National Disaster Management Agency
The Republic of Indonesia

No.

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR SAFE SCHOOL RECONSTRUCTION IN DEVASTATED AREAS OF EARTHQUAKE IN OFFSHORE OF PADANG IN WEST SUMATRA REGION IN THE REPUBLIC OF INDONESIA

JUNE 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD.
OYO INTERNATIONAL CORPORATION

GED
JR
10-078

CHAPTER 1

BACKGROUND OF THE PROJECT

CHAPTER 1 BACKGROUND OF THE PROJECT

1-1 Background and Outline of the Project

The earthquake on September 30, 2009 caused the enormous damage over the West Sumatra Province, in particular Padang City and Padang-Pariaman District. There were about 1,119 people died or missed, 1,214 people seriously injured and 1,688 people harmed. The total damage and loss was estimated as Rp. 21.6 trillion. Total damage and losses in education sector in West Sumatra are estimated as Rp. 618.8 billion.

Among 1,003 damaged schools in West Sumatra, collapsed or seriously damaged rooms were 259 in Padang City and 1,140 in Padang-Pariaman District in primary schools. Collapsed or seriously damaged rooms were 158 in Padang City and 222 in Padang-Pariaman District in junior high schools.

In the circumstances, National Disaster Management Agency (BNPB) sent a Rapid Reaction Team and provided Rp.100 billion on call fund for the management of the emergency response phase.

In response to the request of the Government of Indonesia, a needs assessment study mission was dispatched by Japan International Cooperation Agency to Indonesia from 9 October 2009 to 16 October 2009 and the needs for support for school reconstruction and disaster risk management were identified in priority.

A preparatory (outline design) survey team was sent from 18 December 2009 and the first draft of Preparatory (Outline Design) Survey Report was prepared based on the survey and discussion with various related organizations and people. The survey will be continued in order to prepare for implementation stage by Japan's Grant Aid Scheme for Disaster Prevention and Reconstruction.

BAPPENAS (National Development and Planning Agent) made "Action Plan for Rehabilitation and Reconstruction of Post-Earthquake Areas in West Sumatera Province 2009-2011" This project will contribute to a part of the Action Plan.

1-2 Natural Conditions

(1) Topography

The Republic of Indonesia (hereinafter "Indonesia") is largest archipelago with the total area of 1.89 million km^2 stretching 5,000km east – west and 1,900km north – south. It is the world's fourth most populous country with a population of 228 million (2008).

In the west of Sumatra Island, the Indo-Australia Plate is getting into under the Eurasia Plate and Sunda Mega-thrust fault line is running on a parallel with Sumatra Island north and south. Thus large earthquakes have occurred many times and the earthquake and tsunami in north Sumatra on December 2004 killed more than 160 thousand people in Indonesia. There is high possibility that large earthquakes in this area would occur as strain energy in the Plate boundary remain accumulated.

(2) Climate

Padang is located in a tropical zone and the temperature is high all year round with average minimum temperature of 22°C to average maximum temperature of 31°C. Rainy season is from September to January with average rainfall of 230mm per month. The lowest month is May with precipitation of more than 170mm.

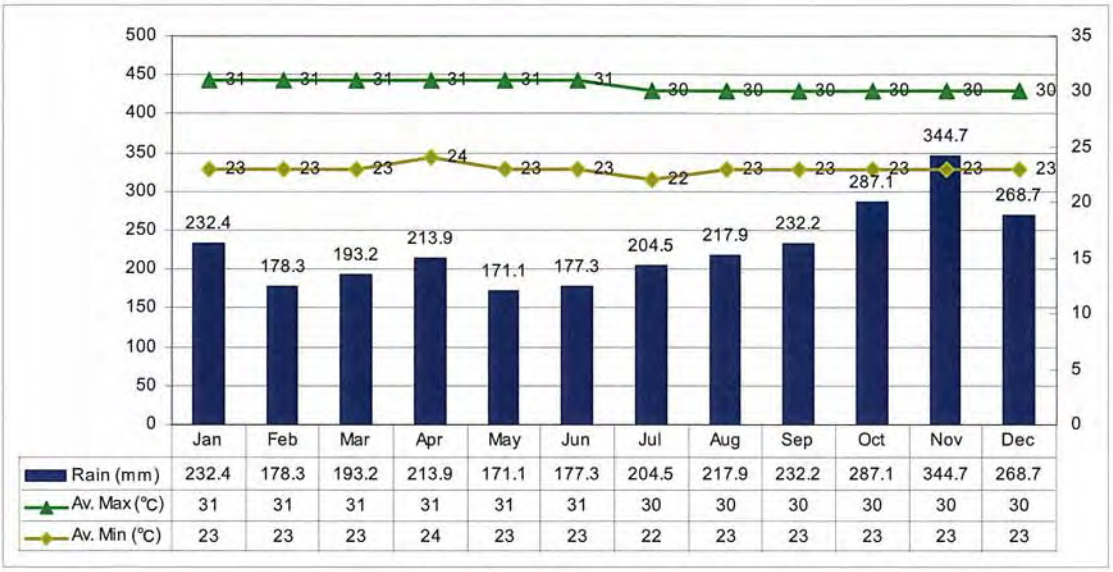

Figure 1-1 Climate of Padang

(Source: weather.msn.com)

(3) Earthquake

Indonesia Regulation (SNI 03-1726-2003: Tata Cara Perencanaan Kethanan Gempa untuk Bangunan Gedung) shall be applied to the Quake-Resistance Design. Padang and Padang-Pariaman areas are categorized into Zone-6 (most critical zone) by New Earthquake Hazard Map issued by Ministry of Public Works in Indonesia.

Indonesian Earthquake regulation had been improved on the year of 1989 and 2002. Basically, same design concept was applied, however, the new design earthquake considered has a return period of 500 years (10% probability of expedience in 50 years) compared to 200years retune period specified in the old regulation, and resulting peak base rock acceleration forms the basis for establishing the Indonesian Seismic Zone map. As same as the old regulation, all of the Indonesian area is categorized by six (6) zoning considered peak acceleration for base rocks and soil surface categorized by three (3) kind of soil condition (Hard soil, Medium soil and Soft soil). Furthermore, Base Shear Coefficient has been improved, and the new regulation applied Ductility Parameter of Building Structure (R) instead of Structural Frame Coefficient (K), with these regards, Base Shear Coefficient (CI/R) calculated by new regulation has almost double of the value of the old regulation, and has almost same base shear coefficient with Japanese standards.

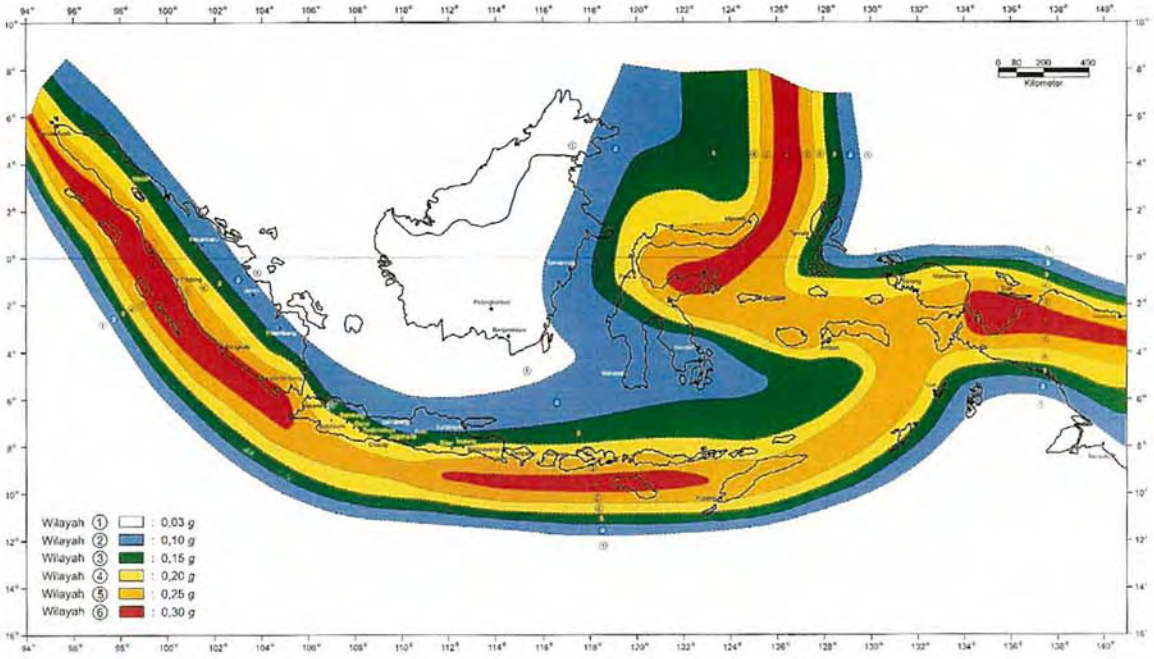

Figure. 1. Indonesian seismic hazard map (SNI 03-1726-2002).

Figure 1-2 Indonesian Seismic Hazard Map

(Source: SNI 03-1726-2003)

National Disaster Management Agency
The Republic of Indonesia

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR SAFE SCHOOL RECONSTRUCTION IN DEVASTATED AREAS OF EARTHQUAKE IN OFFSHORE OF PADANG IN WEST SUMATRA REGION IN THE REPUBLIC OF INDONESIA

JUNE 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD.
OYO INTERNATIONAL CORPORATION

PREFACE

In response to a request from the Government of Indonesia, the Government of Japan decided to conduct a Preparatory Survey on the Project for Safe School Reconstruction in devastated Areas of Earthquake in Offshore of Padang in West Sumatra Region in the Republic of Indonesia. and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Indonesia a study team from December 2009 to June 2010.

The team held discussions with the officials concerned of the Government of Indonesia, and conducted a field study in the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Indonesia in order to discuss a draft outline design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Indonesia for their close cooperation extended to the teams.

June, 2010

Kikuo NAKAGAWA
Director General,
Global Environment Department
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

June, 2010

We are pleased to submit to you the Preparatory Survey Report on the Project for Safe School Reconstruction in devastated Areas of Earthquake in Offshore of Padang in West Sumatra Region in the Republic of Indonesia.

This study was conducted by Yachiyo Engineering Co., Ltd., under a contract to JICA, during the period from December 2009 to June 2010. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Inodesia and formulated the most appropriate outline design for the project under Japan's grant aid scheme.

Finally, we hope that this report will contribute to further promotion of the programme.

Very truly yours,

Naoyuki Minami

Project Manager,
Preparatory Survey Team
on the Project for Safe School Reconstruction
in devastated Areas of Earthquake in Offshore
of Padang in West Sumatra Region in the
Republic of Indonesia

Yachiyo Engineering Co., Ltd.

Summary

SUMMARY

(1) Overview of the Country

The Republic of Indonesia (hereinafter "Indonesia") is largest archipelago with the total area of 1.89 million km^2 stretching 5,000km east – west and 1,900km north – south. it is the world's fourth most populous country with a population of 228 million (2008).

In the west of Sumatra Island, the Indo-Australia Plate is getting into under the Eurasia Plate and Sunda Mega-thrust fault line is running on a parallel with Sumatra Island north and south. Thus large earthquakes have occurred many times and the earthquake and tsunami in north Sumatra on December 2004 killed more than 160 thousand people in Indonesia. There is high possibility that large earthquakes in this area would occur as strain energy in the Plate boundary remain accumulated.

(2) Background of the Project

The earthquake on September 30, 2009 caused the enormous damage over the West Sumatra Province, in particular Padang City and Padang-Pariaman District. There were about 1,119 people died or missed, 1,214 people seriously injured and 1,688 people harmed. The total damage and loss was estimated as Rp. 21.6 trillion. Total damage and losses in education sector in West Sumatra are estimated as Rp. 618.8 billion.

Among 1,003 damaged schools in West Sumatra, collapsed or seriously damaged rooms were 259 in Padang City and 1,140 in Padang-Pariaman District in primary schools. Collapsed or seriously damaged rooms were 158 in Padang City and 222 in Padang-Pariaman District in junior high schools.

In the circumstances, National Disaster Management Agency (BNPB) sent a Rapid Reaction Team and provided Rp.100 billion on call fund for the management of the emergency response phase.

(3) Outline of the Survey

In response to the request of the Government of Indonesia, a needs assessment study mission was dispatched by Japan International Cooperation Agency to Indonesia on October 2009 and the needs for support for school reconstruction and disaster risk management were identified in priority.

Based on this result, a preparatory (outline design) survey team was sent from 18 December 2009 and the first draft of Preparatory (Outline Design) Survey Report was prepared based on the survey and discussion with various related organizations and people. The survey will be continued in order to prepare for implementation stage by Japan's Grant Aid Scheme for Disaster Prevention and Reconstruction.

The Survey Team continued its work, and the report has been revised.

BAPPENAS (National Development and Planning Agent) made "Action Plan for Rehabilitation and Reconstruction of Post-Earthquake Areas in West Sumatera Province 2009-2011" This project will contribute to a part of the Action Plan.

(4) Outline of the Project

The basic components of the Project based on the site surveys and results of discussions with the Indonesian side were compiled.

The size of the classroom will be as follows:

- Primary school: 7m x 8m ($56m^2$), 40 students/classroom, $1.4m^2$/student
- Junior high school: 8m x 8m ($64m^2$), 40 students/classroom, $1.6m^2$/student

The outline of the Project component is as follows.

Planned Floor Area by School

Site No.	Name of School	Type	Floor Area	Total Floor Area
PA-21	SMPN7 Padang	Building A 2F	848.00m2	3,460.00m2
		Building B 3F	888.00m2	
		Building C 2F	688.00m2	
		Building D 3F	1,036.00m2	
PA-22	SMPN25 Padang	Building A 3F	2,406.00m2	4,046.00m2
		Building B 3F	1,640.00m2	
PP-21	SDN02 V Koto Timur	2F	864.00m2	864.00m2
PP-22	SDN08 2 x 11 Enam Linkung	2F	872.80m2	872.80m2
PP-23	SDN03 V Koto Kampung Dalam	2F	872.80m2	872.80m2
PP-24	SDN07 Sungai Geringging	1F	793.20m2	793.20m2
PP-25	SMPN1 Enam Linkung	Building A 2F	1,280.00m2	1,360.00m2
		Building B 1F	80.00m2	
PP-26	SDN05 Batang Gasan	2F	872.80m2	872.80m2
PP-27	SDN01 Enam Linkung	2F	800.80m2	800.80m2
Grand Total				$13,942.40m^2$

Planned Rooms and Floor Area by School

No.	PA-21		PA-22		PP-21		PP-22		PP-23		PP-24		PP-25		PP-26		PP-27	
Area	Padang City				Padang-Pariaman District													
School No.	SMPN7		SMPN25		SDN02		SDN08		SDN03		SDN07		SMPN1		SDN05		SDN01	
School Name	Padang		Padang		V Koto Timur		2 x 11 Enam Lingkung		V Koto Kampung Dalam		Sungai Geringging		Enam Lingkung		Batang Gasan		Enam Lingkung	
	Q,ty	Space	Q,ty	Space	Q,ty	Space	Q,ty	Space	Q,ty	Space	Q,ty	Space	Q,ty	Space	Q,ty	Space	Q,ty	Space
Classroom																		
Classroom	18	1,152㎡	21	1,344㎡	6	336㎡	6	336㎡	6	336㎡	6	336㎡	14	896㎡	6	336㎡	6	336㎡
Library	1	128㎡	1	128㎡	1	56㎡	1	56㎡	1	56㎡	1	56㎡			1	56㎡	1	28㎡
Laboratory-Language/Cor	1	128㎡	1	128㎡														
Laboratory-Sience	1	128㎡	1	128㎡	1	56㎡	1	56㎡	1	56㎡	1	56㎡			1	56㎡	1	56㎡
Art room/Skill room	1	128㎡	1	128㎡														
Multipurpose room	1	64㎡	1	64㎡														
Office																		
Headmaster room	1	20㎡	1	20㎡	1	12㎡	1	12㎡	1	12㎡	1	12㎡			1	12㎡	1	12㎡
Vice Headmaster room	1	15㎡	1	15㎡														
Teacher's room	1	64㎡	1	96㎡	1	32㎡	1	32㎡	1	32㎡	1	32㎡			1	32㎡	1	32㎡
Administration room	1	32㎡	1	32㎡														
Guest room	1	29㎡	1	29㎡														
Others																		
Storage	2	64㎡	4	128㎡														
Reproduction room	1	12㎡	1	12㎡														
Janitor & Pantry	1	12㎡	1	12㎡														
Toilet-Gents/Ladys	1	40㎡	1	40㎡	1	10㎡	1	10㎡	1	10㎡	1	10㎡			1	10㎡	1	10㎡
Toilet-Boys/Girls	4	86㎡	5	118㎡	1	32㎡	1	32㎡	1	32㎡	1	12㎡	1	30㎡	1	32㎡	1	32㎡
Changing room	3	66㎡	3	66㎡									2	43㎡				
Counsulting Guidance	1	32㎡	1	32㎡														
Healthcare	1	32㎡	1	32㎡	1	12㎡	1	12㎡	1	12㎡	1	12㎡			1	12㎡	1	12㎡
Community Corperation ro	1	64㎡	1	64㎡	1	56㎡	1	56㎡	1	56㎡	1	56㎡			1	56㎡	1	28㎡
Gard Post	1	10㎡	1	10㎡														
Corridor/Stair/Othres		1,154㎡		1,420㎡		262㎡		271㎡		271㎡		211㎡		392㎡		271㎡		255㎡
	3,460.0㎡		4,046.0㎡		864.0㎡		872.8㎡		872.8㎡		793.2㎡		1,360.0㎡		872.8㎡		800.8㎡	

(5) Project Implementation Schedule and Cost Estimation

In the event where the Project is implemented under the Government of Japan's Grant Aid for Disaster Prevention and Reconstruction program, the rough project cost is estimated as 550 million yen. The major scope of works on the Indonesian side will be preparation of the construction site, bearing of taxes, bearing of bank commission fees and so on, and the project implementation schedule from the tender to completion of works will be approximately 17.5 months.

(6) Verification of Project Validity

National Disaster Management Agency (BNPB) shall be the responsible organization for the Project. The responsible organization will act as coordinator between Indonesian implementing organization and the Government of Japan.

A Steering Committee will be set up to guide the project implementation. The committee consist of the will hold meetings upon request of BNPB and JICA.

- ◊ National Disaster Management Agency (BNPB)
- ◊ Technical Support Team for Rehabilitation and Reconstruction of West Sumatra Province
- ◊ Planning Board (BAPPEDA) of West Sumatra Provincial Government
- ◊ Provincial Education Office of West Sumatra Provincial Government
- ◊ Municipal Education Office of Padang City Municipality
- ◊ District Education Office of Padang-Pariaman District
- ◊ Japan International Cooperation Agency (JICA)
- ◊ Embassy of Japan (EoJ)
- ◊ Procurement Agent

The major effects anticipated as a result of Project implementation are as follows.

1) Direct Effects

- ◊ 6 primary schools and 3 junior high schools in Padang City and Padang-Pariaman District will be reconstructed.
  Approximately 3,000 students will have education in proper and safe condition. The benefiting number of students will account for about 50,000 cumulatively in 50 years.
- ◊ About 75,000 people in the school area will have shelter and space for community based disaster risk management.

2) Indirect Effects

- ◊ Increase of enrollment rate and achievement will be expected through improved safe educational environment.
- ◊ The schools in Padang City will function as shelter in case of Tsunami.

The quake resistant buildings will be a model for promotion of construction of quake-resistant and safe schools. Thus, since the Project can be expected to realize sufficient beneficial effects and will not entail any problems in maintenance, the implementation of the Project under grant aid of the Government of Japan is judged to be appropriate.

Moreover, in order to realize the more efficient and effective implementation of the Project, it is necessary to establish the operation and maintenance setup, secure and appropriately assign personnel without delay, and secure an appropriate budget for operation and maintenance.

CONTENTS

Chaptr1 Background of the Project 1- 1

1-1 Background and Outline of the Project 1- 1
1-2 Natural Conditions 1- 1

Chaptr2 Contents of the Project 2- 1

2-1 Basic Concept of the Project 2- 1
2-1-1 Superior Plan 2- 1
2-1-2 Objectives of the Project 2- 3
2-2 Selection of Target Schools 2- 3
2-2-1 Criteria for Selection of the Target Schools 2- 3
2-2-2 Selected Target Schools 2- 4
2-2-3 Design Policy 2- 5
2-2-3-1 Policy regarding Natural Conditions 2- 5
2-2-3-2 Policy regarding Social Conditions 2- 7
2-2-3-3 Policy regarding the Construction Situation and Utilization of Local Contractors 2- 8
2-2-3-4 Policy regarding Operation and Maintenance Capacity 2- 9
2-2-3-5 Policy regarding Setting of Facilities Grades 2- 9
2-2-3-6 Policy regarding Environment 2- 9
2-2-3-7 Policy regarding Construction Schedule 2- 9
2-2-3-8 Policy regarding Procurement Method 2- 9
2-2-4 Outline Plan 2-10
2-2-4-1 Design Conditions 2-10
2-2-4-2 Design Policy 2-12
2-2-4-3 Design Concept 2-12
2-2-4-4 Design Outline 2-13
2-2-4-5 Structural Plan 2-15
2-2-3-6 Planning of Each Site 2-18
2-2-5 Outline Design Drawings 2-20
2-2-6 Implementation Plan 2-39
2-2-6-1 Implementation Policy 2-39
2-2-6-2 Implementation Conditions 2-41
2-2-6-3 Quality Control Plan 2-41
2-2-7 Procurement Plan 2-44
2-2-8 Implementation Schedule 2-44

2-3 Obligations of the Recipient Country 2-46
2-3-1 General Matters 2-46
2-3-2 Special Notes 2-47
2-3-3 Demarcation of Work 2-47
2-4 Project Operation Plan 2-46
2-4-1 Operation and Maintenance Plan 2-46
2-4-2 Operation and Maintenance Cost 2-48
2-5 Responsibility and Cost borne by Recipient Country 2-48

Chaptr3 PROJECT EVALUATION AND RECOMMENDATIONS 2- 1

3-1 Project Effects 3- 1
3-2 Recommendations 3- 1

Appendix

1. Member List of the Survey team
2. Schedule of Survey
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussion
5. List of Acquired Reference Materials and Data
6. Existing Layout of the schools

List of Selected Schools

Region	Code	Name of School
Padang City	SMPN7	Padang
	SMPN25	Padang
Padang Pariaman District	SDN02	V Koto Timur
	SDN08	2X11 Enam Lingkung
	SDN03	V Koto Kanpung Dalam
	SDN07	Sungai Geringging
	SMPN1	Enam Lingkung
	SDN05	Batang Gasan
	SDN01	Enam Lingkung

Location of Project Sites

Perspective View of School
Standard Type

Perspective View of School
SDN02 V Koto Timur

Perspective View of School
SMPN7 Padang

Perspective View of School
SMPN25 Padang

LIST OF FIGURES AND TABLE

FIGURE (page)

Figure1-1 Climate of Padang 1-2

Figure1-2 Indonesian Seismic Hazard Map 1-3

Figure2-1 1 Organization Chart for Project Implementation 2-40

TABLE

Table 2- 1 Stages of the Action Plan 2- 2

Table 2- 2 Vision, Mission and Related Program in Disaster Management Plan of West Sumatra Province 2- 2

Table 2- 3 Condition of Target Schools 2- 4

Table 2- 4 Infrastructure Condition of Target Schools 2- 4

Table 2- 5 Soil Type 2- 5

Table 2- 6 Peak Acceleration for Base Rocks and Soil Surface 2- 6

Table 2- 7 Response Spectrum Predetermined Earthquake (Am) 2- 6

Table 2- 8 Corner natural frequency period (Tc) and Earthquake Response Factor (C) 2- 6

Table 2- 9 Significance Factor (I) 2- 7

Table 2-10 Ductility parameters of Buildings of Building Structure (R) 2- 7

Table 2-11 Ranking of Construction Operators in Indonesia 2- 8

Table 2-12 Number of Companies Affiliated with the Indonesian Contractors' Association 2- 8

Table 2-13 List of Live Loads 2-11

Table 2-14 Finishin 2-14

Table 2-15 Improvement in Quake Resistant Design 2-17

Table 2-16 Comparison of Indonesian Standard and Japanese Building Standard in Reinforcement 2-17

Table 2-17 Planned Rooms and Floor Area by School 2-19

Table 2-18 Planned Floor Area by School 2-19

Table 2-19 Main Quality Control Items 2-42

Table 2-20 Division of Building Design Qualifications 2-43

Table 2-21 Project Implementation Schedule 2-45

Table 2-22 Demarcation of Work 2-47

Table 2-23 Estimated Annual Maintenance Cost of Target Schools 2-48

Table 2-24 Responsibility and Cost borne by Recipient Country 2-48

Table 3- 1 Principal Project Effects 3- 1