

**Ministry of Agriculture and Irrigation
The Republic of the Union of Myanmar**

**THE PROJECT
FOR
PRESERVATION OF FARMING AREA FOR URGENT
REHABILITATION OF AGRICULTURAL
PRODUCTION AND RURAL LIFE IN AREAS
AFFECTED BY CYCLONE NARGIS
IN
THE REPUBLIC OF THE UNION OF MYANMAR**

**FINAL REPORT
APPENDICES**

OCTOBER 2011

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SANYU CONSULTANTS INC. NIPPON KOEI CO., LTD.**

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APPENDIX 1

*TEAM MEMBERS, C/PS, GOVERNMENT
OFFICIALS AND NGOs CONTACTED*

APPENDIX 1

Team Members, C/Ps, Government Officials and NGOs contacted

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Appendix 1 Team Members, C/Ps, Government Officials and NGOs contacted

<u>Name</u>	<u>Position/ Office Name</u>
<u>A. Ministry of Agriculture and Irrigation (MOAI)</u>	
1) <u>Minister Office</u>	
1. U Ohn Than	Deputy Minister
2. U Khin Zaw	Deputy Minister
2) <u>Department of Agricultural Planning (DAP)</u>	
1. U Than Aye	Director General, Chairman of Steering Committee
2. U Hla Kyaw	Deputy Director General
3. U Aung Hlaing	Director of International Relation (IR) cum Trade and Investment Section (TRIS)
4. Dr. Thandar Kyi	Deputy Director, IR
5. Daw Htay Htay	Staff Officer
6. U Aung Kyi	Assistant Director (Yangon)
7. Daw Nyo Nyo Mar	Deputy Programme Officer
8. Daw Kyawt Yin Min Thein	Deputy Programme Officer, Secretary of JICA Project Team
3) <u>Irrigation Department (ID)</u>	
<u>a) Head Office</u>	
1. U Kyaw Myint Hlaing	Director General
2. U Aung Win	Deputy Director General, Secretary of Steering Committee
3. U Tint Zaw	Deputy Director General
4. U Shwe Kyaw	Chief Mechanical Engineer
<u>b) Planning and Work Branch</u>	
1. U Han Than	Director
2. Daw Soe Tint	Assistant Director
3. U Zaw Win	Staff Officer, C/P of JICA project team
<u>c) Design Branch</u>	
1. U Min Aung Than	Director
2. Dr. Zaw Lwin Tun	Director
3. U Htun Htun Oo	Assistant Director
4. Daw Hla Oo Nwe	Assistant Director
<u>d) Procurement Branch</u>	
1. U San Htoo	Director
<u>e) Hydrology Branch</u>	
1. Daw Khan Ra	Director
2. Daw Myintzu Saw	Deputy Director
<u>f) Investigation Branch</u>	
1. U Kyaw Soe	Director

2. U Khin Maung Htay Assistant Director

g) Construction (1)

1. U Khin Zaw Assistant Director
2. U Maung Manug Moe Nyunt Staff Officer
3. U Aung Thu Kywe Staff Officer
4. U Thein Soe Sub- Assistant Engineer
5. U Aung Kyi Soe Sub- Assistant Engineer
6. U Zaw OO Sub- Assistant Engineer

h) Patheingyi Region

1. U Tin Win Director
2. U Minn Swe Deputy Director

h-1) Patheingyi and Labutta District

1. U Myint Thein Assistant Director
2. U Than Win Staff Officer
3. U Tin Win Sub- Assistant Engineer
4. U Tin Tun Myint Sub- Assistant Engineer
5. U Kyaw Soe Engineering Survey
6. U Kyaw Lin Engineering Survey

h-2) Phyayon District

1. U Zaw Min Assistant Director
2. U Khin Zaw Staff Officer

i) Construction (6)

1. U Win Bo Deputy Director
2. U Kyaw Swa Myint Staff Officer, C/P of JICA project team
3. U Kyaw Kyaw Aung Staff Officer, C/P of JICA project team
4. U Toe Sub- Assistant Engineer
5. U San Thwin Sub- Assistant Engineer

j) Mechanical Division (1)

1. U Myint Cho Director
2. U Myint Soe Assistant Director
3. U Soe Naing Assistant Director
4. U Thaug Ngwe Assistant Director
5. U Kyaw Ye Win Staff Officer
6. U Myo Win Kyaw Staff Officer
7. U Aung Soe Sub- Assistant Engineer
8. U Aung Min Sub- Assistant Engineer
9. U Thant Zin Tun Sub- Assistant Engineer
10. U Thant Zin Oo Sub- Assistant Engineer
11. U Saw Soe Naing Than Sub- Assistant Engineer
12. U Tun Mywe Sub- Assistant Engineer

4) Myanmar Agriculture Service (MAS)

a) Head Office

1. U Kyaw Win Managing Director

b) Planning Division

1. U Kyaw Yee General Manager, Member of Steering Committee
2. Daw Je Ni Lu Manager

c) Extension Division

1. U Hla Gyi General Manager
2. U Tin Maung Tun Deputy General Manager
3. Dr. Tin Ohnmar Win Assistant Manger

d) Horticulture Division

1. U Ko Ko Deputy General Manager
2. U That Zin Mg Project Manager of Vegetable and Fruit Research and Development Centre (VFRDC)
3. Daw Tin Tin Cho Senior Researcher of VFRDC, C/P of JICA project team

e) Seed Division

1. U Htein Lin General Manager
2. Dr. Ye Tin Htun Deputy General Manager
3. Daw Me Me Cho Assistant Manager, C/P of JICA project team
4. Daw Nhwe Nhwe Win Assistant Manager
Ayeyarwaddy Division, Seed Officer, Pathein Division
5. U Saw Kyaw Htin Lay Deputy Supervisor, C/P of JICA project team

f) Labutta Township

1. U Myint Oo Assistant Manager
2. Daw Shu Yee Assistant Manager
3. U Kyaw Kyaw Hlaing Deputy Supervisor
4. U Hla Htoo Deputy Supervisor
5. U Nyein Myint Assistant Supervisor
6. U Han Ngwe Assistant supervisor

5) Myanma Agriculture Development Bank (MADB)

1. U Hla Shwe Managing Director
2. U Sein Hla Tun Deputy General Manager, Member of Steering Committee
3. Daw Aye Aye Mar Assistant Director, C/P of JICA project team

6) Settlement and Land Records Department (SLRD)

1. U Myint Swe Director General
2. U Aye Maung Sein Director, Member of Steering Committee
3. U Myint Thu Staff Officer, C/P of JICA project team
4. U Aung Kyaw Myint Township Head Office of SLRD (Labutta Township)

7) Agriculture Mechanization Department (AMD)

1. U Soe Hlaing Director General, Member of Steering Committee

8) Myanmar Academy of Agricultural, Forestry, Livestock and Fishery Sciences

1. U Tin Maung Shwe Executive Committee Member

9) Agri- Business News

1. Daw Ei Ei Myat Senior Reporter

2. Daw Khin Khin Myint Admin Officer

B. Other Ministries concern

1) Ministry of Forestry (MOF)

• Forest Department (FD)

- | | |
|-------------------------|--------------------|
| 1. Col. Aye Myint Maung | Director General |
| 2. U Sein Tun | Director |
| 3. U Maung Maung Than | Deputy Director |
| 4. U Bo Ni | Assistant Director |
| 5. U Win Naing | Ranger |
| 6. U Hla Shwe | Range Officer |
| 7. U Hlaing Htay | Forester |

• Planning and Statistic Department (PSD)

- | | |
|---------------|-------------------------|
| 1. U San Lwin | Director General |
| 2. U Kyaw Tun | Deputy Director General |

• National Commission for Environmental Affairs (NCEA)

- | | |
|---------------------|--------------------|
| 1. U San Lwin | Acting Secretary |
| 2. U Kyaw Tun | Secretary |
| 3. Daw Htwe Nyo Nyo | Deputy Director |
| 4. Daw Yi Yi Htwe | Assistant Director |

2) Ministry of Livestock Breedings and Fisheries (MOLBF)

• Livestock Breeding and Veterinary Department (LBVD)

- | | |
|--------------------|-------------------------|
| 1. U Khin Ko Lay | Director General |
| 2. Dr. Aung Gyi | Deputy Director General |
| 3. Dr. Than Myint | Assistant Director |
| 4. Dr. Yin Yin San | Assistant Director |

• Department of Fisheries(DOF)

- | | |
|---------------|--------------------|
| 1. U Htun Win | Director |
| 2. U Tint Wai | Assistant Director |

C. Local Consultants

- | | |
|-------------------------|--|
| 1. U Cho Cho | Managing Director of National Engineering Planning Service (NEPS), Consultant |
| 2. U Kyaw Thein | Director of National Engineering Planning Service (NEPS) Consultant, Irrigation |
| 3. Daw Thein Thein Aung | Managing Director of Golden Plain Agricultural Products Co-op Ltd, Consultant, Agriculture |
| 4. Daw Htwe Htwe Aung | Chairperson of Golden Plain Agricultural Products Co-op Ltd, Consultant, Agriculture |
| 5. U Tint Lwin | General Manager of K & L Co., Ltd (Embankment Work) |
| 6. U Khin Maung Wai | General Manager of K & L Co., Ltd (Embankment Work) |
| 7. U Maung Maung | Aung Pan Myaing (APM) Engineering Co., Ltd (Gate) |

D. Non-Governmental Organizations (NGOs)

- | | |
|---------------------------|---|
| 1. Dr. Shin Imai | FAO Representative in Myanmar |
| 2. Mr. Simon Langbroke | Country Director, Consortium of Dutch NGO's (CDN) |
| 3. U Saw Jackson | Program Manager, Consortium of Dutch NGO's (CDN) |
| 4. Ms. Natthinee Rodraksa | Operations Manager, Tripartite Core Group (TCG) |
| 5. Kaeon Rand | Tripartite Core Group (TCG) |

E. International Non-Governmental Organizations (INGOs)

- | | |
|-------------------------|--|
| 1. Daw Myat Myat Khaing | Township Project Coordinator, World Vision |
| 2. Daw Aye Aye Win | Field facilitator, UNDP |
| 3. U Aung Myo Kyaw | Township Project Coordinator, Acted |

F. Local Non-Governmental Organizations (LNGOs)

- | | |
|---------------------|---|
| 1. U Saw Joseph | Township Project Coordinator, Myanmar Heart |
| 2. Daw Nu Nu Hlaing | Field facilitator, Myanmar Heart |
| 3. Daw Nilar | Field facilitator, Myanmar Heart |

G. General Administration Department

- | | |
|-----------------|---|
| 1. U Aye Mg Kyi | Administrator of Labutta District
District General Administration Department |
| 2. U Myint Oo | Administrator of Labutta Township
Township General Administration Department |

H. Related Japanese Agencies

1) Embassy of Japan in Myanmar

- | | |
|--------------------------|------------------|
| 1. Mr. Mitsuji SUZUKA | Counselor |
| 2. Mr. Masayuki ISHIKAWA | Second Secretary |

2) JICA Myanmar Office

- | | |
|-------------------------|--|
| 1. Mr. Hideo MIYAMOTO | Chief Representative, Member of Steering Committee |
| 2. Mr. Katsuyoshi SAITO | Senior Representative |
| 3. Mr. Minoru YOSHIDA | Project Formulation Advisor |
| 4. U Maung Maung Than | Program Officer |
| 5. U Kyaw Lwin Oo | Program Assistant |

I. JICA Project Team and Counterpart

- | | |
|---------------------------|---|
| 1. Mr. Shunichi HOSONO | Team leader / Rural Infrastructure /Rural Development |
| 2. Mr. Kazuhisa OKADA | Sub-Team Leader /Polder and Gate Design |
| 3. Mr. Hironori TAKAHASHI | Irrigation / Drainage |
| 4. Mr. Yoshiaki KIMURA | Meteorology / Hydrology |
| 5. Mr. Michinori YOSHINO | Farm Management / Agriculture Support |
| 6. Mr. Takaki TOYODA | Windbreak |
| 7. Ms. Yoko KITAUCHI | Rural Life Improvement |
| 8. Ms. Rie KITAO | Environmental Assessment |
| 9. Mr. Kosuke HIROTA | Cost Estimate / Irrigation & Drainage (B) |
| 10. Mr. Nobuki TOYOOKA | Project Evaluation |
| 11. Mr. Yoshihiro SAGAWA | Project Operation/ Coordinator / Polder and Gate Design (B) |
| 12. U Saw Kyaw Htin Lay | C/P from MAS |
| 13. U Zaw Win | C/P from ID |
| 14. U Kyaw Kyaw Aung | C/P from ID |
| 15. U Kyaw Swa Myint | C/P from ID |

APPENDIX 2
*SCOPE OF WORK AND
MINUTES OF MEETING*

APPENDIX 2

Scope of Work and Minutes of Meeting

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SCOPE OF WORK

FOR

THE PROJECT FOR PRESERVATION OF FARMING AREA
FOR URGENT REHABILITATION OF AGRICULTURAL PRODUCTION
AND RURAL LIFE IN AREAS AFFECTED BY CYCLONE NARGIS

IN

THE UNION OF MYANMAR

AGREED UPON BETWEEN

THE MINISTRY OF AGRICULTURE AND IRRIGATION

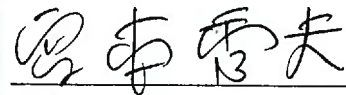
AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Nay Pyi Taw, 6 October 2009



U Tin Htut Oo
Director General
Department of Agricultural
Planning,
Ministry of Agriculture and
Irrigation,
The Union of Myanmar



Mr. Hideo MIYAMOTO
Chief Representative
Myanmar Office
Japan International Cooperation
Agency

I INTRODUCTION

In response to the official request of the Government of the Union of Myanmar (hereinafter referred to as "the GOM"), for the study and formulation a plan for preservation of farming areas for urgent rehabilitation of agricultural production and rural life in areas affected by Cyclone Nargis, the Government of Japan (hereinafter referred to as "the GOJ") decided to conduct " the Project for preservation of farming area for urgent rehabilitation of agricultural production and rural life in areas affected by Cyclone Nargis" (hereinafter referred to as "the Project"), 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 implementation of the technical cooperation program of the GOJ, will conduct the Project in close cooperation with the authorities concerned of the GOM.

On the part of GOM, Ministry of Agriculture and Irrigation shall act as the representative of counterpart agencies to the Japanese project team(hereinafter referred to as "the Team") and also as the coordinating body in relation with other concerned government and non-governmental organizations for the smooth implementation of the Project.

II OBJECTIVE OF THE PROJECT

The objectives of the Project are as follows:

- 1 "The plan on preservation of farming area for urgent rehabilitation of agricultural production and rural life in areas affected by cyclone Nargis" (hereinafter referred to as "the Development Plan") for the purposes of restoration of agricultural production and rural rife will be formulated.
- 2 The capacity of counterparts for project implementation and technical skills will be developed as well as the agricultural production and rural life in target areas will be rehabilitated through pilot project(s) implementation.
- 3 The immediate objective of the Project is to implement the pilot project of rehabilitation of embankment and sluice gate etc. in Labutta Township and agricultural development within the polder area as a model for other 34 embankments in Ayeyarwaddy delta area.

III PROJECT AREA

The project area is in Labutta Township, which represents 34 agricultural production areas being protected from saline water intrusion by embankments among the areas affected by the cyclone Nargis in Ayeyarwady Division. These areas are shown in Attachment 1.

IV SCOPE OF THE PROJECT

In order to achieve the objectives mentioned above, the Project will cover following items.

- 1 Identification of details and Implementation of Pilot Project(s)
 - 1) Review of legal and institutional frameworks

- 2) Current situation survey of facilities and geological survey
- 3) Identification of components in pilot project(s)
- 4) Making an operation and maintenance plan of facilities
- 5) Detailed design and cost estimate
- 6) Overall implementation schedule
- 7) Establishment of an operation and maintenance system of facilities
- 8) Implementation of pilot project(s)
- 9) Economic, social and financial evaluation
- 10) Environmental impact Assessment (EIA)
- 11) Improvement of Capacity Development through pilot project(s)

2 Data Collection and Analysis

- 1) National, regional and sectoral development plans
- 2) Programs/projects for urgent recovery and rehabilitation implemented by the government, UN and donor agencies
- 3) Disaster risk reduction and management by the government
- 4) Topographical, geological and soil data
- 5) Meteorological and hydrological data
- 6) Land use data
- 7) Agricultural production and villagers' livelihood
- 8) Existing facilities to protect agricultural lands and for rice production
- 9) Previous studies on construction of embankments and other facilities
- 10) Past cyclone damage data
- 11) Other related data (related institutions, cost estimate data, etc.)

3 Preparation of the Development Plan

- 1) Needs and opportunities to restore and improve agricultural production and rural life
- 2) Disaster risk analysis for designing of embankment dimensions
- 3) Priority among above needs and opportunities
- 4) Proposal for the methods and criteria of rehabilitation
- 5) Drafting the Development Plan
- 6) Economic, social and environmental evaluation of the drafted Development Plan
- 7) Environmental and Social Considerations
- 8) Feedback of result of pilot project(s) to the drafted Development Plan
- 9) Finalization of the Development Plan

V PROJECT SCHEDULE

The Project will be carried out within twenty five (25) months period including selection of consultants and report preparation in Japan and implementation of pilot projects in accordance with following tentative schedule. The schedule, including report submission dates stated in the next clause (VI), is tentative and subject to be modified

when any necessity arises in the course of the Project upon agreement between both parties.

Tentative Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
Work in Myanmar			█											█															
Work in Japan	▭								▭														▭						
Report	△ IC/R				△ PR/R					△ IT/R														△ DF/R		△ F/R			

Note IC/R : Inception Report, PR/R : Progress Report, IT/R : Interim Report, DF/R : Draft Final Report, F/R : Final Report

VI REPORTS

JICA will prepare and submit the following reports in English.

- 1 Inception Report
Twenty (20) copies at the commencement of the Project
- 2 Progress Report
Twenty (20) copies within four (4) months after the commencement of the Project.
- 3 Interim Report
Twenty (20) copies within eleven (11) months after the commencement of the Project.
- 4 Draft Final Report
Twenty (20) copies within twenty three (23) months after the commencement of the Project.
The written comments on the Draft Final Report from the MOAI shall be submitted to JICA within one (1) month after submission of the report.
- 5 Final Report
Twenty (20) copies within one (1) month after the receipt of the comments on the Draft Final Report.

VII UNDERTAKING OF THE MOAI

- 1 In order to facilitate a smooth conduct of the Project, the MOAI shall take the following measures:
 - 1) To permit the members of the Team to enter, leave and sojourn in the Union of Myanmar for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees;
 - 2) To exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other material brought into the Union of Myanmar for the implementation of the Project;
 - 3) To exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their service in connection with the implementation of the Project; and
 - 4) To provide necessary facilities to the Team for the remittance as well as utilization of the funds introduced into the Union of Myanmar from Japan in connection with the implementation of the Project.

- 2 MOAI 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 Project, except when such claims arise from gross negligence or willful misconduct on the part of the Team.
- 3 Department of Agricultural Planning (hereinafter referred to as "DAP") shall act as coordinating body in relation with other necessary governmental and non-governmental organizations concerned for the smooth implementation of the Project.
- 4 Irrigation Department (hereinafter referred to as "ID") and Myanmar Agriculture Service (hereinafter referred to as "MAS") shall act as implementing organizations.
- 5 MOAI shall, at its own expense, provide the Team with the following, in cooperation with other organization 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 and information related to the Project;
 - 4) Counterpart personnel;
 - 5) Suitable office space with necessary office equipment and furniture; and
 - 6) Credentials or identification cards
- 6 ID shall, at its own expense, also do their own activities such as rehabilitation work of embankments and polder embankments in Ayeyarwaddy Delta at the time of the Project and these works will not affect the Project.
- 7 DAP, ID and MAS will, as the executing organizations of the Project, take responsibilities that may arise from the products of the Project which is to be handed over to Myanmar side just after the Project.

VIII UNDERTAKING OF JICA

For the implementation of the Project, JICA shall take the following measures:

- 1) To dispatch, at its own expense, the Project Team to the Union of Myanmar; and
- 2) To pursue technology transfer to Myanmar counterpart personnel in the course of the Project.

IX OTHERS

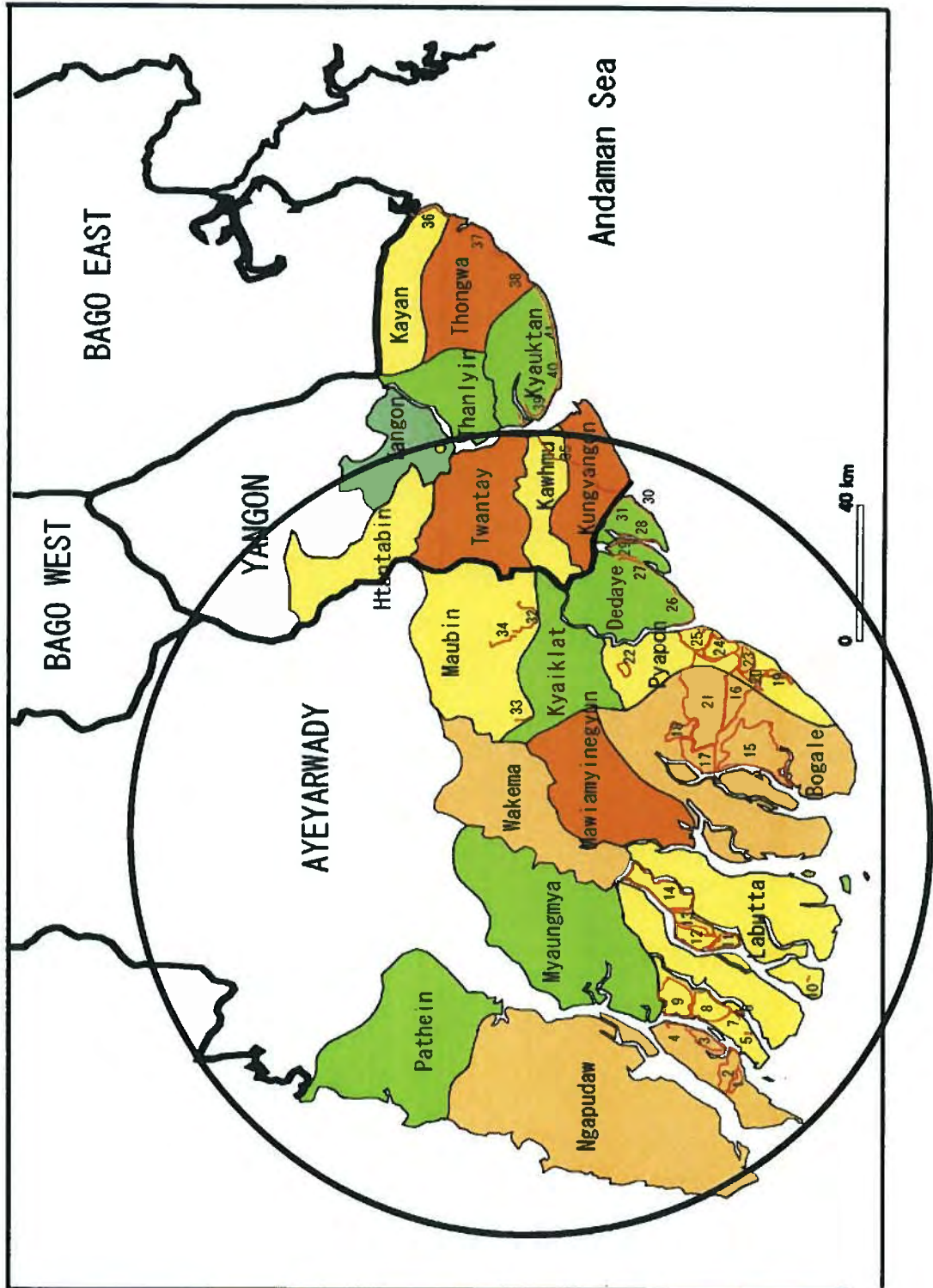
JICA and MOAI shall maintain the constant communication and consult with each other in respect of any matter that may arise from or in connection with the Project.

Attachment1 : Project area



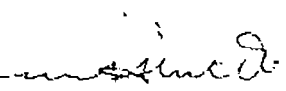
Attachment 1

LOCATION OF EMBANKMENTS AND TOWNSHIPS AFFECTED BY CYCLONE

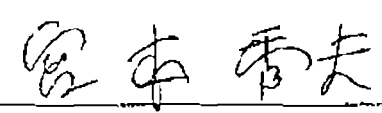


MINUTES OF MEETING
ON
SCOPE OF WORK
FOR
THE PROJECT FOR PRESERVATION OF FARMING AREA FOR URGENT
REHABILITATION OF AGRICULTURAL PRODUCTION AND RURAL LIFE IN
AREAS AFFECTED BY CYCLONE NARGIS
IN
THE UNION OF MYANMAR
BETWEEN
MINISTRY OF AGRICULTURE AND IRRIGATION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Nay Pyi Taw, 6 October 2009



U Tin Htut Oo
Director General
Department of Agricultural Planning,
Ministry of Agriculture and Irrigation,
The Union of Myanmar



Mr. Hideo MIYAMOTO
Chief Representative
Myanmar Office
Japan International Cooperation Agency

1. INTRODUCTION

In order to rehabilitate and renovate the cyclone affect farmlands, polders and embankment, the Government of the Union of Myanmar (hereinafter referred to as "GOM") officially proposed an official request to the Government of Japan (hereinafter referred to as "GOJ") on 19 January 2009.

In response to the request of GOM, the Mission on Rehabilitation and Renovation of Polders and Embankment in Ayeyarwady Division was dispatched by the Japan International Cooperation Agency (hereinafter referred to as "JICA") to Myanmar from 22 February to 21 March 2009 to provide necessary assistance on formulation of the said Project and advices for selection of pilot sites.

Department of Agricultural Planning (hereinafter referred to as "DAP"), Irrigation Department (hereinafter referred to as "ID") and Myanma Agriculture Service (hereinafter referred to as "MAS") under the Ministry of Agriculture and Irrigation (hereinafter referred to as "MOAI") and JICA had a series of discussions.

As a result of the discussions, MOAI and JICA prepared the Scope of Work (S/W) for the Project.

The main point of discussion is summarized below.

1. Title of the Project

Both sides agreed the Project Title as "the Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas affected by Cyclone Nargis in the Union of Myanmar."

2. Managerial Structure of the Project

(1) For the effective and efficient implementation of the Project, both sides agreed the need for establishment of Steering Committee and Working Group(s). The member of the Steering Committee and Working Group(s) will be decided within the 1st month of the Project.

(2) The expected participants for the Steering Committee (SC) are as follows:

(a) Myanmar side

- Representative of DAP
- Representative of ID
- Representative of MAS
- Representative of Settlement and Land Records Department (hereinafter referred to as "SLRD")

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- Representative of Agricultural Mechanization Department (hereinafter referred to as "AMD")
- Representative of Myanma Agricultural Development (hereinafter referred to as "MADB")

(b) Japanese side

- Project Team Leader
- Representative of JICA Myanmar Office
- Representative of Embassy of Japan

(c) Functions

- Appraisal of the results of the Project
- Advice the Project Team on direction of the Project

(3) The expected participants for the Working Group(s):

(a) Myanmar side

- Responsible official of the Project at DAP
- Responsible official of the Project at ID
- Responsible official of the Project at MAS
- Responsible official of the Project at SLRD
- Responsible official of the Project at AMD
- Responsible official of the Project at MADB

(b) Japanese side

- The Project team member(s)
- Officer in-charge of the Project at JICA Myanmar Office
- Officer in charge of Embassy of Japan

(c) Functions

- Collaboration Work with the Team on the daily basis as a counterpart
- Report to the Steering Committee by summarizing the result of the Project

3. Environmental and Social Considerations

The Myanmar side understood the contents of the JICA guidelines for environmental and social considerations (basic principles, procedures and etc.), and agreed to comply with the guidelines.

The Japanese side expressed that JICA shall support for implementation of environmental and social consideration.

4. Others

(1) Project Office Space

ID shall provide office spaces equipped with furniture (desk, chairs, telephone lines and etc.) at ID for implementation of the Project.

(2) Reports

Both sides agreed that final report of the Project would be opened to the public and Donors as necessary.

(3) Coordination

Myanmar side agreed that ID shall coordinate with the Public Works under the Ministry of Construction for sharing some portions of the embankment in the delta area as the road embankment of that ministry as well.

DAP also agreed that it will coordinate with other governmental organizations (such as Livestock Breeding and Veterinary Department (LBVD), Department of Fisheries (DOF) under the Ministry of Livestock and Fisheries (MOLF), Forest Department (FD) under the Ministry of Forestry (MOF), etc.) as necessary.

MINUTES OF THE MEETING

FOR

**THE PROJECT FOR PRESEERVATION OF FARMING AREA FOR URGENT
REHABILITATION OF AGRICULTURAL PRODUCTION AND RURAL LIFE
IN AREA AFFECTED BY CYCLONE NARGIS IN MYANMAR**

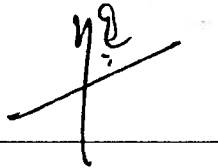
BETWEEN

THE MINISTRY OF AGRICULTURE AND IRRIGATION

AND

JICA Project Team

Nay Pyi Taw, 13th January 2010



U Than Aye
Chairman of the Steering Committee
Acting Director General
Department of Agricultural Planning
Ministry of Agriculture and Irrigation
The Government of the Union of Myanmar



Mr. Shunichi HOSONO
Leader
Project Team
Japan International Cooperation Agency
Japan

Following the Scope of Work (hereinafter referred to as S/W) on “The Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Area Affected by Cyclone Nargis in the Union Myanmar (hereinafter referred to as “the Project”), which has been agreed upon between the Japan International Cooperation Agency (hereinafter referred to as “JICA”) and the Government of the Union of Myanmar on 6th October 2009, JICA has sent the Project Team headed by Mr. Shunichi HOSONO of the Sanyu Consultants Inc. to the Union of Myanmar.

The Project Team submitted 20 copies of the Inception Report (hereinafter to as “Ic/R”) and presented its contents. A series of discussions was held the 1st Steering Committee Meeting chaired by U Than Aye, Acting Director General, Department of Agricultural Planning, Ministry of Agriculture and Irrigation (hereinafter referred to as MOAI) on 13th January 2010. The list of the Steering Committee Member is shown in Attachment-1. The following is the major outcome of the meeting.

- 1) The 1st Steering Committee generally accepted the contents of the Ic/R .
- 2) The Steering Committee will present a list of counterpart personnel to work together with the Project Team at the central level by the end of second week of January 2010.
- 3) The Project Team confirmed that office space has been already prepared in Irrigation Department in Yangon.
- 4) The Project Team requested Myanmar side to assure smooth implementation of the project with counterparts from Ministry of Agriculture and Irrigation for the survey and analysis of existing data, gathering data from concerned Ministries and Departments, to issues the identification card for the project team and to issues the Official Letters to related other ministries and departments when we needed.
- 5) The Project Team was suggested by MOAI and agreed the following points.
 - To consider agriculture and livelihood development activity with focus of a few subjects during the project implementation in consideration of project period for only two years.
 - Rehabilitation of polder dikes could be stated only after harvesting of wet season rice around end of November (or) first week of December.

Attachment-1

List of Steering Committee Member**Chairman**

1. U Than Aye Acting Director General, Department of Agricultural Planning, Ministry of Agriculture and Irrigation.

Co-Chairman

2. U Hla Baw Deputy Director General, Irrigation Department
Ministry of Agriculture and Irrigation

Member

3. U Maung Maung Yi General Manager, Myanmar Agriculture Service
Ministry of Agriculture and Irrigation
(OBO U Ohn Than, MD)
4. U Soe Hlaing Director, Agriculture Mechanization Department
Ministry of Agriculture and Irrigation
(OBO U Win Maw, DG)
5. U Thein Win Director, Settlement and Land Records Department
Ministry of Agriculture and Irrigation
(OBO U Win Kyi, DG)
6. U Sein Hla Tun Deputy General Manger, Myanmar Agriculture
Development Bank, Ministry of Agriculture and Irrigation
(OBO U Tin Lwan, MD)

Secretary

7. U Aung Win Director, Irrigation Department
Ministry of Agriculture and Irrigation

Embassy of Japan

- 8 Mr. Mitsuji SUZUKA Counselor, Embassy of Japan

JICA Myanmar Office

9. Mr. Hideo Miyamoto Representative of JICA Myanmar Office

JICA Project Team

10. Mr. Shunichi HOSONO Leader of JICA Study Team

Note: OBO; on behalf of

Attachment-2

List of Attendance on Steering Committee

No.	Name	Department
1.	U Than Aye	Department of Agricultural Planning
2.	U Soe Win Maung	Department of Agricultural Planning
3.	Dr. Tin Htut	Department of Agricultural Planning
4.	Daw Kin Mar Oo	Department of Agricultural Planning
5.	Daw Myat Thuzar Thein	Department of Agricultural Planning
6.	Daw Htay Htay	Department of Agricultural Planning
7.	Daw Nyo Nyo Mar	Department of Agricultural Planning
8.	U Hla Baw	Irrigation Department
9.	U Aung Win	Irrigation Department
10.	U Win Kyaw	Irrigation Department
11.	U Kyaw Lin Oo	Irrigation Department
12.	Dr. Zaw Lwin Tun	Irrigation Department
13.	U Thein Win	Settlement and Land Record Department
14.	U San Lwin Oo	Settlement and Land Record Department
15.	U Maung Maung Yi	Myanma Agriculture Service
16.	U Soe Hlaing	Agriculture Mechanization Department
17.	U Sein Hla Tun	Myanma Agriculture Development Bank
18.	Mr. Hideo Miyamoto	Representative of JICA Myanmar Office
19.	Mr. Minoru YOSHIDA	Project Formulation Advisor, JICA Myanmar Office
20.	U Maung Maung Than	JICA Myanmar Office
21.	Mr. Shunichi HOSONO	Leader of JICA Study Team
22.	Mr. Hideki SATO	Coordinator of JICA Study Team
23.	U Zaw Win	Counterpart, Irrigation Department
24.	Ms. Kyawt Yin Min Thein	Office Secretary of JICA Study Team

MINUTES OF THE MEETING

FOR

**THE PROJECT FOR PRESEERVATION OF FARMING AREA FOR URGENT
REHABILITATION OF AGRICULTURAL PRODUCTION AND RURAL LIFE
IN AREA AFFECTED BY CYCLONE NARGIS IN MYANMAR**

BETWEEN

THE MINISTRY OF AGRICULTURE AND IRRIGATION

AND

JICA Project Team

Nay Pyi Taw, 18th March 2010



U Than Aye
Chairman of the Steering Committee
Director General
Department of Agricultural Planning
Ministry of Agriculture and Irrigation
The Government of the Union of Myanmar



Mr. Shunichi HOSONO
Leader
Project Team
Japan International Cooperation Agency
Japan

Following the Scope of Work (hereinafter referred to as “S/W”) on “The Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas Affected by Cyclone Nargis in the Union Myanmar” (hereinafter referred to as “the Project”), which has been agreed upon between the Japan International Cooperation Agency (hereinafter referred to as “JICA”) and the Government of the Union of Myanmar on 6th October 2009, JICA has sent the Project Team headed by Mr. Shunichi HOSONO of the Sanyu Consultants Inc. to the Union of Myanmar.

In the middle of the First Field Survey commenced in the end of December 2009, the JICA Project Team submitted 20 copies of the Progress Report (hereinafter to as “P/R”) to the Ministry of Agriculture and Irrigation (hereinafter referred to as “MOAI”).

The 2nd Steering Committee Meeting as chaired by U Than Aye, Director General, Department of Agricultural Planning, MOAI was held at the conference room of the MOAI on 25th February 2010. The list of the Steering Committee Member is shown in Attachment-1 and the list of participants attended at the 2nd Steering Committee Meeting in Attachment-2. The following are major outcomes of the meeting.

- 1) The Steering Committee approved the contents of the P/R such as the condition of the project area, draft development plan, basic plan for the pilot project, etc.
- 2) Regarding the rehabilitation of polder dikes in the pilot project area, both sides agreed for the provision of work sharing that the Irrigation Department (ID) will try to contribute the machinery for the rehabilitation work.
- 3) According to the provision of livelihood and income generation activities, suggestions were made to the JICA Project Team that vegetable cultivation, fruit tree plantation with banana and beetle nuts and breeding of goats would be efficient to targeted landless households.
- 4) Under the study of IEE, as to compensation of affected inhabitants due to the dike embankment work, the both side agreed that such compensation should be properly made according to the laws as the ID has experienced the process to be made in many other projects before.

Attachment-1

List of Steering Committee Member

Chairman

1. U Than Aye Acting Director General, Department of Agricultural Planning, Ministry of Agriculture and Irrigation.

Co-Chairman

2. U Hla Baw Deputy Director General, Irrigation Department
Ministry of Agriculture and Irrigation

Member

3. U Maung Maung Yi General Manager, Myanmar Agriculture Service
Ministry of Agriculture and Irrigation
(OBO U Ohn Than, MD)
4. U Soe Hlaing Director, Agriculture Mechanization Department
Ministry of Agriculture and Irrigation
(OBO U Win Maw, DG)
5. U Thein Win Director, Settlement and Land Records Department
Ministry of Agriculture and Irrigation
(OBO U Win Kyi, DG)
6. U Sein Hla Tun Deputy General Manger, Myanmar Agriculture
Development Bank, Ministry of Agriculture and Irrigation
(OBO U Tin Lwan, MD)

Secretary

7. U Aung Win Director, Irrigation Department
Ministry of Agriculture and Irrigation

Embassy of Japan

- 8 Mr. Mitsuji SUZUKA Counselor, Embassy of Japan

JICA Myanmar Office

9. Mr. Hideo Miyamoto Representative of JICA Myanmar Office

JICA Project Team

10. Mr. Shunichi HOSONO Leader of JICA Study Team

Note: OBO; on behalf of

List of Attendance on Steering Committee

No.	Name	Department
1.	U Than Aye	Department of Agricultural Planning
2.	U Myo Tint Tun	Department of Agricultural Planning
3.	Daw Marlar Oo	Department of Agricultural Planning
4.	Daw Htay Htay	Department of Agricultural Planning
5.	Daw Nyo Nyo Mar	Department of Agricultural Planning
6.	U Hla Baw	Irrigation Department
7.	U Aung Win	Irrigation Department
8.	U Win Kyaw	Irrigation Department
9.	U Kyaw Lin Oo	Irrigation Department
10.	Daw Soe Tint	Irrigation Department
11.	Daw Nu Nu Htwe	Irrigation Department
12.	U Aye Maung Sein	Settlement and Land Record Department
13.	U Htin Aung Shein	Myanma Agriculture Service
14.	U Win Maung	Agriculture Mechanization Department
15.	Mr. Katsuyoshi SATIO	Deputy Representative of JICA Myanmar Office
16.	Mr. Minoru YOSHIDA	Project Formulation Advisor, JICA Myanmar Office
17.	U Kyaw Lwin Oo	JICA Myanmar Office
18.	Mr. Shunichi HOSONO	Leader of JICA Study Team
19.	Mr. Mr. Kazuhisa OKADA	Sub-leader of JICA Study Team
20.	Mr. Takaki TOYODA	Windbreak Expert of JICA Study Team
21.	Mr. Yasuharu YOTSUMOTO	Evaluation Expert of JICA Study Team
22.	U Zaw Win	Counterpart, Irrigation Department
23.	Ms. Kyawt Yin Min Thein	Office Secretary of JICA Study Team

MINUTES OF THE MEETING

FOR

**THE PROJECT FOR PRESEERVATION OF FARMING AREA FOR URGENT
REHABILITATION OF AGRICULTURAL PRODUCTION AND RURAL LIFE
IN AREA AFFECTED BY CYCLONE NARGIS IN MYANMAR**

BETWEEN

THE MINISTRY OF AGRICULTURE AND IRRIGATION

AND

JICA Project Team

Nay Pyi Taw, 15th July 2010



**U Than Aye
Chairman of the Steering Committee
Director General
Department of Agricultural Planning
Ministry of Agriculture and Irrigation
The Government of the Union of Myanmar**



**Mr. Shunichi HOSONO
Leader
Project Team
Japan International Cooperation Agency
Japan**

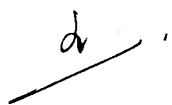
Following the Scope of Work (hereinafter referred to as “S/W”) on “The Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas Affected by Cyclone Nargis in the Union Myanmar” (hereinafter referred to as “the Project”), which has been agreed upon between the Japan International Cooperation Agency (hereinafter referred to as “JICA”) and the Government of the Union of Myanmar on 6th October 2009, JICA has sent the Project Team headed by Mr. Shunichi HOSONO of the Sanyu Consultants Inc. to the Union of Myanmar.

At the end of the First Field Work that was commenced in December 2009, the JICA Project Team submitted 20 copies of the Interim Report (hereinafter to as “I/R”) to the Ministry of Agriculture and Irrigation (hereinafter referred to as “MOAI”).

The 3rd Steering Committee Meeting as chaired by U Than Aye, Director General, Department of Agricultural Planning, MOAI was held at the conference room of the MOAI on 15th July 2010 for the explanation and discussion of the It/R. The list of the Steering Committee Members is shown in Attachment-1 and the list of participants attended in the 3rd Steering Committee Meeting in Attachment-2. The following are major outcomes of the meeting.

- 1) The 3rd Steering Committee generally approved the contents of the It/R such as the condition of the project area, implementation of the pilot project activities and draft development plan for preservation of farming area and overall schedule and subsequence work.
- 2) Regarding the rehabilitation of sluice gate in the project area, both sides agreed stainless steel to be used as gate material for replacement.
- 3) In terms of vegetable cultivation under the income generation activities for landless households in the Pilot Project, The MAS suggested that provision to the beneficiaries would include not only vegetable seeds and fertilizers but farming tools and means for irrigation such as watering cans and treadle pumps. The Team Leader of the study team replied that farming tools of their own would be used and irrigation would be by watering cans at base. But treadle pumps would also be studied and discussed its viability and reality with beneficiaries.

The SLRD also suggested that land use arrangement for vegetable cultivation during dry season among landowners, landless households and local authority should be discussed with great care about tiller’s right. The



Team Leader agreed and took this point in discussion when initial activity starts in October.

- 4) Also for the income generation activities in the Draft Development Plan, the DAP suggested that support system on the access to market would be included to bring higher profit to landless households besides the crop/fruit production. The Team Leader agreed and replied that support activity on marketing had been included in the Pilot Project.

It was also suggested that meetings with relevant ministries related to some of income generation activities in the Draft Development Plan would be organized to improve the contents of the plan.

- 5) Regarding the land acquisition mentioned in the IEE for the Pilot Project implementation, both side agreed to minimize land acquisition through employing manual embankment method with borrow area and not to disturb existing huts or houses. It was also agreed that compensation to the inhabitants for the land and crops should be properly made according to the recent actual measures being undertaken by the ID.
- 6) JICA Myanmar Office confirmed that implementation schedule described in the Draft Development Plan would cover for all components. The Team Leader replied that implementation schedule should be established on component basis. The one prepared in the current Draft Development Plan is only for the agricultural and rural infrastructure component. Implementation schedule for others would be prepared through more study and discussion with Myanmar side.
- 7) Regarding the rehabilitation of dike and sluices, the ID inquired that any implementation would follow the Pilot Project. The Team Leader replied that under this study project the Pilot Project was only implementation activity being scheduled therefore the MOAI should make necessary effort to procure the fund for further implementation from own government and/or donors. The Team Leader explained that the Development Plan would be established for convenient use for the budget procurement.

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Attachment-1

List of Steering Committee Member

Chairman

1. U Than Aye Acting Director General, Department of Agricultural Planning, Ministry of Agriculture and Irrigation.

Co-Chairman

2. U Hla Baw Deputy Director General, Irrigation Department Ministry of Agriculture and Irrigation

Member

3. U Maung Maung Yi General Manager, Myanmar Agriculture Service Ministry of Agriculture and Irrigation (OBO U Ohn Than, MD)
4. U Soe Hlaing Director, Agriculture Mechanization Department Ministry of Agriculture and Irrigation (OBO U Win Maw, DG)
5. U Thein Win Director, Settlement and Land Records Department Ministry of Agriculture and Irrigation (OBO U Win Kyi, DG)
6. U Sein Hla Tun Deputy General Manger, Myanmar Agriculture Development Bank, Ministry of Agriculture and Irrigation (OBO U Tin Lwan, MD)

Secretary

7. U Aung Win Director, Irrigation Department Ministry of Agriculture and Irrigation

Embassy of Japan

- 8 Mr. Mitsuji SUZUKA Counselor, Embassy of Japan

JICA Myanmar Office

9. Mr. Hideo Miyamoto Representative of JICA Myanmar Office

JICA Project Team

10. Mr. Shunichi HOSONO Leader of JICA Study Team

Note: OBO; on behalf of

List of Attendance on Steering Committee

No.	Name	Department
1.	U Than Aye	Department of Agricultural Planning
2.	U Aung Hlaing	Department of Agricultural Planning
3.	Daw Myat Thuzar Thein	Department of Agricultural Planning
4.	Daw Htay Htay	Department of Agricultural Planning
5.	Daw Nyo Nyo Mar	Department of Agricultural Planning
6.	Daw Soe Ma Ma	Department of Agricultural Planning
7.	Daw Nwe Nwe San	Department of Agricultural Planning
8.	U Tin Maung Ohn	Irrigation Department
9.	U San Htoo	Irrigation Department
10.	Daw Soe Tint	Irrigation Department
11.	U Htay Aung Shein	Irrigation Department
12.	U Htay Aung Tin	Settlement and Land Record Department
13.	U Maung Maung Yi	Myanma Agriculture Service
14.	U Sein Hla Tun	Myanma Agriculture Development Bank
15.	U Win Maung	Agriculture Mechanization Department
16.	Mr. Hideo MIYAMOTO	Chief Representative of JICA Myanmar Office
17.	Mr. Minoru YOSHIDA	Project Formulation Advisor, JICA Myanmar Office
18.	U Kyaw Lwin Oo	JICA Myanmar Office
19.	Mr. Shunichi HOSONO	Leader of JICA Study Team
20.	Mr. Hironori TAKAHASHI	Irrigation and Drainage Expert of JICA Study Team
21.	Mr. Hideki SATO	Project Coordinator of JICA Study Team
22.	U Kyaw Kyaw Aung	Counterpart, Irrigation Department
23.	U Saw Kyaw Htin Lay	Counterpart, Myanma Agriculture Service
24.	Ms. Kyawt Yin Min Thein	Office Secretary of JICA Study Team

MINUTES OF THE MEETING

FOR

**THE PROJECT FOR PRESERVATION OF FARMING AREA FOR URGENT
REHABILITATION OF AGRICULTURAL PRODUCTION AND RURAL LIFE
IN AREA AFFECTED BY CYCLONE NARGIS IN MYANMAR**

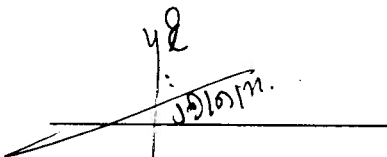
BETWEEN

THE MINISTRY OF AGRICULTURE AND IRRIGATION

AND

JICA Project Team

Nay Pyi Taw, 25th August 2011



**U Than Aye
Chairman of the Steering Committee
Director General
Department of Agricultural Planning
Ministry of Agriculture and Irrigation
The Government of the Union of Myanmar**



**Mr. Shunichi HOSONO
Leader
Project Team
Japan International Cooperation Agency
Japan**

Following the Scope of Work (hereinafter referred to as "S/W") on "The Project for Preservation of Farming Area for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas Affected by Cyclone Nargis in the Union Myanmar" (hereinafter referred to as "the Project"), which has been agreed upon between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Government of the Union of Myanmar on 6th October 2009, JICA has sent the Project Team headed by Mr. Shunichi HOSONO of the Sanyu Consultants Inc. to the Union of Myanmar.

At the end of the project activities commenced in December 2009, the JICA Project Team submitted 20 copies of the Draft Final Report (hereinafter to as "Df/R") to the Ministry of Agriculture and Irrigation (hereinafter referred to as "MOAI").

The 4th Steering Committee Meeting as chaired by U Than Aye, Director General, Department of Agricultural Planning, MOAI was held at the conference room of the MOAI on 25th August 2011 for the explanation and discussion of the Df/R. The list of the Steering Committee Member is shown in Attachment-1 and the list of participants attended in the 4th Steering Committee Meeting in Attachment-2. The following are major outcomes of the meeting.

- 1) The 4th Steering Committee approved the contents of the Draft Final Report such as the pilot project activities implemented, Development Plan formulated for the preservation of farming area, conclusion and recommendations. The Chairman of the Steering Committee expressed great appreciation to JICA Study Team, JICA Myanmar Office and MOAI officials for the comprehensive Df/R that will be used for the development of not only the project area but also other similar area being affected by cyclones.
- 2) In the income generation component, the MAS questioned that fishing-related activity could be considered for landless people. The Team Leader of the study team replied that five activities were initially considered including technical improvement of fish processing. After examination, it was concluded that fish processing improvement would be difficult as income generation by landless people due to absence of quality standard and guarantee of profit increment.
- 3) In relation to quality rice seed production project, the MAS inquired that seed multiplication of pulses, which are widely cropped in the delta area after rice harvest, could be considered. The Team Leader replied that target farmland in the project is polder area located in the lower delta where surrounded by salty river water. Therefore irrigation practice which needs for pulse cropping in the polder is limited. Seed multiplication of pulses would be developed with target area in the upper delta.



Attachment-1

List of Steering Committee Member

Chairman

1. U Than Aye Acting Director General, Department of Agricultural Planning, Ministry of Agriculture and Irrigation.

Co-Chairman

2. U Aung Win Deputy Director General, Irrigation Department Ministry of Agriculture and Irrigation

Member

3. U Kyaw Yee General Manager, Myanmar Agriculture Service Ministry of Agriculture and Irrigation (OBO U Ohn Than, MD)
4. U Soe Hlaing Director, Agriculture Mechanization Department Ministry of Agriculture and Irrigation (OBO U Win Maw, DG)
5. U Aye Maung Sein Director, Settlement and Land Records Department Ministry of Agriculture and Irrigation (OBO U Win Kyi, DG)
6. U Hla Shwe Managing Director, Myanmar Agriculture Development Bank, Ministry of Agriculture and Irrigation (OBO U Tin Lwan, MD)
- Secretary**
7. U Han Than Director, Irrigation Department Ministry of Agriculture and Irrigation

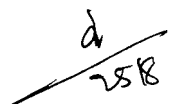
JICA Myanmar Office

8. Mr. Hideo Miyamoto Representative of JICA Myanmar Office

JICA Project Team

9. Mr. Shunichi HOSONO Leader of JICA Study Team

Note: OBO; on behalf of



Attachment-2

List of Attendance on Steering Committee

No.	Name	Department
1.	U Than Aye	Department of Agricultural Planning
2.	U Hla Kyaw	Department of Agricultural Planning
3.	U Aung Hlaing	Department of Agricultural Planning
4.	Daw Myat Thuzar Thein	Department of Agricultural Planning
5.	Daw Kyawt Yin Min Thein	Department of Agricultural Planning
6.	U Tint Zaw	Irrigation Department
7.	U Aung Win	Irrigation Department
8.	U San Htoo	Irrigation Department
8.	U Han Than	Irrigation Department
9.	U Tin Winn	Irrigation Department
10.	U Min Aung Than	Irrigation Department
11.	Daw Soe Tint	Irrigation Department
12.	Daw Aye Aye Hlaing	Irrigation Department
13.	U Aung Thu Kywe	Irrigation Department
14.	U Kyaw Naing Oo	Irrigation Department
15.	U Kyi Wai	Irrigation Department
16.	U Htay Aung Tint	Irrigation Department
17.	U Hla Shwe	Myanma Agriculture Development Bank
18.	U Aye Maung Sein	Settlement and Land Records Department
19.	U Kyaw Yee	Myanma Agriculture Service
20.	U Win Myaing	Agriculture Mechanization Department
21.	Mr. Hideo Miyamoto	Chief Representative of JICA Myanmar Office
22.	Mr. Minoru YOSHIDA	Project Formulation Advisor, JICA Myanmar Office
23.	Mr. Shunichi HOSONO	Leader of JICA Study Team



- | | |
|--------------------------|--|
| 24. Mr. Kazuhisa OKADA | Sub team Leader of JICA Study Team |
| 25. Mr. Yoshihiro SAGAWA | Polder and Gate Design Expert of JICA Study Team |
| 26. Daw Thwe Thwe | Civil Engineer of JICA Study Team |
| 27. U Zaw Win | Counterpart, Irrigation Department |
| 28. U Saw Kyaw Htin Lay | Counterpart, Myanmar Agriculture Service |



APPENDIX 3
*ESTIMATION OF
EXTERNAL HIGH WATER LEVEL
FOR EMBANKMENT DESIGN*

APPENDIX 3

Estimation of External High Water Level for Embankment Design

	<u>Page</u>
A3-1 Definition of External High Water Level.....	A3-1
A3-2 Astronomical Spring Tide.....	A3-1
A3-3 Probable Storm Surge Amplitude.....	A3-4
A3-4 Maximum Water Level from River Mouth Upstream-ward.....	A3-5
A3-5 Spatial Distribution of External High Water Level.....	A3-10
A3-6 Design Crest Level of Embankment.....	A3-13

Appendix 3

Estimation of External High Water Level for Embankment Design

A3.1 Definition of External High Water Level

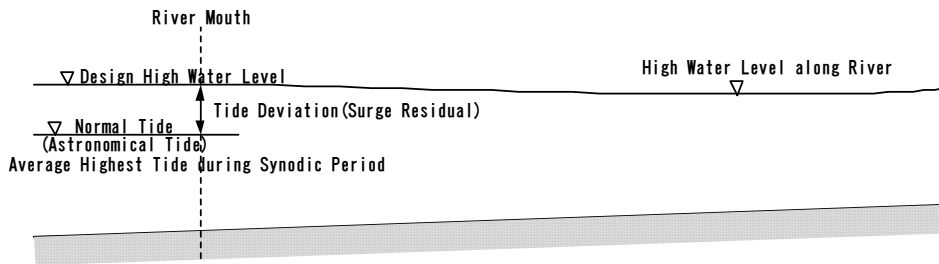


Figure A3.1 Image of High Water Level along the River

Defining that “High water level at the delta coastline (or at the river mouths) = averaged highest astronomical tide during spring tide in May + probable storm surge residual of 50 year recurrence”, high water level along the river is estimated applying the pattern and distribution of flood water levels along the rivers as simulated for the 1974-type flood in the existing available report^{*1}.

*1: A one dimensional analysis of the tidal hydraulics of deltas, Nicholas Odd, Report OD 44, July 1982, Hydraulics Research Station, UK

A3.2 Astronomical Spring Tide

Hourly calculated data of astronomical tide are available from web site^{*2} at Diamond Island, located at about 10 km off the Ayeyawady delta coast opposite the mouth of the Ngawun (Bassein) River, and Elephant Point at the mouth of Yangon River.

*2: [//www.eri.u-tokyo.ac.jp/namegawa/sumatera/tide/data/index.htm](http://www.eri.u-tokyo.ac.jp/namegawa/sumatera/tide/data/index.htm)

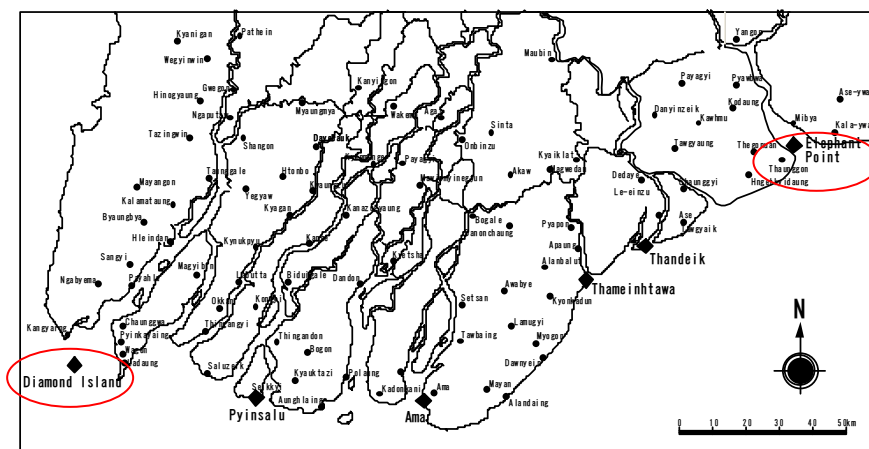


Figure A3.2 Location of Tidal Station

Astronomical tides of May 2005 are extracted from a series of dataset, and spring tides during the synodic period are averaged to generate highest tide level for use of embankment design as shown respectively in Figure A3.3 and A3.4.

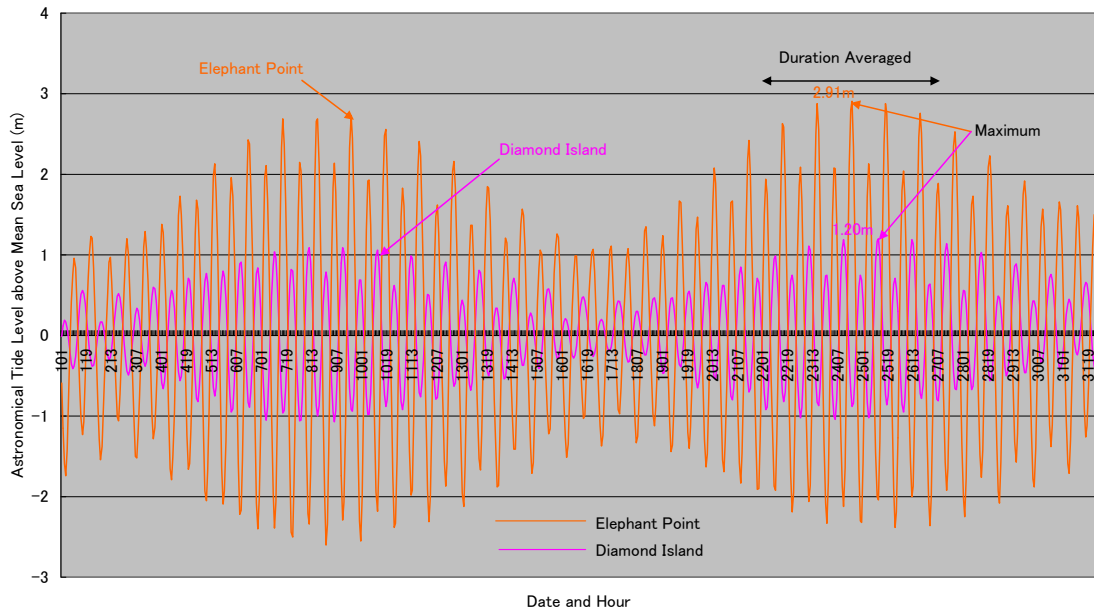


Figure A3.3 Astronomical Tide at Diamond Island and Elephant Point

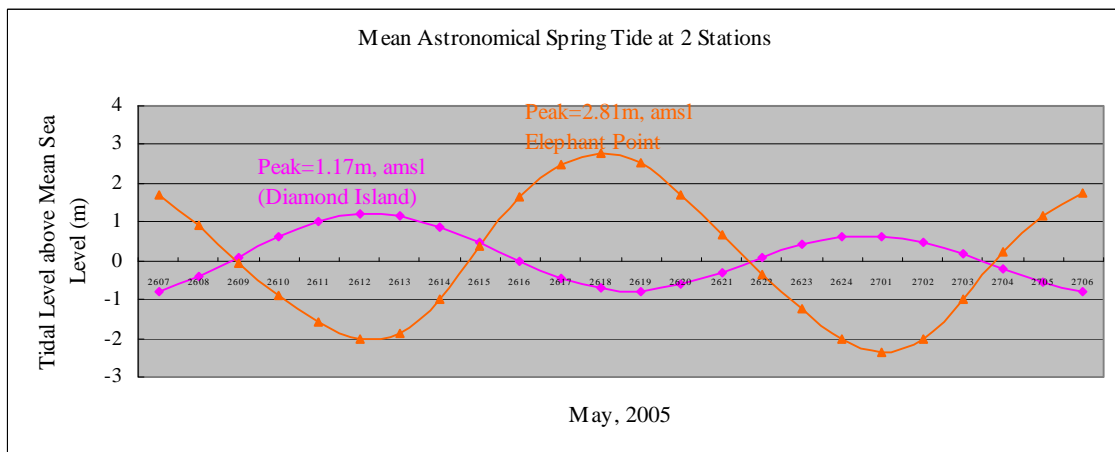


Figure A3.4 Averaged Astronomical Spring Tide at Two Stations

Spatial Distribution of Astronomical Tide along the Delta Coast

Diamond Island is about 250 km away from Elephant Point and figures A3.3 and A3.4 denote that tidal ranges between high tide and low tide are relatively big at Elephant Point and small at Diamond Island. It is therefore necessary to spatially distribute the difference of tidal range between these two stations taking an acceptable manner.

In general, the highest astronomical tide can be estimated by summing all the significant semi-diurnal and diurnal tidal constituents, and is the highest tidal level that will occur purely as a result of tidal motions excluding meteorological effects. However, it is common to extract major four tidal constituent for evaluation of tidal amplitude, and fortunately related figures are available in the existing report*³ as given in Table A3.1.

*3: Irrawaddy Delta Hydrological Investigations and Delta Survey, Volume 3 – Analysis, Sir William Halcrow & Partners, January 1982

Table A3.1 Amplitude of Major Tidal Constituents Actually Measured in 1978-79

Station	Diamond Island	Pyinsalu	Ama	Thameinhtawa	Thandeik	Elephant Point
Latitude	15 51'	15 48'	15 46'	16 07'	16 12'	16 30'
Longitude	94 17'	94 48'	95 16'	95 44'	95 55'	96 18'
O1	0.05	0.051	0.06	0.069	0.077	0.093
K1	0.13	0.125	0.166	0.168	0.059	0.205
P1		0.041	0.055	0.055	0.02	0.068
M2	0.67	0.805	0.809	0.624	0.806	1.75
S2	0.3	0.33	0.395	0.38	0.36	0.701
N2		0.169	0.164	0.113	0.126	0.334
K2		0.09	0.108	0.104	0.098	0.191
Sum of Major 4 Constituents	1.15	1.311	1.43	1.241	1.302	2.749
Distance from Bassein Mouth	0	55	100	175	200	250 km

Sums of major four constituents, namely O₁, K₁, M₂ and S₂ are then plotted against the distance along the delta coast from the Ngawun (Bassein) River mouth as given in Figure A3.5. Location of the stations shown above is supplementary noted in Figure A3.2.

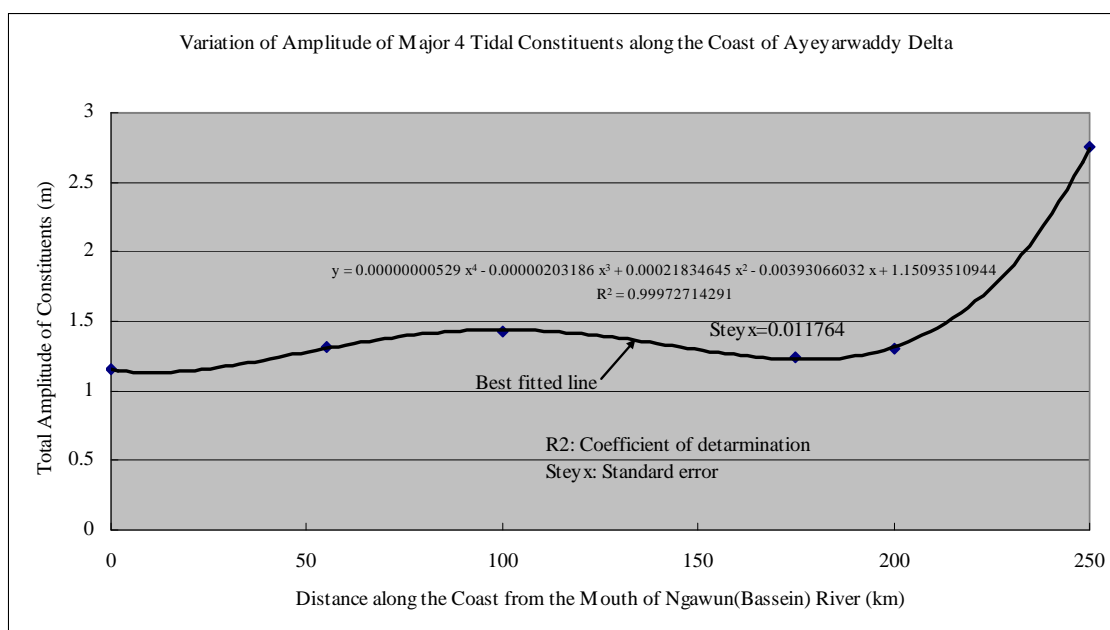


Figure A3.5 Variation of Amplitude of 4 Major Constituents along the Delta Coast

Approximation in a form of polynomial equation presents a good correlation between given and predicted values of tidal amplitudes indicating a coefficient of determination at 0.9997. The highest astronomical tides at river mouths in consideration are interpolated on this equation by giving distances along the delta coast from the mouth of Ngawun (Bassein) River, as shown in Figure A3.6.

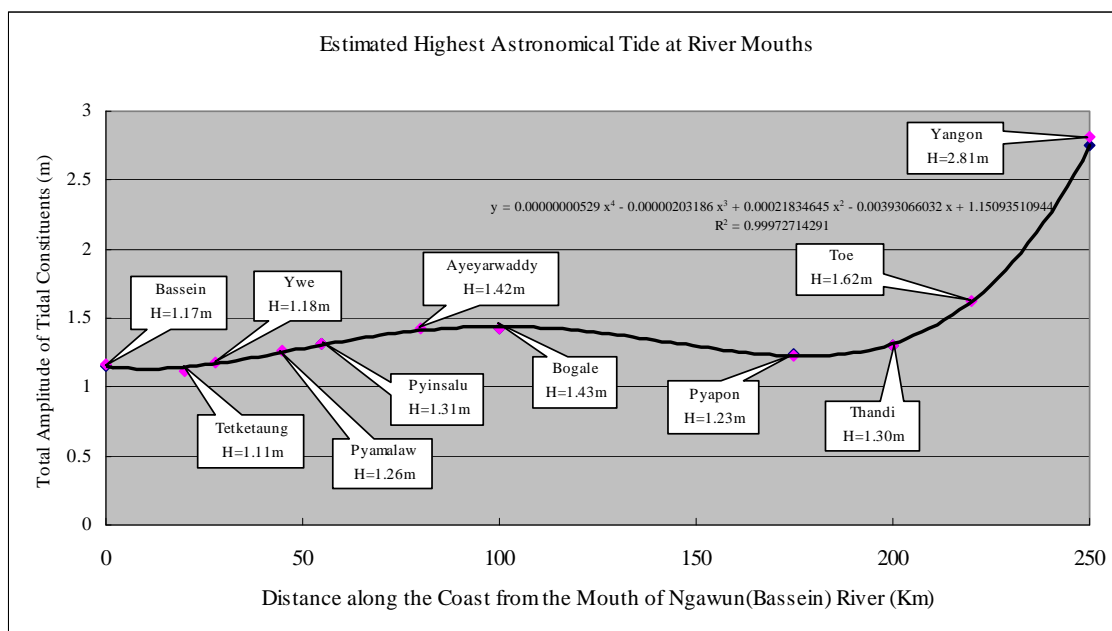


Figure A3.6 Estimated Higher Highest Astronomical Tide at River Mouths

A3.3 Probable Storm Surge Amplitude

Probable Surge Amplitudes are provided from Hydrology Branch of Irrigation Department as given in Table A3.2.

Table A3.2 Return Period and Surge Amplitude at Elephant Point

Return Period	5	10	20	25	50	100	200
Surge (m)	0.889	1.046	1.196	1.244	1.391	1.537	1.682

Above figures give probable surge amplitudes at Elephant Point at the mouth of Yangon River. Due mainly to topographical reason, surge amplitude along the Ayeyarwady delta coastline is evaluated to be much smaller than that observed at Elephant Point, providing a ratio of coastline surge against Elephant Point surge ranging from about 0.6^{*4} to 0.75^{*1}. For the sake of safety, 0.75 is applied to estimate surge amplitude at coastline. At the mouths of rivers between PyaMaLaw and Yangon, surge amplitudes are interpolated linearly according to distance from the Yangon river mouth.

*4: On Tide and Storm Surges, IHP/OHP, 1987

A3.4 Maximum Water Level from River Mouth Upstream-ward

Setting up the highest tidal level (i.e. highest astronomical spring tide + probable tidal surge amplitude of once in 50 years occurrence) at the mouth of each river, water levels along the river course upstream-ward are estimated employing the simulated results of flood hydraulics presented in the said report ^{*1}. At the river mouths, the following figures are given.

Table A3.3 Tidal Conditions Given at the River Mouths

River	Distance from Bassein River Mouth (km)	Peak Sea Level at 1975 Cyclone	50 Years Return Period		
			High Tide (m, amsl)	Surge (m)	Total (m, amsl)
NgaWun (Bassein)	0	1.98	1.17	1.04	2.21
TetKeTaung	20	1.98	1.11	1.04	2.15
Ywe	28	1.99	1.18	1.04	2.22
PyMaLaw	45	1.98	1.26	1.04	2.30
PyinSalu	55	2.00	1.31	1.07	2.38
Ayeyawady	80	2.01	1.42	1.14	2.56
Bogale	100	1.94	1.43	1.17	2.60
Pyapon	175	2.12	1.23	1.28	2.51
Thandi	200	2.17	1.30	1.32	2.62
Toe (China Bakir)	220	2.40	1.62	1.35	2.97
Yangon	250	2.80	2.81	1.39	4.20

Notes:

- 1) Tidal condition during 1975 cyclone was neap tide. Maximum surge amplitude at delta coastline was estimated at 1.60m. $1.98\text{m (Peak sea level)} - 1.60\text{m (surge amplitude)} = 0.38\text{m}$ (flood tide level during neap tide at Diamond Island, thus assumptions are reasonable.
- 2) Spring tide conditions are used for estimation of high water level for embankment design.

Flood Water Levels along the River Courses

Flood water levels along the river systems are then approximated, starting from the given magnitude of tidal water levels (astronomical tide + surge amplitude) at the river mouths upstream-ward, in accordance with the simulated pattern of flood during high tides explained in the above mentioned ^{*1} Report. Spatial distribution of the maximum water levels in the river systems are as visualized in Figure A3.7.

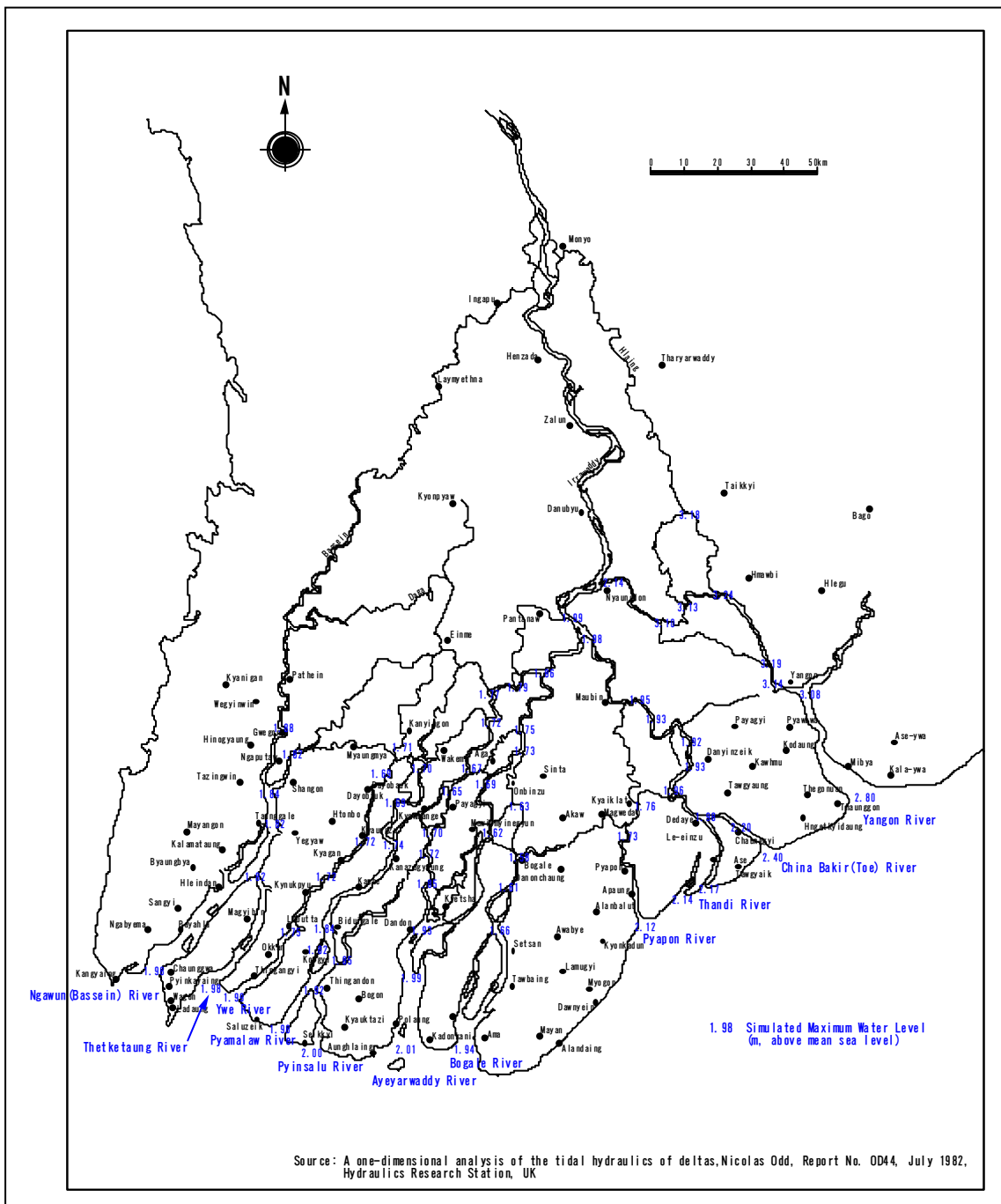


Figure A3.7 Maximum Water Level along River Courses Simulated for 1975 Cyclone Storm

Above approximations were made on EXCEL work-sheets as presented in Figures A3.8 (1) to A3.8 (11).

Figure A3.8 (1) Profile of NgaWun(Bassein) River during High Tide, (Simulated)

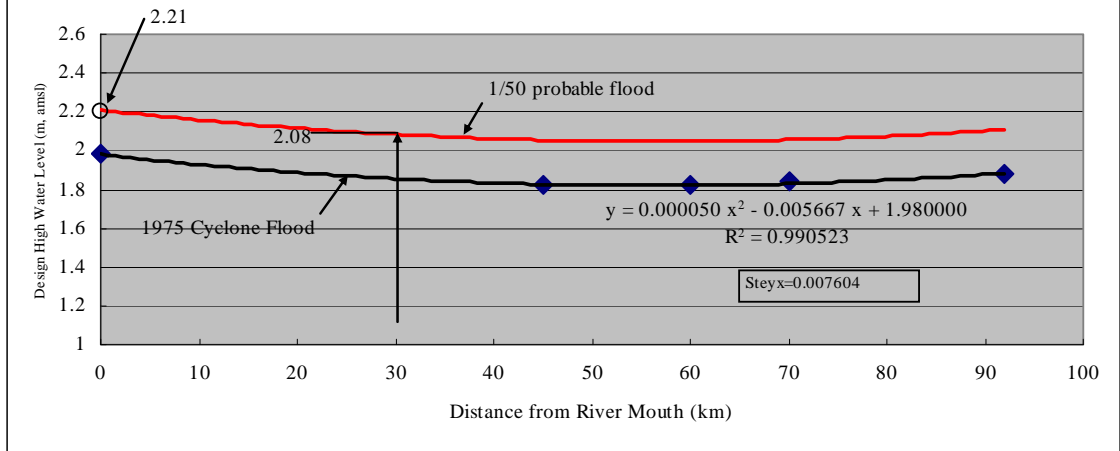


Figure A3.8 (2) Profile of TetkeTaung River during High Tide, (Simulated)

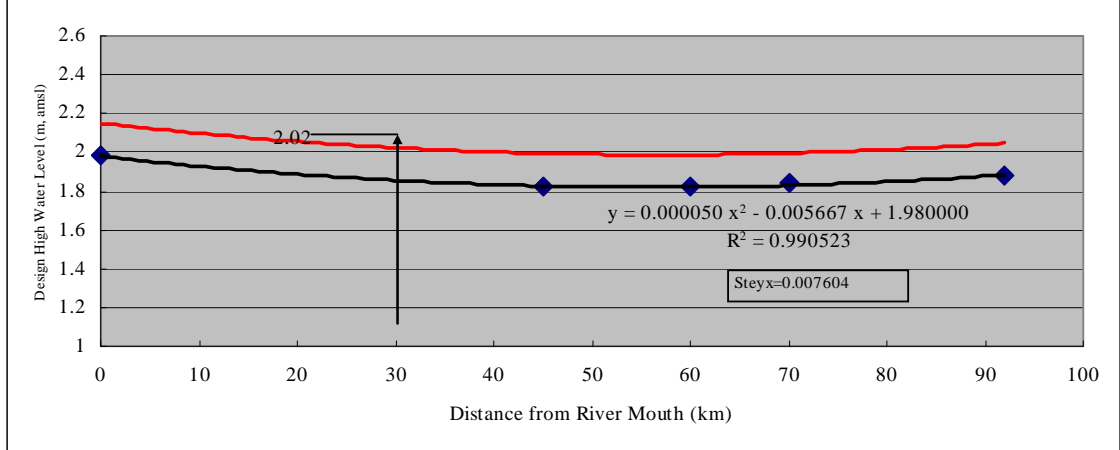


Figure A3.8 (3) Profile of Ywe River during High Tide, (Simulated)

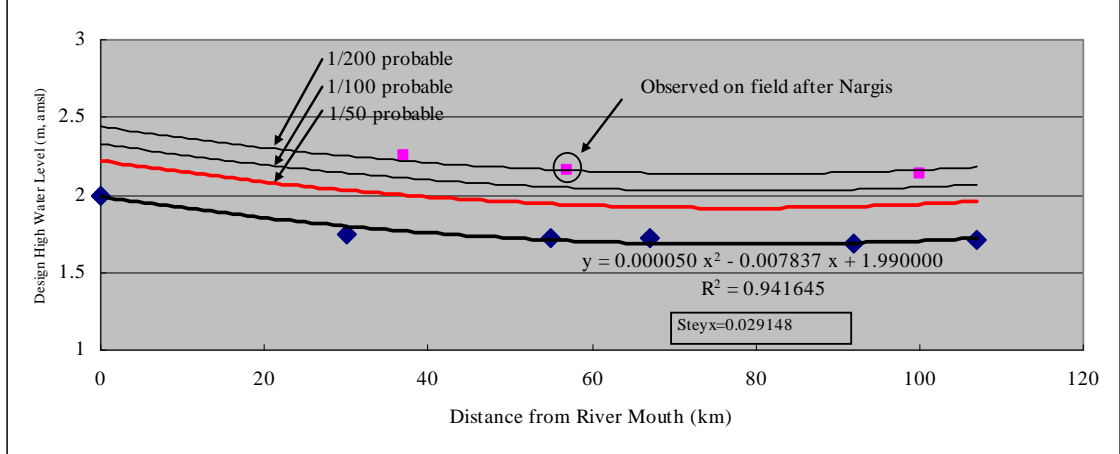


Figure A3.8 (4) Profile of PyaMaLaw River during High Tide (Simulated)

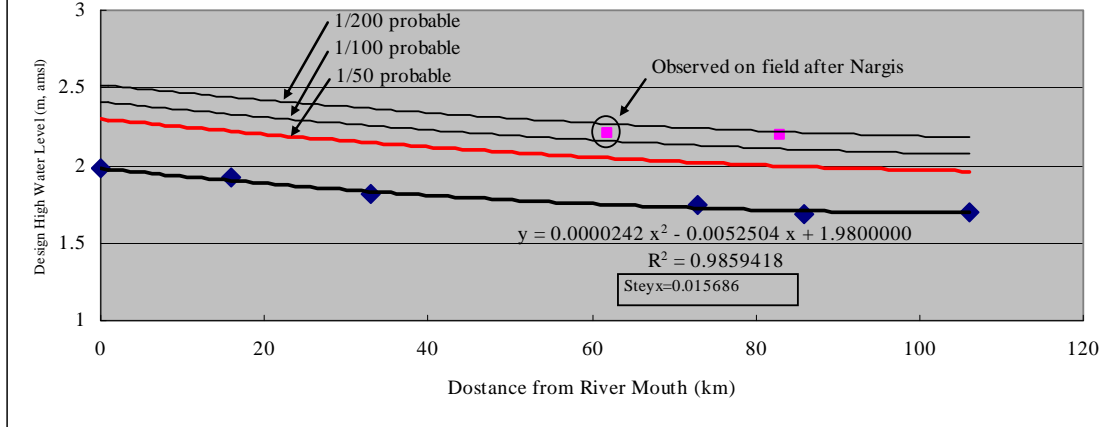


Figure A3.8 (5) Profile of PyinSalu River during High Tide (Simulated)

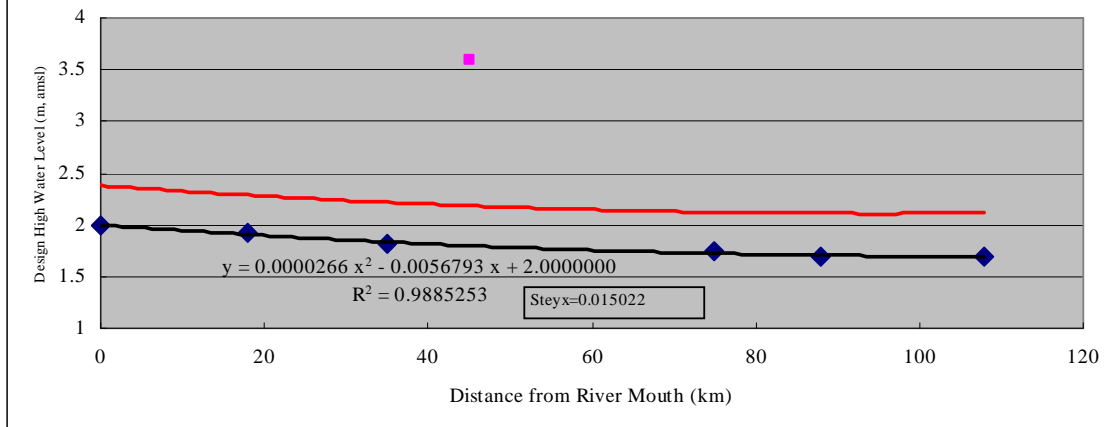


Figure A3.8 (6) Profile of Ayeyarwaddy River during High Tide (Simulated)

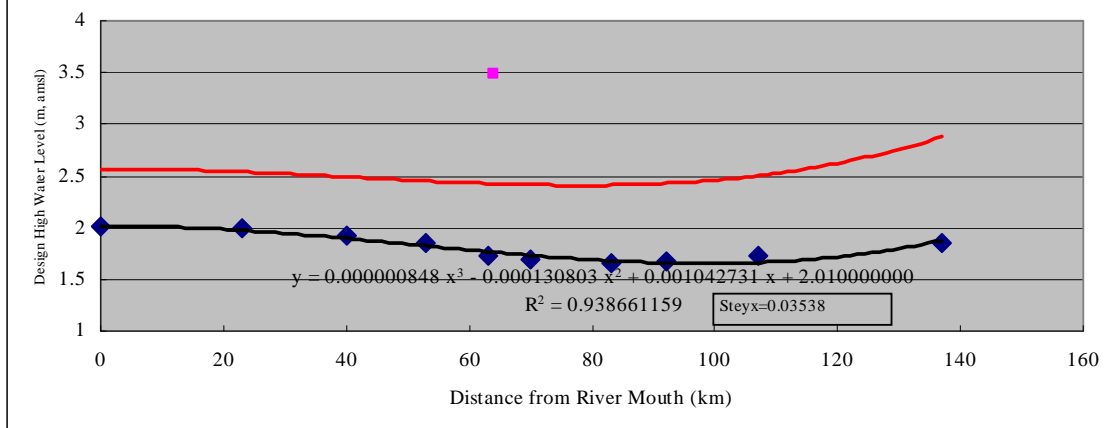


Figure A3.8 (7) Profile of Bogale River during High Tide (Simulated)

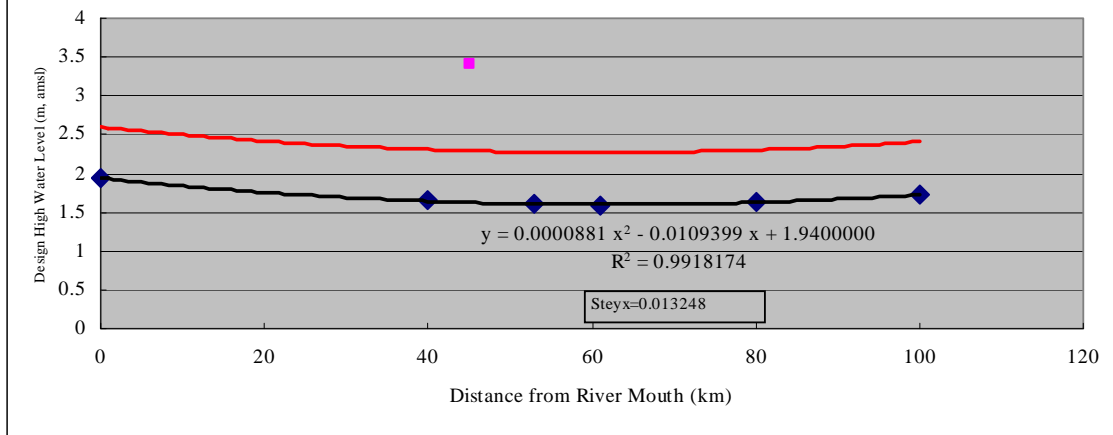


Figure A3.8 (8) Profile of Pyapon River during High Tide (Simulated)

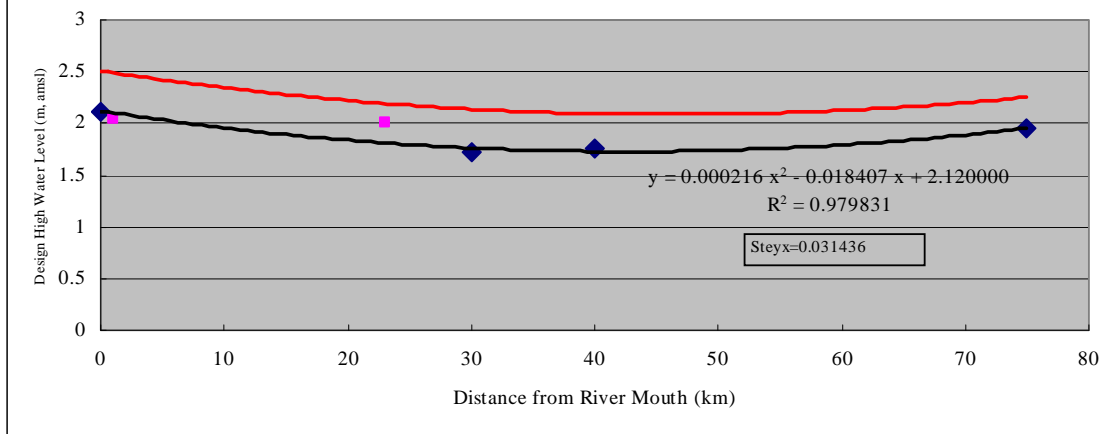
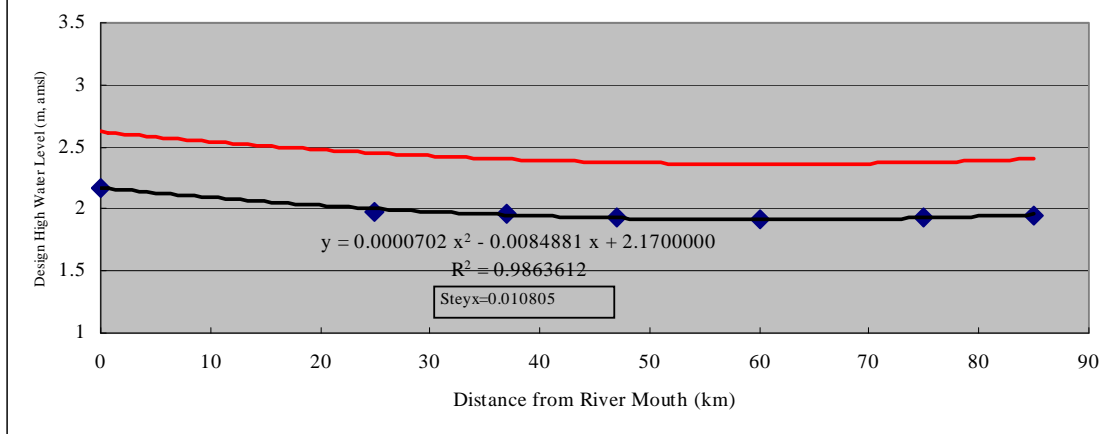
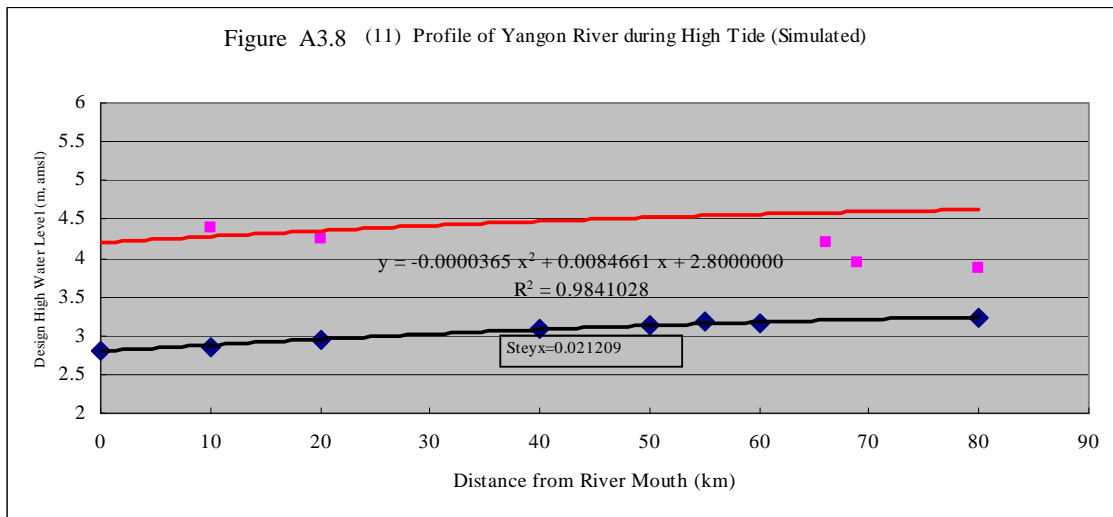
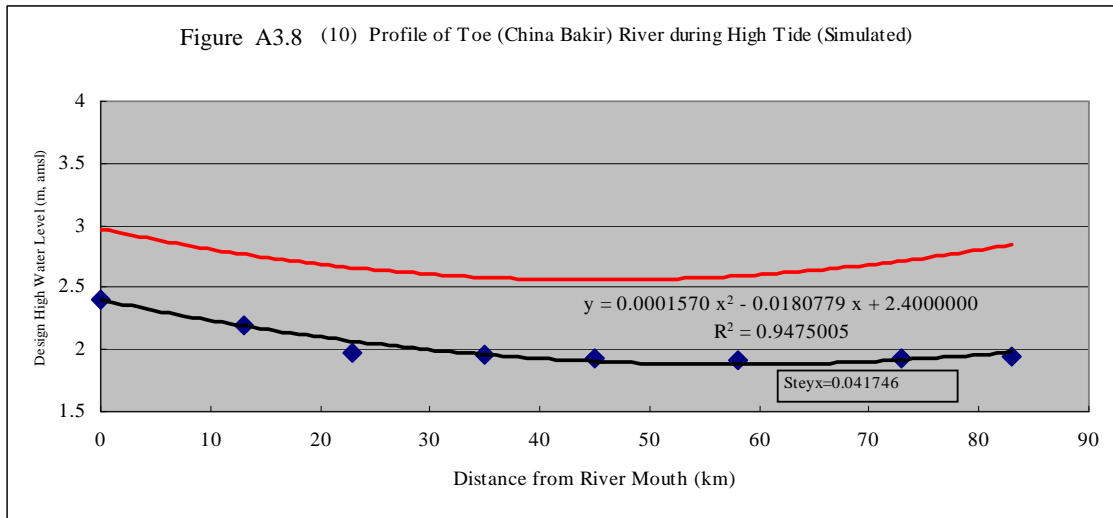


Figure A3.8 (9) Profile of Thandi River during High Tide (Simulated)





A3.5 Spatial Distribution of External High Water Level

Calculated water levels are then plotted in a plan view, as given in Figure A3.9, so that spatial distribution of flood water levels can be seen on a map. An iso-line map of the maximum water levels is also generated as shown in Figure A3.10.

Figure A3.10 would provide a maximum external water level elsewhere embankment is planned for implementation. It ought to be said that a freeboard is considered in addition to the maximum water level whenever crest elevation of embankment is determined.

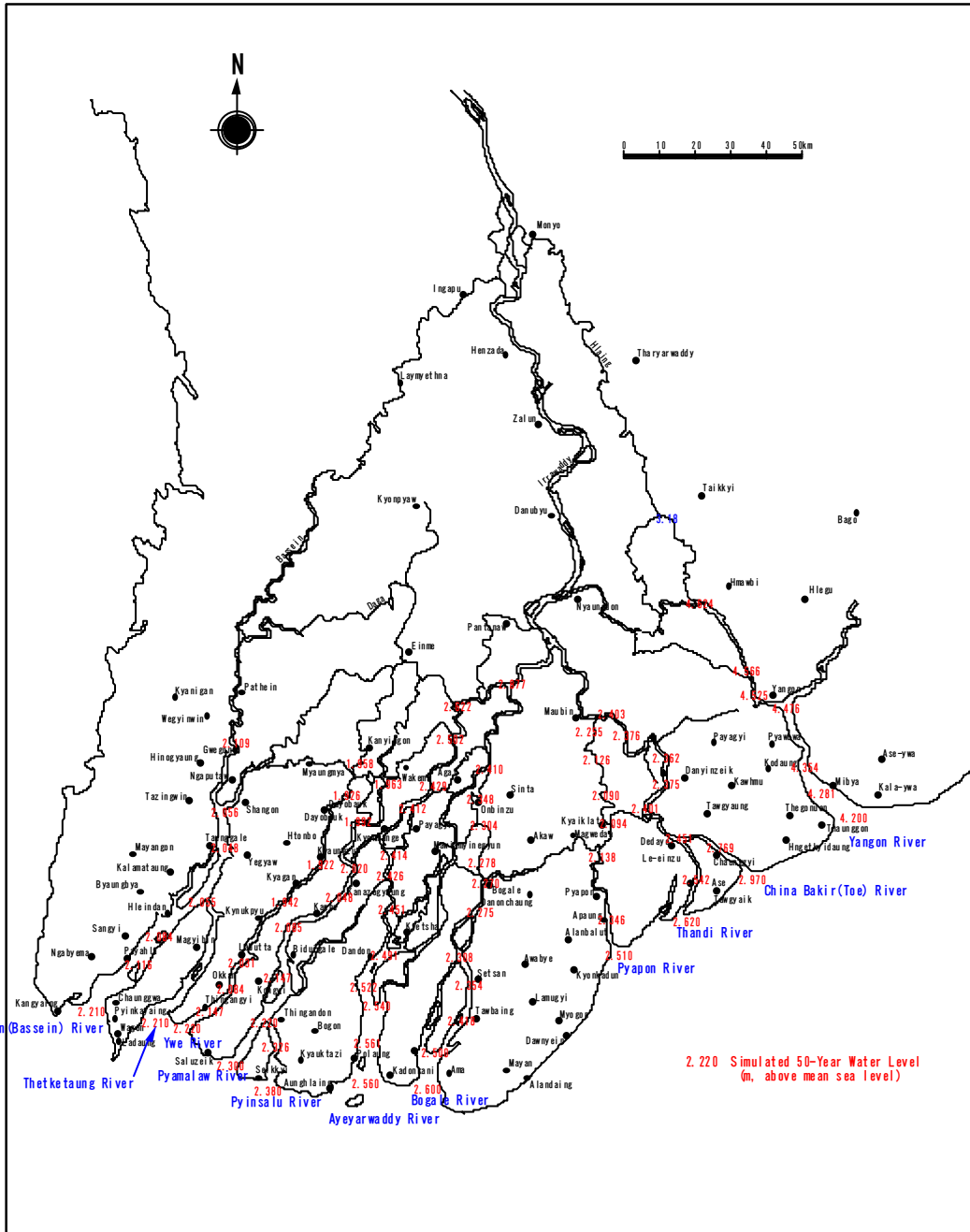


Figure A3.9 Spatial Distribution of Maximum Water Level during 1/50 Probable High Tide

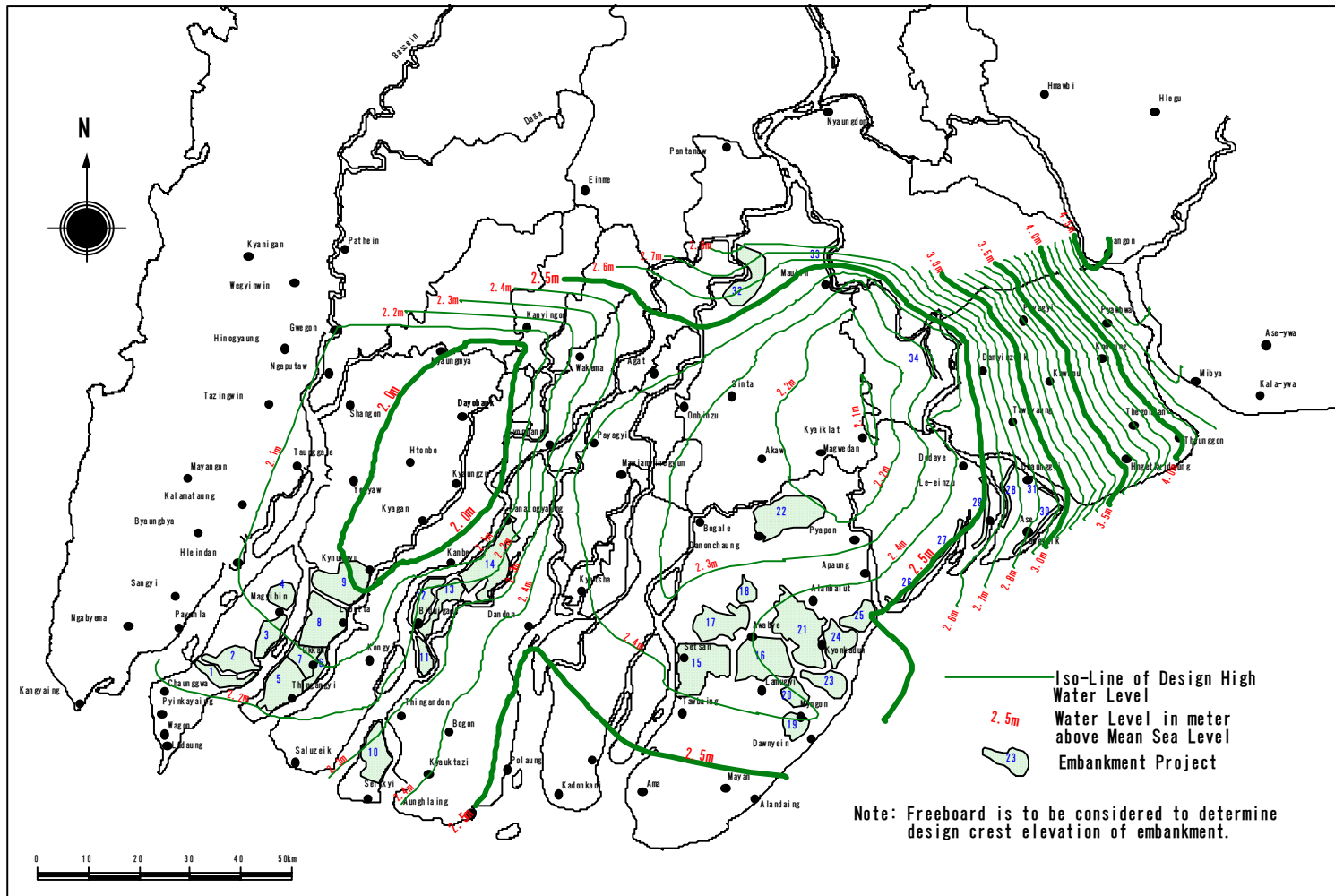


Figure A3.10 Iso-lines of External High Water Levels for Embankment Design

A3.6 Design Crest Level of Embankment

(1) Inland Embankment

For example in case of Labutta North embankment, embankments face the Tetketaung River on the west and Ywe River on the east, located about 30km upstream from river mouths. Simply from iso-lines of Figure A3.10, a line of 2.1m can be read for the Labutta North embankment. As for freeboard of river dike, the followings are standardized in Japan.

Table A3.4 Freeboard for River Dike

Design Flood Discharge (m ³ /sec)	Freeboard (m)
$Q < 200$	H = 0.6m
$200 < Q < 500$	H = 0.8m
$500 < Q < 2,000$	H = 1.0m
$2,000 < Q < 5,000$	H = 1.2m
$5,000 < Q < 10,000$	H = 1.5m
$10,000 < Q$	H = 2.0m

More than 2,000 m³/sec of flow is used to be maintained in the TatkeTaung River during flood requiring a freeboard of 1.2m, on the other hand greater than 500 m³/sec but less than 2,000 m³/sec is usually observed in Ywe River requiring a freeboard of 1.0m. Thus crest level of embankment would be more than $2.1 + 1.2 = 3.3\text{m}$ (10.83 ft) on the west side and $2.1 + 1.0 = 3.1\text{m}$ (10.17 ft) on the east side. As a standard to estimate flow discharge in the river during severe flood, Figure A3.11 extracted from the said report^{*1} would be useful.

(2) Embankment Located on or nearby Coastline

When embankment is located on or nearby the coastline, high water levels at the river mouths are employed directly, together with estimated design wave height and freeboard.

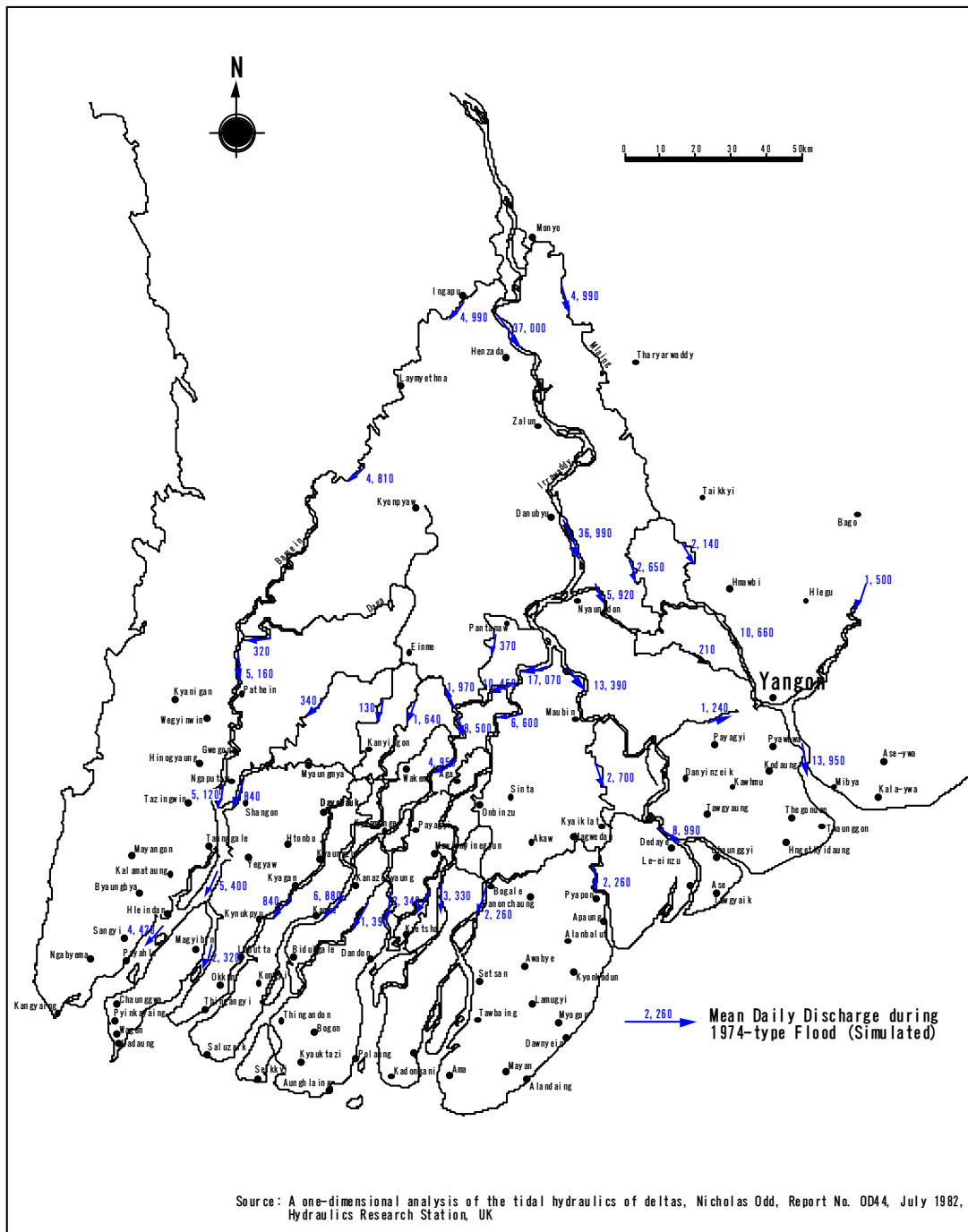


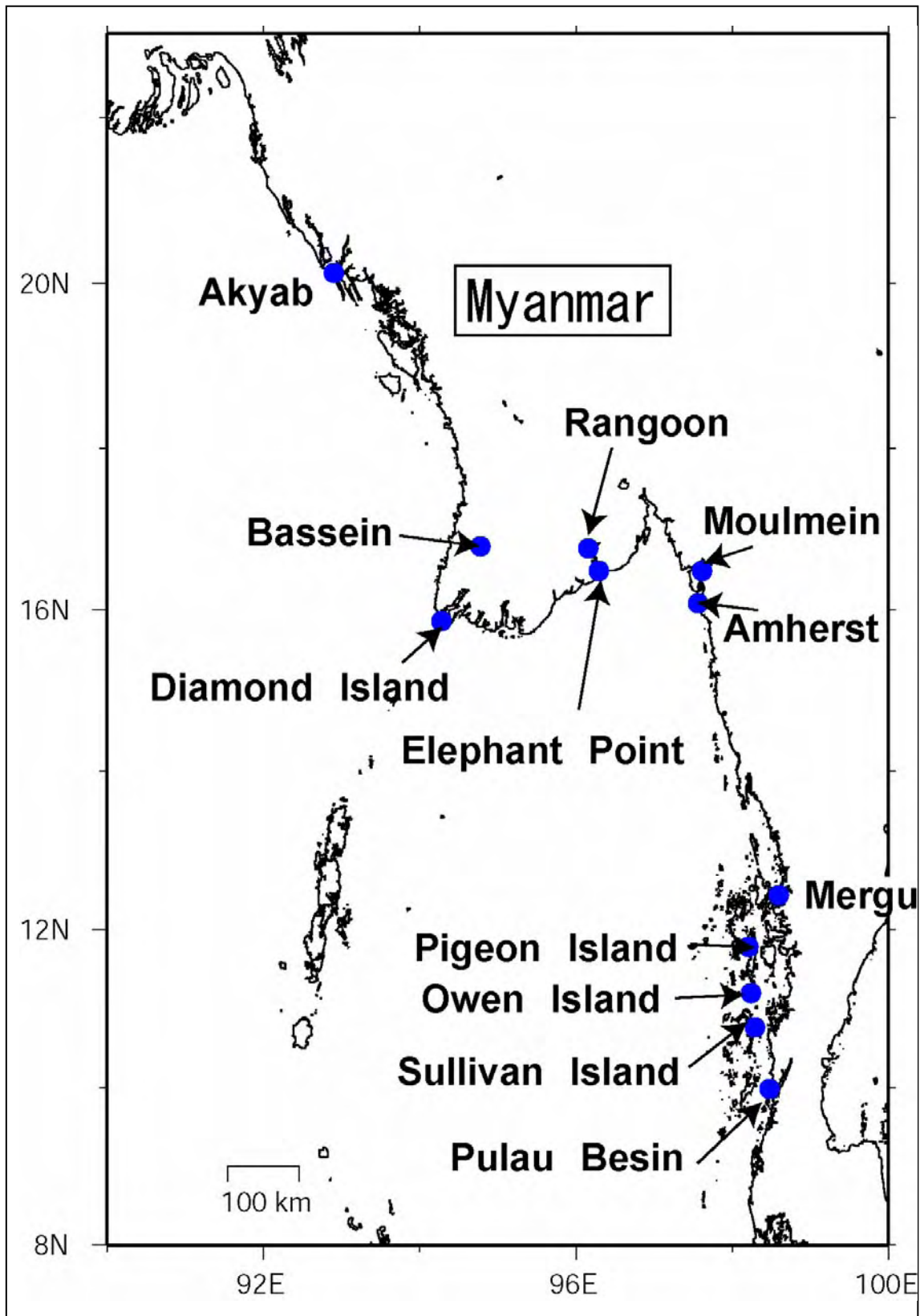
Figure A3.11 Predicted Peak 1974-type Flood Conditions with Ultimate Banking

Attached Table A: Astronomical Tide at Elephant Point for May 2005

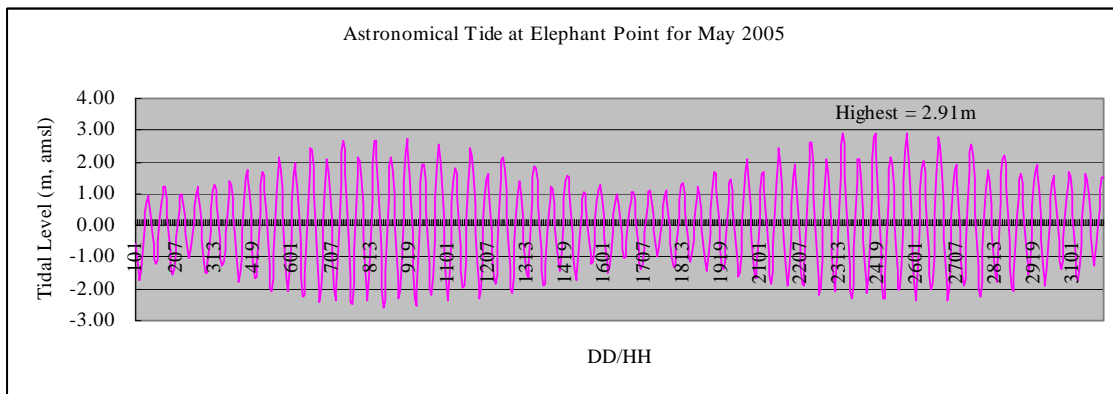
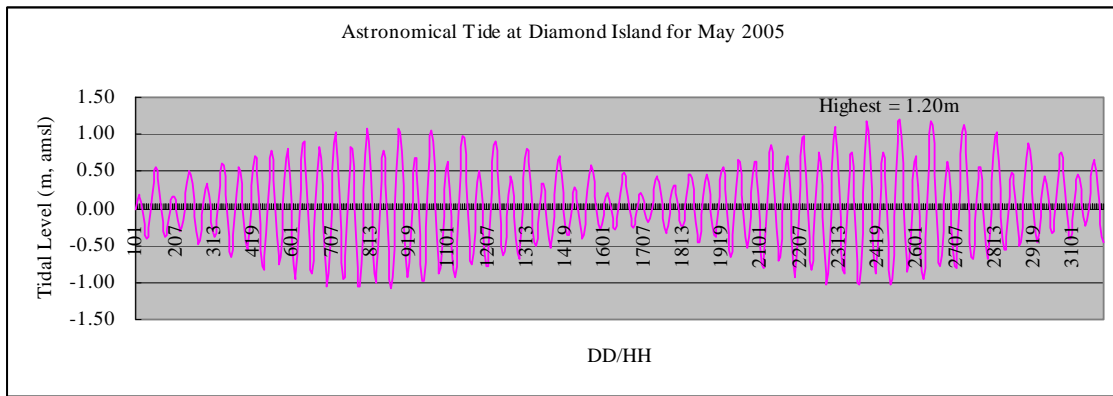
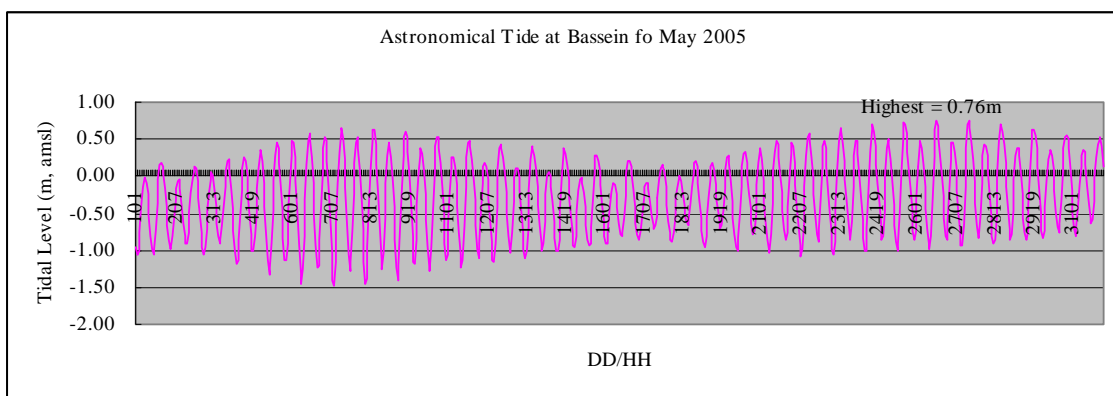
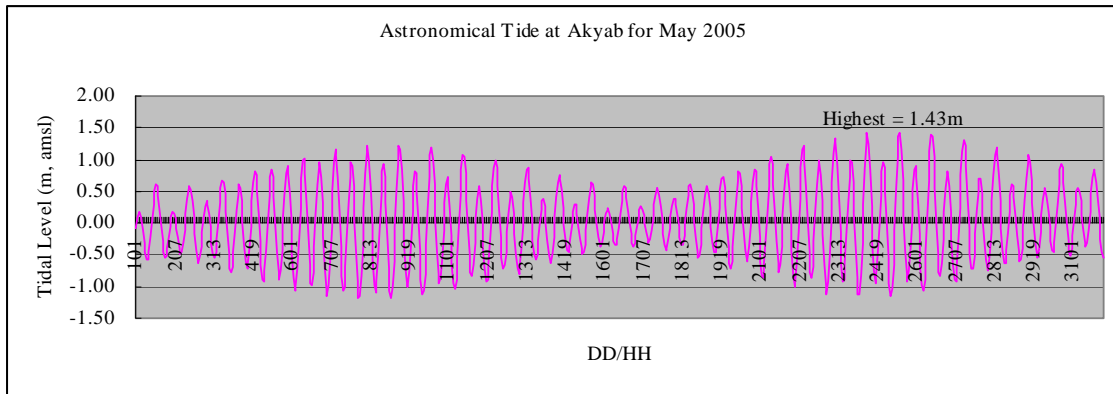
dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)
101	-0.01	501	-0.55	901	0.34	1301	0.44	1701	-0.13	2101	-0.52	2501	0.43	2901	0.38
102	0.12	502	-0.78	902	-0.12	1302	0.36	1702	0	2102	-0.75	2502	0.02	2902	0.49
103	0.19	503	-0.82	903	-0.59	1303	0.17	1703	0.11	2103	-0.8	2503	-0.45	2903	0.47
104	0.17	504	-0.65	904	-0.95	1304	-0.11	1704	0.18	2104	-0.65	2504	-0.83	2904	0.34
105	0.09	505	-0.33	905	-1.07	1305	-0.4	1705	0.2	2105	-0.32	2505	-1.02	2905	0.1
106	-0.05	506	0.06	906	-0.93	1306	-0.61	1706	0.17	2106	0.1	2506	-0.96	2906	-0.17
107	-0.21	507	0.42	907	-0.54	1307	-0.68	1707	0.08	2107	0.48	2507	-0.63	2907	-0.4
108	-0.35	508	0.67	908	-0.01	1308	-0.58	1708	-0.03	2108	0.75	2508	-0.12	2908	-0.5
109	-0.41	509	0.77	909	0.51	1309	-0.32	1709	-0.13	2109	0.85	2509	0.44	2909	-0.45
110	-0.38	510	0.66	910	0.9	1310	0.04	1710	-0.19	2110	0.76	2510	0.91	2910	-0.25
111	-0.26	511	0.39	911	1.09	1311	0.4	1711	-0.19	2111	0.5	2511	1.17	2911	0.05
112	-0.07	512	0.02	912	1.04	1312	0.68	1712	-0.14	2112	0.13	2512	1.2	2912	0.39
113	0.16	513	-0.35	913	0.76	1313	0.81	1713	-0.03	2113	-0.25	2513	0.99	2913	0.69
114	0.37	514	-0.64	914	0.31	1314	0.78	1714	0.12	2114	-0.55	2514	0.6	2914	0.86
115	0.51	515	-0.75	915	-0.21	1315	0.62	1715	0.27	2115	-0.7	2515	0.1	2915	0.89
116	0.56	516	-0.65	916	-0.66	1316	0.35	1716	0.38	2116	-0.66	2516	-0.39	2916	0.78
117	0.52	517	-0.37	917	-0.92	1317	0.03	1717	0.43	2117	-0.42	2517	-0.73	2917	0.55
118	0.4	518	0.01	918	-0.94	1318	-0.26	1718	0.42	2118	-0.07	2518	-0.86	2918	0.24
119	0.21	519	0.39	919	-0.72	1319	-0.45	1719	0.35	2119	0.3	2519	-0.75	2919	-0.08
120	0	520	0.67	920	-0.32	1320	-0.5	1720	0.21	2120	0.58	2520	-0.44	2920	-0.34
121	-0.19	521	0.8	921	0.12	1321	-0.41	1721	0.04	2121	0.71	2521	-0.02	2921	-0.46
122	-0.32	522	0.73	922	0.48	1322	-0.22	1722	-0.13	2122	0.66	2522	0.38	2922	-0.46
123	-0.38	523	0.46	923	0.69	1323	0.02	1723	-0.26	2123	0.42	2523	0.64	2923	-0.33
124	-0.37	524	0.05	924	0.69	1324	0.23	1724	-0.33	2124	0.06	2524	0.71	2924	-0.11
201	-0.28	601	-0.39	1001	0.48	1401	0.34	1801	-0.32	2201	-0.36	2601	0.59	3001	0.12
202	-0.14	602	-0.76	1002	0.11	1402	0.34	1802	-0.23	2202	-0.72	2602	0.3	3002	0.32
203	0	603	-0.95	1003	-0.35	1403	0.23	1803	-0.07	2203	-0.92	2603	-0.12	3003	0.43
204	0.11	604	-0.91	1004	-0.75	1404	0.03	1804	0.1	2204	-0.89	2604	-0.54	3004	0.43
205	0.17	605	-0.63	1005	-0.98	1405	-0.2	1805	0.23	2205	-0.63	2605	-0.85	3005	0.34
206	0.17	606	-0.2	1006	-0.98	1406	-0.41	1806	0.3	2206	-0.2	2606	-0.95	3006	0.16
207	0.11	607	0.26	1007	-0.72	1407	-0.54	1807	0.3	2207	0.3	2607	-0.8	3007	-0.06
208	-0.01	608	0.65	1008	-0.27	1408	-0.52	1808	0.22	2208	0.71	2608	-0.42	3008	-0.25
209	-0.15	609	0.89	1009	0.25	1409	-0.37	1809	0.09	2209	0.95	2609	0.09	3009	-0.34
210	-0.25	610	0.91	1010	0.71	1410	-0.11	1810	-0.05	2210	0.99	2610	0.61	3010	-0.31
211	-0.3	611	0.71	1011	0.99	1411	0.19	1811	-0.17	2211	0.81	2611	1.01	3011	-0.17
212	-0.27	612	0.34	1012	1.06	1412	0.47	1812	-0.24	2212	0.46	2612	1.19	3012	0.07
213	-0.16	613	-0.12	1013	0.91	1413	0.65	1813	-0.24	2213	0.02	2613	1.14	3013	0.34
214	0.01	614	-0.54	1014	0.56	1414	0.71	1814	-0.15	2214	-0.41	2614	0.89	3014	0.57
215	0.2	615	-0.83	1015	0.1	1415	0.63	1815	0.01	2215	-0.71	2615	0.47	3015	0.72
216	0.37	616	-0.89	1016	-0.38	1416	0.46	1816	0.19	2216	-0.82	2616	-0.02	3016	0.76
217	0.49	617	-0.7	1017	-0.73	1417	0.22	1817	0.35	2217	-0.7	2617	-0.45	3017	0.69
218	0.52	618	-0.33	1018	-0.88	1418	-0.03	1818	0.45	2218	-0.38	2618	-0.72	3018	0.5
219	0.47	619	0.11	1019	-0.8	1419	-0.25	1819	0.47	2219	0.03	2619	-0.78	3019	0.24
220	0.33	620	0.5	1020	-0.51	1420	-0.37	1820	0.4	2220	0.42	2620	-0.62	3020	-0.03
221	0.12	621	0.77	1021	-0.12	1421	-0.37	1821	0.25	2221	0.68	2621	-0.3	3021	-0.26
222	-0.1	622	0.84	1022	0.26	1422	-0.27	1822	0.03	2222	0.75	2622	0.09	3022	-0.4
223	-0.3	623	0.68	1023	0.53	1423	-0.11	1823	-0.19	2223	0.63	2623	0.42	3023	-0.42
224	-0.44	624	0.32	1024	0.62	1424	0.08	1824	-0.37	2224	0.32	2624	0.62	3024	-0.33
301	-0.49	701	-0.15	1101	0.53	1501	0.22	1901	-0.47	2301	-0.11	2701	0.64	3101	-0.16
302	-0.43	702	-0.61	1102	0.26	1502	0.28	1902	-0.46	2302	-0.56	2702	0.48	3102	0.06
303	-0.28	703	-0.94	1103	-0.12	1503	0.24	1903	-0.32	2303	-0.89	2703	0.18	3103	0.26
304	-0.08	704	-1.05	1104	-0.52	1504	0.13	1904	-0.09	2304	-1.02	2704	-0.2	3104	0.39
305	0.11	705	-0.89	1105	-0.82	1505	-0.03	1905	0.15	2305	-0.89	2705	-0.56	3105	0.45
306	0.26	706	-0.5	1106	-0.92	1506	-0.21	1906	0.35	2306	-0.52	2706	-0.79	3106	0.4
307	0.34	707	0.01	1107	-0.79	1507	-0.35	1907	0.46	2307	0	2707	-0.81	3107	0.27
308	0.31	708	0.5	1108	-0.46	1508	-0.41	1908	0.47	2308	0.52	2708	-0.61	3108	0.08
309	0.19	709	0.87	1109	0.01	1509	-0.36	1909	0.36	2309	0.92	2709	-0.22	3109	-0.1
310	0.01	710	1.04	1110	0.48	1510	-0.21	1910	0.18	2310	1.11	2710	0.27	3110	-0.21
311	-0.18	711	0.96	1111	0.83	1511	0.01	1911	-0.04	2311	1.06	2711	0.72	3111	-0.24
312	-0.32	712	0.66	1112	0.99	1512	0.25	1912	-0.24	2312	0.79	2712	1.03	3112	-0.17
313	-0.38	713	0.19	1113	0.96	1513	0.45	1913	-0.36	2313	0.36	2713	1.14	3113	0
314	-0.33	714	-0.31	1114	0.73	1514	0.57	1914	-0.39	2314	-0.13	2714	1.04	3114	0.22
315	-0.17	715	-0.73	1115	0.35	1515	0.58	1915	-0.29	2315	-0.57	2715	0.76	3115	0.43
316	0.06	716	-0.96	1116	-0.09	1516	0.51	1916	-0.08	2316	-0.83	2716	0.35	3116	0.59
317	0.3	717	-0.93	1117	-0.47	1517	0.36	1917	0.17	2317	-0.87	2717	-0.09	3117	0.66
318	0.49	718	-0.65	1118	-0.71	1518	0.17	1918	0.38	2318	-0.66	2718	-0.45	3118	0.64
319	0.6	719	-0.22	1119	-0.76	1519	-0.04	1919	0.52	2319	-0.28	2719	-0.66	3119	0.5
320	0.58	720	0.24	1120	-0.6	1520	-0.2	1920	0.55	2320	0.16	2720	-0.67	3120	0.27
321	0.44	721	0.62	1121	-0.3	1521	-0.28	1921	0.46	2321	0.53	2721	-0.49	3121	0.02
322	0.19	722	0.82	1122	0.06	1522	-0.28	1922	0.25	2322	0.74	2722	-0.19	3122	-0.22
323	-0.11	723	0.8	1123	0.35	1523	-0.2	1923	-0.04	2323	0.75	2723	0.15	3123	-0.38
324	-0.38	724	0.55	1124	0.51	1524	-0.08	1924	-0.33	2324	0.55	2724	0.42	3124	-0.45
401	-0.59	801	0.12	1201	0.5	1601	0.06	2001	-0.55	2401	0.17	2801	0.56		
402	-0.66	802	-0.38	1202	0.34	1602	0.17	2002	-0.65	2402	-0.29	2802	0.55		
403	-0.57	803	-0.81	1203	0.06	1603	0.21	2003	-0.58	2403	-0.73	2803	0.39		
404	-0.35	804	-1.06	1204	-0.3	1604	0.19	2004	-0.36	2404	-1	2804	0.11		
405	-0.06	805	-1.05	1205	-0.61	1605	0.11	2005	-0.04	2405	-1.04	2805	-0.22		
406	0.22	806	-0.76	1206	-0.79	1606	-0.01	2006	0.29	2406	-0.8	2806	-0.51		
407	0.45	807	-0.28	1207	-0.77	1607	-0.14	2007	0.53	2407	-0.34	2807	-0.67		
408	0.56	808	0.26	1208	-0.56	1608	-0.25	2008	0.66	2408	0.22	2808	-0.63		
409	0.52	809	0.73	1209	-0.19	1609	-0.28	2009	0.63	2409	0.74	2809	-0.41		
410	0.34	810	1.03	1210	0.24	1610	-0.24	2010	0.47	2410	1.08	2810	-0.05		
411	0.07	811	1.09	1211	0.62	1611	-0.13	2011	0.19	2411	1.19	2811	0.37		
412	-0.22	812	0.91	1212	0.86	1612	0.04	2012	-0.11	2412	1.06	2812	0.74		
413	-0.45	813													

Attached Table B: Astronomical Tide at Diamond Island for May 2005

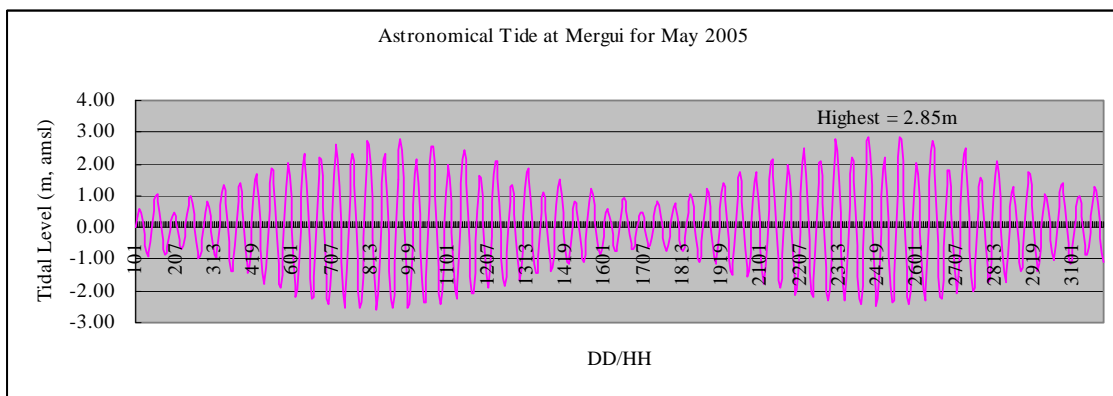
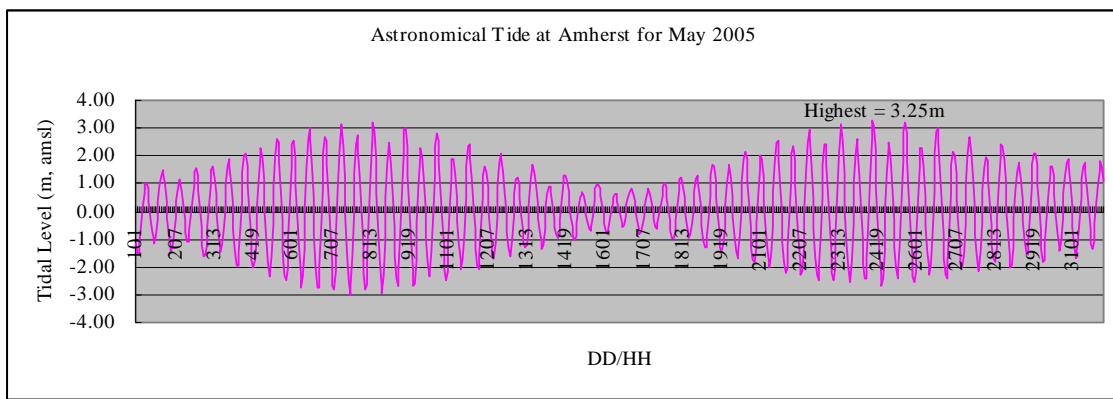
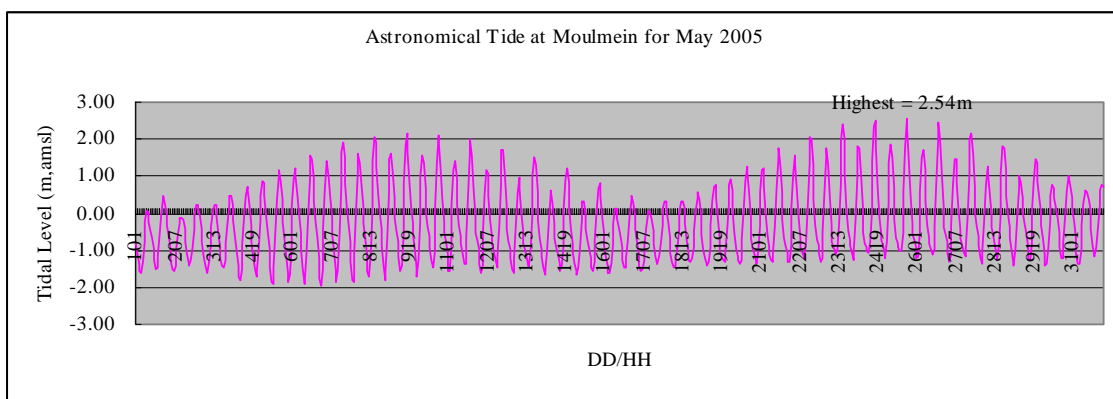
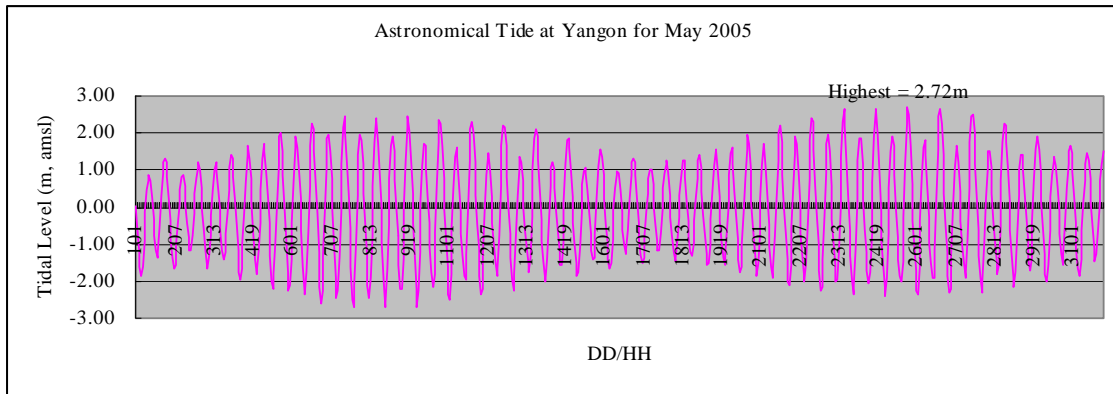
dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)	dd/hh	Tide(m)
101	-0.59	501	1.26	901	-1.42	1301	-1.96	1701	0.27	2101	1.08	2501	-1.57	2901	-1.32
102	-1.15	502	1.68	902	-0.22	1302	-2.12	1702	-0.25	2102	1.65	2502	-0.35	2902	-1.93
103	-1.59	503	1.57	903	0.96	1303	-1.6	1703	-0.7	2103	1.67	2503	0.84	2903	-2.08
104	-1.74	504	1.13	904	1.84	1304	-0.63	1704	-1.12	2104	1.17	2504	1.72	2904	-1.56
105	-1.42	505	0.51	905	2.14	1305	0.32	1705	-1.37	2105	0.45	2505	2.13	2905	-0.6
106	-0.74	506	-0.32	906	1.77	1306	-1	1706	-1.24	2106	-0.25	2506	1.92	2906	0.33
107	-0.06	507	-1.26	907	1.02	1307	1.37	1707	-0.77	2107	-0.95	2507	1.15	2907	1.02
108	0.42	508	-1.93	908	0.15	1308	1.37	1708	-0.22	2108	-1.58	2508	0.17	2908	1.48
109	0.76	509	-2.05	909	-0.8	1309	0.95	1709	0.25	2109	-1.83	2509	-0.71	2909	1.61
110	0.96	510	-1.66	910	-1.74	1310	0.25	1710	0.7	2110	-1.46	2510	-1.45	2910	1.31
111	0.84	511	-0.89	911	-2.29	1311	-0.45	1711	1.06	2111	-0.62	2511	-2	2911	0.67
112	0.39	512	0.14	912	-2.07	1312	-1.05	1712	1.11	2112	0.41	2512	-2.04	2912	-0.07
113	-0.17	513	1.23	913	-1.11	1313	-1.53	1713	0.78	2113	1.42	2513	-1.32	2913	-0.75
114	-0.64	514	1.98	914	0.17	1314	-1.67	1714	0.28	2114	2.19	2514	-0.01	2914	-1.32
115	-1.02	515	2.13	915	1.4	1315	-1.19	1715	-0.17	2115	2.42	2515	1.36	2915	-1.57
116	-1.23	516	1.79	916	2.33	1316	-0.19	1716	-0.58	2116	1.99	2516	2.38	2916	-1.22
117	-1.07	517	1.18	917	2.73	1317	0.84	1717	-0.92	2117	1.18	2517	2.88	2917	-0.35
118	-0.49	518	0.34	918	2.45	1318	1.54	1718	-0.97	2118	0.33	2518	2.76	2918	0.6
119	0.2	519	-0.69	919	1.68	1319	1.85	1719	-0.65	2119	-0.5	2519	2.03	2919	1.31
120	0.7	520	-1.64	920	0.72	1320	1.83	1720	-0.18	2120	-1.33	2520	0.94	2920	1.75
121	1.02	521	-2.09	921	-0.3	1321	1.42	1721	0.24	2121	-1.91	2521	-0.14	2921	1.92
122	1.23	522	-1.93	922	-1.39	1322	0.7	1722	0.6	2122	-1.9	2522	-1.08	2922	1.71
123	1.21	523	-1.31	923	-2.3	1323	-0.09	1723	0.94	2123	-1.29	2523	-1.89	2923	1.1
124	0.84	524	-0.37	924	-2.55	1324	-0.8	1724	1.08	2124	-0.35	2524	-2.38	2924	0.3
201	0.27	601	0.72	1001	-1.99	1401	-1.42	1801	0.85	2201	0.64	2601	-2.19	3001	-0.48
202	-0.29	602	1.62	1002	-0.9	1402	-1.88	1802	0.37	2202	1.5	2602	-1.27	3002	-1.21
203	-0.81	603	1.96	1003	0.29	1403	-1.86	1803	-0.13	2203	1.94	2603	-0.01	3003	-1.78
204	-1.28	604	1.73	1004	1.31	1404	-1.24	1804	-0.58	2204	1.75	2604	1.08	3004	-1.88
205	-1.54	605	1.17	1005	1.92	1405	-0.33	1805	-1.04	2205	1.05	2605	1.8	3005	-1.39
206	-1.38	606	0.41	1006	1.93	1406	0.44	1806	-1.33	2206	0.22	2606	2.04	3006	-0.56
207	-0.92	607	-0.57	1007	1.37	1407	0.95	1807	-1.25	2207	-0.55	2607	1.71	3007	0.23
208	-0.41	608	-1.59	1008	0.55	1408	1.21	1808	-0.83	2208	-1.29	2608	0.9	3008	0.86
209	0.05	609	-2.22	1009	-0.31	1409	1.15	1809	-0.3	2209	-1.87	2609	-0.05	3009	1.35
210	0.52	610	-2.17	1010	-1.18	1410	0.72	1810	0.26	2210	-1.92	2610	-0.88	3010	1.57
211	0.91	611	-1.54	1011	-1.94	1411	0.08	1811	0.84	2211	-1.29	2611	-1.56	3011	1.35
212	0.97	612	-0.53	1012	-2.18	1412	-0.54	1812	-1.3	2212	-0.19	2612	-2	3012	0.78
213	0.67	613	0.69	1013	-1.63	1413	-1.04	1813	1.35	2213	0.99	2613	-1.87	3013	0.11
214	0.23	614	1.81	1014	-0.47	1414	-1.41	1814	0.99	2214	2.01	2614	-0.97	3014	-0.54
215	-0.2	615	2.43	1015	0.8	1415	-1.41	1815	0.47	2215	2.63	2615	0.38	3015	-1.11
216	-0.65	616	2.38	1016	1.85	1416	-0.85	1816	-0.03	2216	2.59	2616	1.64	3016	-1.38
217	-1.01	617	1.84	1017	2.48	1417	0.07	1817	-0.53	2217	1.9	2617	2.46	3017	-1.11
218	-1.06	618	1.06	1018	2.56	1418	0.9	1818	-0.97	2218	0.93	2618	2.76	3018	-0.4
219	-0.73	619	0.05	1019	2.04	1419	1.38	1819	-1.12	2219	-0.02	2619	2.51	3019	0.35
220	-0.26	620	-1.13	1020	1.16	1420	1.57	1820	-0.88	2220	-0.92	2620	1.71	3020	0.94
221	0.16	621	-2.08	1021	0.2	1421	1.49	1821	-0.44	2221	-1.74	2621	0.65	3021	1.39
222	0.59	622	-2.4	1022	-0.77	1422	1.09	1822	0.05	2222	-2.19	2622	-0.37	3022	1.66
223	1.01	623	-2.02	1023	-1.73	1423	0.42	1823	0.56	2223	-1.95	2623	-1.26	3023	1.56
224	1.2	624	-1.15	1024	-2.38	1424	-0.27	1824	1.05	2224	-1.08	2624	-2	3024	1.06
301	1	701	-0.02	1101	-2.33	1501	-0.87	1901	1.24	2301	0.03	2701	-2.36	3101	0.37
302	0.56	702	1.15	1102	-1.52	1502	-1.39	1902	0.99	2302	1.09	2702	-2	3102	-0.34
303	0.07	703	1.96	1103	-0.38	1503	-1.71	1903	0.48	2303	1.86	2703	-0.98	3103	-1.04
304	-0.48	704	2.11	1104	0.69	1504	-1.58	1904	-0.04	2304	2.09	2704	0.22	3104	-1.59
305	-1.08	705	1.69	1105	1.48	1505	-0.96	1905	-0.56	2305	1.66	2705	1.18	3105	-1.71
306	-1.5	706	0.99	1106	1.83	1506	-0.18	1906	-1.09	2306	0.8	2706	1.75	3106	-1.3
307	-1.52	707	0.1	1107	1.61	1507	0.43	1907	-1.44	2307	-0.1	2707	1.89	3107	-0.62
308	-1.21	708	-0.97	1108	0.94	1508	0.83	1908	-1.36	2308	-0.91	2708	1.51	3108	0.07
309	-0.76	709	-1.95	1109	0.11	1509	1.06	1909	-0.9	2309	-1.63	2709	0.72	3109	0.71
310	-0.19	710	-2.39	1110	-0.68	1510	1.01	1910	-0.26	2310	-2.06	2710	-0.16	3110	1.29
311	0.51	711	-2.06	1111	-1.43	1511	0.62	1911	0.45	2311	-1.86	2711	-0.93	3111	1.61
312	1.1	712	-1.14	1112	-1.98	1512	0.03	1912	1.18	2312	-0.93	2712	-1.57	3112	1.47
313	1.29	713	0.07	1113	-1.92	1513	-0.5	1913	1.67	2313	0.36	2713	-1.92	3113	0.97
314	1.08	714	1.34	1114	-1.11	1514	-0.93	1914	1.65	2314	1.59	2714	-1.65	3114	0.35
315	0.68	715	2.33	1115	0.12	1515	-1.22	1915	1.19	2315	2.5	2715	-0.67	3115	-0.29
316	0.18	716	2.69	1116	1.27	1516	-1.16	1916	0.58	2316	2.88	2716	0.62	3116	-0.91
317	-0.43	717	2.37	1117	2.06	1517	-0.62	1917	-0.01	2317	2.55	2717	1.71	3117	-1.26
318	-1.01	718	1.65	1118	2.41	1518	0.15	1918	-0.64	2318	1.65	2718	2.35	3118	-1.12
319	-1.28	719	0.72	1119	2.23	1519	0.77	1919	-1.2	2319	0.57	2719	2.53	3119	-0.6
320	-1.14	720	-0.42	1120	1.56	1520	1.11	1920	-1.4	2320	-0.42	2720	2.21	3120	-0.01
321	-0.77	721	-1.62	1121	0.65	1521	1.26	1921	-1.14	2321	-1.33	2721	1.44	3121	0.54
322	-0.27	722	-2.44	1122	-0.25	1522	1.22	1922	-0.61	2322	-2.08	2722	0.44	3122	1.09
323	0.37	723	-2.5	1123	-1.12	1523	0.87	1923	0.04	2323	-2.33	2723	-0.5	3123	1.5
324	1.03	724	-1.83	1124	-1.91	1524	0.28	1924	0.74	2324	-1.82	2724	-1.34	3124	1.51
401	1.38	801	-0.75	1201	-2.31	1601	-0.32	2001	1.32	2401	-0.74	2801	-2.01		
402	1.28	802	0.48	1202	-1.99	1602	-0.82	2002	1.47	2402	0.47	2802	-2.25		
403	0.89	803	1.56	1203	-1.05	1603	-1.26	2003	1.13	2403	1.48	2803	-1.77		
404	0.37	804	2.15	1204	0.04	1604	-1.51	2004	0.54	2404	2.08	2804	-0.75		
405	-0.29	805	2.04	1205	0.92	1605	-1.35	2005	-0.07	2405	2.07	2805	0.33		
406	-1.06	806	1.44	1206	1.48	1606	-0.8	2006	-0.68	2406	1.44	2806	1.15		
407	-1.65	807	0.62	1207	1.62	1607	-0.15	2007	-1.29	2407	0.48	2807	1.63		
408	-1.79	808	-0.34	1208	1.26	1608	0.34	2008	-1.63	2408	-0.44	2808	1.73		
409	-1.51	809	-1.39	1209	0.55	1609	0.72	2009	-1.47	2409	-1.23	2809	1.37		
410	-0.96	810	-2.21	1210	-0.23	1610	0.99	2010	-0.85	2410	-1.87	2810	0.65		
411	-0.17	811	-2.34	1211	-0.93	1611	0.99	2011	-0.03	2411	-2.12	2811	-0.16		
412	0.76	812	-1.68	1212	-1.55	1612	0.64	2012	0.86	2412	-1.64	2812	-0.88		



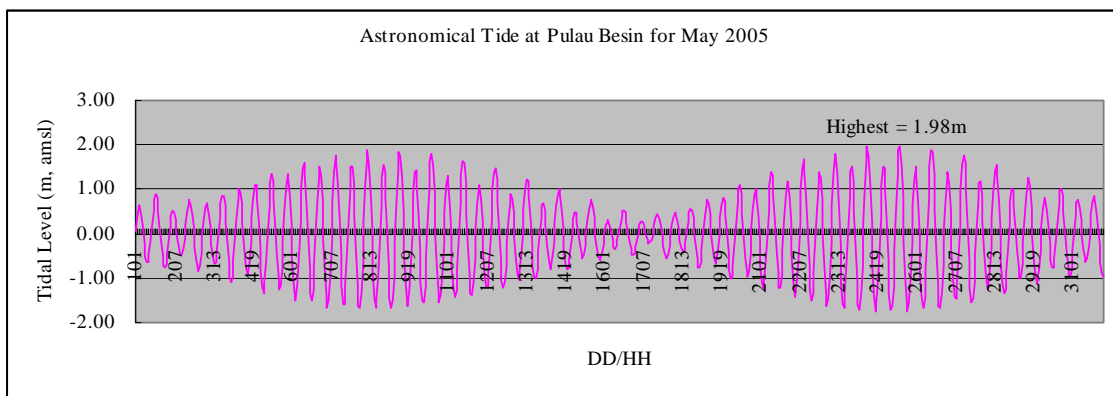
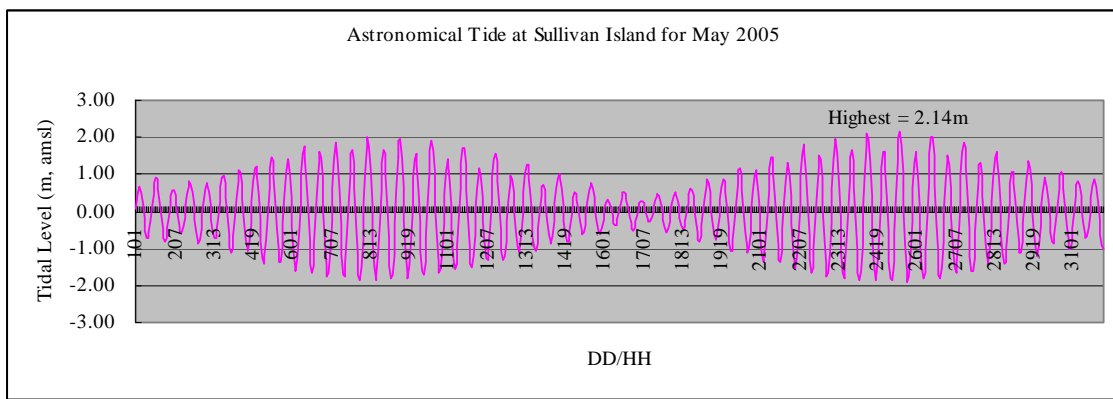
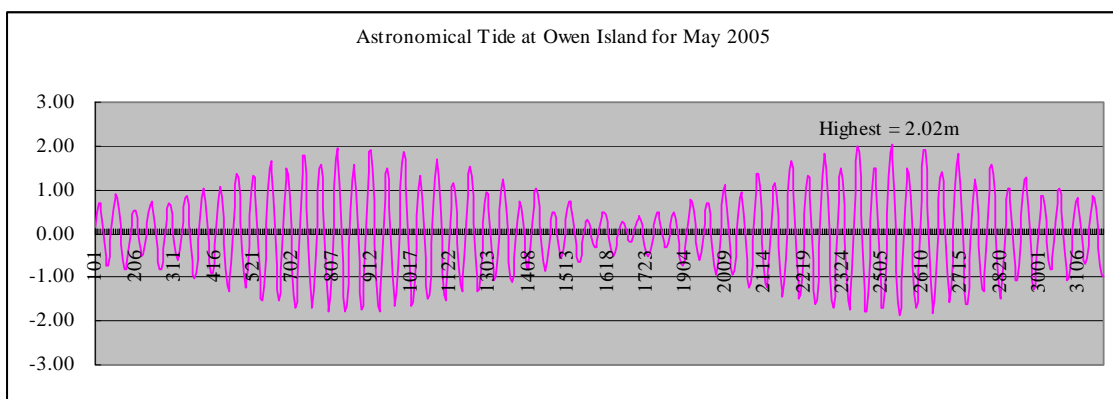
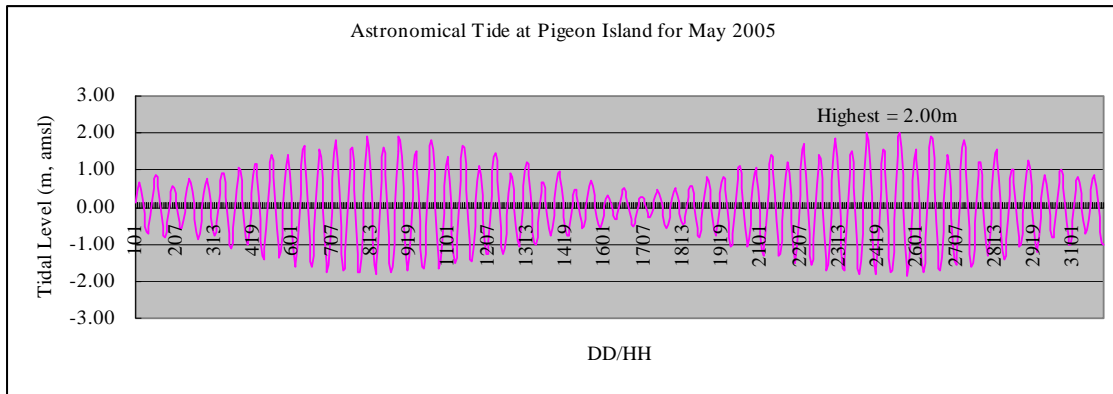
Attached Figure A: Location of Points Where Tides Are Calculated



Attached Figure B: Astronomical Tide at Various Point (1)



Attached Figure B: Astronomical Tide at Various Point (2)



Attached Figure B: Astronomical Tide at Various Point (3)

Attached Table C-1: Location and Z₀ of Points where Astronomical Tides are Calculated

Point	Location				Z ₀ (m)	Nos of Constituents of Harmonic Constants
	Latitude N		Longitude E			
Akyab	20	8	92	94	1.268	28
Bassein	16	47	94	47	1.615	28
Diamond Island	15	52	94	17	1.430	28
Elephant Point	16	29	96	18	3.661	28
Yangon	16	46	96	10	3.124	23
Moulmein	16	29	97	37	1.786	29
Amherst	16	5	97	34	3.066	25
Mergui	12	26	98	36	2.786	28
Pigeon Island	11	47	98	13	1.972	9
Owen Island	11	12	98	15	2.042	9
Sullivan Island	10	46	98	18	2.009	8
Pulau Besin	9	59	98	29	1.987	9

Attached Table C-2: Calculated Highest Astronomical Tidal Level during May 2005

No.	Station	Highest Tidal Level in meter above mean sea level		
		Date	Hour	Tidal Level (m, amsl)
1	Akyab	24	11	1.43
2	Bassein	26	16	0.76
3	Diamond Island	25	12	1.20
4	Elephant Point	24	17	2.91
5	Yangon	25	18	2.72
6	Moulmein	25	17	2.54
7	Amherst	24	15	3.25
8	Mergui	24	12	2.85
9	Pigeon Island	24	11	2.00
10	Owen Island	25	12	2.02
11	Sullivan Island	25	12	2.14
12	Pulau Besin	25	12	1.98

APPENDIX 4
RESULT OF
PRESENT CONDITION SURVEY

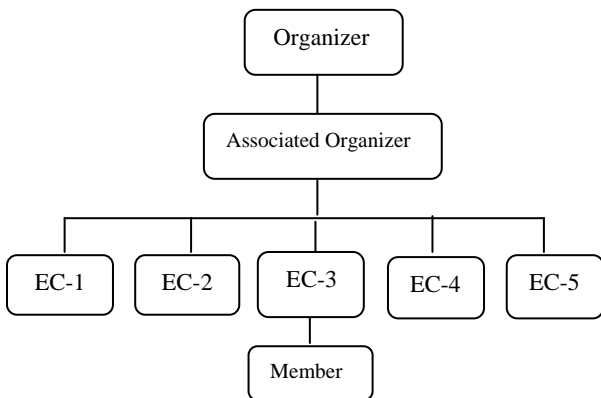
APPENDIX 4

Result of Present Condition Survey

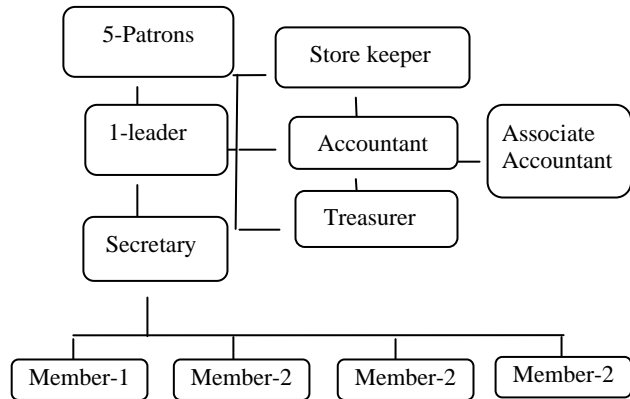
		<u>Page</u>
A4-1	Results of Inventory Survey on Socio-economic, Agricultural Condition and Villagers' Needs	A4-1
	(1) Organization Chart of the Associations in the Villages	
	(2) Agriculture Extension and Education Activities in Villages after Nargis	
	(3) Damages in Agriculture by Nargis	
	(4) Damages to Livestock by Nargis and Recovery Condition	
	(5) Government Support for Recovery in the Survey Areas	
	(6) Support by Various NGOs and Effects of Supports	
	(7) Household Size and Occupation	
	(8) Average Yield and Price of Paddy in the Year 2007, 2008 and 2009	
	(9) Extension and Education Services Received by the Farmers in 2007 and 2009	
A4-2	Results of Measurement of Polder and Dike	A4-10
	(1) Conditions of Gate	
A4-3	Results of Water and Soil Quality Test	A4-15
	(1) Result of Water Quality Test	
	(2) Result of Soil Quality Test	
A4-4	Surveys on Present Condition in the Pilot Project Area	A4-21
	(1) Geological and Soil Mechanical Investigation	
	(2) Electric Conductivity (EC) Test and pH Test at Sluice in Labutta North and Daunggyi Polder	

(1) Organization Chart of the Associations in the Villages

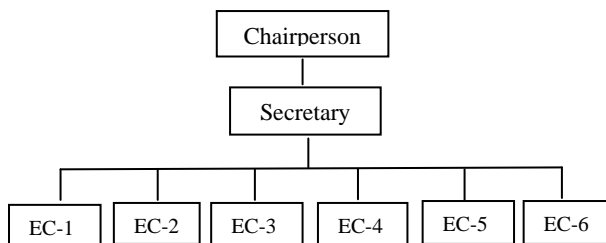
1. Union Solidarity and Development Association



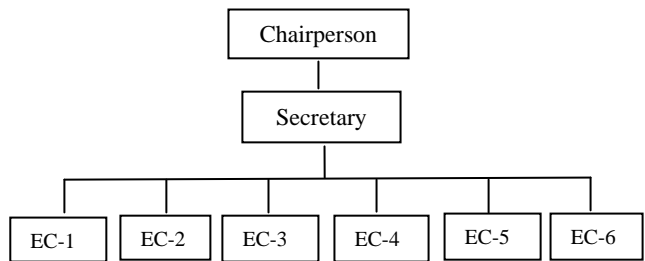
2. Village Rehabilitation Committee



3. Myanmar Women Affair Association

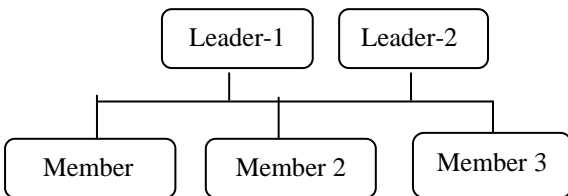


4. Maternal & Child Welfare Association

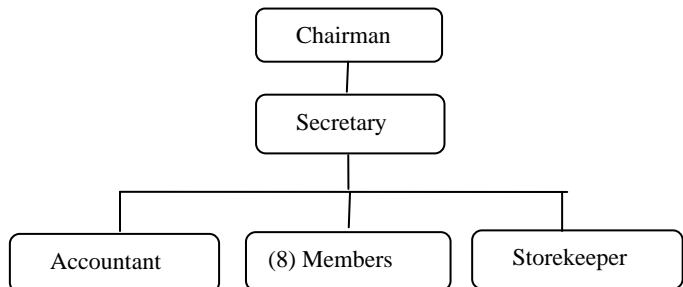


EC=Executive committee

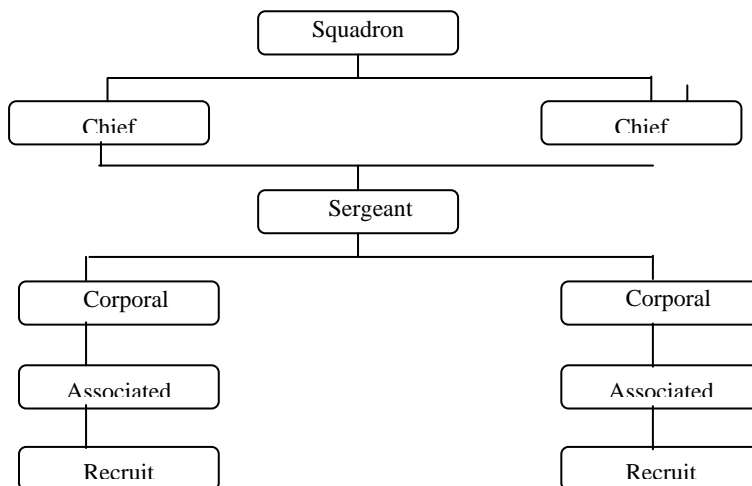
5. Myanmar Red Cross Association



6. Disaster Risk Reduction



7. Fire Emergency Brigade



(2) Agricultural Extension & Education Activities in Villages after Nargis

Township	Sr No	Polder	Village	Action		List of topics/ subjects	Average Frequency
				Yes	No		
Labutta	1	Alegyun-1	Hpoenyokone	Â		Cultural practices, Compost making	6
	2	Alegyun-2	Hpoebagankone	Â		Cultural practices	16
	3	Alegyun-3	Ingaday	Â		Rice Cultivation	2
	4	Magyibinmadaukan	Madaukan		Â		
	5	Thingangyi	Nalinkyaw	Â		Rice Cultivation, fertilizer/application	1
	6	Zinywe	Koebo		Â		
	7	Leikkwin	Leikkwin	Â		Pulses cultivation	1
	8	Labutta (S)	Kyarnikan	Â		Pulses cultivation, pest control	5
	9	Labutta (N)	Daminchaunglay	Â		Variety improvement, Pest control	2
	10	U Gaungpu	Kangyidaunt		Â		
	11	Bitud Island-1	Zeebyu		Â		
	12	Bitud Island-2	Lay-ein-tan		Â		
	13	Bitud Island-3	Kabarkwin		Â		
	14	Bitud Island-4	Leik-i	Â		Rice, chilli, pulses cultivation, pest control	4
Bogalay	15	Daunggyi	Daunggyi	Â		Sunflower cultivation/gardening	3
	16	Daunggyi(East)	Hpoenyo	Â		Fertilizer application	1
	17	Daunggyi(West)	Paungde		Â		
	18	Daunggyi(Upper)	Kamarkalu	Â		Fertilizer application	4
Phyapon	19	Daw Nyein	Daw Nyein	Â		Soil conservation, fertilizer/application	2
	20	Myokone	Phayarkone		Â		
	21	Kyetphamwezaung	Aukkapar	Â		Fertilizer/application	1
	22	Banbwezu	Koe-ein-tan	Â		Seed Selection, Pesticide/application	6
	23	Daydalu	Ngoat-ta-htaung		Â		
	24	Letpanbin	Letpanbin	Â		Pest control	1
	25	Zinbaung	Tinpalwel		Â		
Daydaye	26	Myaseinkan	Akeichaungwa	Â		Pest control, fertilizer application	2
	27	Thandi	Baygyi		Â		
	28	Suclubbaluma	Hnarkhaung chaung	Â		Soil conservation, fertilizer application, post harvest tech	2
	29	Hleseikchaunggyi	Lay	Â		ISM	3
	30	Tamatakaw	Toe	Â		Soil conservation, cultivation	2
	31	Kyonsoat	Kawat	Â		Soil conservation, fertilizer application	1
Kyaiklatt	32	Maubin Island(N)	Hlaingtar	Â		Variety improvement, pest control	2
	33	Maubin Island(S)	Tharyarwel	Â		Pest control, cultivation method	2
	34	Thonegwakyun	Tamatpyay	Â		Variety improvement, cultivation method	2

(3) Damages in Agriculture by Nargis

Township	Sr No	Polder	Village	Farm land (ac)	Farm products (basket)	Others	
						Farm machine	Draft cattle
Labutta	1	Alegyun-1	Hpoenyokone	357	0	0	150
	2	Alegyun-2	Hpoebagankone	238	7,950	-	520
	3	Alegyun-3	Ingadae	1,385	23,000	-	300
	4	Magyibinmadaukan	Madaukan	15	1,125	-	50
	5	Thingangyi	Nalinkyaw	220	-	-	-

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	6	Zinywe	Ohebo	778	35,000	-	157
	7	Leikkwin	Leikkwin	381	35,000	-	80
	8	Labutta (S)	Kyarnikan	250	35,000	20	1,000
	9	Labutta (N)	Daminchaunglay	-	2,000	-	40
	10	U Gaunpu	Kangyidaunt	519	4,000	-	160
	11	Bitud Island-1	Zeebyu	1,351	50,000	-	2,000
	12	Bitud Island-2	Lay-ein-tan	808	45,000	-	300
	13	Bitud Island-3	Kabarkwin	880	40,000	-	400
	14	Bitud Island-4	Leik-i	498	4,000	-	200
Subtotal average				591	21698	10	412
Bogalay	15	Daunggyi	Daunggyi	200	16,000	30	36
	16	Daunggyi(East)	Hpoenyoy	1,818	40,000	23	86
	17	Daunggyi(West)	Paungde	670	2,000	2	64
	18	Daunggyi(Upper)	Kamarkalu	701	20,000	7	70
Subtotal average				847	19,500	15	64
Phyapon	19	Daw Nyein	Daw Nyein	-	-	-	4
	20	Myokone	Phayarkone	-	1,300	-	50
	21	Kyetphamwezaung	Aukkapar	-	40,000	-	25
	22	Banbwezu	Koe-ein-tan	-	10,000	1	-
	23	Daydalu	Ngoat-ta-htaung	-	1,500	-	-
	24	Letpanbin	Letpanbin	500	100,000	-	50
	25	Zinbaung	Tinpalwel	-	140,000	-	101
Subtotal average				500	48,800	1	46
Daydaye	26	Myaseinkan	Akelchaungwa	-	-	-	81
	27	Thandi	Baygyi	-	-	-	8
	28	Suclubbaluma	Hnarkhaungchaung	-	-	-	380
	29	Hleseikchaunggyi	Lay	-	-	-	1,300
	30	Tamatakaw	Toe	-	10,000	-	55
	31	Kyonsoat	Kawat	-	-	-	350
Subtotal average				-	10,000	-	202
Kyaiklatt	32	Maubin Island(N)	Hlaingtar	-	-	-	-
	33	Maubin Island(S)	Tharyarwel	-	24,000	-	-
	34	Thonegwakyun	Tamatpyay	-	10,800	-	-
Subtotal average				-	17,400	-	-
Average/village				627	21,900		

(4) Damages to Livestock by Nargis and Recovery Condition

Township	Sr No	Polder	Village	Draft cattle(no.)			Pig(no.)			Poultry(no.)		
				D	I	H	D	I	H	D	I	H
Labutta	1	Alegyun-1	Hpoenyokone	180	20	50	390	10	200	2,000	0	400
	2	Alegyun-2	Hpoebagankone	520	na	10	242	0	15	600	0	200
	3	Alegyun-3	Ingadae	20	na	6	150	0	60	10,000	0	30
	4	Magyibinmadaukan	Madaukan									
	5	Thingangyi	Nalinkyaw	na	na	6	na	na	20	na	na	na
	6	Zinywe	Ohebo	157	0	15	120	0	15	270	0	10
	7	Leikkwin	Leikkwin	0	0	0	20	0	10	200	0	50
	8	Labutta (S)	Kyarnikan	1,200	5	30	200	0	30	1,500	0	1,000
	9	Labutta (N)	Daminchaunglay	40	0	na	na	na	na	na	na	na
	10	U Gaunpu	Kangyidaunt	0	0	0	100	0	30	200	0	100
	11	Bitud Island-1	Zeebyu	na	na	na	500	0	100	700	0	70
	12	Bitud Island-2	Lay-ein-tan	na	na	na	200	0	100	1,057	0	400

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	13	Bitud Island-3	Kabarkwin	25	0	32	200	0	91	1,000	0	2,500
	14	Bitud Island-4	Leik-i	100	0	10	250	0	50	1,400	0	600
Bogalay	15	Daunggyi	Daunggyi	10	0	3	120	0	150	3,000	0	4,800
	16	Daunggyi(East)	Hpoenyoy	6	0	7	100	0	128	2,000	0	4,300
	17	Daunggyi(West)	Paungde	20	0	4	50	0	100	0	0	150
	18	Daunggyi(Upper)	Kamarkalu	4	0	4	180	20	280	1,800	10 0	2,800
Phyarpon	19	Daw Nyein	Daw Nyein	3	6	100	10	15	160	350	0	2,000
	20	Myokone	Phayarkone	50	6	50	20	2	150	500	0	2,000
	21	Kyethphamwezaung	Aukkappar	25	40	60	20	0	40	1,000	0	4,000
	22	Banbwezu	Koe-ein-tan	na	na	na	0	0	80	500	0	2,400
	23	Daydalu	Ngoat-tahtaung	na	na	na	100	0	100	1,300	0	600
	24	Letpanbin	Letpanbin	50	0	52	15	2	40	500	0	1,100
	25	Zinbaung	Tinpalwel	0	0	200	100	0	200	2,000	0	1,500
Deadye	26	Myaseinkan	Akelchaungwa	81	0	9	50	0	150	1500	0	1300
	27	Thandi	Baygyi	8	0	0	40	0	0	500	0	0
	28	Sucubbaluma	Hnarkhaungchaung	380	0	20	200	0	80	8,000	0	1,000
	29	Hleseikchaunggyi	Lay	na	na	na	na	na	na	na	na	na
	30	Tamatakaw	Toe	55	0	300	0	0	60	0	0	1,500
	31	Kyonsoat	Kawat	350	0	200	20	0	40	100	0	600
Kyaiklatt	32	Maubin Island(N)	Hlaingtar	0	0	20	40	0	100	50	0	150
	33	Maubin Island(S)	Tharyarwel	5	0	30	15	0	50	1,500	0	2,000
	34	Thonegwakyun	Tamatpyay	10	0	0	na	na	na	200	0	0

Code: D=Death & Lost, I=ill, H=in hand, na=not available

(5) Government Support for Recovery in the Survey Areas

Township	Sr No	Polder	Village	Name of organization	Content of Support	Effect of support for recovery
Labutta	1	Alegyun-1	Hpoenyokone	MOLF	net, boat	Moderate
	2	Alegyun-2	Hpoebagankone	MOAI	tractor	moderate
	3	Alegyun-3	Ingadae	MOAI	Polder repair	Moderate
	4	Magyibinmadaukan	Madaukan	Nil	Nil	
	5	Thingangyi	Nalinkyaw	MOAI, MOLF	Hand tractor, Honda engine, boat	insufficient
	6	Zinywe	Ohebo	MOAI, LBVD	Hand tractor, Buffalo	insufficient
	7	Leikkwin	Leikkwin	MOAI	Hand tractor, Diesel, Buffalo	insufficient
	8	Labutta (S)	Kyarnikan	MOAI	Hand tractor, Diesel, Rice	insufficient
	9	Labutta (N)	Daminchaunglay	MOLF, GA Dept.	Draft cattle, boat, net, engine, rice	insufficient
	10	U Gaunpu	Kangyidaunt	MOLF, GA Dept.	Boat	Moderate
	11	Bitud Island-1	Zeebyu	GA Dept., MOAI, MOLF	Hand tractor, boat, Rice, motor	insufficient
	12	Bitud Island-2	Lay-ein-tan	MOLF, GA Dept.	Boat, net	insufficient
	13	Bitud Island-3	Kabarkwin	Military, MOAI, MOLF	Rice, paddy, Diesel, net	insufficient
	14	Bitud Island-4	Leik-i	Military, GA Dept.	Hand tractor, Diesel, Rice	Moderate
Bogalay	15	Daunggyi	Daunggyi	MOE, USDA	school, roof	
	16	Daunggyi(East)	Hpoenyoy	Nil	Nil	

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	17	Daunggyi(West)	Paungde	Nil	Nil	
	18	Daunggyi(Upper)	Kamarkalu	MOE, MOH	School, medicine	Moderate
Phyapon	19	Daw Nyein	Daw Nyein	Military, TPDC	Rations	Moderate
	20	Myokone	Phayarkone	Military, TPDC	Rice, Rations	insufficient
	21	Kyetphamwezaung	Aukkapar	Military	Clothes, Rations	insufficient
	22	Banbwezu	Koe-ein-tan	Military	Rice	insufficient
	23	Daydalu	Ngoat-ta-haung	Military	Clothes, Rations	Moderate
	24	Letpanbin	Letpanbin	Military, TPDC	Clothes, Rations	Moderate
	25	Zinbaung	Tinpalwel	Military, MOHT	Clothes, Rations	Moderate
Daydaye	26	Myaseinkan	Akelchaungwa	MOE	school	Moderate
	27	Thandi	Baygyi	MOAI	Paddy seed, diesel	insufficient
	28	Suclubbaluma	Hnarkhaungchaung	MOE,	school, rice	insufficient
	29	Hleseikchaunggyi	Lay	MOE, Gov	school, rice	insufficient
	30	Tamatakaw	Toe	MOCPT, Gov	CDMA, Cyclone shelter	Moderate
	31	Kyonsoat	Kawat	MOAI	Tractor, Paddy seed, buffalo	insufficient
Kyaiklatt	32	Maubin Island(N)	Hlaingtar	Gov	roof, timber	Moderate
	33	Maubin Island(S)	Tharyarwel	Gov	paddy seed, tractor	insufficient
	34	Thonegwakyun	Tamatpyay	Gov	Oil, rice, peas, pure water	insufficient

(6) Support by Various NGOs and Effect of Supports

Township	Sr No	Polder	Village	Name of organization	Content of Support	Effect of support for recovery
Labutta	1	Alegyun-1	Hpoenyokone	Save the Children, UNDP, Mitta , AZG, Yadanamyitta	Ration, Livelihood	fair
	2	Alegyun-2	Hpoebagankone	UNDP, Mitta,	Tractor, loan	fair
	3	Alegyun-3	Ingadae	Save the Children, IRC, City Mart	Poultry, Pig, Fishing Net, Paddy seed	not effective seed,
	4	Magyibinmadaukan	Madaukan	Save the Children, IDE, IRC	Ration, rice, paddy seed pound repair	fair
	5	Thingangyi	Nalinkyaw	TZTMM, War War Win, Swethaha, Mercy cops, UNICEF, Acted	Shelter, houses, H/H utensil, pound, boat,	fair
	6	Zinywe	Ohebo	UNDP, IDE, Acted, SC, NRC	engine, pond, fences, rubbish tank, House	fair
	7	Leikkwin	Leikkwin	Acted, Pact Myanmar, UNDP, SC, IDE, NRC, ADRA	Bridge, Ration, hand tractor, fertilizer, houses, Rubbish tank, tanks	Moderate
	8	Labutta (S)	Kyarnikan	Acted, WFP	Poultry, pig, net, paddy seed, fertilizer, ration	Insufficient
	9	Labutta (N)	Daminchaunglay	MRCS, Marlin, ADRA , IDE, SC, Pact Myanmar, UNDP	H/H utensil, medicine, fertilizer, ration, pound, paddy seed, Credit	Insufficient
	10	U Gaunpu	Kangyidaunt	UNDP, Marlin ,Myitta	credit, paddy seed, disel, health care,	fair
	11	Bitud Island-1	Zeebyu	CDN, AAR, UNDP, Pact Myanmar, Roman catholic	Threshers, Hand Tractors, fertilizers, ration, rice	fair
	12	Bitud Island-2	Lay-ein-tan	Marcy Cops, UNICEF, Monmyat karunar, IDE	Net, bucket, ration, fertilizer, pots	fair

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	13	Bitud Island-3	Kabarkwin	Pact Myanmar, SC, Mercy cops, IDE, Malster, Monmyat karunar	Ration, houses, pound, fertilizer, diesel, engine, pea seeds, school	fair
	14	Bitud Island-4	Leik-i	IDE, Roman Catholic	Paddy seed, boat	Insufficient
Bogalay	15	Daunggyi	Daunggyi	I love Myanmar, Monmyatkarunar, Pact Myanmar, UNICEF	House, ration, pots, loan	Fair
	16	Daunggyi(East)	Hpoenyoy	UNDP, PACT Myanmar, IDE, GAA, Monmyatkaruna, foreign donors	Ration, houses, fertilizers, pound, school	Fair
	17	Daunggyi(West)	Paungde	GAA, Lungearman	Houses, pound, net	moderate
	18	Daunggyi(Upper)	Kamarkalu	Thidagu , GAA, MRCS	School shelter, houses, medicine, ration	moderate
Phyapon	19	Daw Nyein	Daw Nyein	UNDP, WFP ,Pact Myanmar, Mingalar Myanmar, IOM	Ration, clothes	moderate
	20	Myokone	Phayarkone	AZG, NAG	H/H utensil, clothes	Fair
	21	Kyetphamwezaung	Aukkapar	IFRC, MRCS,IDE, SC, WFP, IOM, IR	H/H utensil, clothes, Tractors, schools, ration, Houses, Fences, Drinking pot	Fair
	22	Banwezu	Koe-ein-tan	WFP, SC, Pact Myanmar, MRCS,	H/H utensil, credit, ration	Fair
	23	Daydalu	Ngoat-ta-htaung	IFRC, WFP, WHO	Ration, medicine, tarpaulin	moderate
	24	Letpanbin	Letpanbin	Pact Myanmar	H/H utensil	Insufficient
	25	Zinbaung	Tinpalwel	IDE, SC, UN HABIT, Nan Oo, IOM, Mingalar Myanmar	Fertilizer, houses, drinking water, ration, loan	Fair
Daydaye	26	Myaseinkan	Akelchaungwa	Amara	School, mobile clinic	fair
	27	Thandi	Baygyi	Care Myanmar	ration, toilets,	moderate
	28	Suclubbaluma	Hnarkhaungchaung	Relief, MRCS, Shweziwa Co, Thabeik-I monk	SRHC, Credit, houses, roofs	moderate
	29	Hleseikchaunggyi	Lay	MRCS, Oxfam,	School, fences	Moderate
	30	Tamatakaw	Toe	Marcy cops, MRCS,	Drinking water, rice, Rain coats	fair
	31	Kyonsoat	Kawat	MBE, ICRC	School, pound	fair
Kyaiklatt	32	Maubin Island(N)	Hlaingtar	MRCS,	Fertilizer, credits, Houses	insufficient
	33	Maubin Island(S)	Tharyarwel	SC, MRCS	Rice, houses, Clinic	moderate
	34	Thonegwakyun	Tamatpyay	IDE, MRCS,	Fertilizers, paddy seeds, shelter kits, sprayer	Insufficient

(7) Household Size and Occupation

Township	Sr	Polder	Village	H/H Size	Age <18-60>	Occupation	
						Farm	Non-farm
Labutta	1	Alegyun-1	Hpoenyokone	5	3	2	1
	2	Alegyun-2	Hpoebagankone	4	3	2	2
	3	Alegyun-3	Ingadae	4	3	1	1
	4	Magyibinmadaukan	Madaukan	4	3	1	2
	5	Thingangyi	Nalinkyaw	4	3	1	2
	6	Zinywe	Ohebo	5	2	1	1
	7	Leikkwin	Leikkwin	5	2	1	1

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	8	Labutta (S)	Kyarnikan	3	2	1	2
	9	Labutta (N)	Daminchaunglay	4	2	1	1
	10	U Gaunpu	Kangyidaunt	4	2	1	2
	11	Bitud Island-1	Zeebyu	5	3	2	2
	12	Bitud Island-2	Lay-ein-tan	6	3	2	1
	13	Bitud Island-3	Kabarkwin	6	3	2	2
	14	Bitud Island-4	Leik-i	3	2	1	1
		Average		4	3	2	1
Bogalay	15	Daunggyi	Daunggyi	7	3	1	2
	16	Daunggyi(East)	Hpoenyo	5	3	1	3
	17	Daunggyi(West)	Paungde	5	3	1	2
	18	Daunggyi(Upper)	Kamarkalu	7	4	1	3
		Average		6	3	1	3
Phyapon	19	Daw Nyein	Daw Nyein	6	4	1	3
	20	Myokone	Phayarkone	6	3	2	1
	21	Kyetphamwezaung	Aukkapar	4	3	1	2
	22	Banbwezu	Koe-ein-tan	5	3	1	2
	23	Daydalu	Ngoat-ta-htaung	5	4	1	2
	24	Letpanbin	Letpanbin	5	3	1	2
	25	Zinbaung	Tinpalwel	6	4	1	2
		Average		5	3	1	2
Daydaye	26	Myaseinkan	Akelchaungwa	6	3	1	2
	27	Thandi	Baygyi	4	2	1	2
	28	Suclubbaluma	Hnarkhaungchaung	6	3	1	3
	29	Hleseikchaunggyi	Lay	5	3	1	3
	30	Tamatakaw	Toe	4	3	1	2
	31	Kyonsoat	Kawat	5	3	1	3
		Average		6	3	1	3
Kyaiklatt	32	Maubin Island(N)	Hlaingtar	6	3	1	2
	33	Maubin Island(S)	Tharyarwel	5	3	1	2
	34	Thonegwakyun	Tamatpyay	5	3	1	2
		Average		5	3	1	2

(8) Average Yield and Price of Paddy in the year 2007, 2008 and 2009

Township	Sr. No	Polder	Yield/Acre (basket)			Price/basket (kyat)		
			2007	2008	2009	2007	2008	2009
Labutta	1	Alegyun-1	48	28	24	3,800	2,230	3,780
	2	Alegyun-2	41	25	27	2,800	2,500	3,990
	3	Alegyun-3	32	15	17	3,200	2,600	3,560
	4	Magyibinmadaukan	31	26	28	3,700	2,500	3,700
	5	Thingangyi	41	5	7	3,900	2,300	3,450
	6	Zinywe	35	19	12	3,200	1,700	3,300
	7	Leikkwin	40	11	20	4,500	3,200	4,400
	8	Labutta (S)	44	21	23	3,900	2,450	3,900
	9	Labutta (N)	39	38	34	3,000	2,070	3,600
	10	U Gaungpu	34	15	15	2,200	1,800	3,500
	11	Bitud Island-1	28	10	9	4,300	2,300	4,900
	12	Bitud Island-2	46	27	20	3,300	2,500	3,600
	13	Bitud Island-3	54	28	31	4,300	2,100	3,800
	14	Bitud Island-4	52	46	30	3,500	2,040	3,400
Bogalay	15	Daunggyi	35	30	27	3,150	3,100	4,100
	16	Daunggyi(East)	34	29	22	3,770	2,700	4,200
	17	Daunggyi(West)	36	22	23	3,140	3,800	4,200
	18	Daunggyi(Upper)	37	30	28	3,800	4,200	4,200
Phyapon	19	Daw Nyein	36	29	27	3,800	4,200	4,800
	20	Myokone	38	35	32	5,000	4,900	5,300
	21	Kyetphamwezaung	39	38	33	4,400	4,200	4,700
	22	Banbwezu	30	24	25	3,100	3,000	3,050
	23	Daydalu	46	40	35	4,100	4,200	4,800
	24	Letpanbin	49	46	45	4,800	4,900	5,300
25	Zinbaung	43	44	43	4,700	4,700	5,000	

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Daydaye	26	Myaseinkan	55	43	43	4,900	3,550	4,800
	27	Thandi	41	38	37	4,980	4,600	5,200
	28	Suclubbaluma	46	28	34	3,460	3,460	4,600
	29	Hleseikchaunggyi	53	48	45	4,400	4,370	4,600
	30	Tamatakaw	53	49	46	4,250	5,060	4,460
	31	Kyonsoat	47	42	35	4,850	3,600	2,700
Kyaiklatt	32	Maubin Island(N)	51	53	51	2,340	2,500	3,500
	33	Maubin Island(S)	40	40	37	3,000	2,600	3,700
	34	Thonegwakyun	46	40	40	3,900	3,800	4,200

(9) Extension and Education Services received by the Farmers in 2007

Township Ngaputaw	Sr No	Polder Alegyun-1	Extension & Education Services received by farmer (2007)							
			Seed selection		Pest & disease		Fertilizer		Agri. practices	
			%	Freq.	%	Freq.	%	Freq.	%	Freq.
Labutta	1	Alegyun-1	-	-	-	-	-	-	-	-
	2	Alegyun-2	-	-	-	-	-	-	-	-
	3	Alegyun-3	-	-	-	-	-	-	-	-
	4	Magyibin madaukan	-	-	-	-	-	-	-	-
	5	Thingangyi	-	-	17	1	17	1	33	1
	6	Zinywe	-	-	-	-	-	-	17	1
	7	Leikkwin	-	-	-	-	-	-	12	1
	8	Labutta (S)	-	-	-	-	-	-	-	-
	9	Labutta (N)	-	-	-	-	-	-	-	-
	10	U Gaungpu	-	-	-	-	-	-	-	-
	11	Bitud Island-1	-	-	-	-	-	-	-	-
	12	Bitud Island-2	-	-	17	1	-	-	50	2
	13	Bitud Island-3	-	-	-	-	-	-	-	-
	14	Bitud Island-4	-	-	-	-	-	-	20	1
Bogalay	15	Daunggyi	-	-	-	-	-	-	-	-
	16	Daunggyi(East)	-	-	-	-	-	-	-	-
	17	Daunggyi(West)	-	-	-	-	-	-	-	-
	18	Daunggyi(Upper)	20	1	-	-	-	-	-	-
Phyarpon	19	Daw Nyein	-	-	-	-	25	1	25	1
	20	Myokone	-	-	20	1	-	-	-	-
	21	Kyetphamwezaung	-	-	-	-	-	-	-	-
	22	Banbwezu	-	-	-	-	-	-	-	-
	23	Daydalu	-	-	-	-	-	-	-	-
	24	Letpanbin	-	-	-	-	-	-	-	-
	25	Zinbaung	-	-	-	-	-	-	-	-
Daydaye	26	Myaseinkan	-	-	-	-	-	-	20	1
	27	Thandi	-	-	-	-	-	-	-	-
	28	Suclubbaluma	-	-	-	-	-	-	-	-
	29	Hleseikchaunggyi	-	-	-	-	-	-	-	-
	30	Tamatakaw	-	-	-	-	-	-	-	-
	31	Kyonsoat	-	-	-	-	-	-	-	-
Kyaiklatt	32	Maubin Island(N)	-	-	-	-	20	1	-	-
	33	Maubin Island(S)	-	-	-	-	-	-	-	-
	34	Thonegwakyun	-	-	-	-	-	-	-	-

(9) Extension and Education Services received by the Farmers in 2009

Township Ngaputaw	Sr No	Polder Alegyun-1	Extension & Education Services received by farmer (2009)							
			Seed selection		Pest & disease		Fertilizer		Agri. practices	
			%	Freq.	%	Freq.	%	Freq.	%	Freq.
Labutta	1	Alegyun-1	-	-	-	-	-	-	-	-
	2	Alegyun-2	-	-	-	-	-	-	-	-
	3	Alegyun-3	-	-	7	1	-	-	-	-
	4	Magyibin madaukan	-	-	-	-	-	-	-	-
	5	Thingangyi	-	-	-	-	-	-	50	3
	6	Zinywe	-	-	-	-	-	-	-	-
	7	Leikkwin	-	-	-	-	-	-	12	1
	8	Labutta (S)	-	-	-	-	-	-	-	-
	9	Labutta (N)	17	1	-	-	17	1	-	-
	10	U Gaunpu	-	-	-	-	-	-	-	-
	11	Bitud Island-1	33	1	33	1	33	1	-	-
	12	Bitud Island-2	-	-	-	-	-	-	17	1
	13	Bitud Island-3	20	1	-	-	-	-	-	-
	14	Bitud Island-4	-	-	-	-	-	-	-	-
Bogalay	15	Daunggyi	-	-	-	-	-	-	-	-
	16	Daunggyi(East)	25	1	-	-	-	-	-	-
	17	Daunggyi(West)	-	-	-	-	-	-	-	-
	18	Daunggyi(Upper)	-	-	-	-	-	-	-	-
Phyapon	19	Daw Nyein	-	-	-	-	20	1	20	1
	20	Myokone	-	-	20	1	-	-	20	1
	21	Kyetphamwezaung	-	-	-	-	-	-	-	-
	22	Banbwezu	-	-	20	2	-	-	20	1
	23	Daydal	20	4	-	-	-	-	-	-
	24	Letpanbin	-	-	-	-	-	-	-	-
	25	Zinbaung	-	-	-	-	20	1	-	-
Daydaye	26	Myaseinkan	-	-	-	-	-	-	-	-
	27	Thandi	-	-	-	-	-	-	20	1
	28	Suclubbaluma	-	-	-	-	40	2	20	1
	29	Hleseikchaunggyi	20	1	-	-	60	3	-	-
	30	Tamatakaw	-	-	-	-	-	-	-	-
	31	Kyonsoat	-	-	-	-	-	-	30	2
Kyaiklatt	32	Maubin Island(N)	-	-	-	-	20	1	-	-
	33	Maubin Island(S)	40	2	-	-	60	3	40	2
	34	Thonegwakyun	40	2	-	-	40	2	-	-

A4-2 Results of Measurement of Polder and Dike

(1) Conditions of Gate

Township	Sr No	Name of Polder	Name of sluice	Gate		No.		
				River side	Size			
				Land side				
Labutta	1	Alekyun (1)	Sin The	Flap Gate	φ4'	4		
				Slide Gate	4'2"x4'2"	4		
			Aung Khaing	Flap Gate	φ4'	4		
				Slide Gate	4'2"x4'2"	4		
			Maung Kywet	Flap Gate	φ4'	3		
				Slide Gate	4'2"x4'2"	3		
	2	Alekyun (2)	Kun Nyut	Flap Gate	φ4'	3		
				Stop Log		3		
			Thit Poke	Flap Gate	φ4'	3		
				Stop Log		3		
			Kunwin	Flap Gate	φ4'	5		
				Slide Gate	4'2"x4'2"	3		
				Stop Log		2		
			Thingangone	Flap Gate	φ4'	11		
				Slide Gate	4'2"x4'2"	7		
				Stop Log		4		
			3	Alekyun (3)	Phozone	Flap Gate	φ4'	5
						Slide Gate	4'2"x4'2"	3
	Stop Log					2		
	Poteta	Flap Gate			φ4'	6		
		Slide Gate			4'2"x4'2"	4		
		Stop Log				2		
	Koebo	Flap Gate			φ4'	3		
		Slide Gate			4'2"x4'2"	3		
	Tawgaung	Flap Gate			φ4'	4		
		Slide Gate			4'2"x4'2"	2		
		Stop Log				2		
	4	Magyibin Madaukkan			Non			
	5	Thin gan gyi	Non					
	6	Zinywe	Non					
	7	Lake kwin	Leik Kwin	Flap (Wood)	6'x6'	1		

Labutta	8	Labutta (South)	Kwaklake	Flap Gate	φ4'	6
				Slide Gate	4'2"x4'2"	6
			Ganate	Flap Gate	φ4'	3
				Slide Gate	4'2"x4'2"	3
			Me Oo	Flap Gate	φ4'	8
				Slide Gate	4'2"x4'2"	8
9	Labutta	Phope	Flap Gate	φ4'	10	

A4-2 Results of Measurement of Polder and Dike

		(North)		Slide Gate	4'2"x4'2"	10
			Labuttalok	Flap Gate	φ4'	8
				Slide Gate	4'2"x4'2"	8
			Mayan (North)	Flap Gate	φ4'	5
				Slide Gate	4'2"x4'2"	5
			Mayan (South)	Flap Gate	φ4'	5
				Slide Gate	4'2"x4'2"	5
			Letweikwe	Flap Gate	φ4'	2
				Slide Gate	4'2"x4'2"	2
			Denetan	Flap Gate	φ4'	2
				Slide Gate	4'2"x4'2"	2
			Nyaung Lain	Slide Gate	3'10"x4'	3
				Non		
			Shansu	Flap Gate	φ4'	3
				Slide Gate	4'2"x4'2"	3
			Kyaukchaung	Flap Gate	φ4'	2
				Slide Gate	4'x4'	2
			Denechaung	Flap Gate	φ4'	7
				Slide Gate	4'2"x4'2"	7
	10	U Gaung Pu	Non			
11	Bitud (1)	Zeephu	Flap Gate	φ4'	4	
			Flap Gate	4'2"x4'2"	4	
		Phonnako	Flap Gate	φ4'	6	
			Slide Gate	4'2"x4'2"	6	

Labutta	12	Betud (2)	Satchaung	Flap Gate	φ4'	8		
				Slide Gate	4'2"x4'2"	8		
			Kantbalar	Flap Gate	φ4'	5		
				Slide Gate	4'2"x4'2"	3		
				Flap Gate	φ4'	2		
			Htonebookya	Flap Gate	φ4'	8		
				Slide Gate	4'2"x4'2"	4		
				Flap Gate	φ4'	4		
			Kyainchaung	Flap Gate	φ4'	6		
				Slide Gate	4'2"x4'2"	4		
				Flap Gate	φ4'	2		
			13	Betud (3)	Maungnge	Flap Gate	φ4'	3
						Slide Gate	4'2"x4'2"	3
	Kaingtaw	Flap Gate			φ4'	6		
Slide Gate		4'2"x4'2"			4			

A4-2 Results of Measurement of Polder and Dike

	14	Betud (4)	Thapyaykwin	Flap Gate	φ4'	2
				Flap (Wood)	4'6"x4'6"	2
			Kadauksat	Flap (Wood)	4'2"x4'2"	2
				Non		1
			Chaungbwai	Flap (Wood)	3'x3'	1
				Slide Gate	4'2"x4'2"	4
			Kakayan	Flap Gate	φ4'	5
				Slide Gate	4'2"x4'2"	3
				Flap Gate	φ4'	2
			Phokhwalay	Flap Gate	φ4'	2
	Slide Gate	4'2"x4'2"		2		
	Phokhwagyi	Flap Gate	φ4'	4		
		Slide Gate	4'2"x4'2"	2		
		Flap Gate	φ4'	2		
	Katipar	Flap Gate	φ4'	5		
		Slide Gate	4'2"x4'2"	3		
		Flap Gate	φ4'	2		
	Baepauk	Flap Gate	φ4'	4		
		Slide Gate	4'2"x4'2"	2		
		Flap Gate	φ4'	2		
Bogalay	15	Daunggyi	Satsan (Kyon Kaw)	Flap Gate	φ4'	8
				Slide Gate	4'9"x4'9"	4
				Stop Log		4
			Ahseekalay	Flap Gate	φ4'	9
				Slide Gate	4'6"x5'	9
			Myit Kyo	Flap Gate	φ4'	5
				Slide Gate	4'9"x4'9"	3
				Stop Log		2
			Kalagyi Chaung	Flap Gate	φ4'	6
				Slide Gate	4'6"x5'	4
				Stop Log		2
			Thal Chaung	Flap Gate	φ4'	6
	Slide Gate	4'6"x5'6"		4		
	Stop Log			2		
	Kathapaung	Flap Gate	φ4'	10		
		Slide Gate	4'6"x5'	6		
		Stop Log		4		
	16	Daunggyi (East)	Phonyo	Flap Gate	φ4'	8
Flap Gate				φ4'	8	
Yaekyawtoe			Flap Gate	φ4'	21	
			Slide Gate	4'2"x4'2"	21	
Yatphayone			Flap Gate	4'x4'	4	
			Stop Log		4	

A4-2 Results of Measurement of Polder and Dike

	17	Daunggyi (West)	Ponnayake	Flap Gate	φ4'	7
				Flap Gate	4'2"x4'2"	7
			Thapyi Kone	Flap Gate	φ4'	4
				Slide Gate	4'6"x4'6"	4
			Mangalgyi	Flap Gate	φ4'	4
				Slide Gate	4'2"x4'2"	4
	Mangallay	Flap Gate	5'x5'	5		
		Flap Gate	5'x5'	5		
	18	Daunggyi (Upper)	Kamakalu	Flap Gate	φ4'	5
				Slide Gate	4'2"x4'2"	5
Phyapon	19	Daw Nyein	Sitkalde	Flap Gate	φ4'	8
				Slide Gate	4'2"x4'2"	4
				Stop Log		4

Phyapon	20	Myogone	Awakwin	Flap Gate	φ4'	6
				Slide Gate	4'2"x4'2"	4
				Stop Log		2
			Myochaung	Flap Gate	φ4'	4
				Slide Gate	4'2"x4'2"	2
				Stop Log		2
	21	Kyetphamwezaung	Kazaungma	Flap Gate	5'2"x4'2"	4
				Stop Log		4
			Yatphalon	Flap Gate	φ4'	8
				Non		
			Warchaung	Flap Gate	φ4'	12
				Slide Gate	4'2"x4'2"	6
				Stop Log		6
			Phalat	Flap Gate	φ4'	15
				Slide Gate	4'2"x4'2"	15
			Barlar	Flap Gate	φ4'	7
				Stop Log		7
			Balayoe	Non	5'x6'	3
	Stop Log			3		
	Aukabar	Flap Gate	φ4'	8		
		Stop Log		8		
	22	Banbwezu	Kwinwin	Flap Gate	6'5"x4'6"	4
				Non		
			Mahtaw	Flap Gate	φ4'	3
				Non		
			Kyonthu (east)	Flap Gate	6'6"x6'6"	6
				Non		
			Theein	Flap Gate	6'5"x6'5"	6
			Achan	Flap Gate	φ4'	4
				Non		
Kalabel			Flap Gate	φ4'	2	
	Non					

A4-2 Results of Measurement of Polder and Dike

	23	Daydalu	Htalon	Flap Gate	6'6"x6'6"	10
				Non		
			Bawdima	Flap Gate	φ4'	7
				Slide Gate	4'6"x4'6"	5
Stop Log		2				

Pyapon	24	Letpanbin	Htitan	Flap Gate	φ4'	8
				Slide Gate	4'4"x4'6"	8
			Condeigyi	Flap Gate	φ4'	9
				Slide Gate	4'2"x4'2"	9
			Bandway	Flap Gate	φ4'	2
				Stop Log		2
			Kamaraung	Flap Gate	φ4'	3
				Stop Log		3
	25	Zinbaung	Phayakalay	Flap Gate	φ4'	3
				Stop Log		3
			Kophagyi	Flap Gate	φ4'	6
				Slide Gate	5'x4'	6
			Kyweku	Flap Gate	5'4"x5'42"	5
				Slide Gate	5'x4'	5
			Zinpaung	Flap Gate	φ4'	3
				Slide Gate	4'2"x4'2"	3
Dadeye	26	Myaseikan	Non			
	27	Thandimiyitae	Non			
	28	Suclubbeluma	Non			
	29	Hleaeik Chaunggyi	Non			
	30	Tamartakaw	Non			
	31	Kyonsot	Non			
Kyaiklat	32	Maubin Island (north)	Non			
	33	Maubin Island (Southh)	Phosan	Flap Gate	4'x4'	1
				Flap Gate	4'x4'	1
			Tartpart (west)	Non	4'2"x4'2"	1
				Non	4'2"x4'2"	1
			Latargyi	Flap Gate	4'x4'	1
				Non	4'x4'	1
	34	Thongwa Island	Kyonmange	Non	3'6"x3'6"	2
				Non	3'6"x3'6"	2
			Kyauktaingsu	Flap Gate	8'x8'	8
				Slide Gate	8'x8'	8
			Mezalgone	Non	4'x4'	2
				Flap Gate	4'x4'	2
			Tharyargone	Non	3'6"x3'6"	2
				Non	3'6"x3'6"	2
			Htanpinpyo Lockgate			
			Lintun	Non	4'x4'	2
				Flap Gate	4'x4'	2
Layianpin Lockgate						
Htanpinpyo Sluice	Flap Gate	8'x8'	21			
	Slide Gate	8'x8'	21			

A4-3 Results of Water and Soil Quality Test

(1)Result of Water Quality Test

Sr.No	Polder Name	Village Name	Sample Place	pH	Salinity							Nutrients (g/l)				
					Salt Content		Cations and Anions (g/l)					NO ₃ -N	NH ₄ -N	PO ₄ -P	K	
					EC _w ms/cm	TDS mg/l	Ca ⁺⁺	Mg ⁺⁺	Na ⁺⁺	CO ₃ ⁻	CL ⁻					HCO ₃ ⁻
I Labutta Township																
1	Alegyun-1	Hponyokone	P W	6.6	1.514	968.96	0.015	0.001	81.99	ND	0.486	0.122	0.003	0.003	0.001	0.197
			RO	7.2	35.16	22502.4	0.076	0.173	47.99	ND	11.638	0.292	0.041	0.0045	0.004	2.377
			DC	7.8	27.3	17472	0.162	0.070	31.99	ND	8.824	0.561	0.053	0.012	0.007	1.385
2	Alegyun-2	Hpobagankone	P W	7.1	0.836	535.04	0.005	0.002	0.989	ND	0.277	0.122	0.027	0.0045	0.003	0.077
			RO	7.2	35.1	22464	0.227	0.069	43.99	ND	11.638	0.195	0.038	0.0015	0.003	2.705
			DC	7.2	20.54	13145.6	0.141	0.033	17.99	ND	6.357	0.146	0.032	0.0015	0.005	1.385
3	Alegyun-3	Ingaday	P W	7.7	2.222	1422.1	0.010	0.012	0.2231	ND	0.590	0.219	0.01	0.003	0.029	0.009
			RO	7.2	39.09	25017.6	0.179	0.113	5.299	ND	2.223	0.195	0.043	0.0015	0.029	0.229
			DC -1	7.4	42.72	27340.8	0.954	0.394	5.899	ND	37.252	0.195	0.024	0.0023	0.02	0.299
			DC -2	7.3	39.81	25478.4	0.999	0.308	6.399	ND	12.090	0.195	0.047	0.0030	0.03	0.266
4	Magyibinn madaukan	Madaukan	P W	7.8	0.270	172.8	0.004	0.016	0.045	ND	0.347	0.097	0.023	0.0022	0.047	0.020
			RO	7.4	36.03	23059.2	0.965	0.264	4.599	ND	10.805	0.219	0.039	0.0015	0.033	0.199
			DC	6.5	36.09	23097.6	1.136	0.235	5.099	ND	11.013	0.122	0.005	0.0015	0.028	0.270
5	Thingangyi	Nalinkyaw	P W	7.1	0.835	534.4	0.027	0.011	0.8079	ND	0.156	0.170	0.021	0.0075	0.006	0.009
			RO	7.3	38.76	24806.4	0.874	0.351	5.499	ND	11.517	0.219	0.026	0.006	0.01	0.247
			DC	7.5	38.82	24884.8	0.920	0.333	5.899	ND	11.552	0.195	0.008	0.006	0.009	0.270
6	Zinywe	Ohebo	P W	7.3	0.639	409.0	0.015	0.018	0.0681	ND	0.191	0.146	0.007	0.0023	0.01	0.006
			RO	7.4	37.68	24115.2	0.930	0.292	5.399	ND	10.926	0.195	0.04	0.003	0.014	0.274
			DC	6.9	0.945	604.8	0.008	0.014	0.1413	ND	0.330	0.170	0.009	0.006	0.026	0.028
7	Leikkwin	Leikkwin	P W	6.9	0.253	161.92	0.008	0.009	0.0296	ND	0.052	0.097	0.017	0.0037	0.016	0.006
			RO	7.4	46.65	29856.0	1.034	0.533	7.299	ND	13.567	0.170	0.011	0.0023	0.016	0.258
			DC	7.1	3.28	2099.20	0.106	0.036	0.489	ND	0.746	0.122	0.047	0.003	0.008	0.001
8	Labutta (South)	Kyarnikan	P W	7.9	0.515	329.6	0.004	0.002	0.692	ND	0.138	0.170	0.054	0.0045	0.001	0.187
			RO	7.1	26.4	16896	0.158	0.069	35.99	ND	9.033	0.195	0.024	0.0045	0.004	1.487
			DC	7.4	1.056	675.84	0.007	0.002	1.154	ND	0.347	0.146	0.011	0.003	0.001	0.096

A4-3 Results of Water and Soil Quality Test

9	Labutta (North)	Daminchaunglay	P W	7.5	0.132	84.48	0.002	0.0005	0.043	ND	0.034	0.073	0.011	0.0045	0.006	0.044
			RO	7.4	30.56	19558.4	0.187	0.073	44.99	ND	10.040	0.195	0.02	0.006	0.006	1.658
			DC	6.7	2.974	1903.36	0.020	0.003	4.646	ND	0.972	0.097	0.017	0.0016	0.007	0.186
10	U Gaungpu	Kangyidaunk	P W	7.9	2.304	1474.6	0.034	0.025	0.4334	ND	0.694	0.195	0.026	0.0015	0.004	0.026
			RO	7.3	40.95	26208.0	0.908	0.389	6.399	ND	12.194	0.195	0.021	0.0015	0.011	0.340
			DC	7.2	52.89	33849.6	1.167	0.622	7.599	ND	16.224	0.219	0.012	0.0015	0.003	0.381
11	Bitud Island (1)	Zeebyu	P W	6.8	0.469	300.2	0.011	0.007	0.0461	ND	0.086	0.097	0.104	0.0015	0.006	0.002
			RO	7.3	6.86	4390.4	0.247	0.011	0.8079	ND	1.789	0.170	0.038	0.0015	0.007	0.044
			DC	6.9	1.101	704.6	0.042	0.011	0.0706	ND	0.260	0.170	0.029	0.0015	0.007	0.008
12	Bitud Island (2)	Lay-ein tan	P W	7.5	0.778	497.9	0.103	0.011	0.1859	ND	0.330	0.292	0.035	0.0015	0.012	0.015
			RO	6.8	6.64	4249.6	0.194	0.025	0.5999	ND	1.685	0.170	0.044	0.0015	0.01	0.037
			DC	7.2	1.156	739.8	0.042	0.016	0.8079	ND	0.330	0.170	0.006	0.0015	0.012	0.007
13	Bitud Island (3)	Kabarkwin	P W	7.1	0.232	148.48	0.008	0.014	0.0109	ND	0.086	0.122	0.013	0.0015	0.015	0.001
			RO	7.3	1.464	936.96	0.114	0.014	0.0908	ND	0.364	0.146	0.027	0.0015	0.017	0.006
			DC	7.4	0.667	426.88	0.053	0.004	0.0608	ND	0.191	0.146	0.07	0.003	0.014	0.004
14	Bitud Island (4)	Leik-i	P W	6.8	0.346	221.44	0.015	0.014	0.0208	ND	0.052	0.122	0.014	0.0023	0.018	0.003
			RO	7.8	6.12	3916.80	0.152	0.041	0.6463	ND	1.511	0.170	0.048	0.0015	0.016	0.029
			DC	7.3	1.408	901.12	0.068	0.014	0.091	ND	0.364	0.146	0.012	0.0015	0.010	0.006
III																
Bogalay Township																
15	Daunggyi	Daunggyi	P W	6.5	0.097	62.08	0.001	-	0.089	ND	0.0694	0.076	0.017	0.009	0.006	0.026
			RO	6.8	7.08	4531.2	0.054	0.008	8.685	ND	2.1193	0.17	0.032	0.003	0.006	0.428
			DC	6.8	8.7	5568	0.075	0.002	27.99	ND	2.5709	0.146	0.002	0.0015	0.003	0.571
16	Daunggyi (East)	Hpoe-nyo	P W	6.9	0.139	88.96	-	0.003	0.125	ND	0.1042	0.097	0.012	0.0045	0.002	0.439
			RO	6.7	3.57	2284.8	0.060	0.013	5.25	ND	1.1117	0.146	0.05	0.003	0.001	0.263
			DC	6.8	3.586	2295.04	0.054	0.009	4.846	ND	1.0944	0.195	0.056	0.0015	0.002	0.241
17	Daunggyi (West)	Paung De	P W	6.6	1.366	874.24	0.014	-	1.658	ND	0.4516	0.146	0.008	0.003	0.005	0.318
			RO	7.2	5.34	3417.6	0.042	0.004	6.867	ND	1.493	0.195	0.036	0.0045	0.001	0.329
			DC	7.1	5.04	3225.6	0.053	0.006	6.159	ND	1.389	0.146	0.027	0.003	0.002	0.340

A4-3 Results of Water and Soil Quality Test

18	Daunggyi (Upper)	Kamarkalu	P W	7.8	0.658	421.12	0.005	0.001	0.824	ND	0.243	0.122	0.056	0.0045	0.004	0.034
			RO	7.2	2.75	1760	0.042	0.007	2.212	ND	0.1042	0.122	0.012	0.003	0.006	0.186
			DC	7.3	3.336	2135.04	0.035	0.001	4.038	ND	1.007	0.146	0.039	0.0045	0.004	0.219
IV																
Phvapon Township																
19	Daw Nyein	Daw Nyein	P W	6.7	0.452	289.28	0.004	Not detect ed	1.175	ND	3.665	0.097	0.041	0.0075	0.021	0.040
			RO	7.8	24.46	15654.4	0.157	0.042	37.99	ND	9.328	0.195	0.02	0.012	0.001	3.443
			DC	7.8	28.68	18355.2	0.186	0.061	44.99	ND	0.226	0.244	0.021	0.006	0.036	1.322
20	Myokone	Hpa-yar-kone	P W	7.8	0.351	224.64	0.003	0.002	0.253	ND	2.623	0.122	0.039	0.003	0.001	0.074
			RO	7.7	18.02	11532.8	0.153	0.008	19.99	ND	9.954	0.170	0.036	0.0045	0.006	1.323
			DC	7.7	21.96	14054.4	0.150	0.036	29.99	ND	0.295	0.024	0.026	0.003	0.004	1.679
21	Kyethamwezaung	Okkappar	P W	8.0	0.196	125.4	0.001	0.002	0.109	ND	0.035	0.146	0.021	0.0052	0.007	0.041
			RO	8.2	2.11	1350.4	0.021	0.002	17.99	ND	0.591	0.146	0.013	0.003	0.005	0.252
			DC	8.1	2.772	1774.1	0.025	0.002	29.99	ND	0.695	0.146	0.027	0.003	0.001	0.263
22	Banbwezu	Koe-ein tan	P W	6.6	0.251	160.6	0.004	0.016	0.007	ND	0.069	0.097	0.017	0.0015	0.002	0.003
			RO	7.3	0.410	262.4	0.027	0.007	0.060	ND	0.069	0.146	0.021	0.0015	0.004	0.009
			DC	7.5 0	0.42	266.20	0.03	0.00	0.02	ND	0.02	0.17	0.00	0.00	0.01	0.23
23	Daydalu	Ngoat ta htaung	P W	7.5	0.480	307.20	0.004	0.002	0.659	ND	6.757	0.195	0.044	0.0045	0.018	0.075
			RO	7.9	32.04	2050.6	0.237	0.043	48.99	ND	5.297	0.170	0.039	0.0015	0.004	2.582
			DC	8.0	9.3	5952.00	0.076	0.004	8.99	ND	0.156	0.195	0.002	0.006	0.001	0.629
24	Letpanbin	Letpanbin	P W	8.0	0.219	140.16	0.001	0.001	0.263	ND	9.397	0.146	0.05	0.003	0.005	0.030
			RO	8.0	30.08	19251.2	0.191	0.061	54.99	ND	7.278	0.219	0.062	0.0015	0.004	1.973
			DC	7.7	12.66	8102.4	0.098	0.014	18.99	ND	0.191	0.122	0.066	0.003	0.008	0.734
25	Zinbaung	Timpalwair	P W	8.2	0.306	195.8	0.003	0.002	0.395	ND	0.104	0.146	0.024	0.0023	0.005	0.047
			RO	8.1	13.28	8499.2	0.111	0.007	19.99	ND	3.856	0.195	0.008	0.0022	0.006	0.839
			DC	8.1	15.6	9984.0	0.116	0.017	20.99	ND	4.655	0.195	0.019	0.0023	0.004	1.133
V																
Daydave Township																

A4-3 Results of Water and Soil Quality Test

26	Myaseinkan	Akeichaungwa	P W	7.1	0.190	121.6	0.001	0.001	0.0059	ND	0.017	0.122	0.143	0.053	0.028	0.007
			RO	7.5	9.58	6131.2	0.048	0.025	1.099	ND	2.536	0.219	0.015	0.015	0.028	0.062
			DC	6.8	27.54	17625.6	0.137	0.108	3.699	ND	8.685	0.146	0.136	0.060	0.018	0.075
27	Thandi	Baygyi	P W	6.8	0.313	200.3	0.004	0.001	0.0253	ND	0.034	0.146	0.027	0.003	0.03	0.007
			RO	7.2	8.38	5363.2	0.086	0.003	0.8786	ND	2.223	0.219	0.005	0.005	0.026	0.060
			DC	7.1	6.4	4096.0	0.015	0.027	0.7675	ND	1.737	0.219	0.014	0.007	0.03	0.041
28	Sucubbluma	Hnarkhaungchaung	P W	6.6	0.246	157.4	0.004	0.004	0.128	ND	0.174	0.122	0.008	0.003	0.026	0.003
			RO	7.1	6.98	4467.2	0.036	0.018	1.199	ND	1.876	0.170	0.014	0.0023	0.026	0.041
			DC	7.1	4.46	2854.4	0.021	0.013	0.999	ND	1.181	0.195	0.013	0.003	0.027	0.037
29	Hleseikchaunggyi	Layywar	P W	6.9	0.200	128.0	0.001	0.002	0.1532	ND	0.017	0.170	0.042	0.005	0.003	0.002
			RO	7.1	8.98	5747.2	0.076	0.004	0.899	ND	2.466	0.219	0.014	0.005	0.029	0.060
			DC	7.1	1.276	816.6	0.010	0.004	1.199	ND	0.312	0.219	0.011	0.006	0.033	0.017
30	Tamatakaw	Toeywar	P W	7.7	0.198	126.7	0.001	0.002	0.059	ND	0.034	0.073	0.017	0.0015	0.002	0.026
			RO	7.9	22.76	14566.4	0.171	0.046	36.99	ND	8.582	0.268	0.013	0.003	0.001	1.154
			DC	7.7	29.9	19136.0	0.166	0.098	48.99	ND	9.658	0.170	0.011	0.0022	0.001	1.406
31	Kyonsoat	Kawet	P W	7.9	0.316	202.2	0.015	0.004	0.318	ND	0.138	0.122	0.011	0.0023	0.009	0.059
			RO	8.0	14.48	9267.2	0.080	0.032	19.01	ND	4.238	0.195	0.015	0.0037	0.005	0.881
			DC	7.6	29.66	18982.4	0.183	0.088	46.99	ND	9.311	0.244	0.012	0.003	0.006	1.763
VI																
Kveiklatt Township																
32	Maubin Kyun(N)	Hlaingtar	RO	7.5	0.371	237.44	0.023	0.014	0.0077	ND	0.034	0.195	0.08	0.003	0.007	0.001
			DC	7.2	0.038	245.76	0.03	0.009	0.0125	ND	0.052	0.17	0.013	0.0015	0.01	0.003
33	Maubin Kyun(S)	Tharyarwell	P W	7.4	0.488	312.32	0.03	0.014	0.0153	ND		0.195	0.007	0.0015	0.013	0.001
			RO	7.5	0.393	251.52	0.023	0.004	0.008	ND	0.017	0.195	0.035	0.0015	0.012	0.001
			DC	6.8	0.545	348.8	0.03	0.018	0.0263	ND	0.086	0.122	0.004	0.002	0.017	0.002

A4-3 Results of Water and Soil Quality Test

34	Thonegwaykun	Tamapay	P W	6.7	0.401	256.6	0.015	0.009	0.0164	ND	0.069	0.170	0.023	0.0023	0.011	0.005
			RO	7.4	0.415	265.6	0.03	0.004	0.012	ND	-	0.195	0.057	0.0015	0.015	0.001
			DC	7.2	0.48	307.2	0.030	0.009	0.0125	ND	0.052	0.17	0.013	0.0015	0.01	0.003

(2)Result of Soil Quality Test

Sr. No	Sample			Depth (cm)	pH (1:2:5) Soil: Water	Salinity	
	Polder Name	Village Name	Plot No			EC (1:5) Soil:Water ms/cm	ECe (1:5) Soil:Water ms/cm
I	<u>Labutta Township</u>						
1	Alegyun-2	Hpobagankone	1765	50	5.3	1.758	11.251
				15	5.2	1.618	10.355
2	Alegyun-1	Hponyokone		50	4.9	1.873	11.987
				15	5.0	1.482	9.485
3	Alegyun-3	Ingaday	6/1 (1740)	50	5.8	1.648	10.547
				15	5.7	1.698	10.867
4	Magyibinnmadaukan	Madaukan	1175	50	3.9	2.97	19.008
				15	4.2	2.92	18.688
5	Thingangyi	Nalinkyaw	635/D	50	6.1	2.84	18.176
				15	5.4	3.49	22.336
6	Zinywe	Koebo	644/A	50	6.2	3.27	20.928
				15	6.1	3.51	22.464
7	Leikkwin	Leikkwin	613/E	50	6.0	0.771	4.934
				15	5.1	0.782	5.005
8	Labutta (South)	Kyarnikan	651/B	50	5.6	0.614	3.93
				15	4.9	0.535	3.424
9	Labutta (North)	Daminchaunglay	542/4	50	5.9	0.322	2.061
				15	5.6	0.417	2.669
10	U Gaungpu	Kangyidaunt		50	7.1	1.899	12.154
				15	6.5	2.23	14.272
11	Bitud Island (1)	Zeebyu	1486/1	50	5.6	0.581	3.718
				15	5.2	0.594	3.802
12	Bitud Island (2)	Lay-ein tan	1467	50	5.6	0.532	3.405
				15	5.0	0.460	2.944
13	Bitud Island (3)	Kabarkwin	1461	50	5.7	0.457	2.925
				15	5.2	0.440	2.816
14	Bitud Island (4)	Leik-i	1446/A	50	4.9	0.521	3.334
				15	5.4	0.627	
II	<u>Bogalay Township</u>						
15	Daunggyi	Daunggyi	1/2	50	6.3	0.528	3.379
				15	5.8	0.512	3.277
16	Daunggyi (East)	Hpoe-nyo	3/3	50	4.9	0.667	4.269

A4-3 Results of Water and Soil Quality Test

				15	4.7	0.768	4.915
17	Daunggyi (West)	Paung De	12/1	50	5.4	1.132	7.245
				15	5.1	1.046	6.694
18	Daunggyi (Upper)	Kamarkalu	1/3	50	5.3	1.327	8.493
				15	5.2	1.312	8.397
III	Phyapon Township						
19	Daw Nyein	Daw Nyein		50	5.5	5.22	33.408
				15	4.5	6.70	42.880
20	Myokone	Hpa-yar-kone		50	7.1	1.915	12.256
				15	7.5	1.853	11.859
21	Kyetphamwezaung	Okkapar		50	5.2	0.551	3.526
				15	5.1	0.539	3.450
22	Banbwezu	Koe-ein tan	512/ B	50	5.8	0.363	2.323
				15	6.8	0.414	2.650
23	Daydalu	Ngoat ta htaung		50	5.8	0.809	5.178
				15	4.9	0.714	4.570
24	Letpanbin	Letpanbin		50	5.8	0.729	4.666
				15	6.1	0.623	3.987
25	Zinbaung	Tinpalwair		50	6.2	0.505	3.232
				15	5.2	0.535	3.424
IV	Daydaye Township						
26	Myaseinkan	Akeichaungwa	16/3 (384)	50	6.6	0.885	5.664
				15	5.2	1.947	12.461
27	Thandi	Baygyi	358/B	50	6.1	0.490	3.136
				15	5.5	0.529	3.386
28	Suclubbluma	Hnarkhaungchaung	192	50	6.3	0.621	3.974
				15	5.7	0.750	4.800
29	Hleseikchaunggyi	Lay	273/B	50	6.4	0.520	3.328
				15	5.3	0.550	3.520
30	Tamatakaw	Toe	301/B	50	5.8	0.815	5.216
				15	5.0	0.706	4.518
31	Kyonsoat	Kawet	298/A	50	6.1	1.565	10.016
				15	5.4	1.662	10.637
V	Kyeiklatt Township						
32	Maubin Island (North)	Hlaingtar	4/A	50	5.1	0.326	2.086
				15	4.9	0.240	1.536
33	Maubin Island (South)	Tharyarwel	134	50	5.3	0.381	2.438
				15	4.7	0.472	3.021
34	Thonegwakyun	Tamatpyay	150	50	5.5	0.457	2.925
				15	4.8	0.374	2.394

(1) Geological and Soil Mechanical Investigation

Sample... **Polder Dike**

Table-1 Standard Compaction Test Data Analysis on existing polder dike

Sr No.	Location	Wopt. %	$P_{dmax.}$ (t/m ³)	$D_{90\%}$ (t/m ³)	Water content $D_{90\%}$ (wet side) (%)	Field Water content W_n (%)	Difference $W_n - W_{opt}$ (%)	Remarks.
1.	TP-1	23.70	1.541	1.387	32.00	21.75	-1.95	Minimum $P_{dmax.}$
2.	TP-2	22.50	1.590	1.431	30.30	25.32	2.82	
3.	TP-3	22.70	1.603	1.443	28.30	27.08	4.38	
4.	TP-4	22.70	1.655	1.490	25.30	23.41	0.71	
5.	TP-5	18.50	1.731	1.558	23.40	8.70	-9.80	Maximum $P_{dmax.}$
6.	TP-6	21.50	1.609	1.448	30.20	22.27	0.77	
7.	TP-7	23.40	1.564	1.408	28.40	26.14	2.74	
8.	TP-8	24.10	1.554	1.399	31.30	23.09	-1.01	
9.	TP-9	21.30	1.582	1.424	28.30	22.53	1.23	
10.	TP-10	22.00	1.605	1.445	29.60	32.54	10.54	
	Average	22.24	1.603	1.443	28.71	23.283	1.04	

Note... (1) Field Water Content is mainly considered in the range between Wopt. and W_{wet} of $D_{90\%}$, except Minimum & Maximum dry density of TP 1 & TP 5, i. e. Minimum density of $P_{dmax.}$ is 1.541 t/m³ & Maximum $P_{dmax.}$ is 1.731 t/m³.

(2) Average dry density of existing polder dike is larger than the value of borrow pit in the table below according to the effectiveness by consolidation after completion of Paddy I & II project.

Sample... **Borrow area**

Table -2 Standard Compaction Test Data Analysis of borrow soil

Sr No.	Location	Wopt. %	$P_{dmax.}$ (t/m ³)	$D_{90\%}$ (t/m ³)	Water content $D_{90\%}$ (wet side) (%)	Field Water content W_n (%)	Difference $W_n - W_{opt}$ (%)	Remarks.
1.	TP-1 (0-1.0m)	25.40	1.518	1.366	31.70	26.90	1.50	
	(0.3-0.6m)	24.60	1.522	1.370	32.00	26.90	2.30	
	(0.6-1.0m)	26.80	1.473	1.325	36.80	46.40	19.60	
2.	TP-4 (0-1.0m)	21.80	1.600	1.440	28.80	26.57	4.77	
	(0.3-0.6m)	20.20	1.626	1.463	22.60	25.90	5.70	
	(0.6-1.0m)	20.70	1.624	1.462	27.60	31.10	10.40	
3.	TP-5 (0-1.0m)	21.60	1.627	1.464	28.20	9.40	-12.20	Maximum $P_{dmax.}$
	(0.3-0.6m)	16.00	1.752	1.577	18.20	3.00	-13.00	
	(0.6-1.0m)	19.90	1.654	1.489	25.10	24.50	4.60	
4.	TP-8 (0-1.0m)	27.70	1.450	1.305	35.10	49.80	22.10	Minimum $P_{dmax.}$
	(0.3-0.6m)	29.00	1.410	1.269	36.40	51.10	22.10	
	(0.6-1.0m)	28.60	1.421	1.279	31.80	59.10	30.50	
5.	TP-10 (0-1.0m)	22.80	1.579	1.421	30.00	21.23	-1.57	
	(0.3-0.6m)	23.20	1.543	1.389	30.20	20.80	-2.40	
	(0.6-1.0m)	23.00	1.558	1.403	30.70	28.20	5.20	
	Average	23.42	1.557	1.401	29.68	30.06	6.64	

Note... (1) Dates on sample of layer (0-0.3m) is neglected, because those are stripped as a top soil.

(2) Maximum result of $P_{dmax.}$ is 1.752 t/m³; Minimum density of $P_{dmax.}$ is 1.410 t/m³; Mean $P_{dmax.}$ is 1.557 t/m³ ($P_{dmax.90\%}$ is 1.401 t/m³).

(3) Natural soil condition is able to be improved to near Wopt from W_n due to drying up 2% to 4% of water content.

A4-4 Surveys on Present Condition in the Pilot Project Area

Table-3 Summary of Soil Test Results in Labutta North

	Existing Polder Dike					Borrow Pit				
	TP-1	TP-3	TP-5	TP-7	TP-9	TP-1	TP-4	TP-5	TP-8	TP-10
1. Specific Gravity (Gs)	2.68	2.70	2.67	2.70	2.70	2.70	2.69	2.68	2.68	2.70
2. Field Water Content (%)	21.75	27.08	8.70	26.14	22.53	26.90	26.60	9.40	49.80	21.20
3. Grain Size Analysis										
(1) Clay (%)	52.00	45.00	50.00	54.00	46.00	54.00	49.00	10.00	34.00	48.00
(2) Silt (%)	46.00	53.00	40.00	45.00	53.00	43.00	49.00	32.00	64.00	50.00
(3) Sand (%)	2.00	2.00	10.00	1.00	1.00	3.00	2.00	58.00	2.00	2.00
(4) Gravel (%)	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
4. Consistency Limits										
(1) L.L (%)	57.70	51.30	41.65	67.20	63.40	67.10	49.20	19.75	61.00	63.15
(2) P.L (%)	27.63	27.31	21.23	29.13	26.67	31.09	22.70	17.08	32.25	27.73
(3) P.I: L.L-P.L (%)	30.07	23.99	20.42	38.07	36.73	36.01	26.50	2.67	28.75	35.42
5. Standard Compaction										
(1) O.M.C (%)	23.70	22.70	18.50	23.40	21.30	25.40	21.80	21.60	27.70	22.80
(2) M.D.D (t/m ³)	1.541	1.603	1.731	1.564	1.582	1.518	1.600	1.627	1.450	1.579
6. Triaxial Compression										
(1) C (kg/cm ²)	1.38	1.35	1.18	1.37	1.35	1.30	1.20	1.18	1.36	1.26
(2) φ (degree)	10° 37'	10° 29'	12° 15'	9° 27'	9° 51'	9° 05'	9° 51'	10° 29'	8° 07'	9° 27'
7. Permeability Test										
K (×10 ⁻⁸ cm/sec)	6.18	5.37	3.89	5.87	5.37	3.52	3.89	3.22	18.70	5.51
8. Consolidation Test										
(1) Cc	0.19	0.20	0.12	0.18	0.20	0.17	0.16	0.16	0.22	0.18
(2) Pc	2.30	2.12	2.33	2.00	1.94	1.66	1.54	1.55	2.20	1.50
Soil Type	CH	CH	CH	CH	CH	CH	CH	SM	MH	CH

Note (1) Consistency Limits L.L: Liquid Limit, P.L: Plastic Limit, P.I Plastic Index

(2) Standard Compaction O.M.C: Optimum Moisture Content, M.D.D: Maximum Dry Density

(3) Triaxial Compression C: Cohesion, φ: Angle of Internal Friction

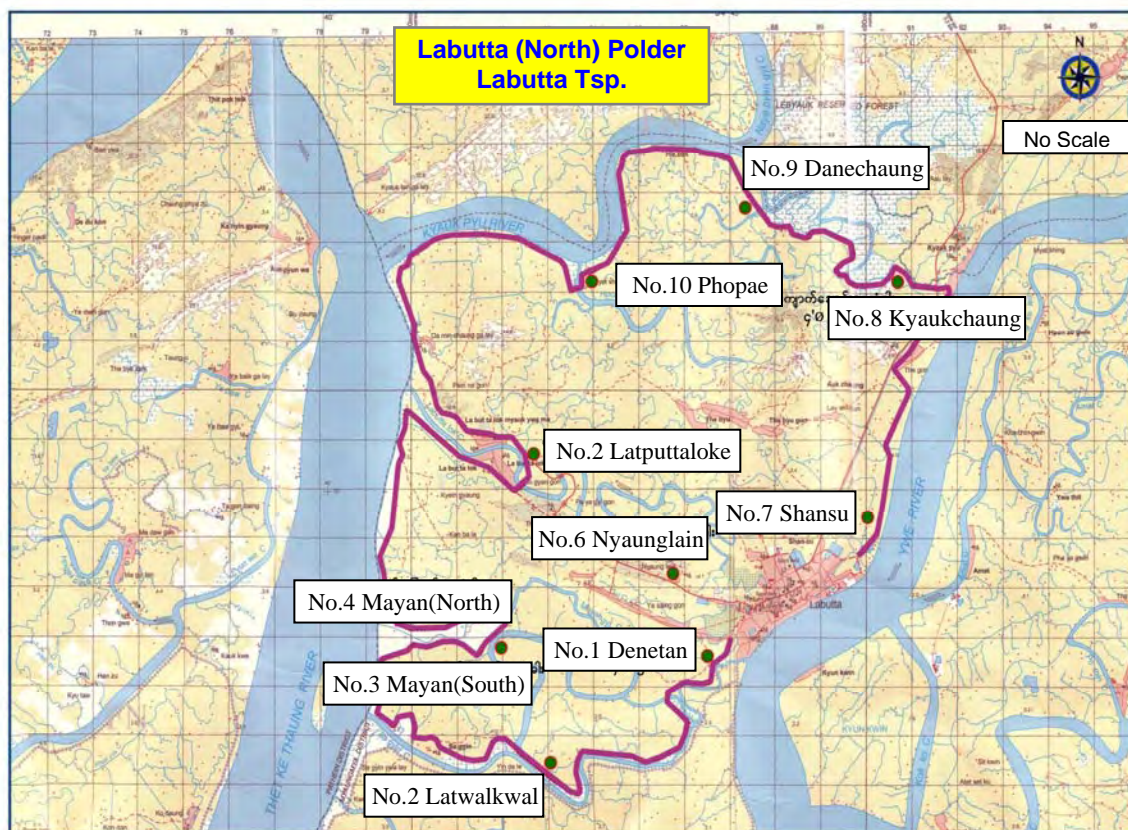
(4) Permeability Test K: Coefficient of Permeability

(5) Consolidation Test Compression Cc: Compression Index, Pc: Pr-consol Stress

(2) Electrical Conductivity (EC) Test and pH Test at Sluice in Labutta North and Daunggyi Polder

Table A2-4-1 Result of EC and pH in each sluice of the Labutta North Polder (Labutta Township)

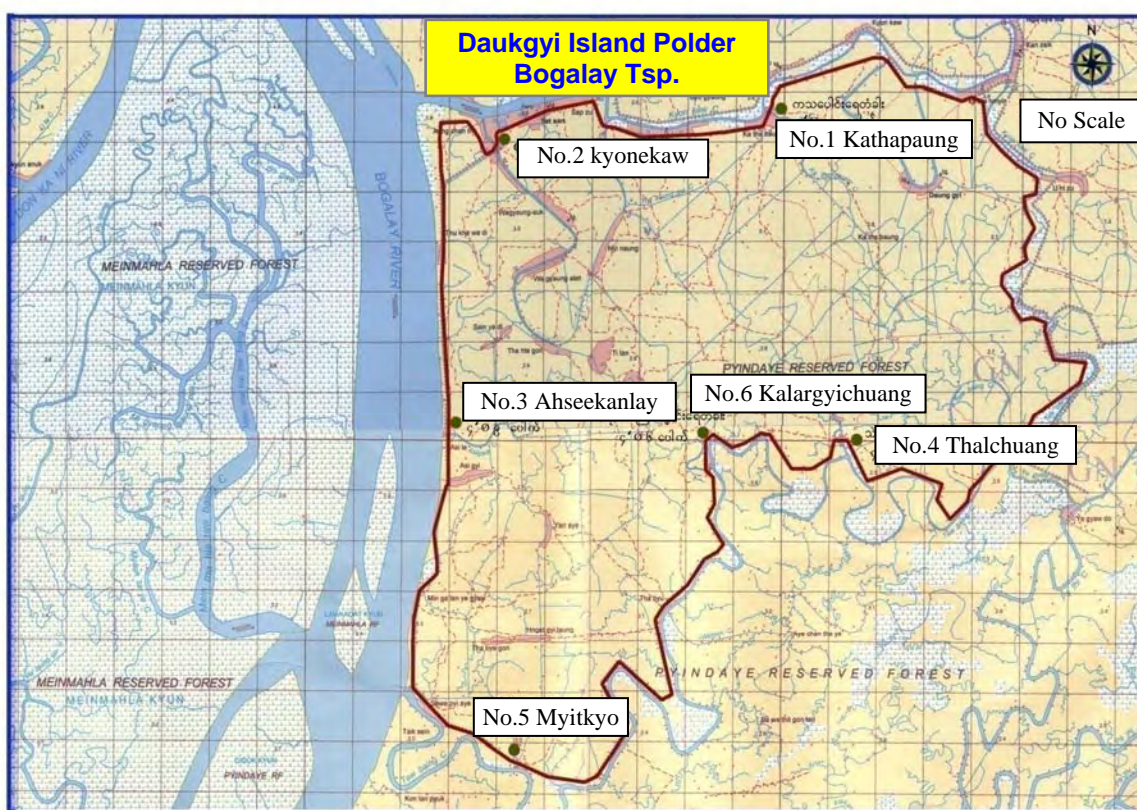
	Date Time of conduct	Location (Sluice Name)		EC (mS)				pH			
				1st	2nd	3rd	Ave.	1st	2nd	3rd	Ave.
1	30.1. 10 1:00 - 1:15 PM	Denetan	Inside	8.50	9.20	9.30	9.00	7.20	7.20	7.20	7.20
			Outside	15.40	15.60	15.70	15.57	7.40	7.40	7.40	7.40
2	30.1. 10 1:30 - 2:00 PM	Latwal khal	Inside	12.90	13.00	12.40	12.77	7.70	7.70	7.70	7.70
			Outside	9.30	9.20	9.30	9.27	7.90	7.90	7.90	7.90
3	30.1. 10 2:30-2:45 PM	Mayan (S)	Inside	2.80	2.80	2.80	2.80	8.00	8.00	8.00	8.00
			Outside	5.10	5.30	5.20	5.20	7.70	7.60	7.70	7.67
4	30.1. 10 2:60-3:00 PM	Mayan (N)	Inside	3.20	3.10	3.20	3.17	8.00	7.90	8.00	7.97
			Outside	7.70	7.70	7.80	7.73	7.90	7.90	7.90	7.90
5	30.1. 10 3:30-3:45 PM	Latputta loke	Inside	2.50	2.50	2.50	2.50	8.20	8.20	8.20	8.20
			Outside	12.40	12.50	12.20	12.37	8.10	8.00	8.00	8.03
6	30.1. 10 4:00-4:10 PM	Naung lain	Inside	1.20	1.20	1.30	1.23	8.60	8.60	8.50	8.57
			Outside	1.20	1.20	1.20	1.20	13.30	8.30	9.30	10.30
7	30.1. 10 4:45-5:00 PM	Shansu	Inside	4.00	4.00	4.00	4.00	7.70	7.70	7.70	7.70
			Outside	15.00	15.10	15.10	15.07	7.80	7.70	7.80	7.77
8	31.1. 10 8:00-8:15 AM	Kyauk chaung	Inside	10.00	10.00	10.00	10.00	8.30	8.30	8.30	8.30
			Outside	10.50	11.30	11.50	11.10	7.20	7.20	7.20	7.20
9	31.1. 10 9:55-10:00 AM	Dane chaung	Inside	10.50	10.90	10.70	10.70	7.20	7.10	7.20	7.17
			Outside	10.90	11.00	10.90	10.93	7.10	7.10	7.10	7.10
10	31.1. 10 9:55 - 10:00 AM	Phoe Pae	Inside	2.60	2.60	2.60	2.60	7.40	7.40	7.40	7.40
			Outside	3.20	3.20	3.20	3.20	7.40	7.40	7.40	7.40



A4-4 Surveys on Present Condition in the Pilot Project Area

Table A2-4-2 Result of EC and pH in each sluice of Daunggyi Polder (Bogalay Township)

	Date Time of conduct	Location (Sluice Name)		EC (mS)				pH			
				1st	2nd	3rd	Ave.	1st	2nd	3rd	Ave.
1	2.2.2010 10:00-10:15 AM	Katha paung	Inside	5.40	5.40	5.40	5.40	7.5	7.4	7.4	7.43
			Outside	5.60	5.70	5.70	5.67	7.5	7.4	7.5	7.47
2	2.2.2010 11:00-11:15 AM	Kyonekaw	Inside	4.10	4.20	4.10	4.13	7.2	7.2	7.20	7.20
			Outside	5.80	5.80	5.80	5.80	7.0	7.0	7.0	7.00
3	2.2.2010 11:30-11:40 AM	Ahseelay	Inside	11.6	11.8	11.6	11.67	6.8	6.8	6.8	6.80
			Outside	9.30	9.30	9.30	9.30	7.4	7.6	7.4	7.47
4	2.2.2010 12:00-12:30 PM	Thal chaung	Inside	8.40	8.50	8.40	8.43	7.2	7.2	7.2	7.20
			Outside	8.40	8.80	8.70	8.68	7.2	7.2	7.2	7.20
5	2.2.2010 2:30-2:50 PM	Myitkyo	Inside	13.8	13.8	13.8	13.8	7.8	7.8	7.8	7.80
			Outside	13.8	13.8	13.8	13.8	7.7	7.7	7.8	7.73
6	2.2.2010 3:00 - 3:10 PM	Kalargyi chaung	Inside	7.90	7.90	8.00	7.93	8.2	8.2	8.2	8.20
			Outside	9.60	9.60	9.60	9.60	7.1	7.2	7.2	7.17



APPENDIX 5

IRRIGATION AND DRAINAGE

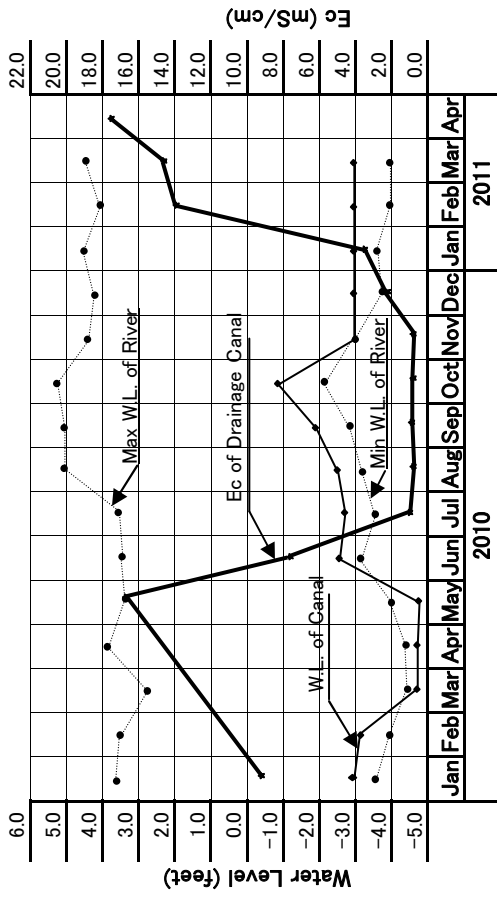
APPENDIX 5

Irrigation and Drainage

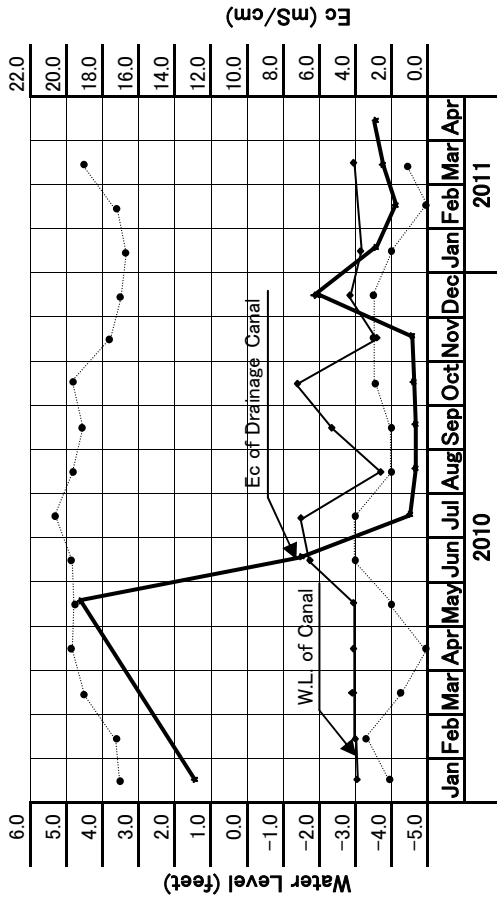
	<u>Page</u>
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Appendix A5-1(1) Monthly Ec Change and Water Level of Drainage Canal

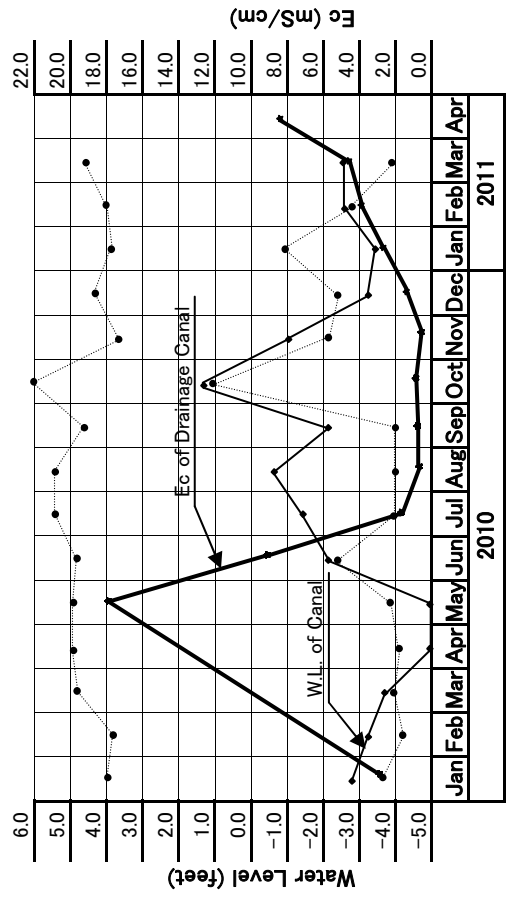
1. Danedan Sluice



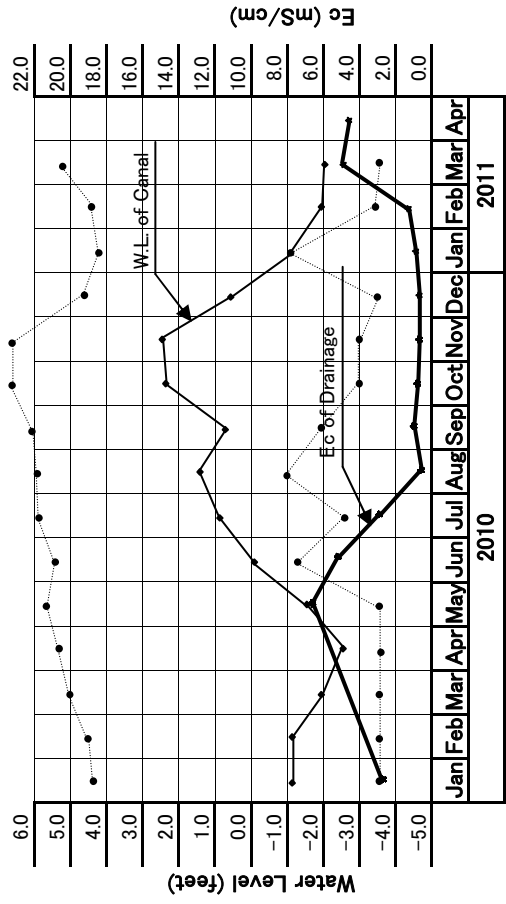
2. Latwalkwal Sluice



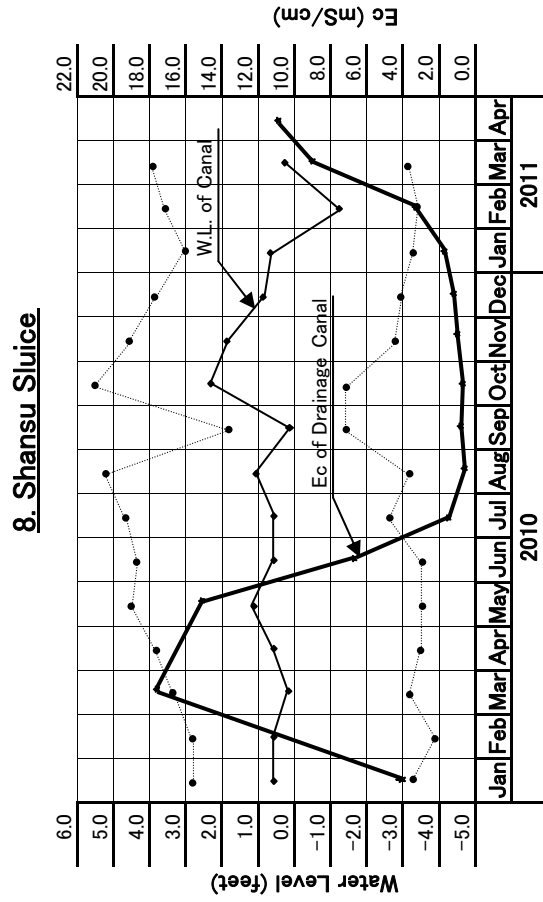
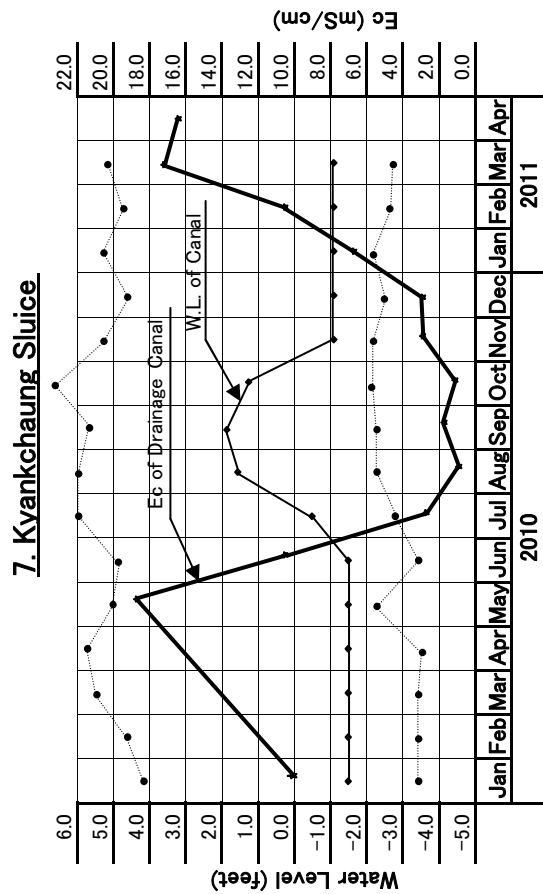
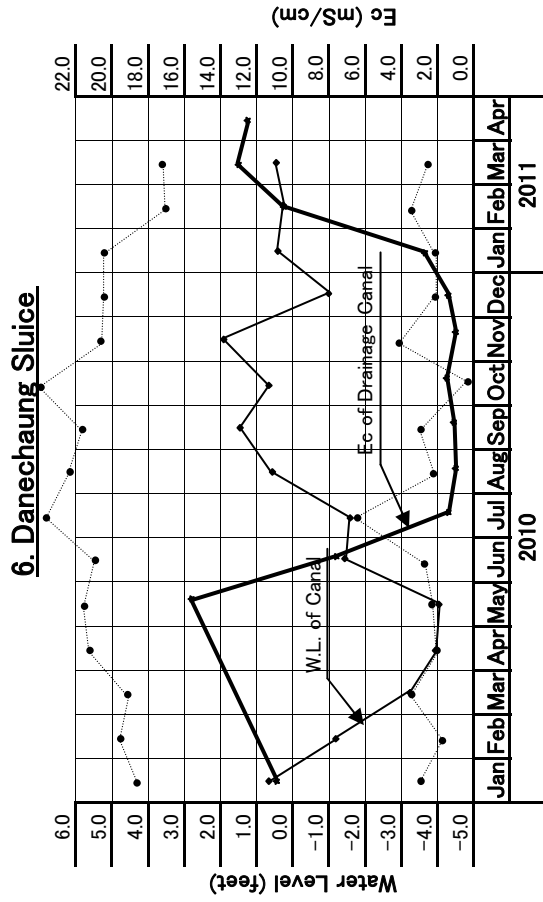
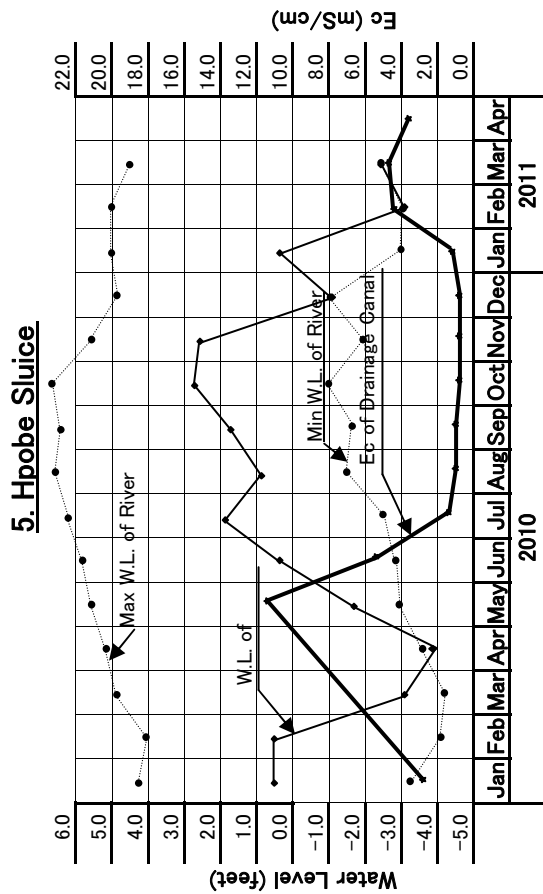
3. Mayan Sluice



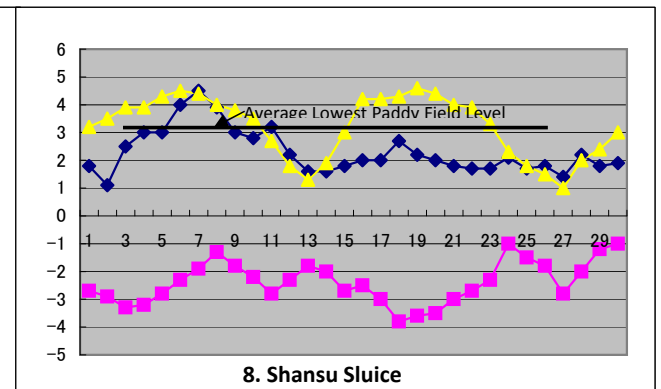
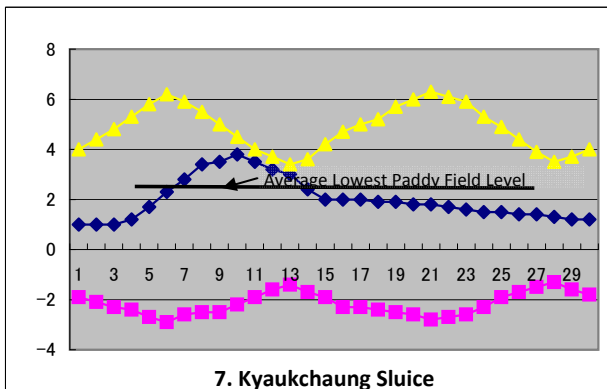
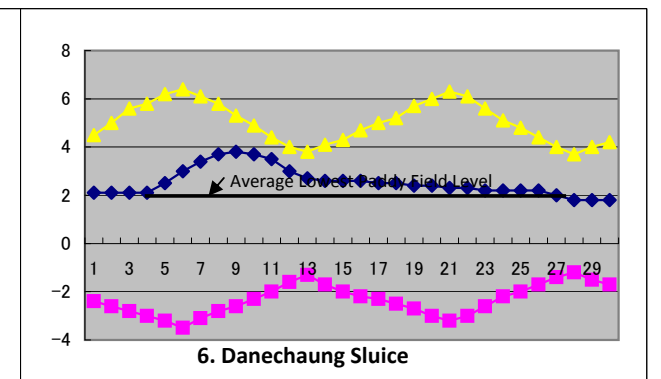
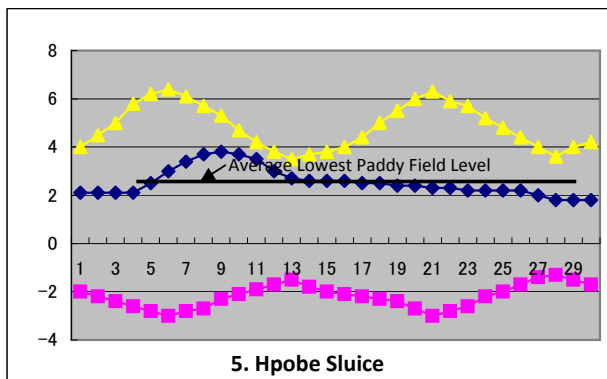
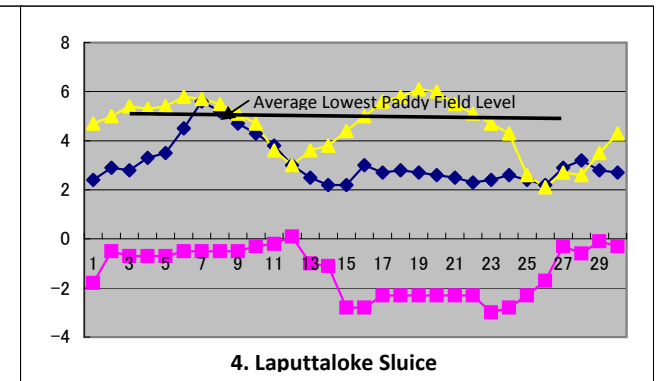
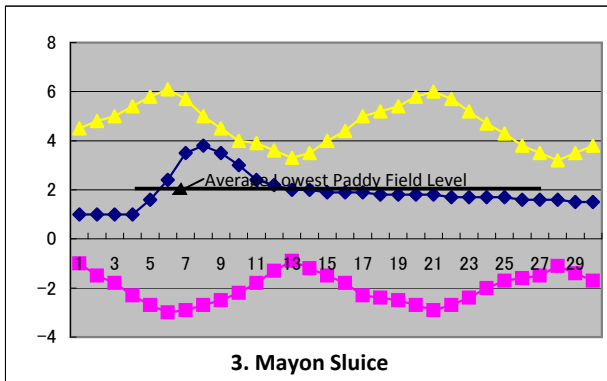
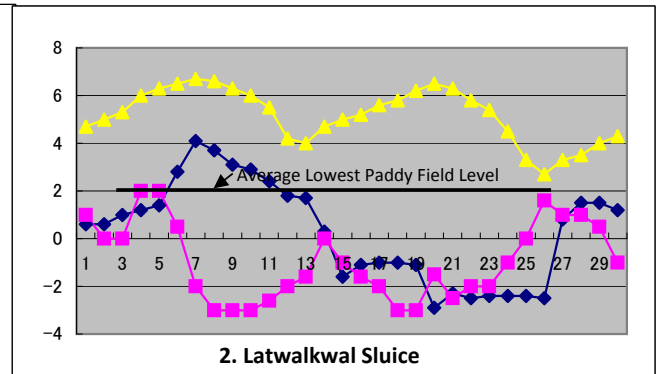
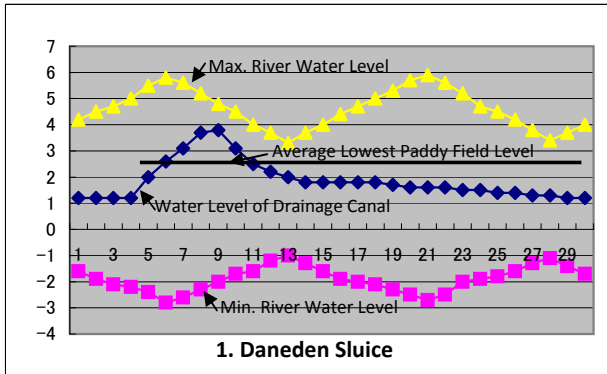
4. Laputtaloke Sluice



Appendix A5-1(2) Monthly Ec Change and Water Level of Drainage Canal



Appendix A5-2 Water Level Behavior in Labutta North Polder in September 2009



Appendix A5-3 Existing Condition of Drainage Canal (1/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area (acre)	Length (mile)	Top Width (ft)	Bottom Width (ft)	Depth (ft)	
Ngaputaw	1	Alegyun(1)polder							
	1		M.D.C-1		2.730	40.0	24.0	8.0	
	2		S-1-1		1.230	20.0	12.0	4.0	
	3		S.1-2		2.080	20.0	12.0	4.0	
	4		S.1-3		1.510	20.0	12.0	4.0	
	5		M.D.C-2		0.900	42.0	21.0	8.0	
	6		S.2-1		1.510	20.0	12.0	4.0	
	7		S.2-2		1.320	20.0	12.0	4.0	
	8		M.D.C-3		2.030	40.0	24.0	8.0	
	9		S.3-1		3.310	20.0	12.0	4.0	
			Sub-total			16.620			
		2	Alegyun(2)polder						
		1		M.D.C-1		3.600	46.0	80.0	8.0
		2		S.1-1		0.380	20.0	12.0	4.0
		3		S.1-2		0.230	20.0	12.0	4.0
		4		S.1-3		2.270	10.0	10.0	4.0
		5		T.3-1		0.570	14.0	8.0	3.0
		6		T.3-2		0.570	14.0	8.0	3.0
		7		T.3-3		0.570	14.0	8.0	3.0
		8		S.1-8		1.330	20.0	12.0	4.0
		9		M.D.C-2		1.800	52.0	36.0	8.0
		10		S.2-1		1.230	20.0	12.0	4.0
		11		S.2-2		1.140	20.0	12.0	4.0
		12		S.2-3		1.130	20.0	12.0	4.0
		13		S.2-5		0.940	20.0	12.0	4.0
		14		S.2-6		1.250	18.0	10.0	4.0
		15		S.2-7		0.660	18.0	10.0	4.0
		16		M.D.C-3		1.330	36.0	20.0	8.0
		17		S.3-1		0.170	20.0	12.0	4.0
		18		S.3-2		0.280	20.0	12.0	4.0
		19		S.3-3		0.850	20.0	12.0	4.0
		20		S.3-4		0.380	20.0	12.0	4.0
		21		.3..T-1		0.910	16.0	17.0	3.0
		22		M.D.C-4		0.640	36.0	20.0	8.0
		23		S.4-1		0.990	20.0	12.0	4.0
		24		S.4-2		1.040	18.0	10.0	4.0
		25		S.4-3		1.310	18.0	10.0	4.0
		26		S.4-4		0.470	18.0	10.0	4.0
			Sub-total			26.040			
		3	Alegyun(3)polder						
		1		M.D.C-1		1.600	52.0	39.0	8.0
		2		S.1-1		1.190	25.0	15.0	5.0
		3		S.1-2		0.360	20.0	12.0	4.0
		4		S.1-3		1.040	20.0	12.0	4.0
		5		M.D.C-2		4.360	60.0	44.0	8.0
		6		S.2-1		1.610	20.0	12.0	4.0
		7		S.2-2		1.230	20.0	12.0	4.0
	8		M.D.C-3		0.950	37.0	20.0	8.0	
	9		S.3-1		1.570	18.0	10.0	4.0	
	10		S.3-3		1.500	18.0	10.0	4.0	
	11		M.D.C-4		3.220	40.0	24.0	8.0	
	12		S4-1		0.490	25.0	15.0	5.0	
	13		4T1-1-2		0.720	25.0	15.0	5.0	
	14		4T2-1-2		0.030	18.0	10.0	4.0	
		Sub-total			19.870				
	4	Magyibinmadaukan							
		Sub-total			0.000				

Appendix A5-3 Existing Condition of Drainage Canal (2/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area (acre)	Length (mile)	Top Width (ft)	Bottom Width (ft)	Depth (ft)	
Labutta	5	Thingangyi							
		Sub-total			0.000				
	6	Zinywe							
		Sub-total			0.000				
	7	Leikkwin							
		Sub-total			0.000				
	8	Labutta South							
		1	M:U Sluice Canal		0.151	80.0	55.0	9.0	
		2	Kwet Lait Sluice Canal		0.227	70.0	50.0	7.0	
		3	Gat Eid Sluice Canal		0.284	50.0	20.0	7.0	
		4	Gat Eid Chaung		3.219	150.0	70.0	18.0	
		5	Kwet Lait Chaung		3.787	170.0	90.0	18.0	
		6	M:U Chaung		3.030	160.0	80.0	16.0	
		7	Yin Dee Lay Chaung		2.500	80.0	40.0	10.0	
		8	Na Kaung Pouk Chaung		1.500	60.0	30.0	8.0	
		9	Yin Dee Lay-Yegyaw Chaung		3.330	50.0	20.0	8.0	
		10	Thayet Kone-Got Eid Canal		0.568	20.0	6.0	8.0	
		11	M:U Cross Canal		0.500	20.0	6.0	5.0	
		12	Kyarnikan-Nakaung Pauk Canal		0.750	20.0	6.0	4.0	
		13	Nakaung Pauk Canal		0.500	20.0	6.0	4.0	
			Sub-total			20.346			
		9	Labutta North						
			1	Danitan Sluice Canal		0.133	40.0	15.0	8.0
			2	Letwe Kwe Sluice Canal		0.150	70.0	40.0	8.0
			3	Mayan (South) Sluice Canal		0.113	70.0	36.0	8.0
			4	Mayan (North) Sluice Canal		0.113	70.0	36.0	8.0
			5	Labuttaloke Sluice Canal		0.227	110.0	70.0	9.0
			6	Phopay Sluice Canal		0.284	120.0	80.0	9.0
			7	Dani Chaung Sluice Canal		0.265	90.0	60.0	9.0
			8	Kyauk Chaung Sluice Canal		0.113	40.0	15.0	8.0
			9	Shan Su Sluice Canal		0.153	50.0	20.0	8.0
			10	Nyaung Lain Sluice Canal		0.416	25.0	8.0	9.0
			11	Myaung Mya-Labutta Left Canal		4.000	20.0	6.0	8.0
			12	Myaung Mya-Labutta Right Canal		4.000	20.0	6.0	8.0
			13	Thayet Kone Canal		0.568	22.0	6.0	7.0
			14	Shan Su -Labuttaloke Cross Canal		0.625	22.0	6.0	7.0
			15	Labuttaloke Chaung		11.363	240.0	110.0	18.0
			16	Phopay Chaung		5.681	350.0	100.0	10.0
			17	Dani Chaung Canal		2.840	150.0	70.0	18.0
			18	Thayet Kone Chaung		0.992	90.0	35.0	10.0
		19	Dani Tan Chaung		1.136	210.0	140.0	18.0	
		20	Letwe Kwe Chaung		5.113	260.0	150.0	18.0	
		21	Ma Yan Chaung		3.974	210.0	130.0	15.0	
		22	Ye Soi Kone		2.840	90.0	30.0	12.0	
		23	Ywartharyar Canal		0.380	20.0	6.0	7.0	
		24	Auk Chaung Yo Canal		0.680	20.0	6.0	6.0	
		25	Lay Ein Tan Yo Canal		1.040	20.0	6.0	6.0	
		26	Shan Su Yo Pyar Canal		1.570	20.0	6.0	6.0	
		27	Kalar Gyi Canal		0.280	20.0	8.0	9.0	
		28	Kayegyaw Yo Canal		0.530	20.0	4.0	6.0	
		29	Bado Letwe Kwe		0.340	20.0	8.0	7.0	
		30	Nyan Chaung		0.930	28.0	4.0	6.0	
		31	Ma Yan Nyan Chaung		0.150	20.0	10.0	7.0	
		32	Ma Yan Ye Gyaw Yo		0.380	28.0	4.0	6.0	
		33	Ma Yan Letwe Kwe Canal		0.300	20.0	4.0	6.0	
		34	KanbaLar Yo		0.660	20.0	4.0	4.0	
		35	Labuttaloke-Mayan Canal		0.750	20.0	6.0	8.0	
		36	Thayet Kone Yo		0.480	20.0	4.0	4.0	
		37	Labuttaloke Kyauk Ai Canal		0.230	20.0	4.0	4.0	
		38	Kyauk Ai Yo Houg		0.980	20.0	4.0	5.0	
		39	Chaung Lay Kyauk Ai Canal		0.325	20.0	4.0	4.0	
		40	Phopay Nga Htein Canal		1.325	20.0	4.0	5.0	
		Sub-total			56.429				
	10	U Gaungpu							
		Sub-total			0.000				

Appendix A5-3 Existing Condition of Drainage Canal (3/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area	Length	Top Width	Bottom Width	Depth	
				(acre)	(mile)	(ft)	(ft)	(ft)	
Labutta	11	Bitud Island (1)							
			1 Zibyu Sluice Canal		0.113	60.0	30.0	10.0	
			2 Phonarko Sluice Canal		0.227	80.0	40.0	10.0	
			3 Phonarko Chaung		3.000	100.0	40.0	12.0	
			4 Zibyyu Chaung		2.500	80.0	35.0	10.0	
			5 Ale Chaung		1.300	70.0	30.0	10.0	
			6 Atet Chaung		1.700	75.0	30.0	12.0	
			7 Htanbin Chaung		1.250	70.0	30.0	12.0	
			8 Kyaung Sha Chaung		1.300	60.0	30.0	12.0	
			9 Nyaung		1.200	60.0	25.0	12.0	
			10 Auk Chaung-Middle Canal		0.500	20.0	8.0	7.0	
			11 Auk Chaung-Upper Canal		0.500	20.0	8.0	7.0	
			12 Myo Chaung		1.100	60.0	25.0	12.0	
			Sub-total			14.690			
		12	Bitud Island (2)						
				1 M.C.C-1		0.236	20.0	10.0	2.5
				2 S.1-1		1.042	10.0	5.0	3.0
				3 S.1-2		0.568	30.0	15.0	6.0
				4 S.1-3		2.652	15.0	8.0	2.0
				5 M.D.C-2		0.549	50.0	50.0	10.0
				6 M.D.C-3		2.083	100.0	40.0	7.0
				7 S.2-9		1.705	50.0	30.0	7.0
				8 S.2-8		0.758	50.0	40.0	7.0
				9 S.2-7		0.805	18.0	6.0	1.5
				10 S.2-6		0.279	10.0	4.0	1.5
				11 S.2-5		0.379	10.0	4.0	1.5
				12 S.2-4		0.947	12.0	6.0	1.5
				13 S.2-3		0.947	12.0	6.0	2.0
				14 S.2-2		0.434	12.0	6.0	2.0
				15 S.3-1		0.568	12.0	6.0	2.0
				16 T.1-1		0.379	18.0	10.0	5.0
				17 T.2-1		0.894	100.0	50.0	12.0
				18 T.1-2		0.597	10.0	6.0	1.5
				19 S.3-1		1.042	10.0	6.0	1.5
				20 S.3-2		0.758	20.0	8.0	3.5
				21 S.3-3		0.758	20.0	6.0	1.5
				22 S.3-4		1.326	15.0	6.0	4.0
				23 S.3-5		0.326	15.0	6.0	4.0
				24 S.3-6		1.136	15.0	6.0	0.5
				25 S.3-7		1.042	15.0	8.0	1.5
				26 T.9-1		0.710	15.0	8.0	1.5
				27 T.8-2		0.568	15.0	8.0	1.5
				28 Hton Bu Kya Chaung		4.000	150.0	65.0	10.0
				29 Set Chaung		1.600	100.0	60.0	10.0
				30 Kyein Gyaung		3.000	100.0	60.0	12.0
			31 Kabarla Caung		2.500	80.0	50.0	12.0	
			32 Sat Chaung		1.500	50.0	30.0	7.5	
			33 Kyun Chaung		1.500	50.0	30.0	2.5	
		Sub-total			37.588				
	13	Bitud Island (3)							
			1 Maung Nga Sluice Canal		0.132	50.0	15.0	7.0	
			2 Kaing Taw Sluice Canal		0.189	80.0	40.0	6.0	
			3 Myint Pauk Sluice Canal		0.189	25.0	10.0	5.0	
			4 Thapyae Kwin Sluice Canal		0.227	30.0	20.0	6.0	
			5 Kataut Sat Sluice Canal		0.170	30.0	12.0	6.0	
			6 Hle Bee Canal		0.284	25.0	12.0	8.0	
			7 S.1-1		2.424	25.0	12.0	5.0	
			8 S.1-2		0.378	15.0	12.0	3.5	
			9 T.2-1		0.681	20.0	6.0	2.5	
			10 T.2-2		0.416	20.0	6.0	2.0	
			11 T.2-1		0.397	22.0	10.0	2.5	
			12 S.2-2		0.606	22.0	10.0	2.5	
			13 S.2-3		0.290	25.0	15.0	2.5	
			14 Ohn Bin Su Canal		1.220	60.0	30.0	10.0	
			15 Daung Chaung		1.120	70.0	20.0	6.0	
			16 Ma Sein Mya Chaung		1.153	60.0	20.0	6.0	
			17 Me Hla U Do Chaung		0.898	70.0	20.0	8.0	
			18 Maung Nge Chaung		3.505	185.0	80.0	18.0	
			19 Katauk Sat Chaung		1.333	60.0	25.0	10.0	
			20 Hla Bee Chaung		1.105	50.0	20.0	10.0	
			21 Let Tan Chaung		2.058	50.0	15.0	10.0	
			22 Phonar Ko Chaung		2.850	70.0	20.0	10.0	
			23 Ma Byain U Do Chaung		3.133	120.0	40.0	12.0	
			24 Kaing Taw Chaung		2.785	120.0	60.0	12.0	

Appendix A5-3 Existing Condition of Drainage Canal (4/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area	Length	Top Width	Bottom Width	Depth	
				(acre)	(mile)	(ft)	(ft)	(ft)	
Labutta	25		Nauk Pyan Toe Chaung		0.632	70.0	20.0	12.0	
	26		Ngar Khu Chaung		0.620	70.0	20.0	10.0	
			Sub-total		1.252				
	14		Bitud Island (4)						
		1		Ka Ka Yan Chaung		5.000	230.0	80.0	12.0
		2		Ka Ka Yan Lay Chaung		3.500	120.0	40.0	12.0
		3		Anauk Tyine Chaung		1.000	60.0	20.0	8.0
		4		Chaung Bye Gye Chaung		1.500	150.0	60.0	10.0
		5		Ko No So Chaung		2.000	60.0	20.0	8.0
		6		Kwin Chaung		0.500	50.0	15.0	8.0
		7		Tal Bin Chaung		1.000	40.0	12.0	7.0
		8		Paiktar Lay Chaung		3.500	70.0	20.0	6.0
		9		Tal Bin Yegyow Chaung		0.500	35.0	12.0	7.0
		10		Ashae Tyine Chaung		3.000	80.0	40.0	15.0
		11		Kazauk Chaung		2.000	60.0	40.0	10.0
		12		Bay Pauk Chaung		2.000	120.0	60.0	15.0
		13		Kyat Sin Chaung		2.000	60.0	35.0	10.0
		14		Nant Moe Lin Chaung		2.500	70.0	40.0	8.0
		15		Aung Hling Chaung		1.000	50.0	20.0	6.0
		16		Kalar Chaung		1.500	80.0	40.0	8.0
		17		Pay Chaung		1.000	60.0	30.0	15.0
		18		Lait Ai Chaung		5.000	100.0	35.0	15.0
		19		Shaw Chaung		1.500	80.0	30.0	8.0
		20		Kadipar Chaung		2.000	130.0	50.0	15.0
		21		We Chaung		2.000	70.0	30.0	2.0
		22		Pho Kywe Gy Chaung		6.500	150.0	80.0	15.0
		23		Lettan Chaung		4.000	80.0	50.0	8.0
		24		Pho Kywe Lay Chaung		5.000	130.0	50.0	10.0
		25		Nant Phaw chaung		3.500	120.0	40.0	8.0
		26		D.C-1		1.325	20.0	8.0	3.0
		27		D.1-1		0.890	15.0	6.0	2.0
		28		D.1-2		0.890	15.0	7.0	2.0
		29		D.1-3		0.625	15.0	6.0	2.0
		30		D.1-4		0.833	20.0	8.0	2.5
		31		D.1-5		2.235	20.0	8.0	2.5
		32		D.1-6		1.458	20.0	8.0	3.0
		33		D.C-2		2.273	20.0	8.0	2.5
		34		D.2-1		0.568	15.0	6.0	2.5
		35		D.C-3		1.890	20.0	8.0	2.5
		36		D.3-1		0.947	15.0	6.0	2.5
		37		D.3-2		1.231	18.0	6.0	2.5
		38		Kat Balar Canal		0.568	20.0	6.0	2.0
		39		Kadipar Canal		0.568	20.0	6.0	4.0
		40		M.C-1		0.568	60.0	30.0	8.0
		41		M.C-2		0.104	56.0	30.0	10.0
	42		M.C-3		0.094	44.0	20.0	8.0	
	43		M.C-4		0.123	70.0	40.0	10.0	
	44		M.C-5		0.223	50.0	30.0	10.0	
	45		M.C-6		0.160	60.0	35.0	8.0	
			Sub-total		80.573				
Bogalay	15		Daunggyi polder						
		1		M.D.C.1	1,019	2,650			
		2		M.D.C.2	1,092	2,840			
		3		M.D.C.3	1,915	4,980			
		4		M.D.C.4	3,714	2,270			
		5		M.D.C.5	2,112	5,490			
		6		M.D.C.6	1,276	3,320			
		7		S.1.1	523	1,360			
		8		S.1.2	335	0,780			
		9		S.1.3	219	0,570			
		10		I.T.1.1	408	1,060			
		11		S.2.1	365	0,950			
		12		S.2.2	604	1,570			
		13		2.T.2.1	480	1,250			
		14		2.T.2.2	554	1,440			
		15		2.T.2.3	307	0,080			
		16		2.Q.3.1	298	0,780			
		17		S.3.1	439	1,140			
		18		S.3.2	366	0,950			
		19		3.T.2.1	376	0,980			
		20		3.T.2.2	408	1,060			
		21		S.4.1	438	1,140			
		22		S.4.2	392	1,020			
	23		S.4.3	293	0,760				

Appendix A5-3 Existing Condition of Drainage Canal (5/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area	Length	Top Width	Bottom Width	Depth	
				(acre)	(mile)	(ft)	(ft)	(ft)	
Bogalay	24	S.4.4		407	1.060				
	25	S.4.5		1,092	2.840				
	26	S.4.6		162	0.420				
	27	S.4.7		1,107	0.950				
	28	S.5.1		2,028	1.760				
	29	S.5.2		275	0.720				
	30	S.5.3		231	0.600				
	31	S.6.1		2,688	2.330				
	32	S.6.2		976	2.540				
			Sub-total			13.220			
		16	Daunggyi East						
		1	Ye Gyaw Do		4,630	7.930			
		2	Sit Kone (New)		799	1.370			
		3	Sit Gon (Old)		1,284	2.200			
		4	Kan Zeik		1,793	3.070			
		5	La Ga Yet		1,472	2.520			
		6	Ka Naung No-1		344	0.590			
		7	Ka Naung No-2		596	1.020			
		8	Yet Pha Yon		2,453	4.200			
		9	Yet Pha Yon (New)		2,628	4.500			
			Sub-total			27.400			
		17	Daunggyi West						
		1	Myit Kalay		830	1.850			
		2	Ma Nge Gale		1,140	2.540			
		3	Ma Nge Gyi		866	1.930			
		4	Tha Bye Gon		1,123	2.500			
		5	Than Da Dar		809	1.800			
		6	Pet Pye		628	1.400			
		7	Ka Zaung Kalay		526	1.170			
		8	Au Lan Oak		579	1.290			
		9	Sin Gu		502	1.120			
		10	Kyein Gyaung		440	0.980			
		11	Byusakan		839	1.870			
		12	Gwe Gon		516	1.150			
		13	Pon Na Yike		516	1.150			
		14	Kan Ba La Bin Zeik		740	1.650			
		15	Ngya Ma Lay		607	1.350			
		16	La Mu Inn		592	1.320			
		17	Hta Lu		633	1.410			
		18	Nauk Pyan Toe		704	1.500			
		19	Kan Gon		903	2.010			
		20	Tha Bye Gon-(1)		507	1.130			
			Sub-total			31.120			
		18	Daunggyi Upper						
		1	Ka Ma Ka Lu (Main)		1,720	3.000			
	2	Ka Ma Ka Lu (Branch)		780	1.360				
		Sub-total			4.360				
Pyapon	19	Dawnyein polder							
	1	M.D.C.1		1,156	3.750				
	2	S.1.3		616	2.000				
	3	S.1.2		1,156	3.750				
	4	T.2.1		185	0.600				
	5	T.2.2		200	0.650				
	6	T.2.3		200	0.650				
	7	S.1.1		201	0.650				
	8	T.1.1		201	0.650				
	9	T.1.2		200	0.650				
	10	T.1.3		200	0.650				
			Sub-total			14.000			
		20	Myokone polder						
		1	M.D.C.1		1,266	3.500			
		2	M.D.C.2		452	1.250			
		3	T.1.1		181	1.000			
		4	S.1.2		361	0.500			
		5	S.1.3		362	1.000			
		6	S.1.4		90	1.000			
		7	S.1.5		362	0.250			
		8	S.1.6		362	1.000			
		9	S.1.7		271	1.000			
		10	S.1.8		362	0.750			
		11	S.1.9		362	1.000			
		12	S.2.1		452	1.000			
		13	S.2.2		181	1.000			
	14	S.2.4		361	0.500				

Appendix A5-3 Existing Condition of Drainage Canal (6/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area	Length	Top Width	Bottom Width	Depth
				(acre)	(mile)	(ft)	(ft)	(ft)
Pyapon			15 T.4.1	361	1.000			
			16 T.4.2	366	1.250			
			Sub-total		2.250			
		21	Kyetphamwezaung					
			1 M.D.C.1	1,910	4.000			
			2 S.1.1	477	1.000			
			3 S.1.2	477	1.000			
			4 S.1.3	478	1.000			
			5 S.1.4	478	1.000			
			6 S.1.5	477	1.000			
			7 S.1.6	478	1.000			
			8 C.1.B	716	1.500			
			9 S.2.1	477	1.500			
			10 2.T.1.2	358	0.750			
			11 2.T.1.1	358	0.750			
			12 S.2.2	716	1.500			
			13 S.2.3	717	1.500			
			14 2.T.2.1	717	1.500			
			15 2.T.3.1	238	0.500			
			16 C.1.A	1,194	2.500			
			17 K.M.D	716	1.500			
			18 C.3	238	0.500			
			19 S.H.1	478	1.000			
			20 5.T.1.3	238	0.500			
			21 S.3.1	736	2.000			
			22 S.3.2	955	2.000			
			23 S.3.3	477	1.000			
			24 S.3.4	478	1.000			
			25 3.T.1.1	358	0.750			
			26 M.D.C.4	1,433	3.000			
			27 S.4.2	358	0.750			
			28 S.4.3	477	1.000			
			29 S.4.4	478	1.000			
			30 4.T.4.1	478	1.000			
			31 M.D.C.5	955	2.000			
			32 S.5.3	358	0.750			
			33 S.5.4	358	0.750			
			34 S.5.5	358	0.750			
			35 M.D.C.6	1,433	3.000			
			36 C.5	955	2.000			
			37 S.5.1	955	2.000			
			38 M.D.C.7	1,194	2.500			
			39 S.7.1	716	1.500			
			40 S.7.2	1,910	4.000			
			41 S.7.3	716	1.000			
			42 T.3.1	238	0.500			
			43 7.T.1.1	358	0.750			
			44 7.T.1.2	358	0.750			
			45 7.T.1.3	238	0.500			
			46 S.6.1	716	1.500			
		47 5.T.1.2	238	0.500				
		48 6.T.1.1	238	0.500				
		49 6.T.1.2	255	0.500				
		50 2.T.2.1	255	1.500				
		Sub-total		66.250				
	22	Banbwezu						
		1 M.D.C.1	1,656	3.000				
		2 S.1.1	276	0.500				
		3 S.1.2	276	0.500				
		4 S.1.3	276	0.500				
		5 S.1.4	276	0.500				
		6 S.1.5	276	0.500				
		7 S.1.6	828	1.500				
		8 S.1.7	552	1.000				
		9 S.1.8	690	1.250				
		10 S.1.9	276	0.500				
		11 S.1.10	828	1.500				
		12 S.1.11	276	0.500				
		13 S.1.12	276	0.500				
		14 T.1.1	276	0.500				
		15 T.2.1	276	0.500				
		16 M.D.C.2	1,380	2.500				
		17 T.6.1	414	0.750				
		18 S.2.1	414	0.750				

Appendix A5-3 Existing Condition of Drainage Canal (7/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area	Length	Top Width	Bottom Width	Depth	
				(acre)	(mile)	(ft)	(ft)	(ft)	
Pyapon			19 S.2.2	276	0.500				
			20 S.2.3	276	0.500				
			21 S.2.4	414	0.750				
			22 S.2.5	414	0.750				
			23 S.2.6	414	0.750				
			24 M.D.C.3	1,380	2.500				
			25 S.3.1	414	0.750				
			26 S.3.2	690	1.250				
			27 S.3.3	414	0.750				
			28 S.3.4	690	1.250				
			29 S.3.5	276	0.500				
			30 S.3.6	276	0.500				
			31 S.3.7	276	0.500				
			32 S.3.8	276	0.500				
			33 S.3.9	276	0.500				
			34 S.3.10	276	0.500				
			35 S.3.11	414	0.750				
			36 MD/C/4	1,242	2.250				
			Sub-total			15.750			
		23	Daydalu						
				1 M.D.C.1	1,987	3.250			
				2 T.1.3	459	0.750			
				3 T.1.5	917	1.500			
				4 T.1.6	459	0.750			
				5 T.1.8	457	0.750			
			Sub-total						
		24	Letpanbin						
				1 M.D.C.5	2,423	3.000			
				2 M.D.C.6	1,615	2.000			
				3 M.D.C.7	807	1.000			
				4 S.5.1	1,615	2.000			
				5 S.6.1	807	1.000			
				6 S.6.2	807	1.000			
				7 S.6.3	404	0.500			
				8 S.6.4	807	1.000			
				9 S.6.5	404	0.500			
			10 S.6.6	808	1.000				
			11 S.7.1	810	1.000				
		Sub-total			14.000				
	25	Zinbaung							
			1 M.D.C.1	728	1.250				
			2 M.D.C.2	1,310	2.250				
			3 M.D.C.3	728	1.250				
			4 M.D.C.4	291	0.500				
			5 S.2.1	1,164	2.000				
			6 S.2.2	145	1.250				
			7 S.2.3	436	0.750				
			8 S.2.4	291	0.500				
			9 S.2.5	145	0.250				
			10 S.2.6	145	0.250				
			11 S.3.1	436	0.750				
			12 S.3.2	291	0.500				
			13 S.4.1	436	0.750				
			14 S.1.5	441	0.750				
		Sub-total			13.000				
Daydaye	26	Myaseinkan							
		Sub-total			0.000				
	27	Thandi							
			1 Thin PaungChaung	389	1.000				
			2 Than Din, Kone Lay, Inn Doo	1,050	4.000				
			3 Lay Ein Kone, Mi Gyaung Aing	1,932	7.000				
			4 Ohn Pin, Chaung Phatr Left/Right Roud	3,534	10.000				
			5 Phayar Kalay, Hsin Gu Left/Right Roud	1,880	6.000				
			6 Ahseit Taw Ka Mai	2,568	4.000				
			7 Kone Tan Lay, Taw Ka Me Left/Right Roud	3,535	11.000				
			Sub-total			43.000			
	28	Suclubbaluma							
		Sub-total				0.000			
29	Hleseikchaunggyi								
	Sub-total				0.000				
30	Tamatakaw								
	Sub-total				0.000				
31	Kyonsoat								
	Sub-total				0.000				

Appendix A5-3 Existing Condition of Drainage Canal (8/8)

Township	No.	Polder	Drainage Canal Name	Drainage Area (acre)	Length (mile)	Top Width (ft)	Bottom Width (ft)	Depth (ft)
Kyaiklatt	32	Maubin Island North						
			1 Hlaing Ta Ahkyin Canal	3,316	5.300			
			2 Lay Ein Dan-Yon Daung- Kyon Kyaik Canal	1,950	10.030			
			3 Yong Daung Kyon Phar Ye Gyaw Canal	2,065	4.900			
			Sub-total		20.230			
		33	Maubin Island South					
			1 Tar Pat-Phaung Yo Seik Left/Right Road	1,550	2.500			
			2 Tha Ya We Tar Pat (25') Canal	650	3.750			
			3 Da Ye Gyo Sluice Canal	1,130	4.200			
			4 Bali Chan Ye Gyaw Canal	4,629	9.130			
			Sub-total		19.580			
		34	Thonegwakyun					
			1 Htan Pin Pyo Sluice Canal	867	5.300			
			2 Kyaik Lat Gyi Canal	978	1.250			
			3 Kyaik Taing Su Canal	3,132	13.000			
			4 Asu Gyi Canal	1,000	1.000			
			5 U Myint Aung Canal	490	1.500			
			6 SaByu Su Canal	898	1.500			
			7 Kyon Ta Mar-Kyaik Kat Su Canal	1,453	1.000			
			Sub-total		24.550			

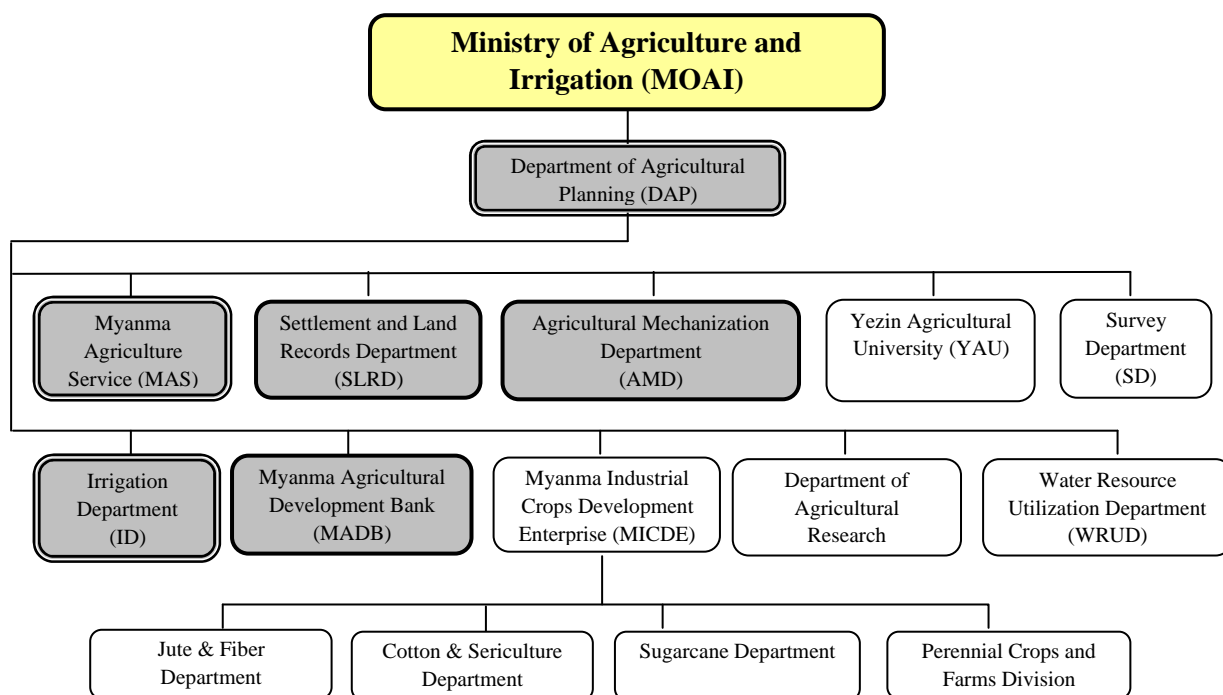


Figure A5-4 (1/4) Organization Chart of Ministry of Agriculture and Irrigation (MOAI)

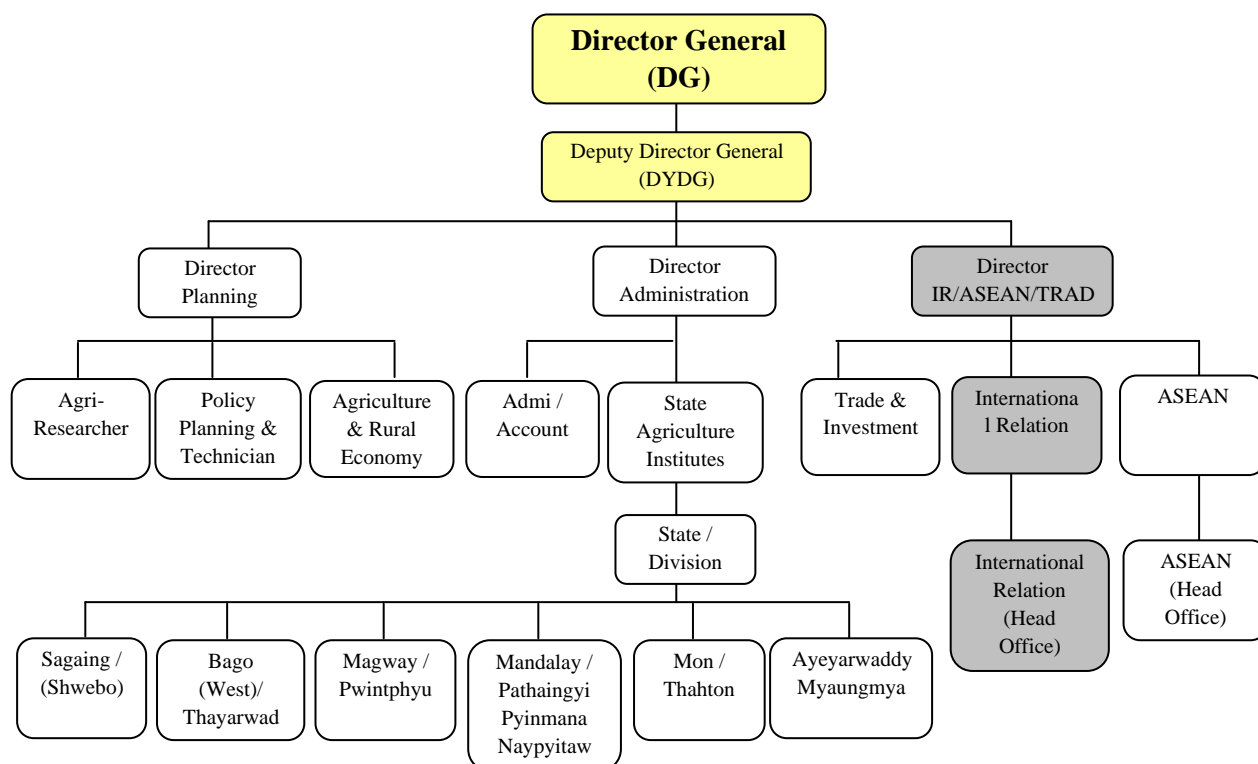


Figure A5-4 (2/4) Organization Chart of Department of Agricultural Planning (DAP)

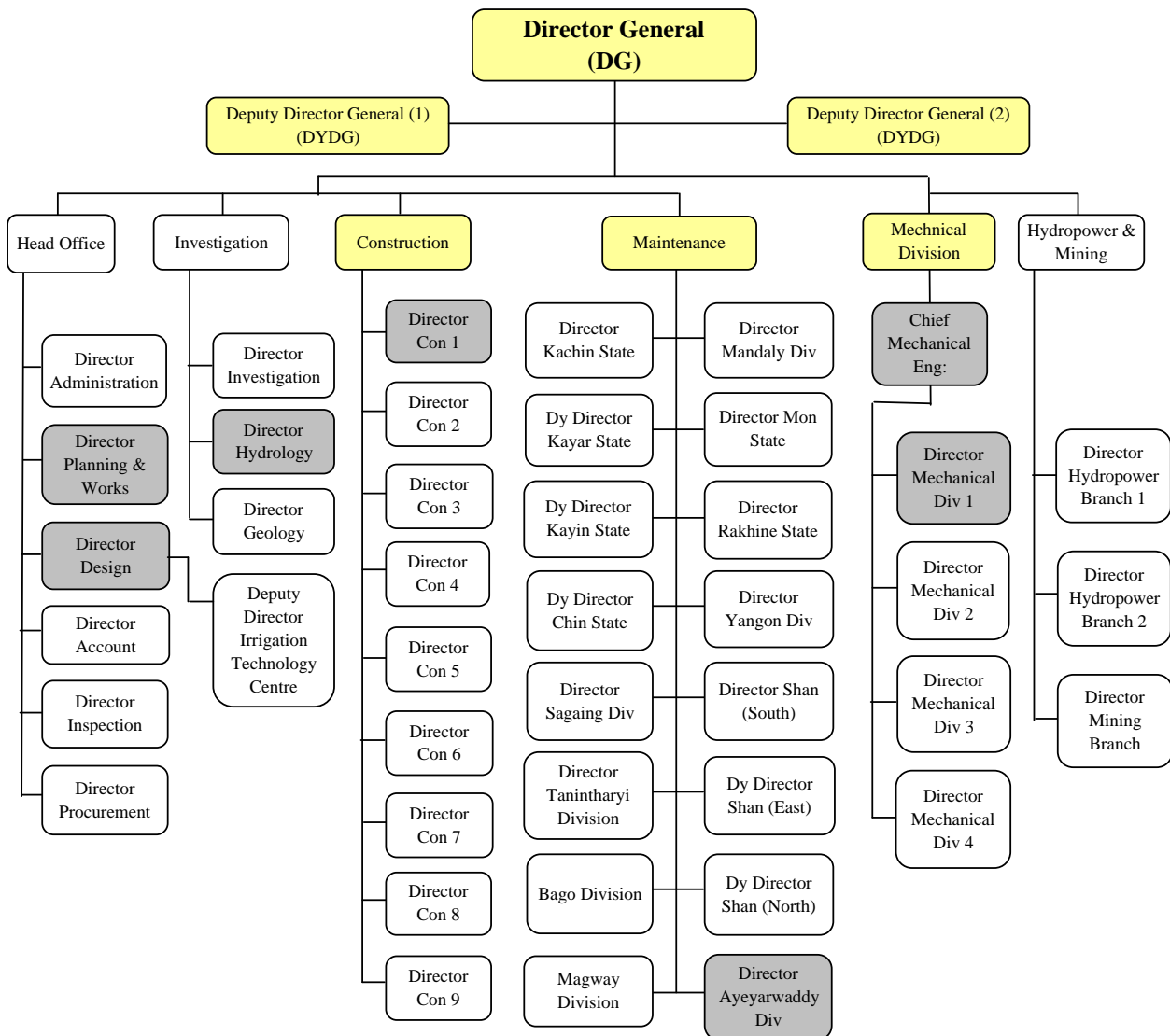


Figure A5-4 (3/4) Organization Chart of Irrigation Department (ID)

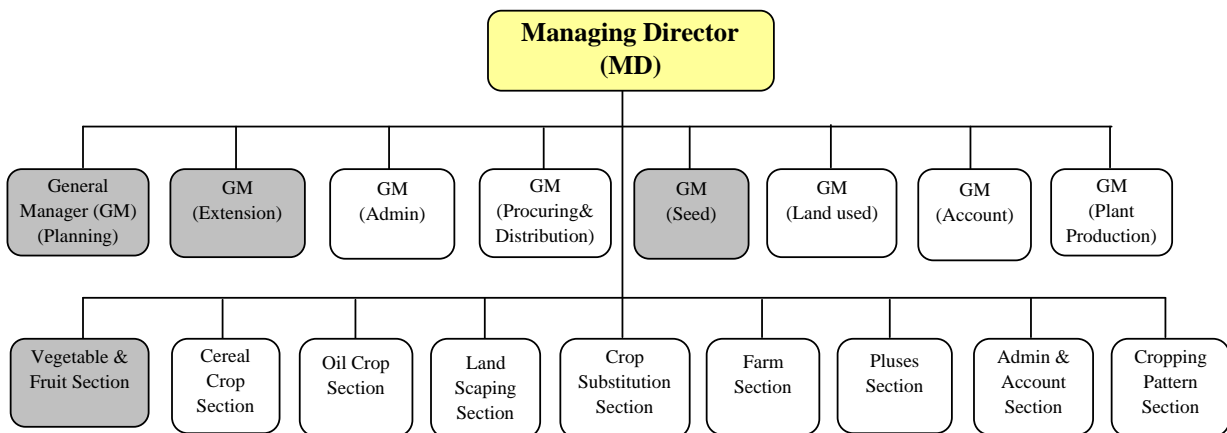


Figure A5-4 (4/4) Organization Chart of Myanmar Agriculture Service (MAS)