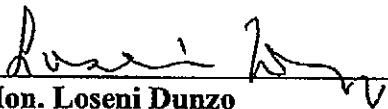
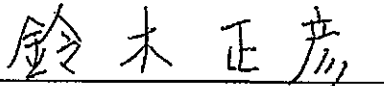



**SCOPE OF WORK  
FOR  
THE MASTER PLAN STUDY ON  
URBAN FACILITIES RESTORATION AND IMPROVEMENT  
IN MONROVIA**


**AGREED UPON  
BETWEEN  
THE GOVERNMENT OF LIBERIA,  
(MINISTRY OF PUBLIC WORKS)  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
Monrovia,  
11<sup>th</sup> June, 2008**


  
**Hon. Loseni Dunzo**  
Minister,  
Minister of Public Works

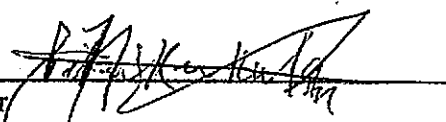
  
**Mr. Masahiko Suzuki**  
Leader,  
Preparatory Study Team,  
Japan International  
Cooperation Agency (JICA)


(Witness by)

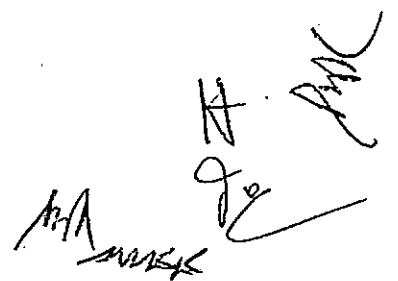
  
**Ambassador William V.S. Bull**  
Acting Minister,  
Ministry of Foreign Affairs

  
**Hon. Toga G. McIntosh**  
Minister,  
Ministry of Planning and Economic  
Affairs

  
**Hon. Jackson E. Doe**  
Minister  
Ministry of Transport

  
for  
**Hon. Ophelia Hoff-Saytumah**  
Mayor  
Monrovia City Corporation

  
for  
**Hon. N. Hun-Bu Tulay**  
Managing Director,  
Liberia Water and Sewer Corporation



## I . INTRODUCTION

In response to the request of the Government of the Republic of Liberia (hereinafter referred to as "GOL"), the Government of Japan (hereinafter referred to as "GOJ") has decided to conduct " The master plan study on Urban Facilities Restoration and Improvement in Monrovia" (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the technical cooperation program of GOJ, will undertake the Study in close cooperation with the concerned authorities of GOL.

The present document sets forth the scope of work with regard to the Study.

The sectors covered by the Study are listed on the Scope of the study (Section IV).

## II . OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. To develop the 10 years master plan including 5year restoration plan on urban facilities.
2. To carry out relevant technology transfer to Liberian counterpart personnel in the course of the Study

## III. STUDY AREA

The Study will cover entire the city of Monrovia and adjoining areas such as Paynesville, and Johnsonville as shown in APPENDIX 1.

## IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study shall cover the following activities:

1. Review and analysis of the present situation
  - 1-1. To review existing laws, regulations, policies and institutional arrangements related to urban facilities restoration and improvement
  - 1-2. To review on-going projects/plans
  - 1-3. To collect and analyze necessary data of the presents situation for the Study
  - 1-4. To evaluate the present conditions of urban facilities for urban restoration and improvement
2. Preparation of digital topographic maps
3. Formulation of the vision for Monrovia Urban Development
4. Formulation of Monrovia Urban Facilities Development Strategies
5. Formulation of Monrovia Urban Facilities Development Plan
  - 5-1 To formulate 5years restoration programs/projects to cope with urgent and priority issues
    - 5-1-1 Road and Road facilities
    - 5-1-2 Water supply system
    - 5-1-3 Sewage system
    - 5-1-4 Drainage system
  - 5-2 To formulate 10years development programs/projects
    - 5-2-1 Road and Road facilities
    - 5-2-2 Water supply system
    - 5-2-3 Sewage system
    - 5-2-4 Drainage system
6. Formulation of the implementation/management plan
7. Formulation of a capacity development plan necessary for implementation/management of the programs/projects
8. Technical/knowledge transfer through the implementation of the Study



9. Overall evaluation and recommendation.

**V. STUDY SCHEDULE**

The Study will be carried for approximately 14 months as shown in APPENDIX 2.

**VI. REPORTS**

JICA shall prepare and submit the following reports in English to GOL.

Inception Report:

Thirty (30) copies in English at the commencement of the Study.

Interim Report:

Thirty (30) copies in English within seven (7) months after the commencement of the Study.

Draft Final Report:

Thirty (30) copies, same number of copies of executive summary in English within twelve (12) months after the commencement of the Study

The authorities concerned with the Study in the Republic of Liberia will provide written comments within one (1) month after receiving the report.

Final Report:

Thirty (30) copies, same number of copies of executive summary in English and a digital file copy. Within one (1) month after the receiving of the written comments from Liberian side on preceding Draft Final Report

**VII. UNDERTAKING OF GOL**

1. To facilitate the smooth implementation of the Study; GOL shall take necessary measures:
  - (1) To permit the members of the Team to enter, leave and sojourn in Republic of Liberia duration of their assignments therein and exempt them from foreign registration requirements and consular fees for the implementation of the Study;
  - (2) To exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other material brought into and out of the Republic of the Liberia for the implementation of the Study;
  - (3) To exempt the members of the Team from income taxes and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the team for their services in connection with the implementation of the Study; and
2. GOL shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the team.
3. GOL shall, at its own expense, provide the Team with the following, in cooperation with other organizations concerned:
  - (1) Security-related information as well as measures to ensure the safety of the Team;
  - (2) Information on as well as support in obtaining medical service;
  - (3) Available data (Including maps) and information related to the Study;
  - (4) Counterpart personnel; and
  - (5) Credentials or identification cards.

**VIII. UNDERTAKING OF JICA**



For the implementation of the Study, JICA shall dispatch, at its own expense, the Team to the Republic of the Liberia.

**IX. OTHERS**

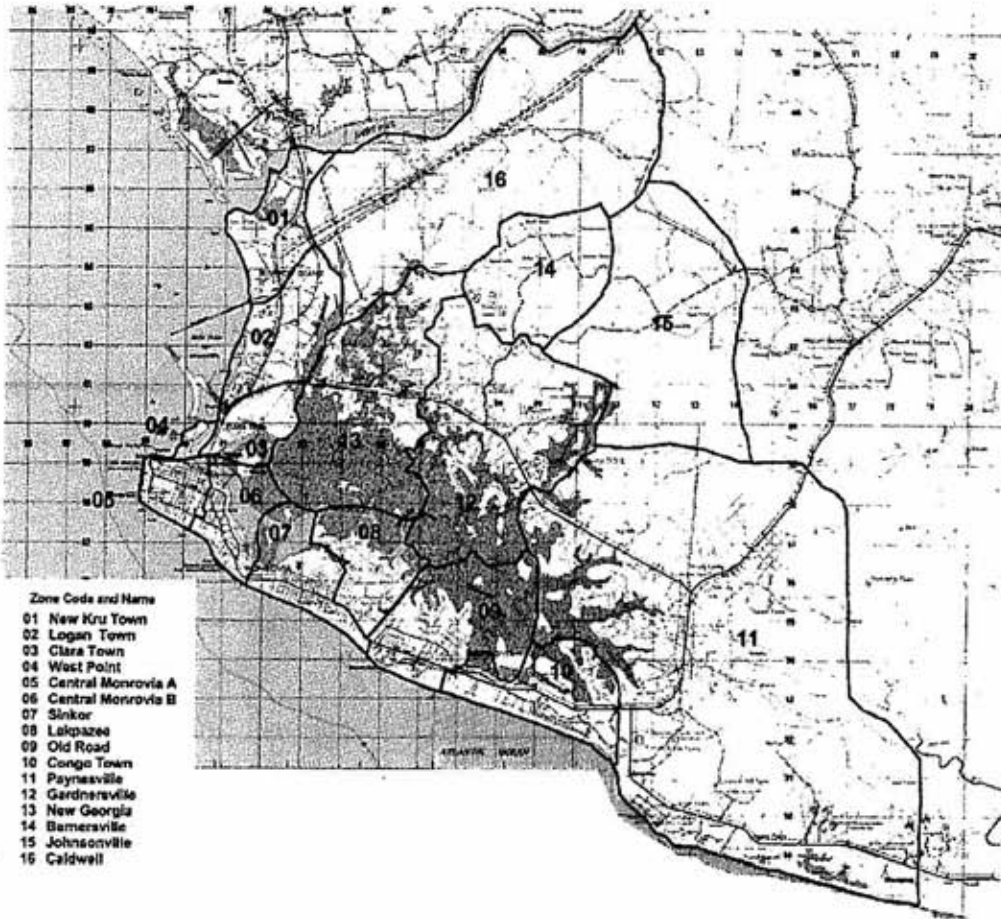
JICA and GOL shall consult with each other in respect of any matter that may arise from or in connection with the Study.

APPENDIX 1 Study Area

APPENDIX 2 Tentative Study Schedule

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Tc  
[Signature]  
[Signature]

APPENDIX 1



Greater Monrovia Administrative Boundaries Zones



□ Zone boundary

Please refer to the map page 102-103 for zone and boundary names



Map compiled using GIS/RS  
Map projection: UTM

Data source:  
Greater Monrovia Administrative Boundaries,  
Ministry of Planning and Economic Affairs, 2007

Boundaries depicted do not represent  
official endorsement by the Government of  
Liberia or the United Nations.  
MHC does not accept any liability  
for any errors or omissions  
and will be updated as soon  
as better information is available.

HIC Liberia  
c/o Planning Unit  
UNDP Building 1st floor  
Burgess Hill  
P.O. Box 2274  
Monrovia, Liberia



- Zone Code and Name
- 01 New Kru Town
  - 02 Logan Town
  - 03 Clara Town
  - 04 West Point
  - 05 Central Monrovia A
  - 06 Central Monrovia B
  - 07 Sinkor
  - 08 Lalpazea
  - 09 Old Road
  - 10 Congo Town
  - 11 Paynesville
  - 12 Gardnersville
  - 13 New Georgia
  - 14 Barmersville
  - 15 Johnsonville
  - 16 Caldwell

Handwritten signatures and initials: 鈴木, Te, [Signature], [Signature]

Tentative Study Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Work in DOL														
Work in Japan	□						□					□		□
Report Presentation		▲ IC/R					▲ IT/R					▲ DF/R		▲ F/R

IC/R: Inception Report  
 IT/R: Interim Report  
 DF/R: Draft Final Report  
 F/R: Final Report


  



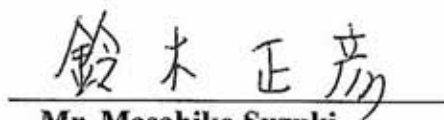
**MINUTES OF MEETINGS ON  
SCOPE OF WORK  
FOR  
THE MASTER PLAN STUDY ON  
URBAN FACILITIES RESTORATION AND IMPROVEMENT  
IN MONROVIA**

**AGREED UPON  
BETWEEN  
THE GOVERNMENT OF LIBERIA,  
(MINISTRY OF PUBLIC WORKS)  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY**

**Monrovia,  
11<sup>th</sup> June, 2008**



**Hon. Loseni Dunzo**  
Minister,  
Minister of Public Works



**Mr. Masahiko Suzuki**  
Leader,  
Preparatory Study Team,  
Japan International  
Cooperation Agency (JICA)

(Witness by)



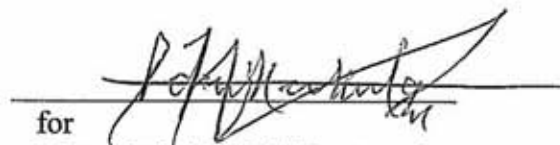
**Ambassador William V.S. Bull**  
Acting Minister,  
Ministry of Foreign Affairs



**Hon. Toga G. McIntosh**  
Minister,  
Ministry of Planning and Economic  
Affairs



**Hon. Jackson E. Doe**  
Minister  
Ministry of Transport



for  
**Hon. Ophelia Hoff-Saytumah**  
Mayor  
Monrovia City Corporation



for  
**Hon. N. Hun-Bu Tulay**  
Managing Director,  
Liberia Water and Sewer Corporation





## INTRODUCTION

In response to the request of the Government of the Republic of Liberia (hereinafter referred to as "GOL"), the Government of Japan (hereinafter referred to as "GOJ") has dispatched the preparatory study team (hereinafter referred to as "the Team") headed by Mr. MASAHIKO SUZUKI to discuss and conclude the scope of work (S/W) for "The Master Plan Study on Urban Facilities Restoration and Improvement in Monrovia" (hereinafter referred to as "the Study").

The Team had a series of discussions with the representatives from Ministry of Public Works (hereinafter referred to as "MPW") and related ministries and agencies. Participants of the discussions are listed in APPENDIX1.

This document summarizes major items discussed and remarks expressed by both sides, and is meant to supplement the S/W.

### 1. Study Title

Both sides agreed that the Study is titled as "The Master Plan Study on Urban Facilities Restoration and Improvement in Monrovia".

### 2. Steering Committee

Both sides agreed that the Steering Committee should be set up to facilitate the Study and review papers submitted by the Team. The Steering Committee will comprise the following ministries and agencies with possible inclusion of others if necessary. MPW shall provide JICA the names of the members of the Steering Committee before the commencement of the Study.

Chair:	Ministry of Public Works
Vice Chair:	Ministry of Planning and Economic Affairs
Member:	Ministry of Foreign Affairs
	Ministry of Transport
	Monrovia City Corporation
	Liberia Water and Sewer Corporation

Both sides also agreed to set up a working group which will consist of counterparts of each ministry and agency based on the themes/sectors to cooperate with the Study.

### 3. JICA guidelines for Environmental and Social Considerations

The Team explained the outline of the JICA guidelines and the need of compliance in the implementation of the Study. Both sides agreed to work together to adopt the approach specified by the guidelines in addition to the adoption of the Liberian Environmental Law.

### 4. Study Schedule

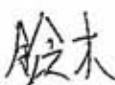




Liberian side requested that the Study period should be short due to urgent needs to coordinate various urban facilities' restoration projects and the Study should cover various sectors due to serious damage on them. Both sides agreed on the Study schedule and the sectors covered by the Study as noted in the S/W in response to the request. Both sides also agreed that the methods and procedure of the Study would be decided in accordance with the schedule of the Study.

### 5. Coordination between the Study and other donor activities

Liberian side mentioned importance of coordination between the Study and other donor activities such as World Bank, GTZ, etc.

### 6. Utilization of the Master Plan

Both sides confirmed that it is important to implement projects identified in the Study using various



resources such as Liberian Reconstruction Trust Fund.

## 7. Map

### (1) Utilization of the existing maps

It is agreed that digital topographic maps would be prepared utilizing existing maps from the Ministry of Land, Mines and Energy.

### (2) Copyright

Both sides agreed that GOL and JICA hold the copyright of the digital topographic map which would be prepared in the Study.

### (3) Preparation

The Team explained that preparation of digital topographic maps could start independently prior to the commencement of the study on the Master Plan.

## 8. Capacity Development Plan

Liberian side mentioned that capacity development plans are necessary for various sectors. The Team emphasised the necessity of capacity development in the road and water sectors. Both sides agreed that the priority areas for the capacity development plan would be determined in the course of the Study.

## 9. Harmonization with policies on settlement

Both sides recognized the importance of harmonization of the Master Plan with Liberian policies on settlement including programs on IDPs and refugees.

## 10. Information Disclosure

Both sides agreed that JICA will disclose the results of the Study after the Study is completed.

## 11. Security arrangements

Both sides confirmed that Liberian side will arrange security protection including police escort, if necessary, for the Study team during conduct of the Study.

## 12. Office Space and Equipment

MPW confirmed provision of office space with basic equipment such as electricity, internet connection for the Study team.

APPENDIX 1 List of Participants

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Handwritten signatures and initials in black ink, including a large signature at the top right, a signature below it, and several initials and smaller signatures at the bottom right.

## List of Participants

### ■ Liberian side

#### ● Ministry of Public Works

Hon. Loseni Dunzo	Minister, Ministry of Public Works
Ms. Bindu Brewer	Coordinator-Planning, Ministry of Public Works
Mr. Ambrose C. Wureh	Technical Assistant, Ministry of Public Works
Mr. Christian Herbert	Consultant / Transport, Ministry of Public Works
Mr. Manfred A. Verdier	Consultant / Electromechanical, Ministry of Public Works
Mr. David L. Wiles	Environmentalist, Ministry of Public Works
Mr. Emmanuel S, Nimely	Project Officer, Ministry of Public Works
Mr. Paul M. Deowoco	Traffic Chief, Ministry of Public Works
Mr. O. P. Shepherd	Urban Planner, Ministry of Public Works

#### ● Ministry of Foreign Affairs

Ambassador William V.S. Bull	Acting Minister, Ministry of Foreign Affairs
------------------------------	----------------------------------------------

#### ● Ministry of Planning and Economic Affairs

Hon. Toga G. McIntosh	Minister, Ministry of Planning and Economic Affairs
Hon. Simeon M. Moribah	Deputy Minister, Ministry of Planning and Economic Affairs

#### ● Ministry of Transport

Hon. Jackson E. Doe	Minister, Ministry of Transport
Mr. D Erasmus Gongar	Director for Special Project, Ministry of Transport

#### ● Monrovia City Corporation

Mr. Daniel Y. Zawu	Monrovia City Corporation
Mr. Peter Kerkulah	Executive Assistant to the Mayor, Monrovia City Corporation

#### ● Liberia Water and Sewer Corporation

Hon. N. Hun-Bu Tulah	Managing Director, Liberia Water and Sewer Corporation
Mr. William E. D. Warner	Deputy Managing Director / Technical Services

### ■ Japanese side

Mr. Masahiko Suzuki	Leader, Preparatory Study Team
Mr. Hitoshi Ara	Member, Preparatory Study Team
Mr. Kazunori Matsui	Member, Preparatory Study Team
Ms. Miho Nakano	Consultant, Preparatory Study Team
Mr. Hirotaka Sato	Consultant, Preparatory Study Team
Mr. Takeshi Yoshida	Consultant, Preparatory Study Team
Mr. Isamu Kikuchi	Resident Representative, JICA Liberia
Mr. Yukinari Tanaka	Assistant Resident Representative, JICA Ghana Office

鈴木

Minutes of Meetings on

4<sup>th</sup> Working Group for

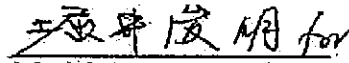
JICA / The Master Plan Study on Urban Facilities Restoration and  
Improvement in Monrovia in the Republic of Liberia

Monrovia

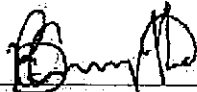
February 13, 2009



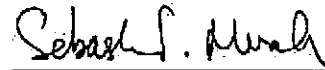
Mr. Edsel Edward Smith  
Consultant Special Project  
Ministry of Public Works  
The Republic of Liberia



Mr. Masatsugu Komiya  
Leader of Study Team  
Japan International Cooperation Agency  
(JICA)



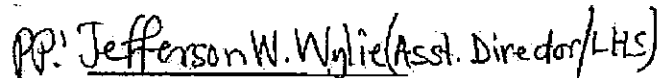
Mr. B. Elias Shoniyin  
Assistant Minister  
Ministry of Foreign Affairs  
The Republic of Liberia



Mr. Sebastian T. Muah  
Deputy Minister  
Ministry of Planning and Economic Affairs  
The Republic of Liberia



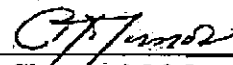
Cdr. Edward K. Goba  
Deputy Minister for Land & Rail Transport  
Ministry of Transport  
The Republic of Liberia

PP:  (Asst. Director/LHS)

Mr. E.C.B. Jones  
Deputy Minister of Operation  
Ministry of Land, Mines and Energy  
The Republic of Liberia



Atty. Peter Kerkulah  
Executive Assistant to the Mayor  
Monrovia City Corporation  
The Republic of Liberia



Mr. Clarence M. Momoh  
Technical Service Manager  
Liberia Water and Sewer Corporation

Participants: See Annex I

**1. Opening remarks**

The Meeting started with opening remarks from Mr. Edsel Edward Smith, Consultant Special Project, MoPW, on behalf of Minister of Public Works.

**2. Introduction of the members**

JICA Study Team (hereinafter referred to as the Team) and Liberian side introduced each member individually.

**3. Progress of the Study**

Each team member in charge of survey work reported progress of survey activities as follows;

**3-1. Sub-Contracts**

- i) Road Sector (Mr. Ono)
- ii) Water Sector (Mr. Oura)

**3-2. Working Content and Schedule of Each Specialist**

- i) Socio-economic Analysis (Mr. Horii)
- ii) Road Plan (Mr. Ono)
- iii) Groundwater Development Plan (Mr. Oura)

Liberian side understood and agreed upon progress and time schedule of the work activities.

**4. Data/Information Collection**

Mr. Horii expressed his concern that he would not get any data regarding 2008 Population and Household Census by the middle of February because the responsible Director is not in Liberia.

**5. Clarification of the Study Area**

Mr. Horii explained that the study area of this study and the mapping work which was conducted by another study team should be expanded based on the new administrative boundary and JICA headquarters would agree upon this change when these working group members have no objections.

Liberian side agreed upon this change. (See Annex II)

**6. Tentative Schedule of next Mini Workshop and Working Group**

All the members of the working group agreed to have the next meeting as follows;

Mini Workshop: February 26 (Thursday), 10:00 - 12:00

Working Group: March 10 (Tuesday), 10:00 - 12:00

[End]

## **Annex I**

### **List of Participants of the 4<sup>th</sup> Working Group Meeting for The Master Plan Study on Urban Facilities Restoration and Improvement In Monrovia in the Republic of Liberia**

**February 13, 2009**

#### **MoPW**

Mr. Edsel Edward Smith, Assistant Minister for Technical Service

Mr. Elijah Karnley, Urban and Community Planning Specialist

#### **MoT**

Mr. Cllr. Edward K. Goba

#### **MoLME**

Mr. Jefferson W. Wylie, Assistant Director

#### **MCC**

Atty. Peter Kerkulah, Executive Assistant to the Mayor

Mr. Othello S. Tarbah, Program Officer

Mr. Patrick W. Paye, Deputy Director of Zoning

#### **LWSC**

Mr. Clarence M. Momoh, Technical Services Manager

#### **The Study Team**

Mr. Toshiaki HORII, Socio Economic Analysis

Mr. Masazumi ONO, Road Plan/Road Maintenance Plan

Mr. Keiicji MURAKAMI, Road Facility Design

Mr. Hisashi OURA, Groundwater Development plan/Construction Management

Mr. Atsushi KATO, Coordinator II/GIS I

# Annex II

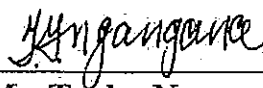


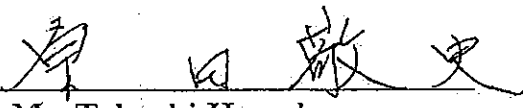
MINUTES OF MEETING ON  
INCEPTION REPORT  
(TOPOGRAPHIC MAPPING)

FOR  
THE MASTER PLAN RESTORATION AND IMPROVEMENT  
IN MONROVIA

AGREED UPON  
BETWEEN  
THE GOVERNMENT OF LIBERIA,  
(MINISTRY OF PUBLIC WORKS)  
AND  
THE JAPAN INTERNATIONAL COOPERATION AGENCY

Monrovia,  
5<sup>th</sup> November, 2008

 05-NOV-08  
\_\_\_\_\_  
Mr. Togba Ngangawa  
Deputy Minister,  
Ministry of Public Works

  
\_\_\_\_\_  
Mr. Takashi Harada  
Leader,  
JICA Study Team



## INTRODUCTION

In response to the request of the Government of the Republic of Liberia (hereinafter referred to as "GOL"), the Government of Japan (hereinafter referred to as "GOJ") has dispatched the digital topographic mapping study team (hereinafter referred to as "JICA Study Team") headed by Mr. TAKASHI HARADA to discuss and conclude the Inception Report for "The Master Plan Study on Urban Facilities Restoration and Improvement in Monrovia" (hereinafter referred to as "the Study").

JICA Study Team had a series of discussion with the representatives from Ministry of Public Works (hereinafter referred to as "MPW"). Participants of the discussions are listed in APPENDIX 1.

This document summaries major items discussed and remarks expressed by both sides, and is meant to supplement the Inception Report.

### 1. Inception Report

Both sides discussed and agreed on Inception Report for the Topographic Mapping as attached APPEDIX 2.

### 2. Number of Inception Report to be submitted

JICA Study Team agreed that five (5) sets of Inception Report are submitted to MPW.

## List of Participants

### **\*Liberian Side**

**Mr. Togba Ngangawa**

**Deputy Minister, Ministry of Public Works**

**Mr. Ambrose C Wureh**

**Technical Assistant, Ministry of Public Works**

**Mr. Christian Herbert**

**Consultant/Transport, Ministry of Public Works**

### **\*Japanese Side**

**Mr. Takashi Harada**

**Team Leader, JICA Study Team**

**Mr. Yuji Ouchi**

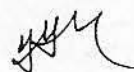
**Coordinator, JICA Study Team**

**Mr. Yukinari Tanaka**

**Representative, JICA Ghana Office**

**Ms. Makiko Kimura**

**Program Officer, JICA Liberia Field Office**



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
MINISTRY OF PUBLIC WORKS

**THE MASTER PLAN STUDY  
ON  
URBAN FACILITIES RESTORATION AND IMPROVEMENT  
IN MONROVIA  
IN  
THE REPUBLIC OF LIBERIA**

**INCEPTION REPORT**

**(TOPOGRAPHIC MAPPING)**

November 2008

AERO ASAHI CORPORATION

A handwritten signature in black ink, consisting of several loops and a final flourish, located in the bottom right corner of the page.

**THE MASTER PLAN STUDY  
ON  
URBAN FACILITIES RESTORATION AND IMPROVEMENT  
IN MONROVIA  
IN  
THE REPUBLIC OF LIBERIA**

**INCEPTION REPORT  
(TOPOGRAPHIC MAPPING)**

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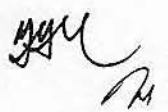
**APPENDICES**

**Appendix 1: Mapping Area**

**Appendix 2: Area for Ortho-photo Production**

**Appendix 3: Agreed Scope of Works**

**Appendix 4: Agreed Minutes of Meeting**



# 1. Introduction

## Background

During the years of conflict, Liberia's infrastructures have been nearly completely destroyed and the majority of services ceased being rendered. Moreover, the population in Monrovia was increased twice before conflict according to the preliminary results of 2008 National Population and Housing Census. So that, the living environment is rapidly getting worse, the improvement of infrastructures is immediately needed.

Employment and rehabilitation of the infrastructure were declared a top priority for the Government because of their direct impact on security and long-term peace process as noted in the Poverty Reduction Strategy.

As emergency projects have been conducted by some donors, it is also necessary to develop projects taking mid-term improvement and development into consideration. In order to achieve the urban facilities restoration and improvement for short- and mid-term, the Government of Republic of Liberia (hereinafter referred to as "GOL") requested the government of Japan (hereinafter referred to as "GOJ") for Development Study "Master Plan Study on Urban Facilities Restoration and Improvement in Monrovia" (hereinafter referred to as "the Study").

In response to the request of the GOL, the GOJ has decided to conduct the Study.

Accordingly, the Japan International Cooperation Agency (hereinafter called JICA), the official agency responsible for the technical cooperation program of GOJ, will undertake the Study in close cooperation with the concerned authorities of GOL. JICA dispatched this study team to produce as the initial step of the Study.

## Study Objectives

The Objectives of the study is to produce the 1:10,000 Digital Topographic Map and Ortho-photo for successive THE MASTER PLAN STUDY ON URBAN FACILITIES RESTORATION AND IMPROVEMENT IN MONROVIA.

## Study Area

The Study Area for Digital Topographic Mapping covers entire city of Monrovia and adjoining areas such as Paynesville, and Johnsonville as agreed on Scope of Works is shown in APPENDIX 1 and 3. Area for the Ortho-photo production is shown in APPENDIX 2.

## 2. Study Approach

### 2.1 Work General

The general of work contents are shown in following table.

Category	Work Classification	Work Items	Work Contents	Work Volume	
1:10,000 Topographic mapping	Preparatory works in Japan	(1)Data Collection	-Existing Data collection, information and analysis -Preparation of tender document for the determination of sub-contractor -Preparation of Symbol Specification (draft), basic approach, work plan, schedule and so on.	1 set	
		(2) Preparation of Inception Report			
	Works in Liberia	(3)Explanation and consultation of Inception Report	With counterpart		1 set
		(4)Field Reconnaissance	Existing data and information		1 set
		(5)Consultation of Work Specification	With counterpart		1 set
		(6)Aerial Photography (sub-contract)	Panchromatic film and photo-scale is 1:10,000		Approx. 265km <sup>2</sup>
		(7)Pre-marking, C.P survey, Simple leveling (sub-contract)	GPS observation		Approx. 35points, 100km
		(8)Production of Interpretation Key	For main filed objects and etc		1 set
		(9)Field Verification (sub-contract)	With digitally compiled sheet		Approx. 240km <sup>2</sup>
		(10)Compilation of Field Verification Result	Data modification and addition if necessary		Approx. 240km <sup>2</sup>
	Works in Japan	(11)Aerial Triangulation, DEM acquisition, Orthophoto production			1 set
		(12)Digital Plotting	Acquisition of various topographic features		Approx. 240km <sup>2</sup>
		(13)Digital Compilation	Compilation of digitally plotted data		Approx. 240km <sup>2</sup>
		(14)Symbolization	Map symbolization of digitally compiled data		Approx. 240km <sup>2</sup>
		(15)Creation of Data File	Quality check, data file format check		1set
		(16)Final Report	Preparation of Final Report		1set

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## 2.2 Technical Approach

Following Items will be Technical Approach of the works to formulate this study. All works are carried out based on the Work Specification for National Base Mapping under Japan International Cooperation Agency, 2006 edition.

### 1) Aerial Photography and Field Works

#### 1. Determination of flying height with consideration of climate of project area

Liberia is tropical rainforest country. Therefore the aerial photography is limited as the duration between November and February of next year only. Based on our own preliminary study, clouds disturb aerial photography work even in dry season. Therefore higher flying height is not recommended. As a result, 1:10,000 of photograph scale, 1,500m of flying height, is selected. Fields works will be carried out taking existing condition of control points into consideration of the work planning.

### 2) Topographic Mapping

#### 2. Datum in Monrovia

Topology of Monrovia consist almost flat area and with sea shoreline except residential area. Information of datum and height accuracy is important for planning of highway, water supply and drainage conducted on further study based on produced topographic map. Thus, planimetric and a height datum shall be determined by consultation between JICA study team and counterpart before work start.

#### 3. Production of Interpretation Key

When photograph interpretation is difficult to be done and/or for some typical filed objects exist, Interpretation Key will be produced by using of either aerial photograph or satellites images. It is helpful to make digital plotting works effective. Production of Interpretation Key will be carried out by Study Team with the assistance of counterpart.

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#### 4. Symbol Specification

Before commencing the Topographic Mapping Work, Study Team will consult an existing symbol specification for production of 1:10,000 Symbol Specifications (draft) with counterpart. For smooth processing of consultation, JICA study team will prepare a sample of Symbol Specification before consultation.

#### 5. Digital Compilation after Field Verification

To produce Topographic Maps in limited time period, Digital Compilation of Field Verification result will be conducted in Liberia. For this reason, 2 (two) experts of Study Team will conduct a supervision of Field Verification and Digital Compilation work of the result of Field Verification.

#### 6. Quality Control

Quality Control of final products including mid-products (ex. Aerial Triangulation results) will be carried out based on the Work Specification for National Base Mapping under Japan International Cooperation Agency, 2006 edition. Quality Control will be carried out following work items.

No.	Work Items
1	Control Point Survey
2	Simple Leveling
3	Aerial Photography
4	Digital Plotting and Compilation
5	Symbolization
6	Creation of Data File

## 2.3 Operational Approach

To conduct the study, following operational approach will be taken into account basically.

### 1. Past experience of similar area and works

The past work experience in Burkina Faso, Benin and Cote d'Ivoire in ECOWAS countries on the national base map production will be taken into account for project implementation. This know-how will be useful for project management and coordination among neighbor countries.

### 2. Suitable study team organization and establishment of work system in Japan

For the study implementation, study team members with sufficient past experience to work as an expert on JICA mapping project will assign to the project for higher work progress due to limited time period of the study. Also work system in Japan is planned suitable to conduct digital photogrammetric works within limited study period.

### 3. Subcontracting works

Following aerial photography and related field works will be carried out as subcontracting work. Regarding the subcontracting, general surveying company as a contractor will be recommended to make work management smooth and get higher work progress of sub-contracting.

1. Aerial photography  
Aerial photography will be carried out by using of with photogrammetric camera with fixed wings aircraft.
2. Pre-marking (or pricking)  
Either pre-marking or pricking will be carried out depending on filed condition and environment.
3. Control point survey  
Control point survey will be carried out by GPS observation.
4. Simple leveling  
Simple leveling will be conducted for height control of aerial triangulation.

5. Field verification

After digital compilation in Japan, digitally compiled data will be checked and modified in Liberia if necessary.



## 2.4 Request to GOL

Study team requests GOL followings items.

1. To support a provision of miscellaneous permissions such as flight permission, handing of aerial photographs, taking out of contact prints, photograph data from Liberia and so on.
2. To provide the guide for field works.
3. To provide project office to the study team.
4. To provide miscellaneous existing data such as topographic maps, "Guide to Reference Features" for basic data of Buchanan city planning done by USA, symbol specification of 1:10,000 topographic maps and so on.
5. To cooperate Liberian cartographic service to this project.

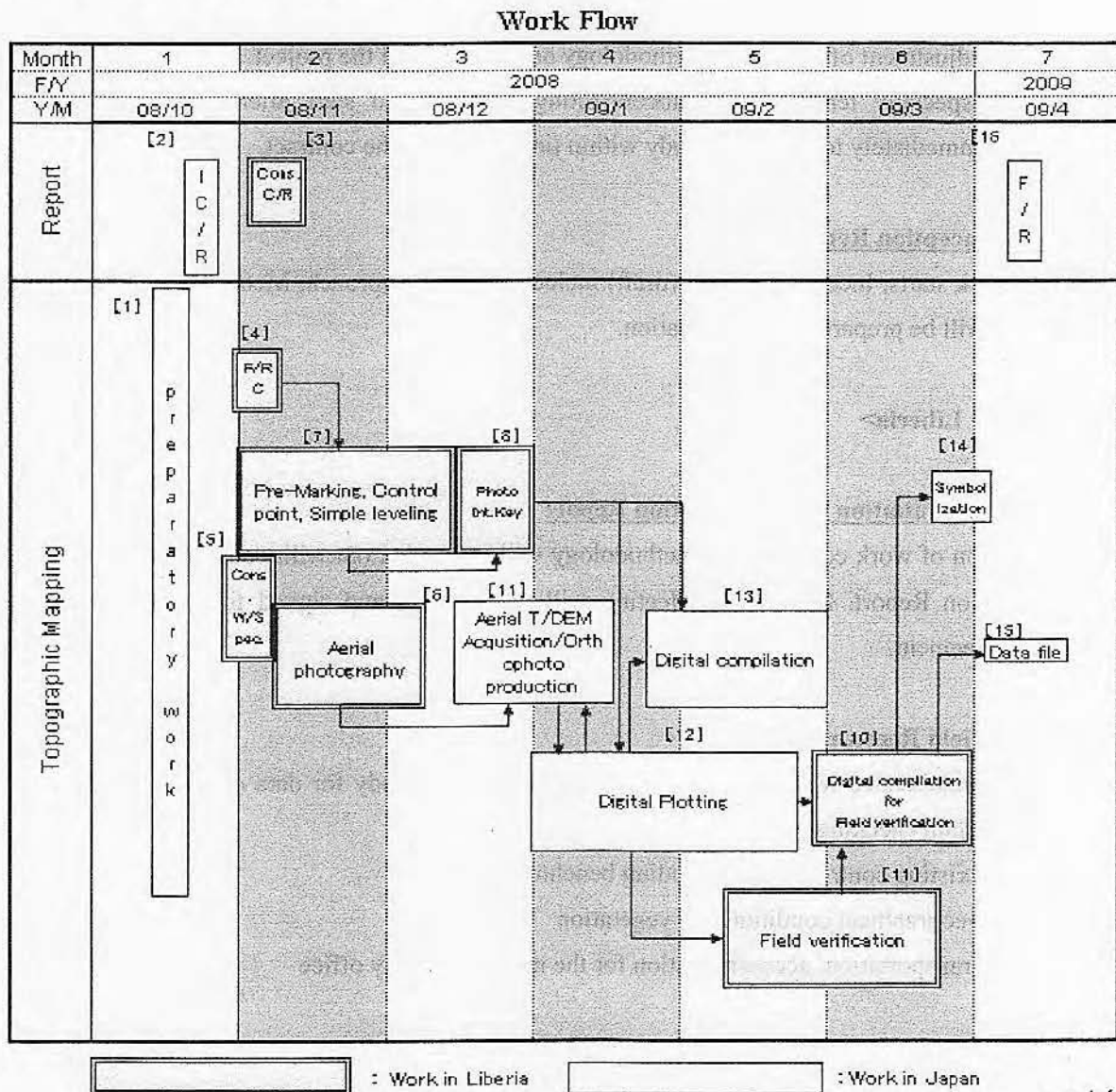
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### 3. Methodology of Study

Methodology of the Study is following.

#### 3.1 Individual Works

Entire work flow is shown in following figure.



## <Works in Japan>

### **[1] Data Collection**

Before work starts, following works will be carried out in Japan.

- Adjustment and analysis of collected data.
- Preparation of tender document, tendering and selection of subcontractor for Aerial Photography, Control Point survey and Field Verification.
- Preparation of Symbol Specification (draft)
- Adjustment of approach, methodology and schedule of the project.

Especially tendering of subcontracting work should start after contract of JICA immediately to complete study within time period of the contract.

### **[2] Inception Report**

Before work starts, Inception Report (draft) including Study Approach, Methodology and Study Schedule will be prepared for consultation.

## <Works in Liberia>

### **[3] Consultation and of Inception Report**

Consultation of work contents and methodology will be carried out with counterpart to finalize the Inception Report. Minutes of Meeting will be prepared and signed for confirmation of mutual agreement.

### **[4] Field Reconnaissance**

Field Reconnaissance will be carried out at the begging of study for data collection and work planning. Main checking work items are as follows:

- Existing control points including benchmarks
- Geographical condition and vegetation
- Transportation, accommodation for the members, study office

### **[5] Work Specification**

Work Specification for Topographic Mapping will be discussed and confirmed by consultation before Topographic Mapping starts. Study Team requests existing 1:10,000 Symbol Specification to the counterpart.

**[6] Aerial Photography**

Aerial Photography refers to take aerial photographs from an aircraft, etc. and includes photo processing required for subsequent works. Acquisition of flight permission has to be projected on sub-contractor's hands with the assist of counterpart.

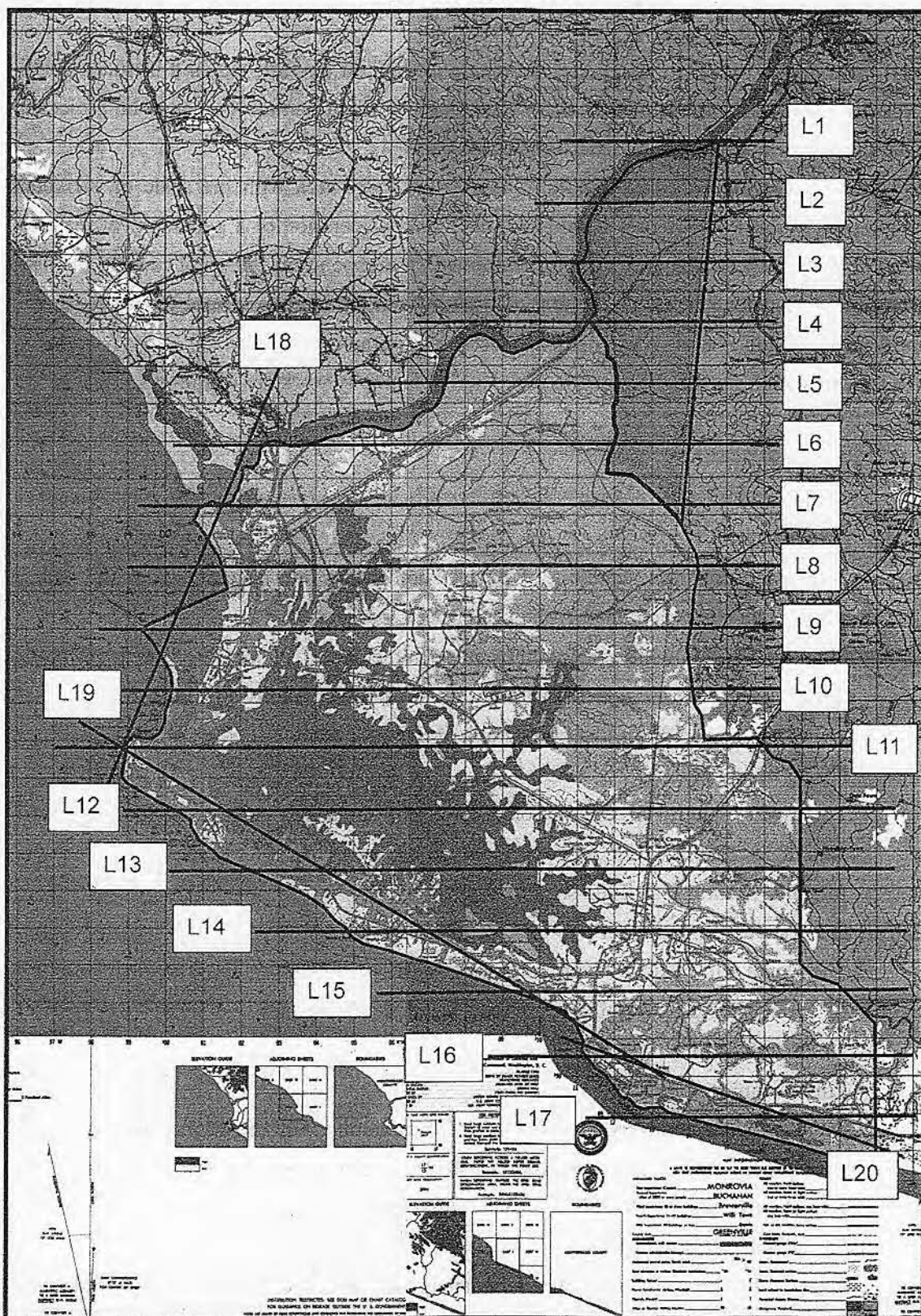
The Aerial Photography executes 265km<sup>2</sup> approx. of study area with the scale of 1:10,000 photographs. Aerial Photography should take enough consideration of a geographical features condition in the project area into work execution with a monochrome film, not causing the loss of the overlap and the side lap, and the flying course and the quality control for the accuracy improvement of the Aerial Triangulation. Aerial Photography will start on early November when the dry season started. The general of Aerial Photography work are as follows.

- Air Base  
Air Base will be the domestic airport in study area for convenience of meteorological judgment.
- Permission of Flight, handling of Aerial Photographs and Negative Film and taking out Contact Prints and Photograph Data from Liberia  
Flight permission will be acquired by sub-contractor with an assistance of counterpart. Regarding the permission of handling of aerial photographs and negative film and taking out contact prints and photograph data are the same.
- Flying Requirement  
The quality control of aerial photography will be carried out by sub-contractor and submit to expert of JICA study team to approve. If the discrepancy is over the tolerated accuracy, re-flight shall be done.
- Film processing and other photographic processing  
The works will be done under the responsibility of sub-contractor. The quality control of aerial photography will be carried out by sub-contractor and submit to expert of JICA study team to approve.
- Film Scanning  
Analog/Digital conversion of aerial photograph will be done by using of photogrammetric scanner. Resolution shall be 15 micron with uncompressed TIFF format under the responsibility of sub-contractor.
- Production of Contact print  
Contact Prints will be produced by using of processed negative film under the responsibility of sub-contractor.

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### Expected Flight Line



Additional area only for  
Ortho-photo production



Project area

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