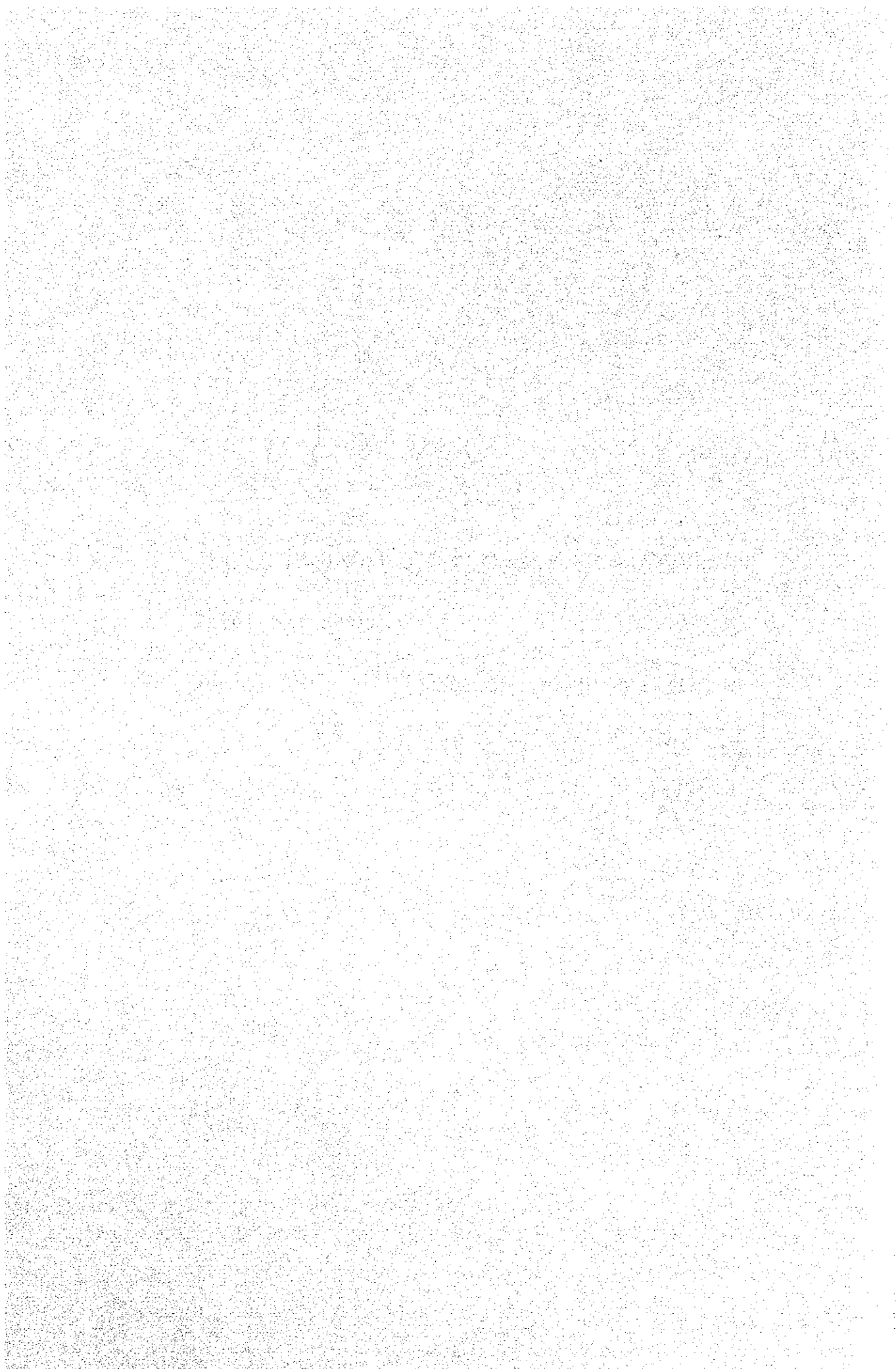


付 録

- (1) MINUTES OF DISCUSSIONS MARCH 19H 1986
- (2) SCOPE OF WORK MARCH 19H 1986
- (3) MINUTES OF DISCUSSIONS FEBRUARY 6, 1986



MINUTES OF DISCUSSIONS
ON
TOPOGRAPHIC MAPPING OF BANGKOK METROPOLITAN AREA
BETWEEN
THE BANGKOK METROPOLITAN ADMINISTRATION
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY
ON
MARCH 19TH 1986

Wicha Jiwalai

DR. WICHA JIWALAI
DEPUTY GOVERNOR
BANGKOK METROPOLITAN ADMINISTRATION

Kazuhiko Otake

MR. KAZUHIKO OTAKE
LEADER OF JAPANESE
PRELIMINARY STUDY TEAM

The Japanese Preliminary Study Team organized by JICA and headed by Mr. Otake, visited the Royal Thai Government from 24th February to 19th March, 1986 to exchange views and opinions with BHA, RTSD, DOL, RID TCFD, DTEC on the captioned Study.

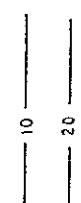
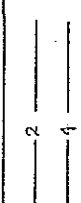
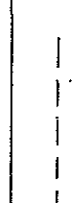
After a series of meetings, the BHA and the Study Team agreed on the following items.

- 1) Both sides discussed about the Specification and Symbols for 1/10,000 Topographic Maps as shown in Appendix I.

These Specification and Symbols including for 1/4,000 will be discussed more in detail between both sides based on the captioned Specification and Symbols.

- 2) Thai side shall prepare the result of leveling survey until the middle of October. (The reference bench marks shall be calculated by the latest data of RTSD)
- 3) Thai side shall be fully responsible for preparation of annotation sheets in Thai.
- 4) Thai side shall provide counterpart personnel to each Japanese field survey group in the course of the field survey.
- 5) Both sides agreed the spot height including direct leveling point shall be plotted about in every 5 cm on the map.
- 6) Any amendment, addition or deletion that may come up later during the implementation of the Study shall be done by mutual agreement of both sides.




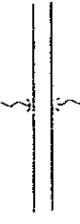
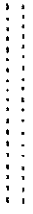



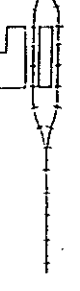
Appendix I Specification and Symbols for 1/10,000 Topographic Maps

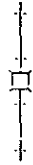

		Symbol	Line No.	color	Specification
CONTROL POINT	Control Point	horizontal control station		black	
		vertical control station		"	
CONTROL POINT	Control Point	Spot height	.72.1	"	Italic, first decimal
		Direct leveling point	12.1	"	Gothic, first decimal
CONTROL POINT	Control Lines	Index contour		blown	Interval 10m
		Standard contour		"	Interval 2m
		Auxiliary contour		"	

Specification and Symbols for 1/10,000 Topographic Maps










		TRANSPORTATION		
Road				
	Symbol	Line No.	color	specification
divided highway			red	
National highway			"	
Provincial road			"	
Other roads			"	single line for road under 3m width
Trail			"	
Road under construction			"	
Side walk			"	
Street tree			"	
Crossing			"	

Specification and Symbols for 1/10,000 Topographic Maps

		Symbol	Line No.	color	Specification
	Pedestrian overpass			black	
	Toll gate			"	
	Bridge			"	
	Culvert				
	Road in park				
	National railway			black	
	Level crossing			"	
	Overpass			"	
	Railway station			"	
Rail way					
TRANSPORTATION					

		Symbol	Line No.	color	specification
TRANSPORTATION					
Pipe Line and Power Transmission Line					
				black	
				"	


Specification and Symbols for 1/10,000 Topographic Maps 7





		Symbol	Line No.	color	specification
Police station				red	
Fire station				"	
Post office				"	
School				"	
Hospital				"	
Monastery with temple, without				red	
Church/mission				"	
Power plant/Sub-station				"	
Bank				"	

BUILDING

Symbol

Specification and Symbols for 1/10,000 Topographic Maps 9

		Miscellaneous Landmark Feature		Miscellaneous Landmark Feature		Symbol	Line No.	color	Specification
	Storage tank					○		black	
	Tower			□ ▲				"	
	Monument			□				"	
	Wall, fence			┌───┐ └───┘				"	
	Revetment			┌───┐ └───┘ ┌───┐ └───┘				brown	
	Antiquity			┌───┐ └───┘				black	
	Park							green	
	Cemetery			┌───┐ └───┘ Cem.				black	enclosed by plantation boundary symbol
	Under construction			┌───┐ └───┘ X				"	

Miscellaneous Landmark Feature	Symbol	Line No.	Color	Specification
Intermittent Canal			Blue	
River stream single line			Blue	
" double line				
Canal / Ditch				

MISCELLANEOUS LANDMARK FEATURE

River

Miscellaneous Landmark Feature

		Symbol	line No.	color	specification
PLANTATION	Plantation	Limit of Vegetation	green	
		Hardwood forest	⊗ ⊗	"	
		Bamboo forest	⊗ ⊗	"	
		Woods or Brushwoods		"	
		Scrub	⊗ ⊗	"	
		Tropical grass	⊗ ⊗	"	
		Orchard	⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	"	
		Rice field	⊗ ⊗ ⊗ ⊗	blue	

Specification and Symbols for 1/10,000 Topographic Maps

		Symbol	Line No.	color	Specification
boundary	Changvat	— — — — —		black	
	Amphoe	— — — — —		//	
	King Amphoe	— — — — —		//	
OTHERS	Line size				
		0.1mm			
		0.15mm			
		0.2mm			
		0.25mm			
		0.3mm			
		0.4mm			
		0.5mm			
		0.6mm			

Appendix 2 LIST OF ATTENDANTS

1. THE STEERING COMMITTEE OF THE TOPOGRAPHIC MAPPING PROJECT

BANGKOK METROPOLITAN ADMINISTRATION

- | | | |
|-----|---|--|
| 1.1 | Dr. Wicha Jiwalai | Deputy Governor (Chairman) |
| 1.2 | Mr. Bampen Jatoorapreuk | Deputy Director General, Dept. of Public Works |
| 1.3 | Mrs. Orapin Bamrunghan for
Dr. Kasemsan Suwarnarat | Director of Policy and Planning Div.1 |
| 1.4 | Ms. Arporn Chanchareonsook | Director of City Planning Div. |
| 1.5 | Mr. Wakorn Pol-anunt for
Mr. Wisarn Chouchuwet | Director of Right of Way and Land Acquisition Div. |
| 1.6 | Mr. Supot Pongkidakarn | Chief of Public Works Planning Sub-Div. |
| 1.7 | Mr. Chailurt Panjatevakupt | Staff of Public Works Planning Sub-Div. |
| 1.8 | Mr. Sarasit Sombutiyanoochit | Staff of Right of Way and Land Acquisition Div. |

THE ROYAL THAI SURVEY DEPT.

- | | | |
|-----|---|--|
| 1.9 | Maj. Boonlert Thasanakrongsin for
Col. Thamnoon Udomsarayuth and
Col. Predee Sumpuranapan | |
|-----|---|--|

THE LAND DEPARTMENT

- | | | |
|------|--|-----------------------------------|
| 1.10 | Mr. Paisal Kasiwat | Chief of Photogrammetric Sub-Div. |
| 1.11 | Mr. Thanoo Sakakorn for
Mr. Soonthorn Wasuwat | Chief of Urban Mapping Div. |

THE ROYAL IRRIGATION DEPARTMENT

- | | | |
|------|------------------------|--|
| 1.12 | Mr. Narong Sopak | Chief of Photogrammetric Mapping Sub-DIV. |
| 1.13 | Dr. Vishit Satharanond | Chief of System Management Sub-Div.,
Data Processing Div. |

FACULTY OF ENGINEERING, CHULALONGKORN UNIVERSITY

- | | | |
|------|----------------------------|-----------------|
| 1.14 | Dr. Chugiat Wichiencharoen | Assistant Prof. |
|------|----------------------------|-----------------|

THE TOWN AND COUNTRY PLANNING DEPT.

1.15 Mr. Sarat Sriviroj

2. DEPARTMENT OF TECHNICAL AND ECONOMIC COOPERATION

2.1 Mr. Sutin Susila

3. JAPANESE SIDE

3.1 Preliminary Study Team

3.1.1 Mr. K. Otake	Leader
3.1.2 Mr. C. Obara	Member
3.1.3 Mr. Y. Yamada	Member
3.1.4 Mr. S. Kakishita	Member
3.1.5 Mr. C. Nishimura	Member

3.2 Embassy of Japan

3.2.1 Mr. N. Takeuchi First Secretary

3.3 JICA Bangkok

3.3.1 Mr. T. Hino Assistant Resident Representative

Apperfix 2

THE STEERING COMMITTEE OF THE TOPOGRAPHIC MAPPING PROJECT

NO.	NAME	POSITION	TEL.
1.	<u>BANGKOK METROPOLITAN ADMINISTRATION</u>		
1.1	MR. WICHA JIWALAI	DEPUTY GOVERNOR	2243051
1.2	MR. BAMPEN JATOORAPREUK	DEPUTY DIRECTOR GENERAL DEPT. OF PUBLIC WORKS	2213811
1.3	MR. KASEMSAN SUWARNARAT	DIRECTOR OF POLICY AND PLANNING DIV.	2242978
1.4	MS. ARPORN CHANCHAREONSOOK	DIRECTOR OF CITY PLANNING DIV.	2228854
1.5	MR. WISARN CHOUCHUWET	DIRECTOR OF RIGHT OF WAY AND LAND AQUISITION DIV.	2227224
1.6	MR. SUPOT PONGKIDAKARN	CHIEF OF PUBLIC WORKS PLANNING SUB-DIV.	2243077
1.7	MR. CHAILERT PANJATEWAKUPUT	STAFF OF PUBLIC WORKS PLANNING SUB-DIV.	2243077
2.	<u>THE ROYAL THAI SURVEY DEPT.</u>		
2.1	COL. THAMNOON UDOMSORAYUTH		2219834
2.2	COL. PREDEE SUMPURANAPAN		2233153
3.	<u>THE LAND DEPARTMENT</u>		
3.1	MR. SOONTHORN WASUWAT	CHIEF OF URBAN MAPPING DIV.	2222332
3.2	MR. PAISAL KASIWAT	CHIEF OF PHOTOGRAMMETRIC SUB-DIV.	2232480
4.	<u>THE ROYAL IRRIGATION DEPARTMENT</u>		
4.1	MR. NARONG SOPAK	CHIEF OF PHOTOGRAMMETRIC MAPPING SUB-DIV.	5838436
4.2	MR. VISHIT SATHARANOND	CHIEF OF SYSTEM MANAGEMENT SUB-DIV., DATA PROCESSING DIV.	5838435
5.	<u>FACULTY OF ENGINEERING CHULALONGKORN UNIVERSITY</u>		
5.1	MR. CHUGIAT WICHIECHARGEN	ASSISTANT PROF.	2511510 ext. 33
6.	<u>THE TOWN AND COUNTRY PLANNING DEPARTMENT</u>		
6.1	MR. SARAT SRIVIROJ		2459963

THE SUB-STEERING COMMITTEE OF THE TOPOGRAPHIC MAPPING PROJECT

NO.	NAME	POSITION	TEL.
1.	<u>DEPARTMENT OF PUBLIC</u>		
1.1	MR. BAMPEN JATOORAPEREUK	DEPUTY DIRECTOR GENERAL DEPT. OF PUBLIC WORKS.	2213811
1.2	MR. CHAILERT PANJATEWAKPUT	STAFF OF PUBLIC WORKS PLANNING SUB-DIV.	2243077
1.3	MR. SARASIT SOMBATYANUCHIT	STAFF OF RIGHT OF WAY AND LAND ACQUISITION DIV.	2224287
2.	<u>THE ROYAL THAI SURVEY DEPARTMENT</u>		
2.1	LTC. LEX CHUDASUTA	ATTACHED TO COMPILATION SECTION	221213 ext. 3748
2.2	MAJ. BOONLERT THASAKRONGSIN	ATTACHED TO COMPILATION SECTION	2212131 ext. 3748
3.	<u>THE LAND DEPARTMENT</u>		
3.1	MR. SOONTHORN WASUWAT	CHIEF OF URBAN MAPPING DIV.	2222332
3.2	MR. PAISAL KASIWAT	CHIEF OF PHOTOGRAMMETRIC SUB-DIV.	2232480
4.	<u>THE ROYAL IRRIGATION DEPARTMENT</u>		
4.1	MR. NARONG SOPAK	CHIEF OF PHOTOGRAMMETRIC MAPPING SUB-DIV.	5838436
4.2	MR. VISHIT SATHARANOND	CHIEF OF SYSTEM MANAGEMENT SUB-DIV.	5838435
5.	<u>FACULTY OF ENGINEERING CHULALONGKORN UNIVERSITY</u>		
5.1	MR. CHUGIAT WICHIENTHARGEN	ASSISTANCE PROFESSOR	2511510 ext. 33

SCOPE OF WORK
FOR
TOPOGRAPHIC MAPPING OF BANGKOK METROPOLITAN AREA

IN
THE KINGDOM OF THAILAND
AGREED UPON BETWEEN
THE BANGKOK METROPOLITAN ADMINISTRATION
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

ON
MARCH 19TH 1986

Wicha Jiwalai

DR. WICHA JIWALAI
DEPUTY GOVERNOR
BANGKOK METROPOLITAN ADMINISTRATION

Kazuhiko Otake

MR. KAZUHIKO OTAKE
LEADER OF JAPANESE
PRELIMINARY STUDY TEAM

I. INTRODUCTION

In response to the request of the Royal Thai Government (hereinafter referred to as "RTG") , the Government of Japan (hereinafter referred to as "GOJ") has decided to conduct the Topographic Mapping of Bangkok Metropolitan Area (hereinafter referred to as "the Study ") within the general framework of technical cooperation between Japan and Thailand ,which is set forth in the Agreement on Technical Cooperation between the Government of Japan and the Government of Thailand, signed on November ,1981.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA") the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study ,in accordance with the relevant laws and regulations in force in Japan and in close cooperation with the authorities of Thailand. The Bangkok Metropolitan Administration (hereinafter referred to as "BMA")shall act as counter agency to the Japanese Study Team and also as a coordinating body in relation with other relevant organizations for the smooth implementation of the Study.

The present document sets forth the Scope of Work for the Study .

II. OBJECTIVE OF THE STUDY

The objective of the Study is to prepare the 1/10,000 Topographic Map covering an area of approximately 2,000km² and the 1/4,000 Topographic Map covering an area of approximately 300km².

Aerial photography will be carried out covering an area of approximately 4,000km². (see APPENDIX I)

III. SCOPE OF THE STUDY

In order to achieve the above mentioned objectives , the Study will cover the following items.(The technical details are as shown in APPENDIX IV)

1. Aerial Photography

Aerial photographs shall be taken at the scale of approximately 1/20,000 with a wide angle camera.

2. Ground Control Point Survey

2.1 Triangulation and traversing

Minor horizontal control points, necessary for aerial triangulation and mapping work ,shall be established by triangulation or traverse .

2.2 Leveling

Leveling shall be carried out to obtain vertical controls necessary for aerial triangulation and mapping work .

2.3 Monumentation

Monumentation of new control points shall be done if necessary.

3. Pricking

Pricking of control points on the aerial photographs shall be done in the field for aerial triangulation.

4. Field Identification

The topographic map information related to land use ,vegetation ,etc.

shall be verified in the field using the aerial photographs.

Geographical names to be expressed on the maps shall also be identified in the field and by the gazetteer .

5. Aerial Triangulation

Aerial triangulation shall be carried out by analytical method.

Adjustment shall be carried out by block adjustment method.

6. Stereo Plotting

Stereo plotting shall be carried out using stereo plotting instruments at scale of 1/10,000 and 1/4,000.

7. Field Completion

Topographic features, vegetation, etc. which cannot be properly identified shall be verified in the field and plotted on the compilation sheet.

Administrative boundaries and geographical names shall be verified and indicated on the paper copy of the compilation sheet by BMA.

8. Drafting

Based on the compiled sheet ,scribing shall be carried out on the stable polyester base for several colors separation plates. Map style and symbols shall be those adopted by BMA.

9. Printing

Plate making shall be carried out using 1/10,000 scribed negatives, and printing shall be carried out by the offset method.

IV. STUDY SCHEDULE

The whole work will be conducted in accordance with the tentative schedule.

(see APPENDIX II)

V. REPORTS AND FINAL RESULTS

A report shall be presented to BMA by JICA every fiscal year (from April to March).

The materials mentioned in APPENDIX III will be submitted to BMA by GOJ . These materials except original negatives will belong to BMA after having completed the whole work.

All maps produced under this project shall bear at the lower margin the following.

This map was produced under a cooperative undertaking between the Royal Thai Government and the Government of Japan.

VI. UNDERTAKING OF RTG

1. In accordance with the Agreement on Technical Cooperation between the Government of the Kingdom of Thailand and the Government of Japan dated November 5, 1981, the Government of the Kingdom of Thailand shall accord benefits to the Japanese Study Team as follows:

- (1) to permit the members of the Japanese Study Team to enter , leave and sojourn in Thailand for the duration of their assignment therein and exempt them from alien registration requirements and consular fees;
- (2) to exempt the members of the Japanese Study Team from taxes , duties and any other charge on equipment, machinery and other materials brought into Thailand for the conduct of the Study;

- (3) to exempt the members of the Japanese Study Team from income tax and charges of any kind imposed on or in connection with any emolument or allowance paid to the members of the Japanese Study Team for their services in connection with the implementation of the Study;
- (4) to bear claims, if any arises against the members of the Japanese Study Team resulting from , occurring in the course of , or otherwise connected with the discharge of their duties in the implementation of the Study , except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese Study Team.

2. To facilitate smooth conduct of the Study , BMA shall take necessary arrangements for the Japanese Study Team and the aerial survey company which carries out the aerial photography as the following , in cooperation with other relevant organization:

- (1) to secure permission for the flight for the aerial photography and use of airports for the implementation of the Study;
- (2) to secure permission for entry into private properties or restricted areas for the conduct of the Study;
- (3) to secure permission for the Study Team to take all necessary data and documents related to the Study out of Thailand to Japan by the Japanese Study Team;
- (4) to provide the medical services as needed (Its expenses will be chargeable on members of the Japanese Study Team);
- (5) to ensure the safety of the members of the Japanese Study Team when as it is required in the course of the Study;

- (6) to provide necessary facilities to the Japanese Study Team from remittance as well as utilization of the funds introduced into the Thailand from Japan in connection with the implementation of the Study.
3. The BMA shall , at its own expense , provide the Japanese Study Team with the following in cooperation with other agencies concerned .
- (1) Available data and information related to the Study
 - (2) Counterpart personnel
 - (3) Administrative and technical support
 - (4) Suitable office space with necessary office equipment , furniture and telephones in Bangkok
 - (5) Credentials or identifications cards to the members of the Study Team
 - (6) Available number of vehicles with drivers
 - (7) Monuments for the new control points ,if necessary
 - (8) Existing facilities and space of the Royal Irrigation Department for processing the aerial photographs
 - (9) Information of the necessary administrative boundary and geographical names on the maps, at its full responsibility
 - (10) Annotation sheets in Thai

VII. UNDERTAKING OF JICA

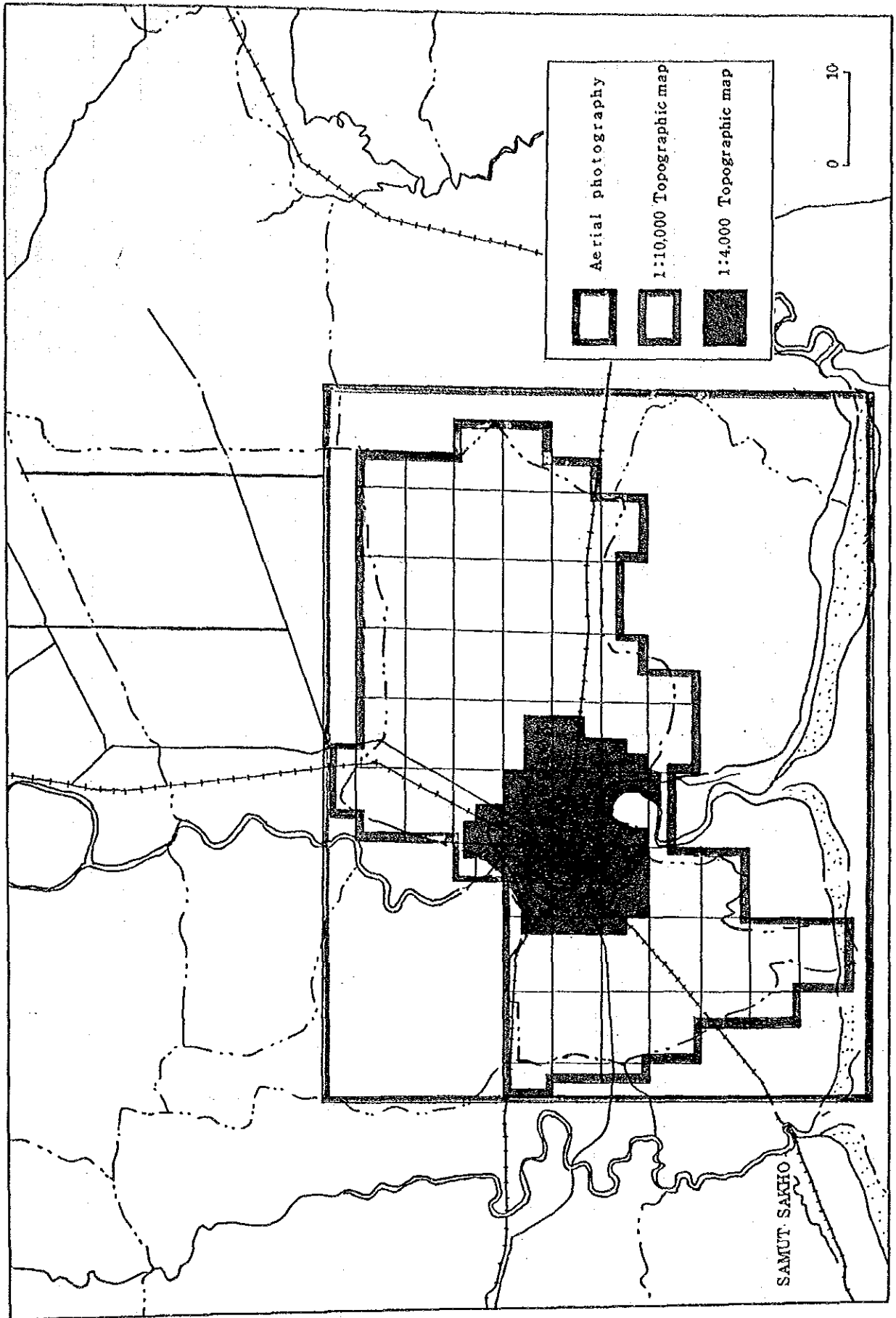
For the implementation of the Study, JICA shall, in accordance with the relevant laws and regulations in force in Japan, take the following measures.

1. To dispatch, at its own expense, the Study Team to Thailand for aerial photography, ground control point survey, pricking, field identification and field completion;
2. To carry out aerial triangulation, stereo plotting, drafting and printing in Japan;
3. To pursue technology transfer to the Thai counterpart personnel in the course of the Study

VIII. CONSULTATION

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

APPENDIX 1





APPENDIX II

TENTATIVE SCHEDULE

—: Rainy Season

	1986												1987												1988											
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
GROUND CONTROL POINT SURVEY																																				
PRICKING																																				
AERIAL PHOTOGRAPHY																																				
FIELD IDENTIFICATION																																				
AERIAL TRIANGULATION																																				
STEREO PLOTTING																																				
FIELD COMPLETION																																				
DRAFTING																																				
PRINTING																																				

Report

NOTE:  ... Work in Thailand
 ... Work in Japan

APPENDIX III FINAL RESULTS

I. Aerial Photography

1. Original negatives (roll)
2. Contact paper prints
3. Index map

II. Ground Control Point Survey

1. Horizontal control results
2. Vertical control results
3. Computation sheets
4. Field notes
5. Description of Points

III. Topographic Mapping

1. Aerial triangulation results
2. Color separation scribed sheets and negative films for printing
3. 1/10,000 topographic maps in English and in Thai (500 sets each)
4. 1/10,000 topographic maps (polyester base) in English and in Thai
(1 set each)
5. 1/4,000 topographic maps (polyester base) in English and in Thai
(1 set each)
6. Pricked photos
7. Original manuscripts

APPENDIX IV TECHNICAL DETAILS (1/10,000)

I. SPECIFICATIONS

Major specifications of the Study are :

1. Ground Control Point Survey

Specifications for 3rd order control point survey in the Technical Manual of Overseas Surveying of JICA (hereinafter referred to as TM of JICA).

2. Leveling survey for minor height control point

Specifications for 3rd order leveling survey in TM of JICA.

3. Monument

Subject to the specification of BMA.

4. Mapping

A class mapping specifications for planimetry in TM of JICA.

A class mapping specifications for height in TM of JICA.

5. Reference Ellipsoid: Everest Ellipsoid

6. Datum : Indian datum 1975 , Vertical datum :Mean Sea Level at Koh Lak.

7. Projection: Universal Transverse Mercator Projection

8. Contour Lines: 2 meter contour intervals

9. Format: 50 x 75 cm

II. ACCURACY (standard deviation)

Accuracy of above-mentioned surveys shall be :

1) Horizontal control survey

$$\frac{\sqrt{X^2 + Y^2}}{S} = \frac{1}{25,000}$$

S:distance in km

2) Vertical control survey

$$12 \text{ mm } \sqrt{S}$$

S:distance in km

3) Mapping

Planimetry	0.5 mm on the map
Spot Height	0.7 m
Contour	1 m

TECHNICAL DETAILS(1/4,000)

I. SPECIFICATIONS

Major specifications of the Study are :

1. Ground Control Point Survey
Specifications for 3rd order control point survey in TM of JICA.
2. Leveling survey for minor height control point
Specifications for 3rd and lower order leveling survey in TM of JICA.
3. Monument
Subject to the specification of BMA.
4. Mapping
A class mapping specifications for planimetry in TM of JICA.
A class mapping specifications for height in TM of JICA.
5. Reference Ellipsoid : Everest Ellipsoid
6. Datum : Indian datum 1975, Vertical datum : Mean Sea Level at Koh
Lak
7. Projection : Universal Transverse Mercator Projection
8. Contour lines : 2 meter contour intervals
9. Format : 62.5 x 93.75 cm

II. ACCURACY

Accuracy of above - mentioned surveys shall be:

1) Horizontal control survey

$$\frac{\sqrt{X^2 + Y^2}}{S} = \frac{1}{25,000}$$

S: distance in km

2) Vertical control survey

3rd	12mm \sqrt{S}	
lower	60mm \sqrt{S}	S: distance in km

3) Mapping

Planimetry	0.5 mm on the map
Spot Height	Direct Leveling Point 0.1m
	Photogrammetric Point 0.7m
Contour	1m

MINUTES OF DISCUSSION
ON
TOPOGRAPHIC MAPPING OF BANGKOK METROPOLITAN AREA
BETWEEN
THE BANGKOK METROPOLITAN ADMINISTRATION
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY
PRELIMINARY STUDY TEAM

FEBRUARY 6, 1986
BANGKOK, THAILAND

Wicha Jiwalai

DR. WICHA JIWALAI
DEPUTY GOVERNOR
BANGKOK METROPOLITAN ADMINISTRATION

Kazuhiko Otake

MR. KAZUHIKO OTAKE
LEADER OF JAPANESE
PRELIMINARY STUDY TEAM

The Japanese Preliminary Study Team (the Team) organized by JICA, headed by Mr. K. OTAKE, visited the Kingdom of Thailand from 27th January to 8th February 1986, to carry out the preliminary survey for the captioned Project.

During the Team's stay in Thailand, the Team exchanged views and discussions with BMA, RTSD, DOL, RID, TCPD, CU University and DTEC.

The main items understood by both sides are as follows:

1. The counterpart agency of JICA shall be BMA. BMA shall take necessary arrangements for the Japanese Study Team in cooperation with RTSD and other authorities concerned.
2. The Team requested to secure permission for flight and take back all necessary data to Japan by the Japanese Study Team.
Thai side agreed.
3. Thai side requested to realize the supervision of mapping process by staff of BMA in Japan in accordance with Thai security regulation.
The Team agreed.
4. The Team requested the provision of existing facilities and space of the Royal Irrigation Department for processing the aerial photographs.
Thai side agreed.
5. Final results of the Study are as follows:

1/20,000 Aerial Photograph (covering area of 4,000 km²)

1/10,000 Topographic Map (" " " 2,000 km²)

Thai side strongly requested to prepare the large scale map (1/4,000), on a polyester base type of transparent material, covering area 200 - 300 km². The reasons are as follows.

In the central area of Bangkok the 1:4,000 topographic map showing the figures of the city in details should be prepared as a

general base map for planning purposes, e.g. land use planning, flood control and drainage system, traffic control, public land, utilities etc.

The Team answered that the request of making 1:4,000 topographic map will be conveyed to the authorities concerned for further consideration in Japan.

6. As for the symbols of topographic map, the Team presented the draft of the symbols to BMA and requested to have the comments of BMA by the time of next mission.
Thai side agreed.
7. Thai side strongly requested to add Thai letters on the topographic map.

The Team answered that the request will be conveyed and discussed for consideration in Japan on condition that Thai side should prepare the annotation sheets in Thai Letters etc. at its full responsibility.

8. Thai side requested to have part of the map of important area as soon as possible.

- Appendix 1 - Modified S/W draft
- Appendix 2 - Draft of the symbols
- Appendix 3 - Questionare
- Appendix 4 - Maps showing Project areas
 - 4.1 aerial photography of 4,000 km² and topographic map of 2,000 km²
 - 4.2 200 or 300 km² of 1:4,000 scale map
- Appendix 5 - List of data requested

Appendix-1

(Modified S/W draft)

SCOPE OF THE WORK

FOR

FOR THE TOPOGRAPHIC MAPPING PROJECT

OF

BANGKOK METROPOLITAN AREA

SCOPE OF WORK

FOR

TOPOGRAPHIC MAPPING OF BANGKOK METROPO-
LITAN AREA

IN

THE KINGDOM OF THAILAND

AGREED UPON BETWEEN

THE BANGKOK METROPOLITAN ADMINISTRATION

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

(DRAFT)

I. INTRODUCTION

Royal Thai Government

In response to the request of the Government of the Thailand (hereinafter referred to as "^{RTG}GOI" , the Government of Japan (hereinafter referred to as "GOJ" has decided to conduct the Topographic Mapping ~~Project~~ of Bangkok Metropolitan Area (hereinafter referred to as "the Study ") within the general framework of technical cooperation between Japan and Thailand ,which is set forth in the Agreement on Technical Cooperation between the Government of Japan and the Government of Thailand, signed on November ,1981.

Accordingly ,the Japan International Cooperation Agency (hereinafter referred to as "JICA") the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study ,in accordance with the relevant laws and regulations in force in Japan and in close cooperation with the authorities of Thailand. The Bangkok Metropolitan Administration (hereinafter referred to as "BMA")shall act as counter agency to the Japanese Study Team and also as a coordinating body in relation with other relevant organizations for the smooth implementation of the Study.

The present document sets forth the Scope of Work for the Study .

II. OBJECTIVE OF THE STUDY

The objective of the Study is to prepare the Topographic Map(1/10,000) covering an area of approximately 2,000km²(see APPENDIX I)

III. SCOPE OF THE STUDY

In order to achieve the above mentioned objectives, the Study will cover the following items.(The technical details are as shown in APPENDIX IV)

1. Aerial Photography

1:20,000

Aerial photographs shall be taken at the scale of approximately 1/30,000 with a wide angle camera.

2. Ground Control Point Survey

2.1 Triangulation and traversing

Minor horizontal control points, necessary for aerial triangulation and mapping work, shall be established by triangulation or traverse.

2.2 Leveling

Leveling shall be carried out to obtain vertical controls necessary for aerial triangulation and mapping work.

2.3 Monumentation

Monumentation of new control points shall be done if necessary.

3. Pricking

Pricking of control points on the aerial photographs shall be done in the field for aerial triangulation.

4. Field Identification

The topographic map information related to land use, vegetation, etc.

shall be verified in the field using the aerial photographs.
Geographical names to be expressed on the maps shall also be identified in the field and by the gazetteer .

5. Aerial Triangulation

Aerial triangulation shall be carried out by analytical method.
Adjustment shall be carried out by block adjustment method.

6. Stereo Plotting

Stereo plotting shall be carried out using stereo plotting instruments at scale of 1/10,000.

7. Field Completion

Topographic features, vegetation, etc. which cannot be properly identified shall be verified in the field and plotted on the compilation sheet.
Administrative boundaries and geographical names shall be verified and indicated on the paper copy of the compilation sheet by BMA.

8. Drafting

Based on the compiled sheet , scribing shall be carried out on the stable polyester base for several colors separation plates. Map style and symbols shall be those adopted by BMA.

9. Printing

Plate making shall be carried out using 1/10,000 scribed negatives, and printing shall be carried out by the offset method.

IV. STUDY SCHEDULE

The whole work will be conducted in accordance with the tentative schedule. (see APPENDIX II)

V. REPORTS AND FINAL RESULTS

A report shall be presented to BMA by JICA every fiscal year (from April to March).

Most of the

The materials mentioned in APPENDIX III will be submitted to BMA by GOJ after having completed the whole work and they shall belong to BMA.

All maps produced under this project shall bear at the lower margin the following.

This map was produced under a cooperative undertaking between the Government of the Kingdom of Thailand and the Government of Japan.

RTG

VI. UNDERTAKING OF GOT

1. In accordance with the Agreement on Technical Cooperation between the Government of the Kingdom of Thailand and the Government of Japan dated November 5, 1981, the Government of the Kingdom of Thailand shall accord benefits to the Japanese Study Team as follows:
 - (1) to permit the members of the Japanese Study Team to enter , leave and sojourn in Thailand for the duration of their assignment therein and exempt them from alien registration requirements and consular fees;
 - (2) to exempt the members of the Japanese Study Team from taxes , duties and any other charge on equipment, machinery and other materials brought into Thailand for the conduct of the Study;

- (3) to exempt the members of the Japanese Study Team from income tax and charges of any kind imposed on or in connection with any emolument or allowance paid to the members of the Japanese Study Team for their services in connection with the implementation of the Study;
- (4) to bear claims, if any arises against the members of the Japanese Study Team resulting from , occurring in the course of , or otherwise connected with the discharge of their duties in the implementation of the Study , except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese Study Team.

2. To facilitate smooth conduct of the Study , BMA shall take necessary arrangements for the Japanese Study Team and the aerial survey company which carries out the aerial photography as the following , in cooperation with other relevant organization:

- (1) to secure permission for the flight for the aerial photography and use of airports for the implementation of the Study;
- (2) to secure permission for entry into private properties or restricted areas for the conduct of the Study;
- (3) to secure permission for the Study Team to take all ^{necessary} data and documents (i/pq/yd/lh/ /qy/glnal/negat/hv/s /qy/qe/y/a) /pho/abg/rb/h/s) related to the Study out of Thailand to Japan by the Japanese Study Team;
- (4) to provide the medical services as needed (Its expenses will be chargeable on members of the Japanese Study Team);
- (5) to ensure the safety of the members of the Japanese Study Team;

(6) to provide necessary facilities to the Japanese Study Team from remittance as well as utilization of the funds introduced into the Thailand from Japan in connection with the implementation of the Study.

3. The BMA shall , at its own expense , provide the Japanese Study Team with the following in cooperation with other agencies concerned .

- (1) Available data and information related to the Study
- (2) Counterpart personnel
- (3) Administrative and technical support
- (4) Suitable office space with necessary office equipment , furniture and telephones in Bangkok
- (5) Credentials or identifications cards to the members of the Study Team
- (6) Appropriate number of vehicles with drivers
- (7) Monuments for the new control points ,if necessary
- (8) Necessary facilities for processing the aerial photographs
- (9) Information of the necessary administrative boundary and geographical names on the maps, at its full responsibility

VII. UNDERTAKING OF JICA

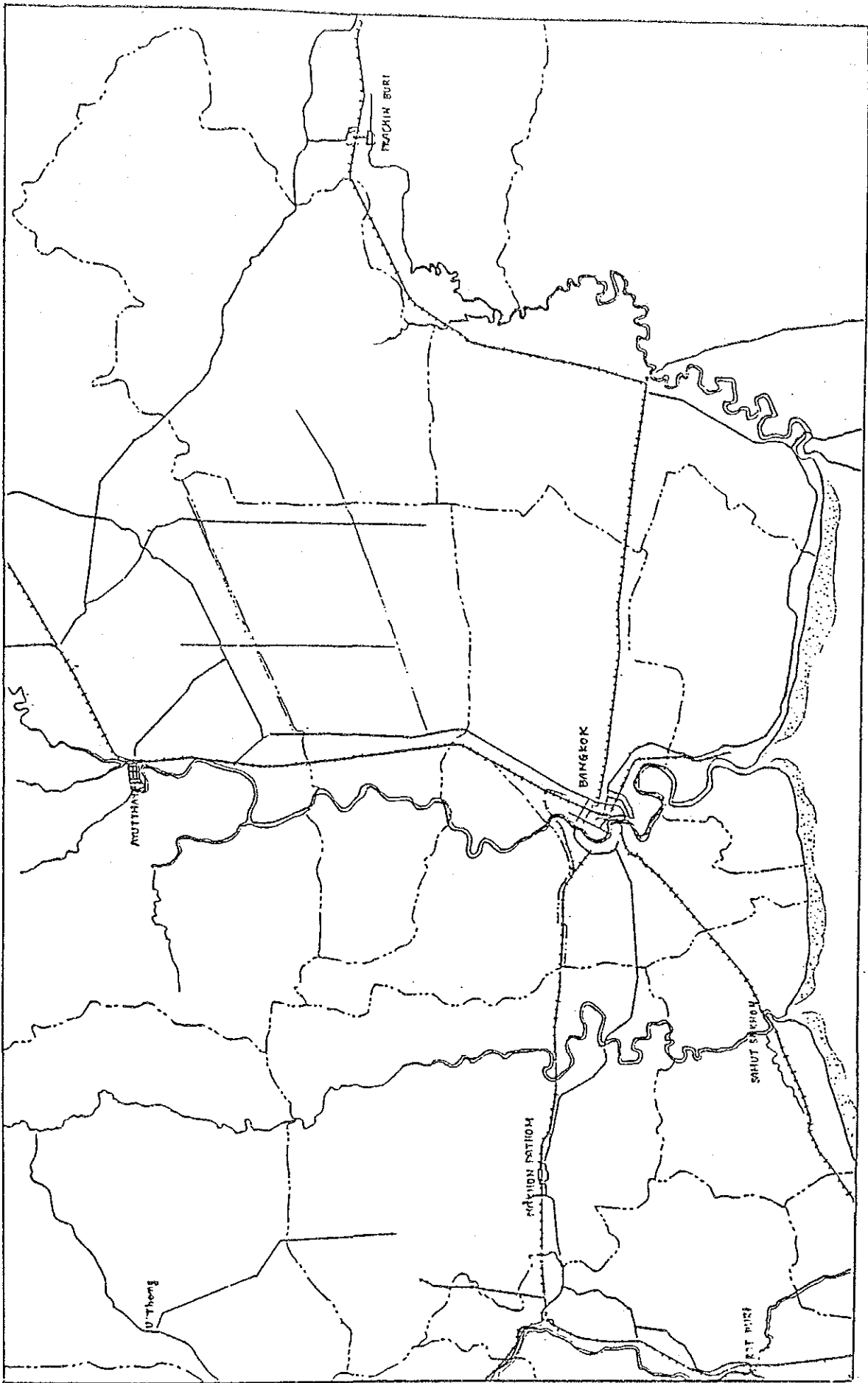
For the implementation of the Study , JICA shall, in accordance with the relevant laws and regulations in force in Japan ,take the following measures.

1. To dispatch , at its own expense ,the Study Team to Thailand for aerial photography, ground control point survey , pricking , field identification and field completion;
2. To carry out aerial triangulation , stereo plotting , drafting and printing in Japan;
3. To pursue technology transfer to the Thai counterpart personnel in the course of the Study

VIII. CONSULTATION

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

APPENDIX I





APPENDIX II

TENTATIVE SCHEDULE

----- : Drain Season

	1986												1987												1988											
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
GROUND CONTROL POINT SURVEY																																				
PRICKING																																				
AERIAL PHOTOGRAPHY																																				
FIELD IDENTIFICATION																																				
AERIAL TRIANGULATION																																				
STEREO PLOTTING																																				
FIELD COMPLETION																																				
DRAFTING																																				
PRINTING																																				

Reports

NOTE:  ... Work in Thailand
 ... Work in Japan

APPENDIX III FINAL RESULTS

I. Aerial Photography

1. Original negatives (roll)
2. Contact paper prints
3. Index map

II. Ground Control Point Survey

1. Horizontal control results
2. Vertical control results
3. Computation sheets
4. Field notes
5. Description of notes

III. Topographic Mapping.

1. Aerial triangulation results
2. Color separation scribed sheets and negative films for printing.
3. 1/10,000 topographic maps (1,000 sheets)
4. Pricked photos
5. Original manuscripts

APPENDIX IV TECHNICAL DETAILS

I. SPECIFICATIONS

Major specifications of the Study are :

1. Ground Control Point Survey

Specifications for 3rd order control point survey in the Technical Manual of Overseas Surveying of JICA (hereinafter referred to as TM of JICA).

2. Leveling survey for minor height control point

Specifications for order leveling survey in TM of JICA.

3. Monument

Subject to the specification of BMA.

4. Mapping

A B class mapping specifications for planimetry in TM of JICA.

A class mapping specifications for height in TM of JICA.

5. Reference Ellipsoid: Everest Ellipsoid

6. Datum : Indian datum 1975, Vertical datum: Mean Sea Level at Koh Lak.

7. Projection: Universal Transverse Mercator Projection

8. Contour Lines: 2 meter contour intervals

9. Format: 50 x 75 cm

II. ACCURACY (standard deviation)

Accuracy of above-mentioned surveys shall be :

1) Horizontal control survey

$$\frac{\sqrt{X^2 + Y^2}}{S} = \frac{1}{25,000}$$

S: distance in km

2) Vertical control survey

$$\text{mm} \sqrt{S}$$

S: distance in km

3) Mapping

Planimetry

0.5 mm on the map

Spot Height

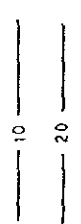
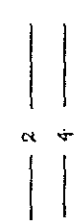

$$\frac{\Delta h}{3}$$

Contour

$$\frac{\Delta h}{2}$$


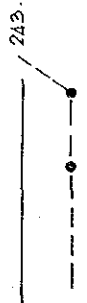

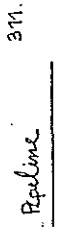
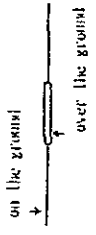
Δh : main contour interval

Appendix 2
Specification and Symbols for 1/10,000 Topographic Maps

		Symbol	Line No.	color	Specification	
CONTROL POINT	Control Point	Horizontal control station		black		
		Vertical control station		"	○	
		Spot height	.12.1		"	Italic, first decimal
		Direct leveling point	.12.1		"	Gothic, first decimal
Contour Lines	Contour Lines	Index contour		blown	Interval 10m	
		Standard contour		"	Interval 2m	
		Auxiliary contour		"		

Specification and Symbols for 1/10,000 Topographic Maps

TRANSPORTATION		line No.	color	specification	
Road	Divided highway		red		
	National highway		"	Primary, writ marker. 130. Secondary, writ marker. 140	
	Provincial road		"		
	Other roads		"	"	single line for road under 3m width
			"	"	
			"	"	
	Trail		"	"	
	Road under construction		"	"	X. Lane. 118. Construction Type by color
	Sine vaik		"	"	
	Street tree		"	"	
	Crossing		"	"	




		Symbol	Line No.	color	specification
TRANSPORTATION					
	Pipe Line and Power Transmission Line			black	
	Power transmission line			"	
	Pipeline				

Specification and Symbols for 1/10,000 Topographic Maps

BUILDING		Symbol	line No.	color	Specification
Police station				red	
Fire station				"	
Post office				"	
School				"	black. 251.
Hospital				red or green	black.
Monastery with temple, without				red	252 black.
Church/mission				"	
Power plant/Sub-station				"	
Bank				"	

Specification and Symbols for 1/10,000 Topographic Maps

			Symbol	Line No.	color	specification
Storage tank			○		black	
Tower			□ △		"	○ Tower.
Monument			⊙		"	⊙ Monument.
Wall, Fence					"	280, 282.
Revetment					brown	293 - 295
Antiquity					black	
Park					green	
Cemetery					black	enclosed by plantation boundary symbol
Under construction					"	
Miscellaneous Landmark Feature						
MISCELLANEOUS LANDMARK FEATURE						

	Miscellaneous Landmark Feature	River					specification
			symbol	Line No.	color		
	River stream	single line			light blue		
	"	double line			"		Solid blue.
	Canal				"		Intermittent canal.

Specification and Symbols for 1/10,000 Topographic Maps II

WATER AND ASSOCIATED FEATURE		Associated feature		Symbol	line No.	color	specification
	Flow arrow					blue	
	Flood gate					"	
	Drain pump					black	
	Wharf					"	296, 297
	Lake/Pond					light blue	Solid blue.
	Ferry					black	
	Swamp/Marsh					light blue	
	Breakwater						290

Specification and Symbols for 1/10,000 Topographic Maps

14

		symbol	line No.	color	specification
boundary	Changwat			black	
	Amphoe			"	
	King Amphoe			"	
Lines	Line size				
		0.1mm			
		0.15mm			
		0.2mm			
		0.25mm			
		0.3mm			
		0.4mm			
				0.5.	
					0.8
OTHERS					

Appendix 3
Questionnaire

I Planning

1. What is the purpose of making maps of Bangkok area at the scale of 1/10,000.
2. JICA propose to prepare topographic maps at the scale of 1/10,000 for about 2,000 km² area. How are your comment.
3. Will you indicate your request area on a map?
4. Why does 0.5m contour interval be needed? Could you tell us your main purpose of making maps?
5. We are not positive for making 1/4,000 scale topographic maps. What is your purpose of making maps of that scale? Don't you think 1/10,000 scale topographic map do for 1/4,000 scale one?
6. JICA propose 3rd order control point survey and leveling survey by Technical Manual of JICA for this mapping project at the scale 1/10,000, while BMA requested 1st and 2nd order control point survey and 2nd order leveling survey by RTSD specification.
Do you have any comment?

II Technical Problem

1. JICA propose aerial photography at the 1/30,000 photo-scale with a wide angle camera and the contour interval as follows
 - 2m for standard contour line
 - 1m for auxiliary contour line
 - 2~3 points/10cm square for spot heightDo you have any comment?
2. Are B.M.s of BMA connected to B.M.s established by RTSD? Are leveling points connected too?

3. How does land-subsidence in Bangkok stand? Can we have any information or data of land-subsidence in Bangkok?
4. Do you recommend for the starting point of our leveling survey. What is the reason of your recommendation ?
point shall be the base point of height for our project?
5. Where is the leveling datum? What is its height?
- 6 Will you give us your comment for the map size. Which do you take rectangular coordinate(X,Y) or geographic coordinate (longitude,latitude)?
7. Will you give us your comments to our draft of map symbol by the end of February?
8. What is the series of scale of the national base maps?
9. What kind of national base maps and aerial photographs are prepared in your country?

III Data and Information

1. Could you provide us topographic maps of the project area at the scale of 1/50,000 and 1/20,000 as soon as possible?
2. Could you make arrangement to get the following RTSD's data?
 - a. 1st order control net-work map of Indian Datum 1975
 - b. 1st and 2nd order leveling net-work map
 - c. coordinates and descriptions of these points in the Bangkok area
 - d. index map of national base maps and aerial photographs with year of survey
 - e. 1 or 2 examples of national base maps at each scale
 - f. technical specification (in English)
 - g. laws on surveying (in English)
3. Could we get meteorological data?

monthly rainfall, season of typhon, monthly number of fine days etc.

4. Are there any other data useful for our project; maps, aerial photographs etc.?

IV Letter from BMA

1. Could you give us more detailed explanation about "No assessment of the positional accuracies of the Chulalongkorn traverse has been undertaken", the 5th line from the bottom of 6 page of the letter dated 22 November 1985

2. We have information from BMA through JICA Bangkok office that leveling survey is scheduled from this February by BMA. When will it complete? Will you tell us an outline of the survey.

V Employment

We want to know the following

- a. working hour a day
- b. payment for overtime
- c. extra-fee to pay for the works on Saturday or Sunday
- d. fee of laborer and fee of driver
- f. others

VI Aerial Photography

1. Could you make arrangement to get the following authorization:

- a. mobilization of an airplane into Thailand from Japan with aerial camera and crews

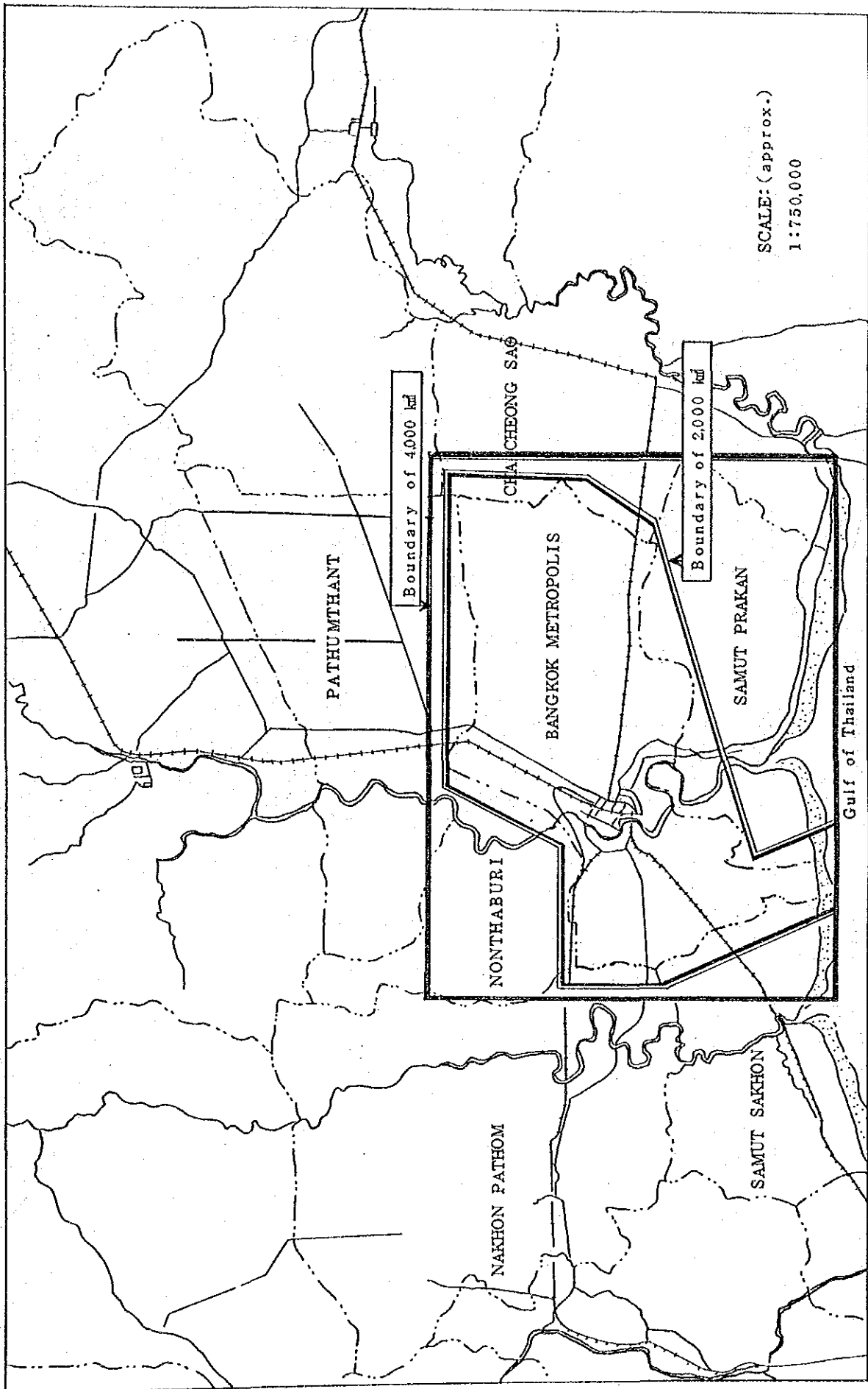
b. use of airport

c. aerial photography

2. Where can we use laboratory for development in Bangkok ?
3. Are there any regulation or restriction for aerial photography?
4. Are there any restriction for flight around Bangkok area ?
5. What is the best season (or month) for aerial photography?
6. Are there any restriction for mapping army facilities on the map ?

VII Others

1. Is there any restriction on the use of tellurometer or transiever?
2. Could provide us an organization chart of BMA ?
3. Who is the full responsible person (technical and administrative) ?



appendix 4.1 Areas of 4,000km for aerial photography and 2,000km for 1:10,000 topographic map

Appendix 5
List of Data Requested

1. Data of Control Points

a) 1st order

- map showing control point network
- final results of the surveying of the Projected area
- descriptions of these points

b) 2nd order

- map showing control point network
- final results of the surveying of the Projected area
- descriptions of these points

c) 3rd order

- map showing control point network
- final results of the surveying of the Projected area
- descriptions of these points

2. Data of Leveling survey

a) 1st order

- map showing leveling network
- final results of the leveling of the Projected area
- descriptions of these points

b) 2nd order

- map showing leveling network
- final results of the leveling of the Projected area
- descriptions of these points

c) 3rd order

- map showing leveling network
- final results of the leveling of the Projected area
- description of these points

3. Report on the Chulalongkorn traverse and the map showing the traverse net

4. Outline or map showing planning of the leveling survey starting from next month
5. Report on the land-subsidence of Bangkok area by AIT
6. Topographic maps of Bangkok area

1/250,000	3 sheets each
1/50,000	5 sheets each
1/20,000	2 sheets each
7. The latest aerial photograph of Bangkok area
8. Specification and example of the symbol of topographic map at the scale of 1/12,000 of RTSD
9. Meteorological data
10. Land use maps of Bangkok area
11. Specification and relevant law of surveying (in English).

THE SUB-STEERING COMMITTEE OF THE TOPOGRAPHIC MAPPING PROJECT

NO.	NAME	POSITION	TEL.
1.	<u>DEPARTMENT OF PUBLIC</u>		
1.1	MR. BAMPEN JATOORAPERUEK	DEPUTY DIRECTOR GENERAL DEPT. OF PUBLIC WORKS.	2213811
1.2	MR. CHAILERT PANJATEWAKPUT	STAFF OF BPULIC WORKS PLANNING SUB-DIV.	2243077
1.3	MR. SARASIT SOMBATYANUCHIT	STAFF OF RIGHT OF WAY AND LAND AQUISTION DIV.	2224287
2.	<u>THE ROYAL THAI SURVEY DEPARTMENT</u>		
2.1	LTC. LEX CHUDASUTA	ATTACHED TO COMPILATION SECTION	221213 ext. 3748
2.2	MAJ. BOONLERT THASAKRONGSIN	ATTACHED TO CONPILATION SECTION	2212131 ext. 3748
3.	<u>THE LAND DEPARTMENT</u>		
3.1	MR. SOONTHORN WASUWAT	CHIEF OF URBAN MAPPING DIV.	2222332
3.2	MR. PAISAL KASIWAT	CHIEF OF PHOTOGRAMMETRIC SUB-DIV.	2232480
4.	<u>THE ROYAL IRRIGATION DEPARTMENT</u>		
4.1	MR. NARONG SOPAK	CHIEF OF PHOTOGRAMMETRIC MAPPING SUB-DIV.	5838436
4.2	MR. VISHIT SATHARANOND	CHIEF OF SYSTEM MANGEMENT SUB-DIV.	5838435
5.	<u>FACULTY OF ENGINEERING CHULALONGKORN UNIVERSITY</u>		
5.1	MR. CHUGIAT WICHIENTHARGEN	ASSISTANCE PROFESSOR	2511510 ext. 33

THE STEERING COMMITTEE OF THE TOPOGRAPHIC MAPPING PROJECT

NO.	NAME	POSITION	TEL.
1.	<u>BANGKOK METROPOLITAN ADMINISTRATION</u>		
1.1	MR. WICHA JIWALAI	DEPUTY GOVERNOR	2243051
1.2	MR. BAMPEN JATORAPREUK	DEPUTY DIRECTOR GENERAL DEPT. OF PUBLIC WORKS	2213811
1.3	MR. KASEMSAN SUWARNARAT	DIRECTOR OF POLICY AND PLANNING DIV.	2242978
1.4	MS. ARPORN CHANCHAREONSOOK	DIRECTOR OF CITY PLANNING DIV.	2228854
1.5	MR. WISARN CHOCHUWET	DIRECTOR OF RIGHT OF WAY AND LAND ACQUISITION DIV.	2227224
1.6	MR. SUPOT PONGKIDAKARN	CHIEF OF PUBLIC WORKS PLANNING SUB-DIV.	2243077
1.7	MR. CHAILERT PANJATEWAKUPUT	STAFF OF PUBLIC WORKS PLANNING SUB-DIV.	2243077
2.	<u>THE ROYAL THAI SURVEY DEPT.</u>		
2.1	COL. THAMNOON UDOMSORAYUTH		2219834
2.2	COL. PREDEE SUMPURANAPAN		2233153
3.	<u>THE LAND DEPARTMENT</u>		
3.1	MR. SOONTHORN WASUWAT	CHIEF OF URBAN MAPPING DIV.	2222332
3.2	MR. PAISAL KASIWAT	CHIEF OF PHOTOGRAMMETRIC SUB-DIV.	2232480
4.	<u>THE ROYAL IRRIGATION DEPARTMENT</u>		
4.1	MR. NARONG SOPAK	CHIEF OF PHOTOGRAMMETRIC MAPPING SUB-DIV.	5838436
4.2	MR. VISHIT SATHARANOND	CHIEF OF SYSTEM MANAGEMENT SUB-DIV., DATA PROCESSING DIV.	5838435
5.	<u>FACULTY OF ENGINEERING CHULALONGKORN UNIVERSITY</u>		
5.1	MR. CHUGIAT WICHENCHARGEN	ASSISTANT PROF.	2511510 ext. 33
6.	<u>THE TOWN AND COUNTRY PLANNING DEPARTMENT</u>		
6.1	MR. SARAT SRIVIROJ		2459963

JICA