangon City
			Proposal Zoning Plan for Yangon and its Environs
			Urban Redevelopment Planning of Mingalartaung Nyunt Township Yangon

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Earthquake-related Disaster <Build Environment>	YTU	-	Redevelopment of Botathaung Pagoda Environs
			Development multifamily Residence on Post Independent period in Yangon
			Urban Redevelopment of Kyauktada Township Yangon
			Urban Renewal of Pabedan Township Yangon
			Design Guideline for Heritage Responsive Buildings in Kyauktada Township Yangon
Earthquake-related Disaster <Heritage>	YTU	-	Property Management Plan of Yangon Heritage Conservation
			Architecture of Colonial Office Buildings in Downtown Yangon
			Analysis of Colonial Public Building Facades in Downtown Yangon
Infrastructure management	YTU	-	Maintenance Strategy for Bayinnaung Bridge
			Monitoring the Inclination and Settlement of Tower and Piers of Twan Tay Bridge
			Monitoring the Inclination and Settlement of Tower and Piers of Tha Kyut Bridge
Transport and Mobility	YTU	-	Development of Bus Location System for Smooth Operation in Yangon
			Effect of Flyover Construction (Thamwe) on Traffic Flow to the near Road Network by using CDR Data
Geospatial Technology	YTU	-	Effect on Ground Control Points in Terms of Distribution and Location on Geometric Correction of CORONA Satellite Image
			Estimation of land use change and building heights from 1966 to 2015 in Yangon by CORONA LandSAT and Geo-eye images
Disaster Management	YTU	-	Review on Regional level Disaster Management System and its Issues in Yangon Region
Geotechnical	YTU	-	Development of Liquefaction Potential Map for selected areas in Yangon
			Liquefaction Potential Map based on Probabilistic Approach in selected areas in Yangon
			Ground information for Infrastructure Development

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			and Earthquake in certain areas
			Micro-tremor Measurements used to Map Thickness of Soft Sediments in certain areas
Takuma USUDA	Architecture UTokyo	M2	Estimation of Building stories in Yangon based on Digital Boundary Module (DBM)

1-5 Changes of Risks and Actions for Mitigation

None

1-6 Progress of Actions undertaken by JICA

No special action undertaken by JICA

1-7 Progress of Actions undertaken by Yangon Technological University

No Special action undertaken by YTU

1-8 Progress of Environmental and Social Considerations (if applicable)

None

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

None

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

No major issue

2. Delay of Work Schedule and/or Problems (if any)

2-1 Detail

Purchase/receiving of some equipment has been delayed.

2-2 Cause

It takes much time to obtain permission for receiving equipment by YTU due to complicated procedure of concerned authorities in Myanmar.

2-3 Action to be taken

Necessary document for procedure of import should be submitted to YTU at least one and half months prior to arrival date in Myanmar.

2-4 Roles of Responsible Persons/Organizations

YTU, Group leaders from Japan side

3. Modification of the project Implementation Plan

3-1 PO

None

3-2 Other modifications on detailed implementation plan

None

4. Preparation of YTU toward after completion of the Project

- The Project has started to discuss with various stakeholders in the government and NPOs regarding the social implementation of the research outcome and will continue to do so.
- YTU will organize a committee for proper usage and maintenance of the equipment.

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Annex 1

Project Title: Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar

Period of Project: 5 years

Version 1

Target Group: Direct: 13 faculty members of Yangon Technological University (YTU), Indirect: Ministries in charge of disaster management and,

Dated 19 October, 2016

local governments, major infrastructure and residents in target area

Project Site: Republic of the Union of Myanmar (Bago River Basin and Yangon)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal YTU further develops the scenario analysis systems by its Research Centre for Urban Safety	At least 1 suggestion based on the result of the updated scenario analysis is submitted to relevant governmental departments mainly by YTU's Research Centre for Urban Safety	1 Updated and improved database 2 Documents submitted	Budget and personnel of YTU is maintained	We have been preparing database server.	
Project Purpose YTU understands in use of scenario analysis systems to assess Myanmar's future disaster vulnerability	1 At least 20 research papers related to the project, which are submitted by mainly YTU during the project period, are accepted by international journals 2 Suggestions based on the result of the scenario analysis are submitted to relevant governmental departments	1 Papers submitted to journal papers 2 Suggestion documents submitted		One journal paper regarding LULC change in Yangon was submitted and under review.	
Outputs					
1 Development of physics model to evaluate disaster vulnerability	1-1 Recent flood events simulated by the developed hydrological and hydraulic model 1-2 Building damage grade estimated at certain earthquake 1-3 Daily people movement simulated by the model	1-1 Database: hydro-climate, water, and river environment 1-2 Database: infrastructures, buildings, and topographical information 1-3 Database: traffic and crowd flow		Water related-disaster group gathered information and data in Bago river, and is developing hydrological and hydraulic model. • LULC map from 1970s to 2010s, DTM and DBM map are completed in Geospatial technology group. • Infrastructure management group has been collecting information of the locations of bridges at Yangon city. • Earthquake-related disaster group has been collecting information of buildings (structure, location, height etc) in Yangon city. Transportation and mobility group has been collecting mobile phone CDR data from MPT to develop real-time people flow system. In addition, this group has been developing bus location system. Monitoring system has been completed, already.	
2 Development of scenario analysis system for assessing future disaster vulnerability	2-1 Assessment of water-related disaster vulnerability 2-2 Assessment of earthquake vulnerability	2-1 Flood inundation map 2-2 Earthquake vulnerability map		•Water related disaster group has been producing flood inundation map by numerical modeling and remote sensing. •Earthquake-related disaster group created a preliminary version of earthquake vulnerability map. In addition, this group developed fragility functions based on push over analysis.	
3 Support to establish Research Centre for Urban Safety in YTU to sustain and enhance research activities and human resource development	3-1 Establishment of Research Centre for Urban Safety in YTU 3-2 Educational program to foster specialists 3-3 Establishment of consortium among government, academia, and industry	3-1 Approval document 3-2 Data / record kept in relevant organizations 3-3 Articles of incorporation		The building for the research centre for urban safety has been constructed. Geo-spatial technology group has created educational program. We are preparing to hold the first meeting for consortium establishment.	
4 Development of integrated disaster response system including infrastructure maintenance management with adequate technologies	4-1 Tutorial for integrated disaster response system 4-2 Guideline proposed on improved infrastructure management and maintenance system	4-1 Contents of the tutorial 4-2 Proposal documents		Disaster management group has been investigating a disaster response system in Myanmar. Disaster management group has been investigating a disaster response system in Myanmar.	

Activities	Inputs		Pre-Conditions
	The Japanese Side	The Myanmar Side	
(1-1) Develop hydrological and flood inundation model of study area (1-1-1) Gather information and data in river, hydro-climate and water resource management and build integrated database (1-1-2) Build hydrological and flood inundation model in the target river basin for flood vulnerability assessment (1-2) Build earthquake vulnerability evaluation method and earthquake vulnerability map of study area (1-2-1) Collect land use, population, buildings, infrastructures, and topographical information in study area (1-2-2) Investigate damage by past earthquakes in Myanmar (1-3) Develop study area's urban development model (1-3-1) Analyse collected geo-spatial data and develop urban expansion simulation by cellular automaton model (1-3-2) Collect and accumulate aggregated mobile phone base station usage data and probe vehicle GPS data (1-3-3) Project traffic and people movement with people activity model (2-1) Assess characteristics of water-related disaster vulnerability (2-1-1) Conduct climate change analysis in local scale (2-1-2) Investigate land use change in the target river basin (2-1-3) Assess river runoff and vulnerability to water-related disasters based on scenarios with climate change and urban development (2-2) Assess characteristics of earthquake disaster vulnerability (2-2-1) Examine possible scenario patterns with proper input and algorithm (2-2-2) Assess vulnerability to earthquake based on scenarios (3-1) Support establishment of Research Centre for Urban Safety in YTU (3-2) Develop educational program to foster experts (3-2-1) Observe current education program at YTU and MTU and examine a trial of YTU's educational program (3-2-2) Introduce YTU's education program (3-3) Establish consortium among government, academia, and industry (3-3-1) Coordinate functions with MES (3-3-2) Identify expected role of consortium (4-1) Develop disaster response system (4-1-1) Analyse disaster management plan of central government and investigate needs on the system (4-1-2) Analyse disaster management plan of local government and investigate citizens' needs on disaster information (4-2) Propose improved infrastructure management and maintenance system, and technology for Myanmar (4-2-1) Review management and maintenance system, and technology of Infrastructures, especially road and bridges, in Myanmar (4-2-2) Propose improved management and maintenance system (4-2-3) Apply and propose inspection and monitoring method for infrastructures and buildings with adequate retrofit technology for damaged infrastructure (4-2-4) Disseminate technology information	1. Dispatch of Experts Water-related Disaster Earthquake-related Disaster Geospatial Technology Infrastructure Management Transport and Mobility Disaster Management Project Coordinator 2. Training in Japan 'Establishment of database for Disaster Management Platform' (1 June - 21 June 2016 for 4 project members) 3. Machinery and Equipment - Database system (1set) - 3D Scanner (1) - Printer with multi function (1) - Portable Dynamic Strain Measurement System (3) - Reinforcement-bar detection Machine (1) - Electric Resistance meter for Concrete (1) - Ultrasonic Tester (1) - Schmidt Hammer (5) - Infrared Thermal Camera (1) - iPhone (5) - IRI Calculation (1) - Micro-tremor Meter (1) - Hydro/Meteorological Sensors (9) - Desktop PC (20) - Microsoft Office (20) - Antivirus Software (16) - Projector (1) - Video Camera (1) 4. Local cost for the activity of Japanese experts	1. Assignment of Project members 2. Project space with necessary Equipment/Internet facilities - Project Office - Mini Lecture Room - Researchers' Office 3. Running expenses for Project space 4. Expenses necessary for transportation within Myanmar for received equipment 5. Coordinate with DTPC on the arrangement for obtaining permission from concerned authorities in installing received equipment 6. Coordinate with DTPC on travel permit for Japanese Expert for official travel	No major issue <Issues and countermeasures>

PROJECT MONITORING SHEET

Project Title : Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar

Version of the Sheet: Ver.1 (Term: October, 2016- March, 2017)

Name: Kimiro Meguro

Title: Chief Advisor

Submission Date: 05 July, 2017

I. Summary**1 Progress****1-1 Progress of Inputs****(1) Input by Japanese side****(a) Dispatch of experts**

The Japanese side has dispatched project researchers consisting of 6 sub-groups.

Details are as shown in Table 1.

Table 1: List of dispatched researchers

Period	Group name	No.*1	Place of Visit	Purpose(main)
4 Oct. – 8 Oct.	GIS	2	Yangon	Lecture, survey
17 Oct. – 24 Oct.	Building	1	Yangon	Meeting, interview
20 Oct. – 26 Oct.	Water	4	Yangon, Bago	Survey, Check equipment
10 Nov. – 11 Nov.	Water	1	Yangon	Meeting
25 Nov. – 28 Nov.	Building	2	Yangon	Workshop
25 Nov. – 16 Dec.	Building	1	Yangon	Workshop, conference
4 Dec. – 11 Dec.	Building	4	Yangon	Conference, meeting, survey
7 Dec. – 18 Dec.	Water	3	Yangon, Bago	Conference, survey
7 Dec. – 15 Dec	Disaster Management	5	Yangon	Conference, meeting, survey
8 Dec. – 14 Dec.	Infrastructure	8	Yangon	Conference, survey
25 Dec. – 28 Dec.	Disaster Management	1	Yangon	Interview, meeting
10 Jan. – 12 Jan.	GIS	2	Yangon	Lecture, survey
16 Jan. – 21 Jan.	Water	5	Yangon, Bago, Nay Pyi taw	Meeting, workshop
25 Jan – 27 Jan.	Transport&Mobility	2	Yangon	Meeting
29 Jan. – 11 Feb.	Building	1	Yangon	Meeting, survey
6 Feb. – 11 Feb.	Infrastructure/GIS	3	Yangon, Patheingyi	Meeting, survey
16 Feb. – 22 Feb.	Water	8	Yangon, Bago	Survey, meeting

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19 Feb. – 23 Feb.	Disaster Management	3	Yangon	Interview, seminar
21 Feb. – 25 Feb.	Infrastructure	3	Yangon, Nay Pyi Taw	Meeting, seminar, survey
4 Mar. – 15 Mar.	Water	6	Yangon, Bago	Installation (weather station)
13 Mar. – 17 Mar.	Infrastructure	3	Yangon	Seminar, meeting

*1: Project members only

(b) Training Course in Japan

Training course “Establishment of Water and Energy Budget-based Distributed Hydrological Model (WEB-DHM) in Myanmar” was conducted in Japan from 16th October to 23rd December 2016. Trainees are as shown in Table 2-A.

Table 2-A: List of trainees

	Name	Title	Department
1	Win Win Zin	Associate Professor	Department of Civil Engineering
2	Zin Mar Lar Tin San	Associate Professor	Department of Civil Engineering
3	Shelly Win	PhD Student	Department of Civil Engineering
4	Kyu Kyu Thin	PhD Student	Department of Civil Engineering

Water-related disaster Group invited Director of department of Meteorology and Hydrology (DMH), Ministry of Transportation and Communication (MOTC) to Tokyo from 8th January to 14th January 2017 mainly for attending Implementation Planning Workshop on International Flood Initiative (IFI) in Asia-Pacific and GEOSS Asian Cycle Water Initiative (AWCI) workshop. Invited member is as shown in Table 2-B.

Table 2-B: List of invitee

	Name	Title	Department / Organization
1	Tin Yi	Director	DMH, MOTC

The Project invited 3 members of YTU from 6th January to 10th January 2017 mainly for discussing about progress and future plan of the Project. Invited members are as shown in Table 2-C.

Table 2-C: List of invitees

	Name	Title	Department /Organization
1	Myint Thein	Rector	YTU
2	Nyan Myint Kyaw	Head of Department	Department of Civil Engineering
3	Htay Win	Associate Professor	Department of Civil Engineering

(c) Provision of equipment

The Japanese side has provided equipment for project office and research activities as shown in Table 2. The total costs of equipment are approximately 4,288,000JPY.

Table 3: List of equipment for provision

No.	Items	Unit	Unit Price	Sub total
1	Optical strain sensor	2	430,000JPY	860,000JPY
2	Air-permeability tester for concrete	1	3,428,000JPY	3,428,000JPY

(d) Local cost for the activity of Japanese experts

The Project has spent local cost for the activity of Japanese experts such as airfare, travel allowance, vehicle, and so on.

(2) Input by Myanmar side**(a) Assignment of project members**

The Myanmar side has assigned project leaders and members for 6 sub-groups as shown in Annex "List of project members".

(b) Project space with necessary equipment

YTU has provided project office including Mini Lecture Room facilities and Researchers' office attached with infrastructure, facilities for RS/GIS Laboratory and research center with basic furniture such as table, chair and steel locker. Internet environment for those offices was set up by the end of September 2016.

(c) Running expenses for Project space

YTU has covered cost for utility such as electricity and water for Project space and some consumable.

(d) Expenses for received equipment within Myanmar

YTU has spent a cost for received equipment within Myanmar such as transportation cost from Yangon Airport to YTU, storage fee at custom office and agent fee for custom clearance. YTU has compromised and arranged for equipment installation at the sites concerned cost via mutual negotiation with Ministry of Agriculture, Livestock and Irrigation, and Ministry of Transport and Communication including costs for infrastructure for equipments such as weather sensors and hydro stations, and long-term operation. It is around 20,000 USD for initial set up per each equipment for water group. Operation costs are under concerned by concerned ministries' budget.

(e) Coordination with DOHE on the arrangement for obtaining permission from concerned authorities in installing received equipment

YTU has coordinated with DOHE for obtaining permission for receiving equipment such as import license, tax exemption letter and special order.

(f) Coordinate with DOHE on travel permit for Japanese Experts

YTU has coordinated with DOHE for obtaining multiple re-entries VISA for Japanese experts.

1-2 Progress of activities

1-2-1 Activities for overall project planning and management

For managing project, project meetings have been held among group leader from Japan side once in a month, and YTU-Japan joint meeting on December 2017. In addition, the project invited the president, a department chair and associate professor from YTU to Japan on March 2017 and discussed current issue and future planning. In order to appeal the presence of this project, at least one person from each group joined ICSE held on December 2016, and exhibited booth. Paper submissions have also been tried from some groups.

For the capacity building, the project have invited 4 staffs from YTU and organized a training course on water related disaster group from October to December, 2016. From February 2017, seminar for YTU student has been started once in two months, and researchers from YTU and Japan sides has joined and discussed the project research.

To proceed research efficiently, the project could have a meeting with Mr. Phyo Myint Thein, president of Yangon Regional Government (YRG), and explained our activities and expected outcomes from our project. He understood the importance of our project. In addition, we visited Japanese embassy on December 2016, and confirmed the necessity of this project for Yangon City in terms of building vulnerability, lack of buildings, urban planning and transportation, conservation of heritage.

1-2-2 Activities for Output 1

- [Water related disaster group] Cross-section of Bago river was investigated. Weather meter was equipped in Bago river and hidro-meteorological data have been observed using the equipment. 3 weather stations has installed in Zaung Tu Dam, Salu Dam and Shwe Laung on March 2017.
- [Water related disaster group] Flood model have been established in Bago river. Effect of sea tide has been assessed at integrated points of Bago river and Yangon river.
- [GIS and remote sensing group] Old urban map and topographical data, old satellite images before 1960 have been collected.
- [GIS and remote sensing group] Urban expansion model have been developed using topographical model and distribution of built-up areas estimated from satellite images.
- [GIS and remote sensing group] Server for data base system has been set up in YTU by collaborating with transport and mobility group.
- [Earthquake related disaster group] Building damage information of historical earthquake in Myanmar has been collected.

- [Earthquake related disaster group] Fragility function for RC structure has been developed.
- [Infrastructure management group] Displacement of suspension bridge tower in Yangon city and Patheingyi was analyzed to identify the reason of fracture.
- [Transport and mobility group] People flow has been estimated using GPS data from mobile phone proposed by MPT. Probe data have been collected using 30 mobile phones equipped on buses.

1-2-3 Activities for Output 2

- [Water related disaster group] To develop a method to evaluate vulnerability of Yangon city for water related disaster, social and economical characteristic of Bago river basin has been investigated by field survey and workshops.
- [Water related disaster group] Local weather model and expected urban environment have been estimated. In addition, relationship between land-use and social economy in several time series have been investigated and analyzed.
- [Earthquake related disaster group] Preliminary vulnerability map was produced by way of trial.

1-2-4 Activities for Output 3

- [Disaster management group] Environments of SATREPS office and PC were created.
- [Earthquake related disaster group, remote sensing and GIS group, and water related disaster group] Short term training for YTU was conducted for earthquake related disaster group, remote sensing and GIS group, and water related disaster group.
- [Disaster management group] A joint meeting between the Project and companies in Myanmar were held on December 2017.

1-2-5 Activities for Output 4

- [Disaster management group] Disaster countermeasures basic acts and action plans were collected. A group investigated disaster prevention/response activities of local government in Yangon on February 2017.
- [Water related disaster group] Workshop for water related disaster group was conducted to identify expected user and stakeholder. In addition, requirements from residential person about disaster information were investigated.
- [Infrastructure management group] A simple system for monitoring deformation on bridge was installed. Then, relative displacement on beam and columns were measured in case of suspension bridges. Joint international seminar by the Project, MOC, SIP (Strategic Innovation Promotion Program) and JPCI (Japan Pre-stressed Concrete Institute) called "Present and Future Road Infrastructure Management in Myanmar and Japan" was conducted on March 2017. 160 participants joined this seminar, and present situation and future efficient maintenance practices for infrastructure management were introduced.

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1-3 Achievement of Output

It remains to be seen at later stage of the project.

1-4 Achievement of Project Purpose

1-4-1 Papers submitted to international journal

Following papers were submitted / announced in journals/conferences.

Table 4: List of Published/announced papers

Title	Author	Group	Name of journal/conference	Date
Effect of Ground Control Points in Terms of Distribution and Location On Geometric Correction of CORONA Satellite Image	Sao Hone Pha	GIS Group	ACRS 2016 (Asian Conference on Remote Sensing, Sri Lanka)	Oct. 2016
Study on Punctuality Index for Bus Operation	Daw Kyaing	Transport and Mobility Group	ACRS 2016 (Asian Conference on Remote Sensing, Sri Lanka)	Oct. 2016
An Investigation of Bus Travel Time Comparing with Private Car Travel Time	Moe Myint Mo	Transport and Mobility Group	ACRS 2016 (Asian Conference on Remote Sensing, Sri Lanka)	Oct. 2016
Route Choice Estimation Based on CDR Remote Sensing Applications Data in Yangon	Thein Aye Zin	Transport and Mobility Group	ACRS 2016 (Asian Conference on Remote Sensing, Sri Lanka)	Oct. 2016
TIDAL FLOW CHARACTERISTICS IN YANGON RIVER CONFLUENCE	Shota SETO, Takenori SHIMOZONO, Yoshimitsu TAJIMA, Akiyuki KAWASAKI	Water related disaster group	Journal of Japan Society of Civil Engineers, Ser. B2 (Coastal Engineering), Vol. 72 (2016) No. 2 p. I_1669-I_1674 (in Japanese)	Nov. 2016
Community-level Flood Response and Relief in Thailand and Myanmar Flood Plains	Yukiko TAHIRA, Akiyuki KAWASAKI	Water related disaster group	JOURNAL OF JAPAN SOCIETY OF HYDROLOGY AND WATER RESOURCES, Vol. 30 (2017) No. 1 p. 18-31 (in Japanese)	Feb. 2017
Urban Development Management Programs, 5.4 Legal and Administrative Framework, 5.4.2 Procedure for Development Activities (3) Data Platform and Risk Monitoring	JICA, Part 5	All	SUDP 5-24	December 2016

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System, The Strategic Urban Development Plan and the Urban Transport Development Plan of the Greater Yangon				
Inclusive flood disaster risk reduction in the Bago River basin	Kawasaki, A., Win, W.Z., Acierto, R., Shimozono, T., Tajima, Y., Bhagabati, S., Shirai, N., Kohtake, N	Water related disaster group	Proceedings of the Seventh International Conference on Science and Engineering, 2016 (7th ICSE 2016), pp. 483-487, Yangon, Myanmar	Dec. 2016
The relationship between flood and poverty: The case study in Myanmar	Kawamura, G., Kawasaki, A., Win, W.Z.	Water related disaster group	Proceedings of the Seventh International Conference on Science and Engineering, 2016 (7th ICSE 2016), pp. 888-893, Yangon, Myanmar	Dec. 2016
Tentative Building Vulnerability Assessment of Yangon	Murao, O., Gokon, H., Meguro, K., Yu, K. T	Earthquake related disaster group	Proceedings of the 7th International Conference on Science and Engineering 2016 (USB), Yangon, Myanmar	Dec. 2016
A Proposal of Installation of Simple Monitoring System for Damaged Bridges in Myanmar	Liyanto EDDY, Koji MATSUMOTO, Kohei NAGAI, Takeshi MIYASHITA, Zin Naung Htun	Water related disaster group	Proceedings of The 6th International Conference of ACF (ACF2016), 2016	
Material Analysis of Fractured Bolts in Ayeyarwady Bridge (Yadanarbon), Myanmar	Kohei NAGAI, Liyanto EDDY, Yi Yi Mon	Infrastructure management group	Proceedings of 15th International Symposium on New Technology for Urban Safety of Mega Cities in Asia (USMCA), 2016	Dec. 2016
Prospect for Implementation of Road Infrastructure Asset Management	Hiroshi YOKOTA, Kohei NAGAI, Koji MATSUMOTO, Yi Yi Mon	Infrastructure management group	, Proceedings of the International Conference - Towards a Sustainable Urban Environment (EBUILT-2016), 2016.	
Report of Monitoring Results of Main Tower Inclination of Twantay Bridge in Myanmar	Liyanto EDDY, Kohei NAGAI, Koji MATSUMOTO, Takeshi MIYASHITA, Win Bo	Water related disaster group	Proceedings of The Seventh International Conference on Science and Engineering (ICSE 2016), 2016	Dec. 2016

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3D Structure-From-Motion Data Acquisition and Processing for Twantay Bridge Inclination Assessment	Nunitkorn KITRATPORN, Wataru TAKEUCHI, Koji MATSUMOTO, Kohei NAGAI	GIS	Proceedings of The Seventh International Conference on Science and Engineering (ICSE 2016), 2016	Dec. 2016
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1-4-2 Research theme for project members

List of research theme is as shown in Table 5.

Table 5: List of research theme

Name/Group	Dept. / University	Academic Year	Theme
Seemanta Sharma Bhagabati	Civil Eng. UTOKYO	D2 student	Development of river basin hydrological model with DIAS and workbench
Genki Kawamura	Civil Eng. UTOKYO	M2 student	Data collection for "Water and Watershed Management" and system conceptual design
Masahiro Kanbara	Civil Eng. UTOKYO	M2 student	Data collection for "Water and Watershed Management" and system conceptual design
Naruhiko Shirai	System Design & Management KEIO Univ.	M2 student	Requirements analysis for centralized disaster response system and development and evaluation of "verification and validation method"
Shin Yonehara	Civil Eng. UTOKYO	M1 student	Data collection for "Water and Watershed Management" and system conceptual design
Shouta Seto	Civil Eng. UTOKYO	M1 student	Data collection for "Water and Watershed Management" and system conceptual design
Takuma Usuda	Architecture UTOKYO	M2 student	Estimation of Building stories in Yangon based on Digital Boundary Module (DBM)
Toshiki Sasaki	Civil Eng. UTOKYO	M2 student	Investigation of infrastructure management system
Ryousuke Takahashi	Civil Eng. UTOKYO	M1 student	Investigation of infrastructure management system
Tanakorn Sri Tarapiapat	RS/GIS UTOKYO	PhD Candidate	Modeling urban expansion with regard to disaster vulnerability in Yangon, Myanmar
Nuntikorn Kitratporn	RG/GIS UTOKYO	M1 student	Structure-from-Motion (SfM) 3D Point Cloud for Bridge Inclination Assessment
			Development of Flood Inundation Map for Bago River

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Water-related Disaster	YTU	-	Flood Risk Assessment for Bago River Basin
			Flood Simulation using WEB-DMH model for Bago River
			Flood Simulation using IFAS Model for Bago River
			Study on Tide Effect of Bago River
Earthquake-related Disaster <Land use and urban Planning>	YTU	-	A New Methodology for Monitoring Urban Growth to Direct a Safer Future Development of Yangon City
Earthquake-related Disaster <Build Environment>	YTU	-	Proposal Zoning Plan for Yangon and its Environs
			Urban Redevelopment Planning of Mingalartaung Nyunt Township Yangon
			Redevelopment of Botathaung Pagoda Environs
			Development multifamily Residence on Post Independent period in Yangon
			Urban Redevelopment of Kyauktada Township Yangon
			Urban Renewal of Pabedan Township Yangon
			Design Guideline for Heritage Responsive Buildings in Kyauktada Township Yangon
Earthquake-related Disaster <Heritage>	YTU	-	Property Management Plan of Yangon Heritage Conservation
			Architecture of Colonial Office Buildings in Downtown Yangon
			Analysis of Colonial Public Building Facades in Downtown Yangon
Infrastructure management	YTU	-	Maintenance Strategy for Bayinnaung Bridge
			Monitoring the Inclination and Settlement of Tower and Piers of Twan Tay Bridge
			Monitoring the Inclination and Settlement of Tower and Piers of Tha Kyut Bridge
Transport and Mobility	YTU	-	Development of Bus Location System for Smooth Operation in Yangon
			Effect of Flyover Construction (Thamwe) on Traffic Flow to the near Road Network by using CDR Data
Geospatial Technology	YTU	-	Effect on Ground Control Points in Terms of Distribution and Location on Geometric Correction of CORONA Satellite Image
			Estimation of land use change and building heights from 1966 to 2015 in Yangon by CORONA LandSAT and Geo-eye images
Disaster	YTU	-	Review on Regional level Disaster Management System and its

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Management			Issues in Yangon Region
Geotechnical	YTU	-	Development of Liquefaction Potential Map for selected areas in Yangon
			Liquefaction Potential Map based on Probabilistic Approach in selected areas in Yangon
			Ground information for Infrastructure Development and Earthquake in certain areas
			Micro-tremor Measurements used to Map Thickness of Soft Sediments in certain areas
Takuma USUDA	Architecture UTokyo	M2	Estimation of Building stories in Yangon based on Digital Boundary Module (DBM)

1-5 Changes of Risks and Actions for Mitigation

None

1-6 Progress of Actions undertaken by JICA

Project regulation for enhancing research activities has set on March 2017.

1-7 Progress of Actions undertaken by Yangon Technological University

YTU has set up research fund for Ground Information Exploration Project in 6 Down Town Area for Geotechnical Group.

1-8 Progress of Environmental and Social Considerations (if applicable)

None

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

None

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

Department of Ministry of Education in charge of YTU has changed from DTPC to DOHE (Dept. of Higher Education since October 2016.

Project Manager of Myanmar side has changed as new Rector of YTU has assigned on December 2016.

2. Delay of Work Schedule and/or Problems (if any)

2-1 Detail

Procurement/receiving of some equipment has been delayed.

2-2 Cause

It takes much time to obtain permission for receiving equipment by YTU due to complicated

procedure of concerned authorities in Myanmar.

Some equipment to be procured is behind schedule as there is a possibility of change.

2-3 Action to be taken

Necessary document for procedure of import should be submitted to YTU at least one and a half months prior to arrival date in Myanmar.

List of providing equipment shall be revised and finalized by September 2017 and be approved by JCC steering committee during JCC meeting to be held on October 2017.

2-4 Roles of Responsible Persons/Organizations

YTU, Group leaders from Japan side

3. Modification of the project Implementation Plan

3-1 PO

None

3-2 Other modifications on detailed implementation plan

None

4. Preparation of YTU toward after completion of the Project

- The Project has started to discuss with various stakeholders in the government and NPOs regarding the social implementation of the research outcome and will continue to do so.

II. Project Monitoring Sheet I & II *as Attached*

Project Title: Development of a Comprehensive Disaster Resilience System and Collaboration Platform in Myanmar

Period of Project: 5 years

Version 1

Target Group: Direct: 13 faculty members of Yangon Technological University (YTU), Indirect: Ministries in charge of disaster management and local governments, major infrastructure and residents in target area

Dated 05 July, 2017

Project Site: Republic of the Union of Myanmar (Bago River Basin and Yangon)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal YTU further develops the scenario analysis systems by its Research Centre for Urban Safety	At least 1 suggestion based on the result of the updated scenario analysis is submitted to relevant governmental departments mainly by YTU's Research Centre for Urban Safety	1 Updated and improved database 2 Documents submitted	Budget and personnel of YTU is maintained		
Project Purpose YTU understands in use of scenario analysis systems to assess Myanmar's future disaster vulnerability	1 At least 20 research papers related to the project, which are submitted by mainly YTU during the project period, are accepted by international journals 2 Suggestions based on the result of the scenario analysis are submitted to relevant governmental departments	1 Papers submitted to journal papers 2 Suggestion documents submitted		2 research papers as the outcomes of collaborative research with YTU have been published on international journals.	
Outputs					
1 Development of physics model to evaluate disaster vulnerability	1-1 Recent flood events simulated by the developed hydrological and hydraulic model 1-2 Building damage grade estimated at certain earthquake 1-3 Daily people movement simulated by the model	1-1 Database: hydro-climate, water, and river environment 1-2 Database: infrastructures, buildings, and topographical information 1-3 Database: traffic and crowd flow		Water related disaster group: - Cross-section of Bago river was investigated. Weather meter was equipped in Bago river and hydrometeorological data have been observed using the equipments. - Flood model have been established in Bago river. Effect of sea tide has been assessed at an integrated points of Bago river and Yangon river. GIS and remote sensing group: - Old urban map and topographical data, old satellite images before 1960 have been collected. - Urban expansion model have been developed using topographical model and distribution of built-up areas estimated from satellite images. - Server for data base system has been set up in YTU by collaborating with transport and mobility group. Earthquake related disaster group: - Building damage information of historical earthquake in Myanmar have been collected. - Fragility function for RC structure has been developed. Infrastructure management group: - Bolts fractured from bridge in Yangon city was analysed to identify the reason of fracture. Transport and mobility group: - People flow have been estimated using GPS data from mobile phone proposed by MPT. Probe data have been collected using 30 mobile phones equipped on buses.	
2 Development of scenario analysis system for assessing future disaster vulnerability	2-1 Assessment of water-related disaster vulnerability 2-2 Assessment of earthquake vulnerability	2-1 Flood inundation map 2-2 Earthquake vulnerability map		Water related disaster group: - To develop a method to evaluate vulnerability of Yangon city for water related disaster, social and economical characteristic of Bago river basin has been investigated by field survey and workshops. - Local weather model and expected urban environment have been estimated. In addition, relationship between landuse and social economy in several time series have been investigated and analysed. Earthquake related disaster group: - Preliminary vulnerability map was produced by way of trial.	
3 Support to establish Research Centre for Urban Safety in YTU to sustain and enhance research activities and human resource development	3-1 Establishment of Research Centre for Urban Safety in YTU 3-2 Educational program to foster specialists 3-3 Establishment of consortium among government, academia, and industry	3-1 Approval document 3-2 Data / record kept in relevant organizations 3-3 Articles of incorporation		Disaster management group: - Environments of SATREPS office and PC were created. - Short term training for YTU was conducted for earthquake related disaster group, remote sensing and GIS group, and water related disaster group. Documents and Disaster management group: A joining meeting between the University of Tokyo and companies in Myanmar were held.	
4 Development of integrated disaster response system including infrastructure maintenance management with adequate technologies	4-1 Tutorial for integrated disaster response system 4-2 Guideline proposed on improved infrastructure management and maintenance system	4-1 Contents of the tutorial 4-2 Proposal documents		Disaster management group: Disaster countermeasures basic acts and actin plans were collected. Water related disaster group: Workshop for water related disaster group was conducted to identify expected user and stakeholder. In addition, requirements from residential person about disaster information were investigated. Infrastructure management group: A simple system for monitoring deformation on bridge was installed. Then, relative displacement on beam and columns were measured in case of PC bridge.	

Activities	Inputs		Pre-Conditions
	The Japanese Side	The Myanmar Side	
(1-1) Develop hydrological and flood inundation model of study area (1-1-1) Gather information and data in river, hydro-climate and water resource management and build integrated database (1-1-2) Build hydrological and flood inundation model in the target river basin for flood vulnerability assessment	1. Dispatch of Experts Water-related Disaster Earthquake-related Disaster Geospatial Technology Infrastructure Management Transport and Mobility Disaster Management Project Coordinator	1. Assignment of Project members 2. Project space with necessary Equipment/Internet facilities - Project Office - Mini Lecture Room - Researchers' Office	
(1-2) Build earthquake vulnerability evaluation method and earthquake vulnerability map of study area (1-2-1) Collect land use, population, buildings, infrastructures, and topographical information in study area (1-2-2) Investigate damage by past earthquakes in Myanmar	2. Training in Japan Establishment of Water and Energy Budget-based Distributed Hydrological Model (WEB-DHM) in Myanmar (16 October - 23 December 2016 for 4 project members)	3. Running expenses for Project space 4. Expenses necessary for transportation within Myanmar for received equipment	
(1-3) Develop study area's urban development model (1-3-1) Analyse collected geo-spatial data and develop urban expansion simulation by cellular automaton model (1-3-2) Collect and accumulate aggregated mobile phone base station usage data and probe vehicle GPS data (1-3-3) Project traffic and people movement with people activity model	3. Machinery and Equipment - Optical strain sensor (2 sets) - Air-permeability tester for concrete (1 set)	5. Coordinate with DOHE on the arrangement for obtaining permission from concerned authorities in installing received equipment	
(2-1) Assess characteristics of water-related disaster vulnerability (2-1-1) Conduct climate change analysis in local scale (2-1-2) Investigate land use change in the target river basin (2-1-3) Assess river runoff and vulnerability to water-related disasters based on scenarios with climate change and urban development	4. Local cost for the activity of Japanese experts	6. Coordinate with DOHE on travel permit for Japanese Expert for official travel	
(2-2) Assess characteristics of earthquake disaster vulnerability (2-2-1) Examine possible scenario patterns with proper input and algorithm (2-2-2) Assess vulnerability to earthquake based on scenarios			
(3-1) Support establishment of Research Centre for Urban Safety in YTU			
(3-2) Develop educational program to foster experts (3-2-1) Observe current education program at YTU and MTU and examine a trial of YTU's educational program (3-2-2) Introduce YTU's education program			
(3-3) Establish consortium among government, academia, and industry (3-3-1) Coordinate functions with MES (3-3-2) Identify expected role of consortium			
(4-1) Develop disaster response system (4-1-1) Analyse disaster management plan of central government and investigate needs on the system (4-1-2) Analyse disaster management plan of local government and investigate citizens' needs on disaster information			
(4-2) Propose improved infrastructure management and maintenance system, and technology for Myanmar (4-2-1) Review management and maintenance system, and technology of Infrastructures, especially road and bridges, in Myanmar (4-2-2) Propose improved management and maintenance system (4-2-3) Apply and propose inspection and monitoring method for infrastructures and buildings with adequate retrofit technology for damaged infrastructure (4-2-4) Disseminate technology information			

Activity ID	Activity Description	Plan	Actual	Remarks
1-3-3				
Output 2-1: Assess characteristics of water-related disaster vulnerability	Conduct climate change analysis in local scale			
2-1-1		Plan		- People flow have been estimated using GPS data from mobile phone proposed by MPT.
2-1-2	Investigate land use change in the target river basin	Plan		- Water related disaster group: - To develop a method to evaluate vulnerability of Yangon city for water related disaster, social and economical characteristic of Bago river basin has been investigated by field survey and workshops.
2-1-3	Assess river runoff and vulnerability to water-related disasters based on scenarios with climate change and urban disaster	Plan		- Water related disaster group: - Local weather model and expected river discharge were estimated. Relationship between landuse and social economy in several time series have been investigated and analysed.
Output 2-2: Assess characteristics of earthquake disaster vulnerability	Examine possible scenario patterns with proper input and algorithm			
2-2-1		Plan		- Earthquake related disaster group: - Preliminary vulnerability map was produced by way of trial.
2-2-2	Assess vulnerability to earthquake based on scenarios	Plan		- Disaster management group: - Environments of SATREPS office and PC were created.
Output 3-1: Support establishment of Research Centre for Urban Safety in YU				
Output 3-2: Develop educational program to foster experts	Observe current education program at YU and MTU and examine a trial of YU's educational program			
3-2-1		Plan		- All groups: - Short term training for YU was conducted for earthquake related disaster group, remote sensing and GIS group, and water related disaster group.
3-2-2	Introduce YU's education program	Plan		
Output 3-3: Establishment of consortium among government, academia, and industry	Coordinate functions with MES			
3-3-1		Plan		- All groups: - We have introduced our activities related to the establishment of consortium, and asked their cooperation.
3-3-2	Identify expected role of consortium	Plan		
Output 4-1: Develop disaster response system	Analyse disaster management plan of central government and investigate needs on the system			
4-1-1		Plan		- Disaster management group: - Disaster countermeasures basic acts and action plans were collected.
4-1-2	Analyse disaster management plan of local government and investigate citizens' needs on disaster information	Plan		- Water related disaster group: - Workshop for water related disaster group was conducted to identify requirements for disaster information. In addition, requirements from residential person about disaster information were investigated.
Output 4-2: Propose improved infrastructure management and maintenance system, and technology for Myanmar	Review management and maintenance system, and technology of infrastructures, especially road and bridges, in Myanmar			
4-2-1		Plan		- Infrastructure management group: - A simple system for monitoring deformation on bridge was installed. Then, relative displacement on beam and columns were measured in case of PC bridge.
4-2-2	Propose improved management and maintenance system	Plan		
4-2-3	Apply and propose inspection and monitoring method for infrastructures and buildings with adequate retrofit technology for damaged infrastructure	Plan		- Infrastructure management group: - A method for monitoring the inclination of bridge has been applied to Twantay bridge.
4-2-4	Disseminate technology information	Plan		