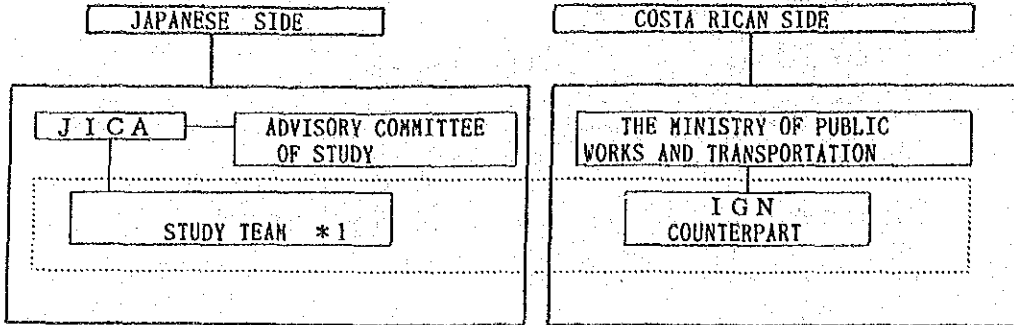


2-3 ORGANIZATION

Parties involved in this STUDY will be organized as follows:



\*1 Final result should be examined by The official organization of third party in Japan.

## CHAPTER 3 WORKS TO BE CARRIED OUT IN THE FIRST YEAR

### 3-1 VOLUME OF WORK IN THE FIRST YEAR

Volume of work in the first year are as follows;

Aerial photography	approximate scale	1:20,000
	East - West strip	20 strips
	flight length	700 km
	(approximate square	1,600 sq. km)
Photo processing	developing	all photos
	paper contact print	all photos
	(for checking)	
Inspection		all photos
	index map	Lump sum
	quality & accuracy	Lump sum
Enlarged paper print	new control points	14 points
	existing control pts.	36 points
	(include signalization points)	
contact paper print		1 set

### 3-1 WORKING SCHEDULE IN THE FIRST YEAR

Working schedule in the first year are as follows;

Contract of photography	the middle of MARCH, 1989
Aerial photography	from the middle of MARCH to the end of APRIL, 1989
Photo processing	from early in APRIL to the middle of APRIL, 1989
Photo inspection	the middle of APRIL, 1989
Partial enlargement	from the middle of APRIL to the end of APRIL, 1989
Paper contact print	the end of APRIL, 1989
Termination of contract and payment	early in MAY, 1989

### 3-3 WORKING GROUP AND THEIR ASSIGNMENT

Table 4 shows working group and their assignment in the first year work.

FIGURE 1 INDEX MAP FOR TOPOGRAPHIC MAP

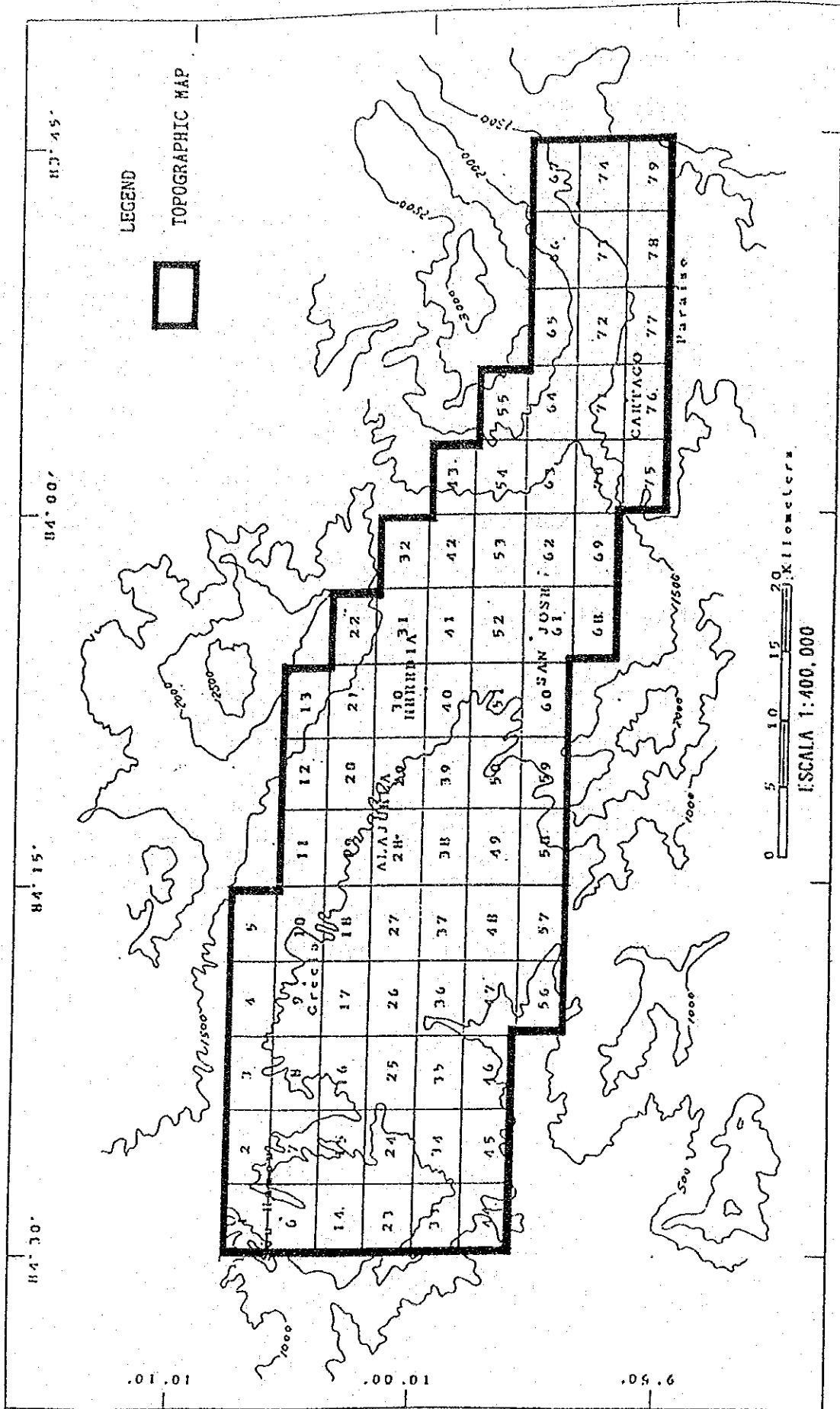


FIGURE 2 INDEX MAP FOR LAND USE MAP

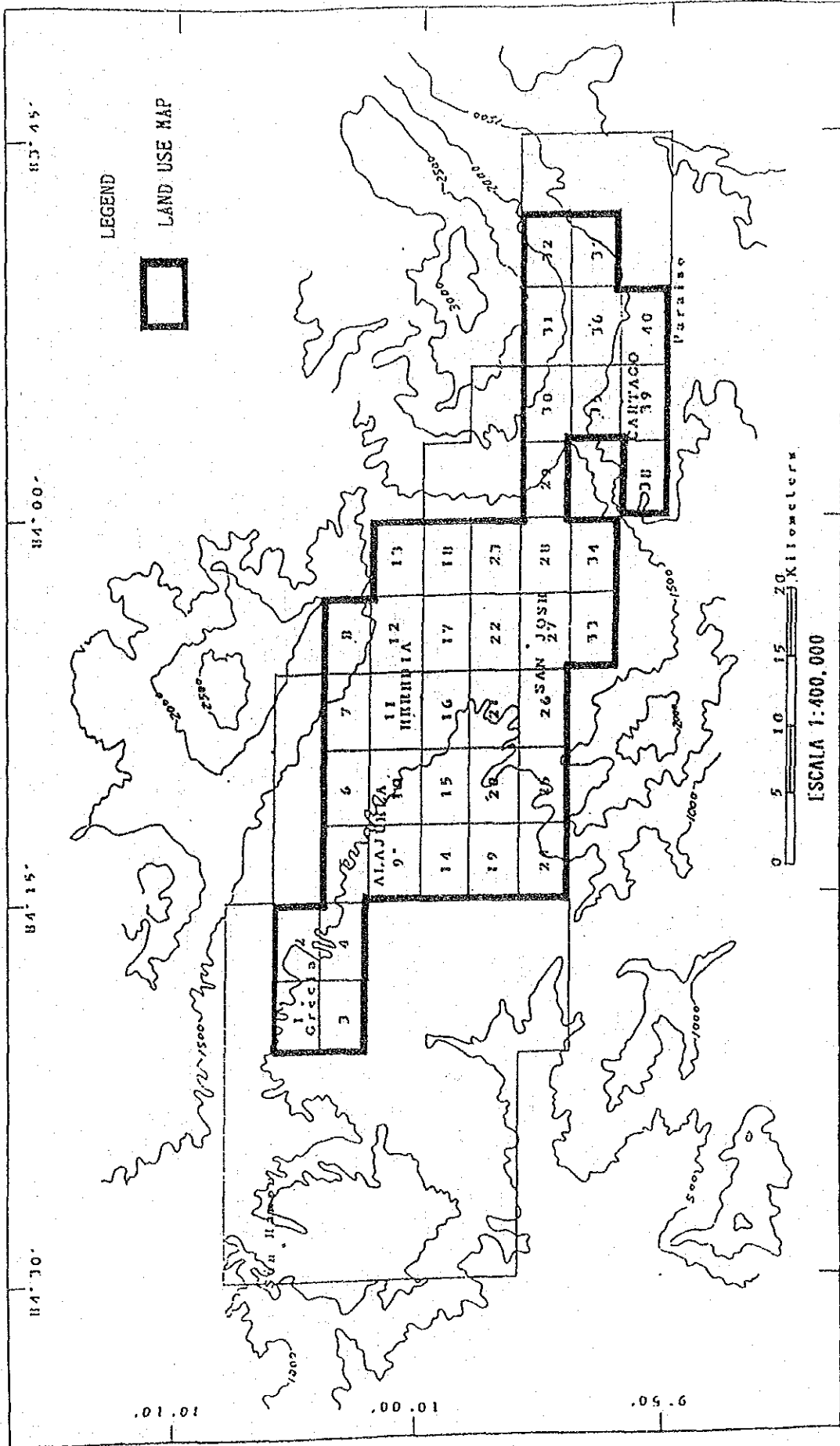


FIGURE 3 FLIGHT PLANNING MAP

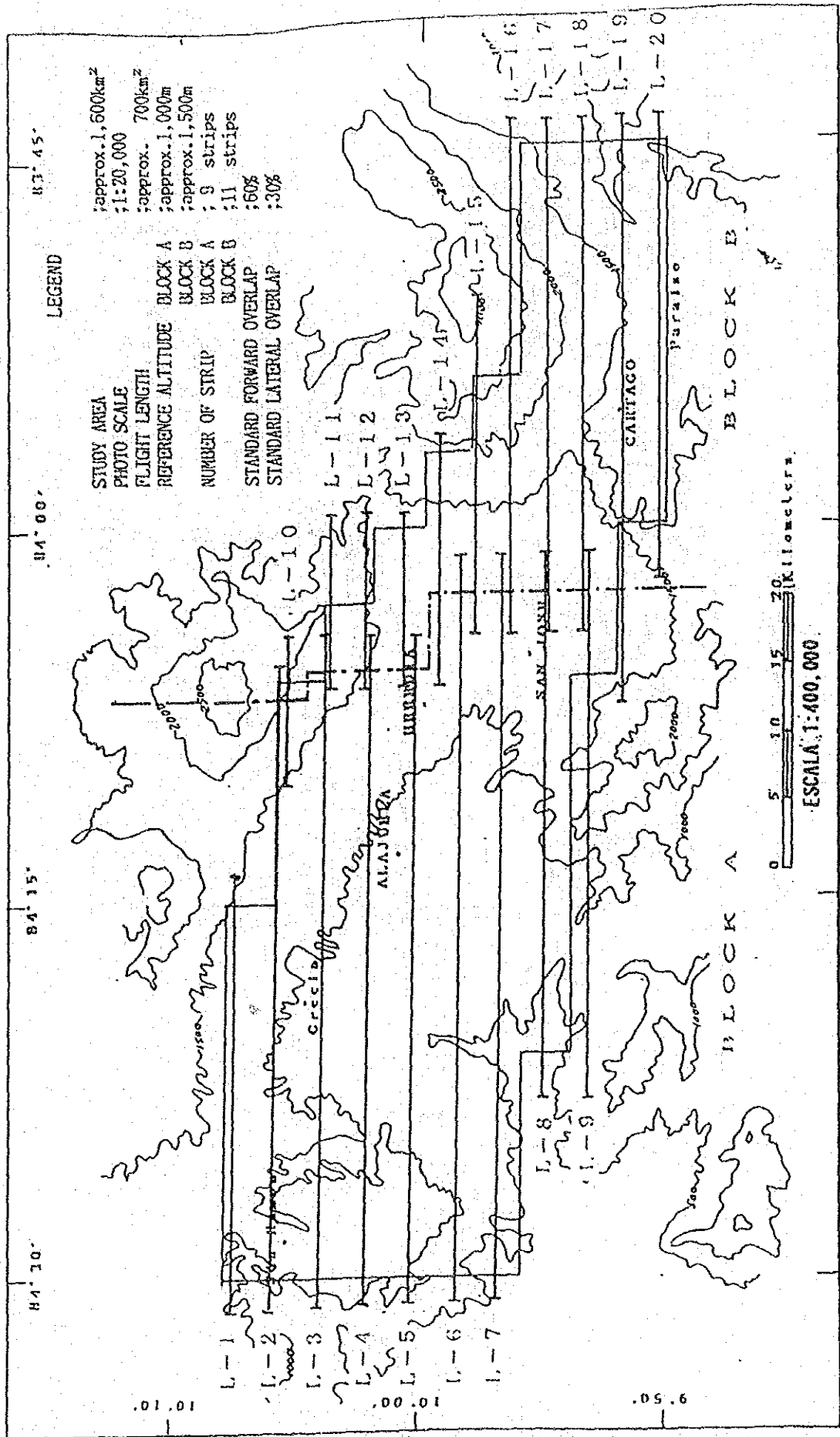


FIGURE 4 INDEX MAP FOR PHOTOGRAMMETRIC GROUND CONTROL POINTS

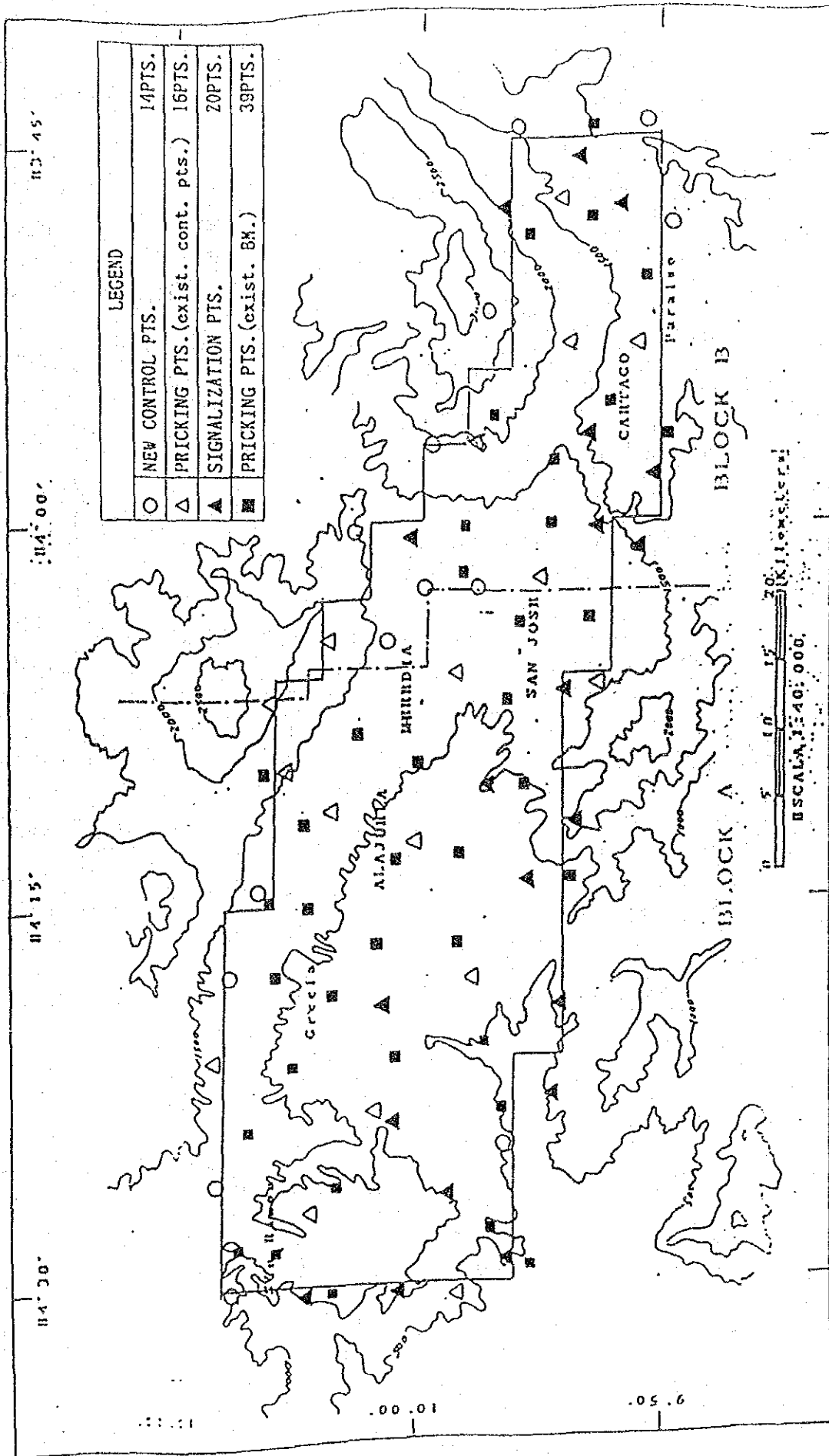
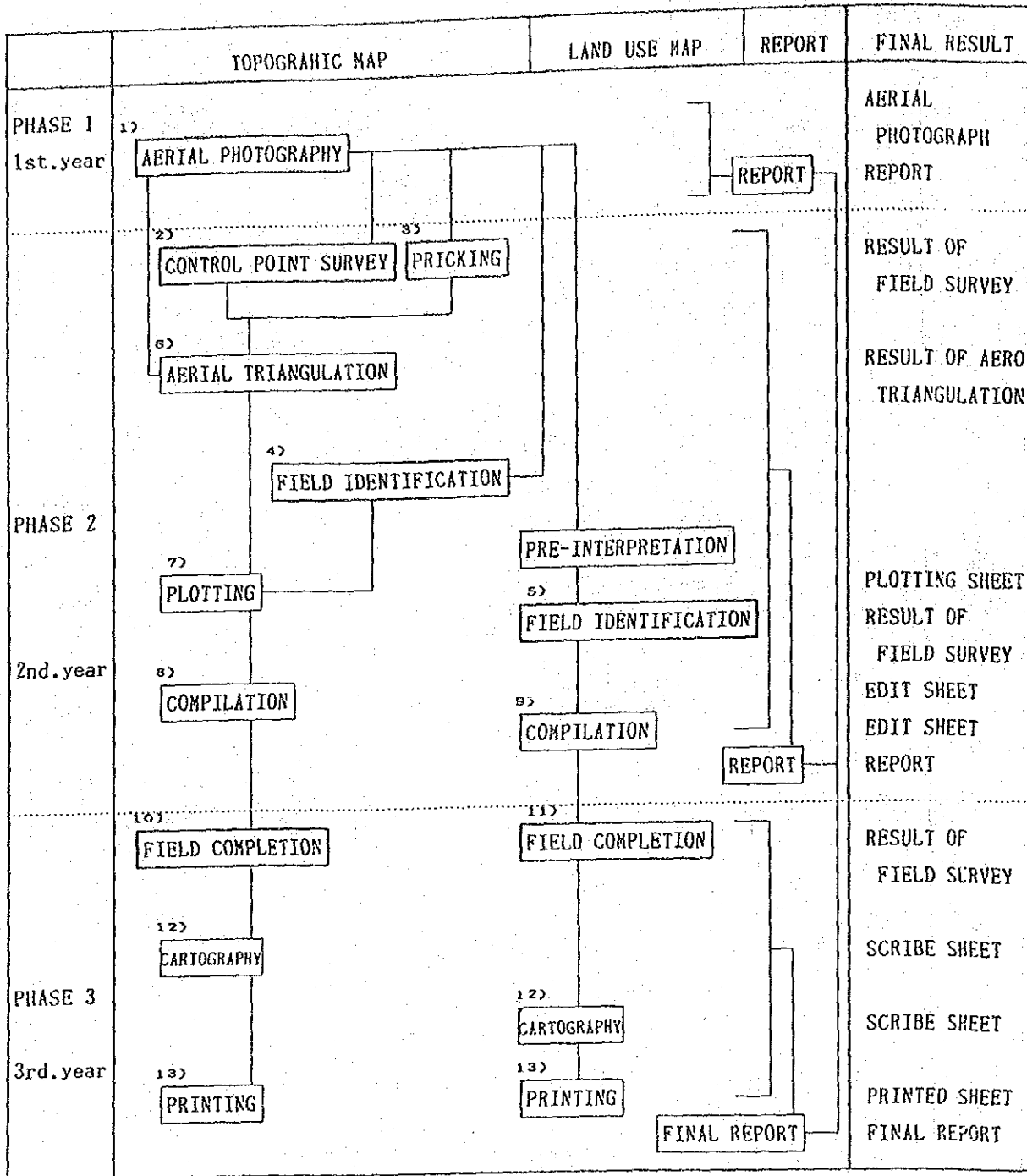


FIGURE 5 FLOWCHART FOR THE PRODUCTION OF TOPOGRAPHIC MAP AND LAND USE MAP



; FIELD WORK (COSTA RICA)
  ; WORK IN JAPAN

) ; Number is explained in chapter 1-5

TABLE 1 TECHNICAL SPECIFICATION

ITEMS	CONTENTS	APPLICATIONS
FINAL RESULTS	AERIAL CAMERA(SUPER WIDE ANGLE) SCALE 1:20,000 APPROX. 1,600km <sup>2</sup>	S/W, INDICATION NOTES
	TOPOGRAPHIC MAP SCALE 1:10,000 79 SHEETS APPROX. 1,600km <sup>2</sup>	DITTO
	( PRINTED MAPS IN SPANISH VERSION 1,500s/each)	DITTO
	LAND USE MAP SCALE 1:10,000 40 SHEETS APPROX. 800km <sup>2</sup> ( PRINTED MAPS IN SPANISH VERSION 1,000s/each)	
MAP SYMBOLS	TOPOGRAPHIC MAP;The detailed application shall be discussed between the both sides based on 1:10,000 map symbols and M/M.	M/M IN FEASIBILITY STUDY
	LAND USE MAP ;The detailed application shall be discussed between the both sides based on 1:10,000 map symbols and M/M.	DITTO
APPLICATION RULE	TECHNICAL MANUAL OF OVERSEAS SURVEYING OF JICA	S/W, INDICATION NOTES
SPECIFICATION	REFERENCE ELLIPSOIDE ; CLARKE 1866	DITTO
	PROJECTION ; LAMBERT CONICAL CONFORMAL	DITTO
	FORMAT ; 3' × 2' (longitude ,latitude)	DITTO
	CONTOUR INTERVAL ; 5m (Δh)	DITTO
ACCURACY	MAP ACCURACY ; A CLASS(horizontal:0.5mm on the map spot height:Δh/3 contour line:Δh/h)	DITTO



TABLE 2 WORKING SCHEDULE (TENTATIVE)

MONTH	1989 (FASE1)					1989 (FASE2)					1990 (FASE3)																			
	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			
ITEMS																														
AERIAL PHOTOGRAPHY																														
CONTROL PT. SURVEY																														
PRICKING																														
FIELD IDENT. (topo. map)																														
FIELD IDENT. (land use map)																														
AERIAL TRIANGULATION PLOTTING																														
COMPILATION (topo. map)																														
COMPILATION (land use map)																														
FIELD COMPLETION (topo. map)																														
FIELD COMPLETION (land use map)																														
CARTOGRAPHY (topo. map)																														
CARTOGRAPHY (land use map)																														
PRINTING (topo. map)																														
PRINTING (land use map)																														
FINAL REPORT																														
INSPECTION (authorization) FINAL																														
DELIVERY																														

Legend:  FIELD SURVEY  WORK IN JAPAN  EXPLANATION OF REPORT

TABLE 3 WORKING GROUP AND THEIR ASSIGNMENT IN THE FIRST YEAR WORK

NAME	ASSIGNMENT	CONTENTS
EIJI INOUE	LEADER	<ol style="list-style-type: none"> <li>1. TOTAL MANAGEMENT</li> <li>2. DISCUSSION LEADER</li> </ol>
MITSUO YOSHIDA	MAPPING PLANNER	<ol style="list-style-type: none"> <li>1. FUNDAMENTAL MAP PLANNING</li> <li>2. COORDINATION</li> <li>3. MANAGEMENT OF SECURITY</li> </ol>
MASAO SATOH	DEPUTY LEADER	<ol style="list-style-type: none"> <li>1. SUB MANAGEMENT</li> <li>2. PLANNING OF IMPLEMENTATION</li> <li>3. MAKING P/O</li> <li>4. MAKING SPECIFICATION AND CONTRACT DOCUMENTS OF PHOTOGRAPHY (DRAFT)</li> <li>5. EXPLANATION OF P/O AND DISCUSSION</li> <li>6. COLLECTION OF INFORMATION AND INVESTIGATION FOR THE SECOND YEAR WORK</li> <li>7. MAKING FINAL CONTRACT DOCUMENTS AND CONCLUSION</li> <li>8. ASSISTANCE OR PROXY OF LEADER IN THE FIRST YEAR WORK</li> <li>9. MAKING REPORT</li> <li>10. PREPERATION OF INSPECTION IN THE FIRST YEAR RESULTS</li> <li>11. SUPERVISING PHOTOGRAPHY</li> </ol>
MASAO MORITA	MANAGER FOR PHOTOGRAPHY	<ol style="list-style-type: none"> <li>1. MAKING SPECIFICATION OF PHOTOGRAPHY</li> <li>2. MANAGEMENT OF PHOTOGRAPHY</li> <li>3. QUALITY CONTROL CHECKING</li> <li>4. MAKING REPORT</li> </ol>

ANNEX 1 ITEMS REQUIRING APPLICATION

STAGE OF WORK	APPLICATION ITEMS	APPLICANT	PERIOD	REMARKS
AERIAL PHOTOGRAPHY	FLIGHT PERMISSION	IGN→OTHER RELATED ORGANIZATION		TAKING STEPS BY STUDY TEAM
	PERMISSION FOR USING AIRPORT	DITTO		DITTO
	PERMISSION FOR PHOTOGRAPHY	DITTO		DITTO
	PERMISSION FOR TAKING OUT FILM AND SO ON, TO JAPAN	DITTO	MIDDLE OF APRIL	DITTO
CONTROL POINT SURVEY PRICKING FIELD IDENTIFICATION (TOPO.MAP AND LAND USE MAP)	REQUEST OF COUNTERPART	IGN	BEGINNING OF JULY	DITTO
	PERMISSION FOR USING TRANSCEIVER	IGN→OTHER RELATED ORGANIZATION	END OF JUNE	DITTO
OVERALL	EXEMPTION FROM ALIEN REGISTRATION	IGN→OTHER RELATED ORGANIZATION	BEGINNING OF THE PHASE	DITTO
	EXEMPTION FROM TAXES, CHARGED CONNECTING STUDY	DITTO	DITTO	DITTO

ANNEX 2 ITEMS REQUIRING ASSISTANCE (PART1)

STAGE OF WORK	REQUEST ITEMS	APPLICANT	PERIOD	REMARKS
OVERALL	PASSING THE CUSTOMS FOR MATERIALS	IGN	PHASE 1(1989) middle of MAR. PHASE 2(1989) early in JUL.& middle of SEP. PHASE 3(1990) end of APR.	JICA
	PERMISSION FOR ENTRANCE AND PREPERATION OF ID. CARD	IGN	PHASE 1(1989) from the middle of MAR.	taking steps by study team
	OFFERING SUITABLE OFFICE SPACE	IGN	PHASE 1(1989) from the middle of MAR. PHASE 3(1990) till the end of JUN.	DITTO
	COUNTERPART PARSONNEL	IGN	PHASE 1(1989) from the middle of MAR. to the end of APR. PHASE 2(1989) from the middle of JUL. to the middle of DEC. PHASE 3(1990) from early in MAY. to the end of JUN.	DITTO
	ARRANGEMENT OF ACCOMMODATION AND TELEPHONE	IGN	PHASE 1(1989) from the middle of MAR.	DITTO

ANNEX 2 ITEMS REQUIRING ASSISTANCE (PART2)

STAGE OF WORK	REQUEST ITEMS	APPLICANT	PERIOD	REMARKS
OVERALL	OFFERING VEHICLE WITH DRIVER	IGN	PHASE 1(1989) from the middle of MAR. to early in MAY. PHASE 2(1989) from the middle of JUL. to the middle of DEC. PHASE 3(1990) from early in MAY. to the end of JUN.	TAKING STEPS BY STUDY TEAM
	ARRANGEMENT FOR LABORER	IGN	PHASE 1(1989) from the middle of MAR.	DITTO
	FACILITY FOR UTILIZATION OF FUNDS	IGN	DITTO	DITTO
	FACILITY FOR MEDICAL SERVICES	IGN	DITTO	DITTO
	CONFIRMATION OF IGN's PARTIAL CHARGE	IGN	PHASE 1(1989) middle of MAR.	DITTO
	OFFERING FOR ATTENDANCE OF HOLIDAY AND OVERTIME WORK	IGN	PHASE 1(1989) from the middle of MAR.	DITTO
	ARRANGEMENT FOR COLLECTING INFORMATION	IGN	PHASE 1(1989) from the middle of MAR.	DITTO
	SECURITY FOR SAFETY OF THE STUDY MEMBERS	IGN	WHOLE TERMS	DITTO
	NOTIFICATION AND INTRODUCTION TO OTHER RELATED ORGANIZATION	IGN	PHASE 1(1989) middle of MAR.	DITTO

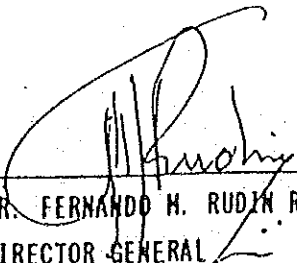
ANNEX 2 ITEMS REQUIRING ASSISTANCE (PART3)

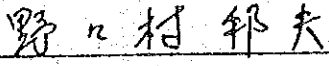
STAGE OF WORK	REQUEST ITEMS	APPLICANT	PERIOD	REMARKS
AERIAL PHOTOGRAPHY	OFFERING AND FACILITY FOR PHOTO PROCESSING	IGN	PHASE 1(1989) from the middle of MAR. to the end of APR.	TAKING STEPS BY STUDY TEAM
	OFFERING NAVIGATOR,CAMERA OPERATOR AND PERSONNEL FOR PHOTO PROCESSING	IGN	DITTO	DITTO
	SUPPLY AND ARRANGEMENT FOR MATERIALS OF PHOTOGRAPHY ( EXPENSES BY STUDY TEAM)	IGN	PHASE 1(1989) middle of MAR.	DITTO
	SECURE AND INSPECTION OF CAMERA, EQUIPMENT AND SO ON	IGN	PHASE 1(1989) middle of FEB.	DITTO
CONTROL POINT SURVEY	DESCRIPTION OF EXISTING CONTROL POINTS, BM. AND THEIR INDEX MAPS	IGN	PHASE 2(1989) end of JUN.	DITTO
	NOTIFICATION FOR USELESS CONTROL POINTS	IGN	DITTO	DITTO
	ARRANGEMENT FOR MATERIALS OF SURVEYING MARKERS	IGN	DITTO	DITTO
PRICKING	DESCRIPTION OF SIGNALIZED POINTS AND THEIR INDEX MAP	IGN	DITTO	DITTO
FIELD IDENTIFICATION (topo. map)	INVESTIGATION FOR ADMINISTRATIVE NAME AND BOUNDARY	IGN	PHASE 2(1989) from the end of JUN. to the middle of JUL.	DITTO
	DISCUSSION AND CONCLUSION OF MAP SYMBOLS AND APPLICATION RULES	IGN	PHASE 2(1989) middle of JUN.	DITTO
FIELD IDENTIFICATION (land use map.)	DITTO	IGN	PHASE 2(1989) middle of SEP.	DITTO
	MAKING LOCATION MAPS OF PUBLIC INSTITUTION AND COLLECTION FOR USEFUL INFORMATION OF LAND USE MAPS	IGN	PHASE 2(1989) from the middle of SEP. to the end of SEP.	DITTO

ANNEX 2 ITEMS REQUIRING ASSISTANCE (PART4)

STAGE OF WORK	REQUEST ITEMS	APPLICANT	PERIOD	REMARKS
FIELD COMPLETION (topo.map)	NOTIFICATION OF ADMINISTRATIVE NAME AND BOUNDARY	IGN	PHASE 3(1990) end of APR.	TAKING STEPS BY STUDY TEAM
	NOTIFICATION AND SIGNATURE ON THE FINAL COMLETION MANUSCRIPTS	IGN	PHASE 3(1990) end of JUN.	DITTO
FIELD COMPLETION (land use map)	NOTIFICATION OF INDIVISUAL LAND USE CLASSIFICATION	IGN	PHASE 3(1990) end of APR.	DITTO
	NOTIFICATION AND SIGNATURE ON THE FINAL COMLETION MANUSCRIPTS	IGN	PHASE 3(1990) end of JUN.	DITTO
PRINTING	NOTIFICATION AND SIGNATURE ON THE FINAL PROOF PRINTS	IGN	PHASE 3(1990) from early in JAN. to the middle of JAN.	DITTO

SCOPE OF WORK  
FOR  
TOPOGRAPHIC MAPPING OF SAN JOSE METROPOLITAN AREA  
IN  
THE REPUBLIC OF COSTA RICA  
AGREED UPON BETWEEN  
NATIONAL GEOGRAPHIC INSTITUTE  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY  
ON  
OCTOBER 20, 1988

  
MR. FERNANDO M. RUDIN RODRIGUEZ  
DIRECTOR GENERAL  
NATIONAL GEOGRAPHIC  
INSTITUTE

  
MR. KUNIO NONOHURA  
LEADER OF JAPANESE  
PRELIMINARY STUDY TEAM,  
JAPAN INTERNATIONAL  
COOPERATION AGENCY



## I. INTRODUCTION

In response to the request of the Government of Republic of Costa Rica, the Government of Japan has decided to conduct the Topographic Mapping of San Jose Metropolitan Area (hereinafter referred to as "the Study") in accordance with the Agreement on Technical Cooperation between the Government of Japan and the Government of Costa Rica signed on May 24, 1985 (hereinafter referred to as "the Agreement").

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 close cooperation with the authorities of Costa Rica.

National Geographic Institute (hereinafter referred to as "IGN") shall act as counterpart agency to the Japanese Study Team (hereinafter referred to as "the 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 objectives of the Study are;

- (1) To prepare 1/10,000 topographic maps covering an area of approximately 1,600 Km<sup>2</sup>. (see APPENDIX I - 1)
- (2) To prepare 1/10,000 land use maps covering an area of approximately 800 Km<sup>2</sup>. (see APPENDIX I - 2)

## III. SCOPE OF THE STUDY

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

1. Aerial photography

Aerial photographs shall be taken at the scale of approximately 1/20,000. Setting of air-photo signals shall be done, if necessary, prior to commencement of the aerial photography.

2. Ground Control Point Survey

Existing ground control points shall be utilized, however, the following works will be carried out, if necessary:

2.1 Triangulation and traversing

Minor horizontal control shall be established by triangulation or traversing.

2.2 Leveling

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

3. Pricking

Pricking on the aerial photographs shall be done in the field.

4. Field identification

The topographic and land use map information shall be identified in the field by using the aerial photographs.

5. Aerial Triangulation

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

6. Stereo Plotting

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

7. Field Completion

Topographic features, land use, vegetation, etc. which cannot be properly identified on the aerial photographs shall be identified in the field and plotted on the compilation sheets. Administrative boundaries and geographic names shall be prepared by IGM.

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 IGN.

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 in Spanish shall be presented to the Government of Costa Rica by JICA every fiscal year (from April to March).

The materials mentioned in APPENDIX III will be submitted to the Government of Costa Rica by JICA. These materials will belong to the Government of Costa Rica after having completed the whole work.

All maps produced by the Study shall bear at the lower margin the following:

Este mapa ha sido preparado en un programa cooperativo entre el Gobierno de Costa Rica y la Agencia de Cooperación Internacional del Japón.

VI. UNDERTAKING OF THE GOVERNMENT OF COSTA RICA

1. To facilitate smooth conduct of the Study, the Government of Costa Rica will accord privileges, exemptions and other benefits to the Team in accordance with the Agreement and shall take necessary measures;

- (1) to secure safety of the members of the Team,
- (2) to permit the members of the Team to enter, leave and sojourn in Costa Rica for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees,
- (3) to exempt the members of the Team from taxes, duties and other charges on equipment, machinery and other materials brought into Costa Rica for the conduct of the Study,
- (4) to exempt the members of the Team from income tax and charged of any kind imposed on or in connection with any emolument or allowance paid to the members of the Team for their services in connection with the implementation of the Study,
- (5) to provide necessary facilities to the Team for remittance as well as utilization of the funds introduced into Costa Rica from Japan in connection with the implementation of the Study,
- (6) to secure permission for entry into all necessary areas for the implementation of the Study,
- (7) to secure permission for the Team to take all necessary data and documents, including original negatives of aerial photographs, related to the Study out of Costa Rica to Japan by the Team,
- (8) to provide the medical services as needed. Its expenses will be chargeable on members of the Team.

2. The Government of Costa Rica shall bear claims, if any arises against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

3. To facilitate smooth conduct of the Study, IGM shall take necessary arrangements for the Team as follows, in cooperation with other relevant organizations;

- (1) to secure permission for the aerial photography and use of airplane and airports for the implementation of the Study,
- (2) to secure permission for the use of communication facilities including transceiver,
- (3) to employ labourers.

4. IGM shall, at its own expense, provide the Team with the followings in cooperation with other related organizations:

- (1) available data and information related to the Study,
- (2) counterpart personnel,
- (3) suitable office space with necessary equipments, e.g. typewriters, furniture and telephones in San Jose Metropolitan Area,
- (4) credentials or identification cards to the members of the Team,
- (5) administrative and technical support,
- (6) processing the aerial films and the photographs under the Team's supervision,
- (7) information of the necessary administrative boundaries and geographic names on the maps, at its full responsibility,
- (8) annotation sheets in the project area,
- (9) appropriate number of vehicles with drivers.

#### VI. UNDERTAKING OF JICA


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

1. to dispatch, at its own expense, the Study Team to Costa Rica 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 Costa Rican counterpart personnel in the course of the Study.



#### VI. CONSULTATION

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



GRAN AREA METROPOLITANA

Barrios 2346-111					Barrios 2346-11				
1	2	3	4	5	6	7	8	9	10
6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35
36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55
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146	147	148	149	150	151	152	153	154	155
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166	167	168	169	170	171	172	173	174	175
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186	187	188	189	190	191	192	193	194	195
196	197	198	199	200	201	202	203	204	205
206	207	208	209	210	211	212	213	214	215
216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235
236	237	238	239	240	241	242	243	244	245
246	247	248	249	250	251	252	253	254	255

The project is shown in the shaded area  
(Approx. 1,600 sqkm)

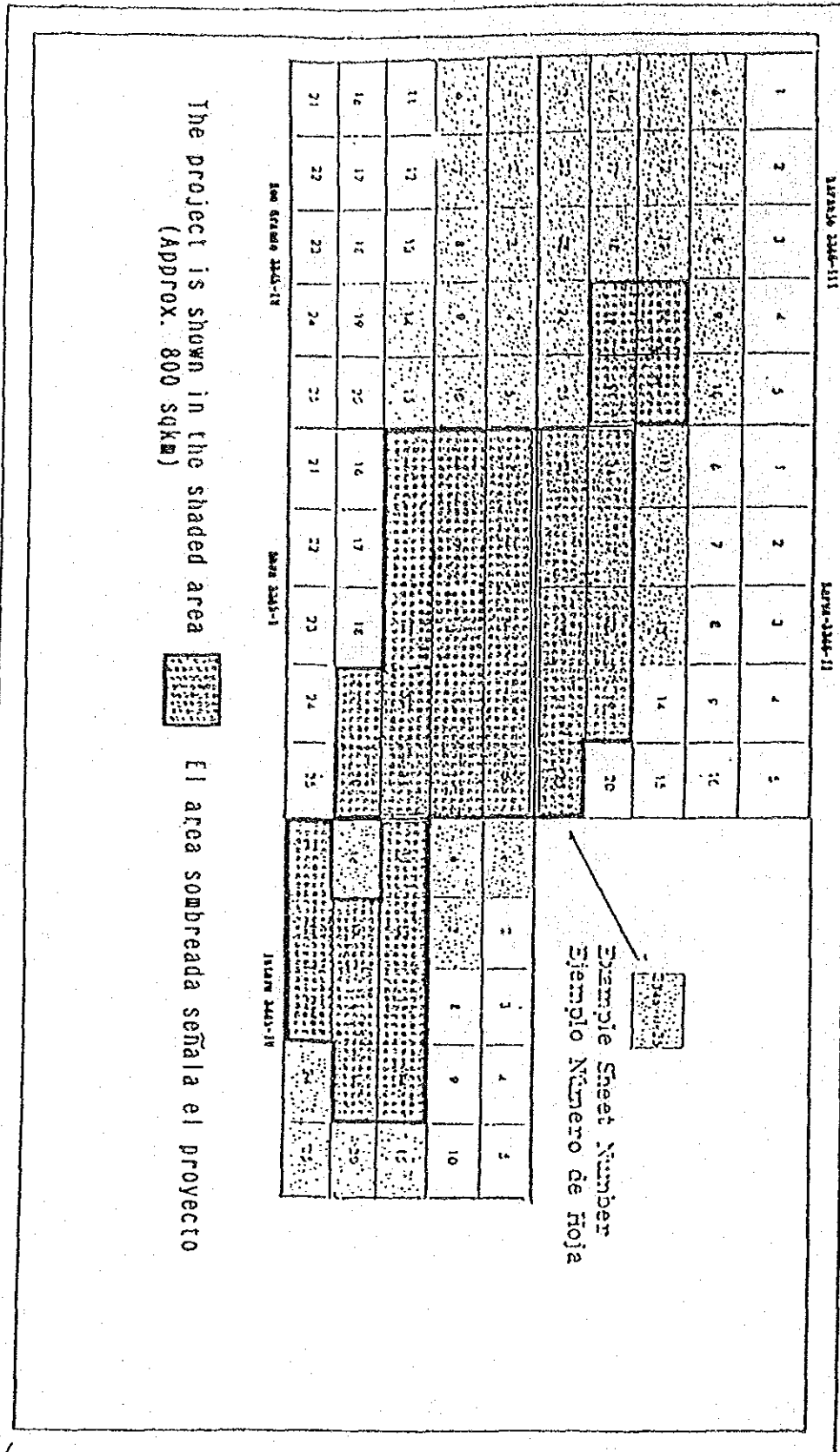


El area sombreada señala el proyecto

Example Sheet Number  
Ejemplo Número de Hoja



GRAN AREA METROPOLITANA



The project is shown in the shaded area  
(APPROX. 800 sqkm)





El area sombreada señala el proyecto


Ejemplo Sheet Number  
Ejemplo Numero de Hoja



TENTATIVE SCHEDULE

ITEM																														
	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	26	27	28	29	30
AERIAL PHOTOGRAPHY																														
GROUND CONTROL POINT SURVEY																														
PRICING																														
FIELD IDENTIFICATION																														
-DITTO-(LAND USE)																														
AERIAL TRIANGULATION																														
STEREO PLOTTING (and COMPILATION)																														
COMPILATION (LAND USE)																														
FIELD COMPLETION																														
-DITTO-(LAND USE)																														
DRAFTING - PRINTING																														
-DITTO-(LAND USE)																														

NOTE :  : Work in Costa Rica  
 : Work in Japan



68



APPENDIX III

FINAL RESULTS

I. Aerial Photography

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

II. Topographic Mapping

1. Aerial triangulation results
2. Color separation scribed sheets
3. 1/10,000 topographic maps in Spanish (1,500 copies)
4. Pricked photographs
5. Original manuscripts

III. Land Use Mapping

1. Color separation scribed sheets
2. 1/10,000 land use maps in Spanish (1,000 copies)
3. Original manuscripts

## APPENDIX IV

### TECHNICAL SPECIFICATIONS

#### 1. Topographic Mapping:

"A" class mapping specifications in the Technical Manual of Overseas Surveying of JICA will be applied with the exception of some subjects and some areas such as obscure areas on photographs, generalized building area, periphery of road in the suburbs and in rural areas, etc.

#### 2. Contour lines:

5 meter contour intervals.

#### 3. Format:

3' × 2'

#### 4. Number of Colors:

4 for Topographic Maps

6 for Land Use Maps

MINUTES OF MEETING

ON

TOPOGRAPHIC MAPPING OF SAN JOSE METROPOLITAN AREA

IN

THE REPUBLIC OF COSTA RICA

BETWEEN

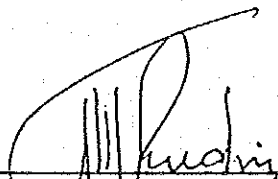
NATIONAL GEOGRAPHIC INSTITUTE

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

ON

OCTOBER 20, 1988



HR. FERNANDO M. RUBIN RODRIGUEZ  
DIRECTOR GENERAL  
NATIONAL GEOGRAPHIC  
INSTITUTE



HR. KURIO NONOHURA  
LEADER  
PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY

The preliminary study team on the topographic mapping of San Jose Metropolitan area, organized by JICA and headed by Mr. K. Monomura, visited the Republic of Costa Rica from September 15, 1988 to October 21, 1988, to carry out the preliminary survey for the captioned survey.

During the Japanese team's stay in Costa Rica, both sides had a series of discussions and exchanged views and opinions in very warm and cooperative atmosphere.

As the results of the series of discussion, both sides have agreed upon and signed the Scope of Work for the smooth implementation of the study.

The other main items understood by both sides are as follows:

1. IGN shall arrange the aerial photography and subsequent processing of aerial photographs with the top priority.
2. For the smooth and effective aerial photography, the Costa Rican aero-photography company, which is under IGN's control, was strongly recommended by the Costa Rican side. The recommendation was also made from the result of cost comparison among others.
3. The final results of aerial photography shall be submitted to the Costa Rican side as soon as possible.
4. IGN stated and the Japanese side agreed that the existing maps of 1/10,000 in some part of the study area are so differently varied in their symbols and contents that it was necessary for those maps to be revised completely, in other words, the mapping in all the study area should be done under the same specifications.
5. Items of symbols for the topographic maps and the land use maps are as attached hereafter. The symbols shall be prepared and determined at the stage of field identification.
6. As for the number of the copies for the topographic maps, the Costa Rican side had pointed out high demands of the maps, and requested strongly 1,500 copies for more effective and significant use of the maps.

7. IGN shall conduct the setting of air-photo signals at the necessary points prior to commencement of the aerial photography.
8. IGN shall provide, for the implementation of the study, the Japanese study team with, at least, 4 4WD station wagons and 2 pick-ups with a driver for each vehicle, while the expenses of fuel for the vehicles shall be born by JICA.
9. With regard to technical transfer, the Costa Rican side stressed the need of working together both in Costa Rica and in Japan in the course of the study.

List of Attendants:

1. Costa Rican side

(IGN)

Mr. Fernand H. Rudin Rodriguez	Director General
Mr. Claudio Vieto R.	Deputy Director General
Mr. Lic. Eduardo Bedoya Benitez	Surveyor (Geography)
Mr. Herna Cantillano Acosta	Chief Cartographer
Mr. Victor H. Guerrero Cruz	Surveyor

2. Japanese Side

(JICA Preliminary Team)

Mr. Kunio Monomura	Leader
Mr. Tadao Hoya	Vice Leader
Mr. Yutaka Shoda	Member
Mr. Yasuo Ide	Member
Mr. Hiroshi Murakami	Member
Mr. Yoshikazu Yamada	Member
Mr. Hiroshi Matsuoka	Member
Mr. Yasuhiro Hori	Member
Ms. Setsuko Ohtaki	Member

(Embassy of Japan)

Mr. Yasusada Oue	Second Secretary
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Símbologia de mapa a escala 1:10,000  
 Symbol of map in the scale of 1:10,000

HAPA TOPOGRAFICO TOPOGRAPHIC MAP

		No.	ACCIDENTES	ITEM	INDICE
					LEGEND
Punto de control	CONTROL POINT	1	Vértice geodésico	Horizontal control point	○
		2	Punto de nivelación	Bench mark	○
		3	Cota fotogramétrica	Spot height by Photogrammetry	○
Topografía	TOPOGRAPHY	1	Curvas de nivel índice	Index contour line	○
		2	Curvas de nivel intermedia	Intermediate contour line	○
		3	Curvas de nivel auxiliar	Auxiliary contour line	○
		4	Depresiones	Depression	○
		5	Peñasco o farallón	Cliff (soil, rock)	○
		6	Corte	Cutting	○
		7	Relleno o terraplén	Embankment	○
Aguas	WATER	1	Límite de aguas	Shore line	○
		2	Curso de agua	River, canal, etc.	
		3	Quebrada intermitente	Intermittent or dry river	○
		4	Acueducto	Water pipeline	
		5	Túnel de acueducto	Tunnel water pipeline	
		6	Saltos	Waterfall	
		7	Hanantial	Spring	

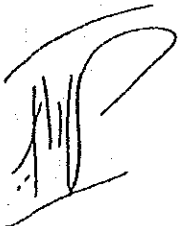
		No.	ACCIDENTES	ITEM	INDICE LEGEND
Carreteras	ROAD	1	Autopista	Express Way	○
		2	Camino pavimentado mayor de 3m de ancho	Pavement Road more than 3m wide	○
		3	Camino sin pavimentar mayor de 3m de ancho	Road without Pavement more than 3m wide	○
		4	Camino de herradura o huella	Road of cattle and horse	○
		5	Vereda, sendero	Footpath	○
		6	Puente	Bridge	○
		7	Puente para peatones	Pedestrian bridge	○
		8	Señal de identificación para carretera principal	Route number for main highway	○
		9	Señal de identificación para carretera secundaria	Route number for secondary highway	○
Ferrocarriles	RAILWAY	1	Vía sencilla	Railway	○
		2	Estación ferroviaria	Railway station	○
		3	Patio ferroviario	Yard	○
		4	Puente ferroviario	Railway bridge	○

		No.	ACCIDENTES	ITEM	INDICE
					LEGEND
Edificio	BUILDING	1	Edificio que no exceda de 0.5mm x 0.5mm	Buildings not over 0.5mm x 0.5mm	○
		2	Edificio que exceda de 0.5mm x 0.5mm, pero que ninguno de cuyos lados exceda de 5.0mm	Buildings over 0.5mm x 0.5mm, but none of the side doesn't over 5.0mm	○
		3	Edificio con cualquier lado mayor de 5.0mm	Buildings, any of the side are more than 5.0mm	○
		4	Zona densamente construida	Congested housing area	○
		5	Galerón	Cattle barn	○
Símbolo de edificio	BUILDING SYMBOL	1	Palacio Municipal	Municipal Office	○
		2	Edificio Gubernamental	Governmental building	○
		3	Poder Judicial	Court	○
		4	Hospital o casa de salud	Hospital, health center	○
		5	Estación de Policía	Police station	○
		6	Estación de Bomberos	Fire station	○
		7	Correos	Post office	○
		8	Escuela y colegio	School and college	○
		9	ICE	ICE	○
		10	Banco	Bank	○
		11	Iglesia	Church	○
		12	Estadio	Stadium	



		No.	ACCIDENTES	ITEM	INDICE LEGEND
Otras construcciones	OTHER CONSTRUCTIONS	1	Construcciones especiales (rotular según el caso: chimenea, torre, silo, etc.)	Special constructions (annotate according to the case: chimney, tower, silo, etc.)	○
		2	Honumento	Honument	○
		3	Línea eléctrica alta tensión	High tension electric transmission line	○
		4	Tubería de gas o petróleo, superficial (rotular según el caso)	Superficial pipeline of gas or petroleum (annotate according to the case)	
		5	Represa de mampostería con camino sobre la misma	Dam with road on the dam	
		6	Represa de tierra	Earth dam	○
		7	Tanque: gasolina, petróleo, gas, agua, etc (rotular según el caso)	Tank: petroleum, gas, water, etc. (annotate according to the case)	
Tipo de uso	TYPE OF LAND USE	1	Límite de uso	Boundary of Land use	○
		2	Huerto y plantaciones	Vegetable garden and plantations	○
		3	Café	Coffee	○
		4	Caña de azúcar	Sugar cane	○
		5	Pasto	Pasture	○
		6	Zona de reforestación	Reforestation zone	○
		7	Bosque secundario	Secondary forest	○
Límite administrativo	ADMINISTRATION BOUNDARY	1	Límite de provincia	Boundary of prefecture	○

Otro tipo de uso OTHER TYPE OF LAND USE	No.	ACCIDENTES	ITEM	INDICE
				LEGEND
	1	Parque	Park	○
	2	Cementerio	Cemetery	○
	3	Aeropuerto	Airport	
	4	Minas de tajo abierto y de desecho de minas	Open cutting mine and waste material mine	



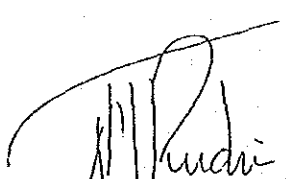
Area urbanizada y habiyada		Urban and Inhabit area	
Uso residencial	Residencia general	Residential use	General residential
	Comercio y negocios		Commercial and business
Uso industrial	Industria	Industrial use	Industrial
	Agencia gubernamental y público		Governmental and public agency
Uso público	Educación-cultura	Public use	Education-culture
	Salud y bienestar		Health and welfare
	Parque y/o Zona verde		Park and/or greenzone
	Cementerio		Cemetery
Uso de servicios y recreativo	Deporte y atletismo	Facilities	Sport and athletic
	Transporte		Transportation
	Servicios		Utility
Area sin construir		Open space	

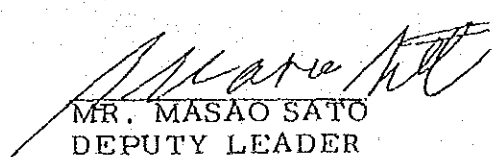
Area agrícola y forestal			
Uso agrícola	Agricultura estacional	Uso ganadera	Tierra inculta
	Cultivo permanente		
	Fruticultura		
	Floricultura		
Uso forestal	Cultivo múltiple	Uso forestal	Tierra descubierta
	Pasto		
	Pasto con árboles		
	Reforestación		
Tierra inculta	Bosque secundario	Tierra descubierta	Tierra descubierta
	Charral		
Agricultural and forest area			
Agricultural use	Seasonal agriculture	Cattle breeder use	Uncultivated land
	Permanent cultivation		
	Fruit cultivation		
	Flower cultivation		
Forest use	Multiple cultivation	Forest use	Uncultivated land
	Pasture		
	Pasture with trees		
	Reforestation		
Waste land	Secondary forest	Waste land	Waste land
	Natural grass land		

MINUTES OF MEETING  
AT THE END OF  
THE FIRST YEAR'S FIELD WORK  
FOR  
TOPOGRAPHIC MAPPING OF SAN JOSE METROPOLITAN AREA  
IN  
THE REPUBLIC OF COSTA RICA

PROJECT BETWEEN  
NATIONAL GEOGRAPHIC INSTITUTE OF COSTA RICA  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

MAY 09, 1989  
San José, Costa Rica

  
MR. FERNANDO M. RUDIN  
DIRECTOR GENERAL  
INSTITUTO GEOGRAFICO NACIONAL

  
MR. MASAO SATO  
DEPUTY LEADER  
JICA STUDY TEAM

MINUTES OF MEETING AT THE END  
OF THE FIRST YEAR'S FIELD WORK IN COSTA RICA

On the ending work of the first phase (1st. year) on taking aerial photography for the preparation of the topographic mapping of San José Metropolitan Area in Costa Rica, the JICA Study Team and the IGN's members have discussed different subjects in relation to the Project and attached outline of Progress Report.

The following items have been agreed and requested by IGN and JICA Study Team.

JOINT ACCORD:

- (1) Just the day of signing these minutes, 83% of aerial photography of the first year's activities according to the programmed schedule, have been taken.
- (2) JICA Study Team and IGN have been agreed to continue the discussion of map symbols and its application proposed by JICA Study Team, for the final accord.
- (3) Remaining 17% of aerial photograph shall be taken in second field work by JICA.

REQUEST OF JICA STUDY TEAM TO IGN:

- (1) To collaborate in the arrangements for airfreight's handling of equipment and materials for the second year's field work.
- (2) To prepare the permits, data and materials requested for the activities of the second year's field work.

REQUEST OF IGN TO JICA STUDY TEAM:

- (1) The JICA Study Team will notify as soon as possible the initial date of activities for second year's field work to IGN.

*M/S*

*[Signature]*

LIST OF ATTENDANTS

1. Government of Republic of Costa Rica  
National Geographic Institute (IGN)

Mr. Fernando M. Rudin	Director General - IGN
Mr. Claudio Vieto	Deputy Director - IGN
Mr. Carlos L. Elizondo	Geographer-General Coordinator
Mr. Eduardo Bedoya	Advisor - Coordinator
Mr. Victor Guerrero	Surveyor - Coordinator

2. JICA Study Team

Mr. Masao Sato	Deputy Leader
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3. Embassy of Japan

Mr. Yasusada Oue	Second Secretary
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ATTACHMENT

OUTLINE OF PROGRESS REPORT  
OF  
THE FIRST YEAR'S FIELD WORK  
FOR  
THE TOPOGRAPHIC MAPPING OF SAN JOSE METROPOLITAN AREA  
IN  
THE REPUBLIC OF COSTA RICA

JICA STUDY TEAM  
OF  
THE TOPOGRAPHIC MAPPING  
OF  
SAN JOSE METROPOLITAN AREA IN THE REPUBLIC OF COSTA RICA  
JAPAN INTERNATIONAL COOPERATION AGENCY

MAY 09, 1989  
SAN JOSE, COSTA RICA

## 1. INTRODUCTION

Project of the topographic mapping of San José Metropolitan Area was started in 16th March, 1989, in three year term Study, as a technical cooperation program of JICA.

In compliance with the Scope of Work agreed upon between IGN and JICA on the 20th October, 1988, the JICA Study Team, composed of 4 members, was dispatched on the 13th March, 1989, for 62 days to execute the first year's field work.

Meantime Costa Rican counterparts from IGN joined the work from time to time.

In accomplishing the first year's field work, the outline of the progress of the work is reported.

## 2. OBJETIVE OF THE STUDY

The objective of the Study is to prepare 1:10.000 topographic map covering an area of approximately 1.600 sq. km, and 1:10.000 land use map covering an area of approximately 800 sq. km of San José Metropolitan Area in Costa Rica.

Main items of Study are as follows:

- |                                   |   |
|-----------------------------------|---|
| (1) Aerial photography            | approx. 1.600 sq.km, 1:20.000 scale                   |
| (2) Topographic map<br>(1:10.000) | approx. 1.600 sq.km, 79 sheets                        |
| (3) Land use map<br>(1:10,000)    | approx. 800 sq.km, <sup>40</sup> <del>48</del> sheets |

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### 3. AERIAL PHOTOGRAPHY

Volume of executed first year's field work are as follows:

Aerial photography	number of strips	23 strips
	number of rolls	7 rolls
	number of photos	approx. 1,500 photos
Photo processing	developing	approx. 1,500 photos
	paper contact print	approx. 1,500 photos
Checking	accepted photos	approx. 500 photos (83%)
	index map	Lump sum

### 4. REMAINING WORK

Due to unfavorable weather conditions, 17% of aerial photography has been remained. (see ANNEX 1).

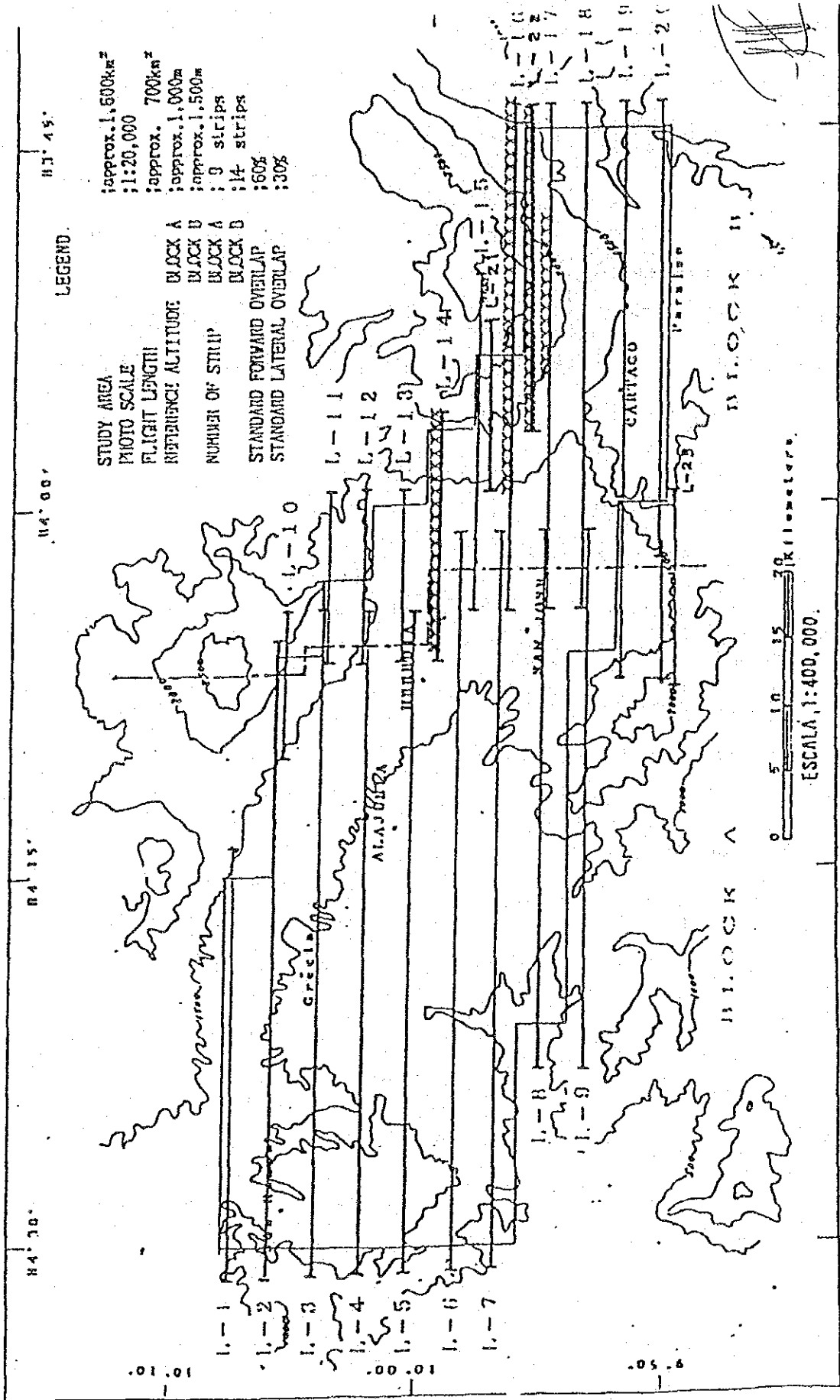
Due to processing of large number of photograph, partial enlargement photo processing for control points has been remained.

### 5. OTHER ITEMS

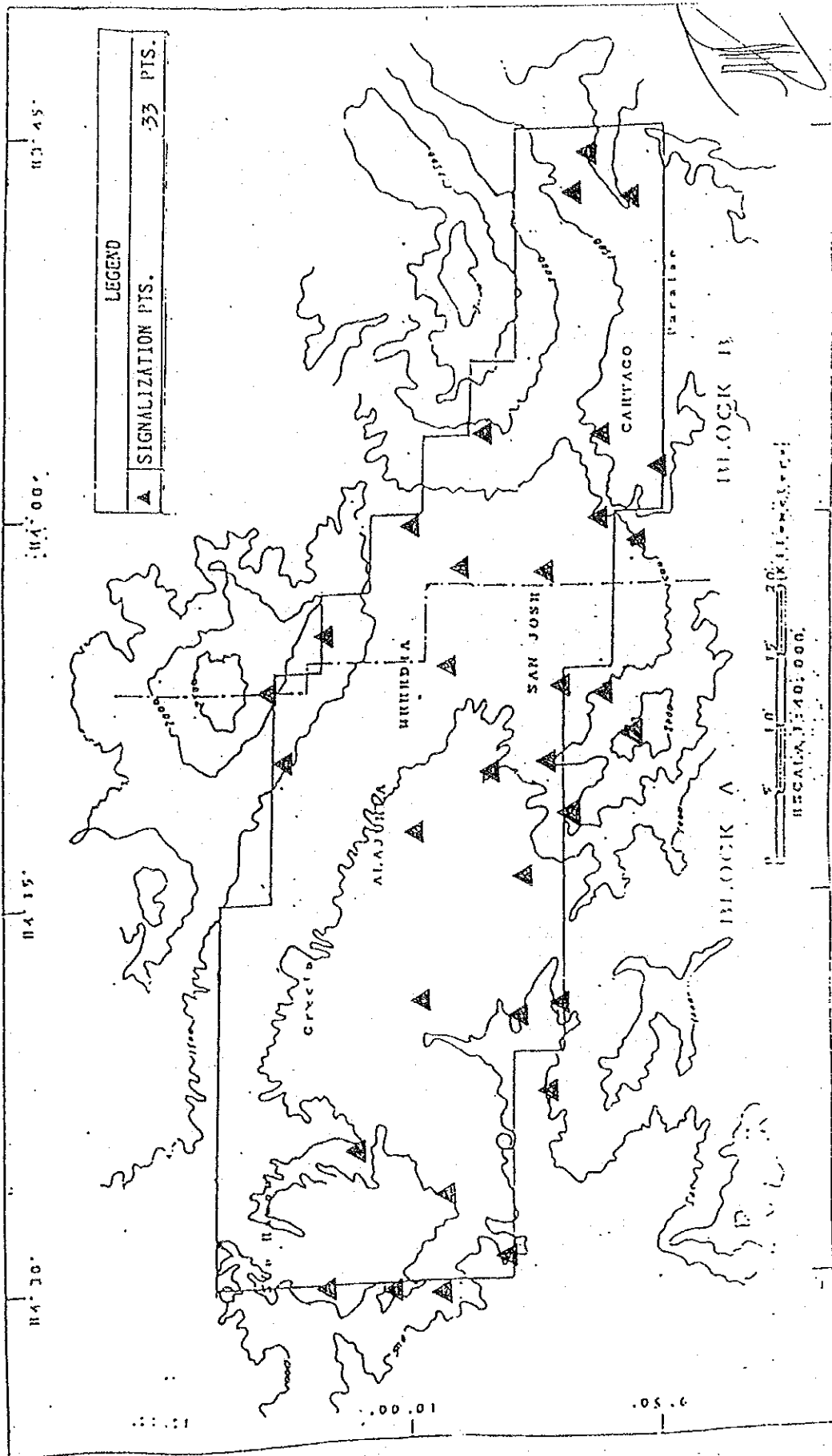
Aerial signalization were done for <sup>33</sup>~~200~~ points in the planned area by IGN.  
(see ANNEX 2)

INDEX MAP FOR RESULT OF PHOTOGRAPHY

REFLIGHT XXXXXXXXXXXX



INDEX MAP FOR AERIAL SIGNALS

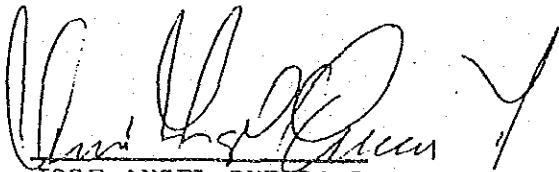


3. 撮影契約書

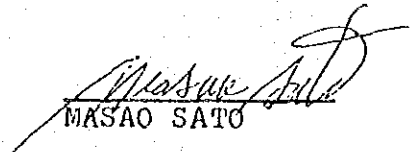
CONTRACT AGREEMENT

RE: CONTRACT FOR AERIAL PHOTOGRAPHIC FLIGHT OF TOPOGRAPHIC  
MAPPING PROJECT OF SAN JOSE METROPOLITAN AREA

SAN JOSE, COSTA RICA MARCH 14 TH, 1989



JOSE ANGEL GUERRA L.  
GERENTE  
TAXI AEREO CENTROAMERICANO, S.A.  
(SERVICIO NACIONAL DE  
HELICOPTEROS LTDA).



MASAO SATO  
DEPUTY LEADER  
JICA STUDY TEAM

CONTRACT FOR AERIAL PHOTOGRAPHIC FLIGHT  
OF  
TOPOGRAPHIC MAPPING PROJECT  
OF  
SAN JOSE METROPOLITAN AREA

This contract is made and entered upon on this 14th day of the month of March of the year 1989, between INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION (JAPAN), a corporate judicial person - established in accordance with the laws of Japan with its principal office at No. 3-23, Kojimachi 5-Chome, Chiyoda-Ku, Tokyo, Japan - (hereinafter referred to as "IECA"), as the representative of the consortium for the topographic mapping project of the San Jose Metropolitan Area (hereinafter referred to as "PROJECT"); and TAXI AEREO CENTROAMERICANO S.A., COMPANY established in accordance with the laws of Costa Rica with its principal office at P.O.BOX 3941 - 1000, San José, Costa Rica (hereinafter referred to as "TACSA").

IECA and TACSA are sometimes referred to together herein as the PARTIES.

WHEREAS; JAPAN INTERNATIONAL COOPERATION AGENCY (hereinafter referred to as "JICA") and NATIONAL GEOGRAPHICAL INSTITUTE MINISTRY OF PUBLIC WORKS AND TRANSPORTS ( hereinafter referred to as "IGN") of the Republic of Costa Rica have agreed upon to perform the - aerial photography of an area of approximately 1600 sq Km. over - San Jose Metropolitan Area of the Republic of Costa Rica, as a part of PROJECT in accordance with the scope of work signed on 20 th October, 1988, and WHEREAS, JICA entrusted the work to the consortium of IECA and ASIA AIR SURVEY CO.,LTD., for the project (hereinafter referred to as "CONSORTIUM") with IECA acting as the representative / and WHEREAS ...



CONSORTIUM desires to subcontract the operation of air craft for the aerial photography (hereinafter referred to as "WORK") to TACSA whereas, TACSA is willing to do the work.

Now, therefore, the PARTIES hereby agree as follows:

ARTICLE 1: WORK

TACSA shall perform the taking of aerial photographs of 1:20,000 scale. The area to be covered is 1.600 Km<sup>2</sup>, and the flight plan is shown in Exhibit A of Appendix 1 & 2 of the specifications A.

ARTICLE 2: SPECIFICATIONS

WORK shall be performed in accordance with the attached Specifications, Exhibit A, which is considered to be an integral part of this contract.

ARTICLE 3: PREPARATION FOR THE WORK

TACSA shall provide all the necessary skilled and well-trained personnel and material for the work. CONSORTIUM will be responsible for supplying TACSA with the flight plan prepared on an available map at the scale of 1:200,000 on which the area to be covered and the planned flight courses are shown in Appendix 1.

ARTICLE 4: COMMENCEMENT OF THE WORK

TACSA shall make the aircraft, crew and necessary equipment ready for flights at the Pavas Airport (or at another suitable airport), unless hindered by a force majeure, after the receipt of the instructions for commencement from the CONSORTIUM and shall commence the work as soon as possible.

ARTICLE 5: WORK PERIOD

TACSA shall complete all of the aerial photography work within 43 days after the receipt of the instructions from CONSORTIUM for the commencement of the work.

ARTICLE 6: REPRESENTATIVE OF CONSORTIUM ON SITE

CONSORTIUM will send its personnel to Costa Rica as its representative during the period of the aerial photography contract in order to coordinate the aerial photography work. The representative will have the following rights and obligations:

- 1.- Instruction for the flights
- 2.- Inspection of the progress and the final results of the aerial photography
- 3.- Instruction for the re-flight when the results do not meet the Specifications.

ARTICLE 7: INSPECTION OF RESULTS

When each roll of film is photographed and photoprocessing by IGN is completed, TACSA shall immediately give a notice of completion and one (1) set of check prints and preliminary flight index to CONSORTIUM'S representative in Costa Rica for his or her inspection and approval. If and when such results are not accepted by CONSORTIUM'S representative because of nonconformity with the Specifications, TACSA shall perform re-flights and submit the results to CONSORTIUM for its approval.

ARTICLE 8: REPORTING

TACSA shall submit a written weekly report of the work as well as flight records in English to CONSORTIUM (or CONSORTIUM'S representative). The flight record form (Shown in Appendix 3) shall be provided by CONSORTIUM.

ARTICLE 9: LIABILITY

CONSORTIUM shall be exempted from or kept harmless against any claim, damage, loss and/or accident incurred on or arisen on third parties in connection with any activity of TACSA during the period of the Work.

ARTICLE 10. INSURANCE

TACSA shall be held liable for injuries to third parties resulting from TACSA's negligence. TACSA shall be responsible for holding negotiations with injured parties and implementing all necessary steps which ensure the settlement of the matter.

ARTICLE 11. CONTRACT PRICE

The contract is "Standby" basis contract and the unit prices are as follows:

- 1.- Aerial photography charge: US\$ per hour
- 2.- Standby charge : US\$ per day

ARTICLE 12: OTHER COSTS

Landing, parking, fuel, and any other fees concerning the work, shall be borne by TACSA.

ARTICLE 13: PAYMENT CONDITIONS

Payment shall be made as follows:

TACSA shall report the job done including the flight record and the standby charges to CONSORTIUM'S representatives. After finishing

the check of the report , CONSORTIUM'S representative will issue the letter of approval every (14) days. After receiving the letter of approval, TACSA can issue a bill to CONSORTIUM'S representative. The payment will be made to TACSA's designated bank by TT remittance. The payment rates are as r stipulated in Article 11.

ARTICLE 14: FORCE MAJEURE

- A) Any failure of TACSA to carry out any of its obligations under this contract shall not be deemed a breach of the contract, if such failure is caused by a force majeure or reasons beyond TACSA'S reasonable control. For the purpose of this contract, force majeure shall include wars, insurrections, civil disturbances, blockages, embargos, strikes, other labour conflicts, riots, earthquakes, epidemics, storms, floods, explosions, fire, lightning, order or directions of any goverment or instrumentality or sub-division thereof, acts of God or the public enemy, and any other cause (whether or not the kind hereinabove described) over which TACSA has no reasonable control and which is of such a nature as to make timely compliance with its obligations under this contract impossible.
- B) In this event, TACSA shall notify CONSORTIUM thereof in writing, stating the cause, and TACSA and CONSORTIUM shall do everthing, reasonably within their power, to remove such cause, provided - however that neither party shall be obligated to resolve or terminate any disagreement with third parties, including labour disputes, except under conditions acceptable to it or pursuant to - the final decision of any arbitral, judicial or statutory agency having jurisdiction to finally resolve the disagreement.
- C) If TACSA is by force majeure rendered unable, wholly or in part,

to perform its obligations and to meet its responsibilities under this contract, then TACSA shall be suspended to the extent of its inability to perform the obligations as long as such inability continues.

ARTICLE 15: RESPONSABILITY

The captain of a TACSA aircraft for taking aerial photographs shall have the final responsibility for the safety of the aircraft and its crew. He is also responsible for making the flight for taking aerial photographs while observing all of the regulations related to the operation of the aircraft.

ARTICLE 16: PROPERTY

All the materials, survey results and information that will be obtained by and furnished to TACSA under this contract shall remain the property of CONSORTIUM and will be transferred to the Costa Rican Government by JICA and TACSA shall not disclose them to others in whole or in part for any purpose.

ARTICLE 17: REPLACEMENT OF CREW AND MATERIAL

TACSA Shall provide replacement for its aircraft, or any other pieces of equipment, when such equipment is rendered unusable for any reason. TACSA shall also provide replacement for the flight crew (pilot), if for any reason, they are not able to carry out their assigned work. Costs for such replacement shall be borne by TACSA.

ARTICLE 18: ASSIGNMENT AND/OR SUBCONTRACT

Without written consent of CONSORTIUM, TACSA shall not assign part -

or all of this contract to a third party or subcontract any portion of the work.

ARTICLE 19: TERMINATION OF CONTRACT

CONSORTIUM has the right to terminate this contract without making any payment in the following cases:

- A) Except as provided in Article 14, Force Majeure, if TACSA does not mobilize the aircraft after the instruction by CONSORTIUM or fails to commence, the WORK for a certain period without justified reasons.
- B) Except as provided in Article 14, FORCE MAJEURE, if TACSA suspends the work for more than one week or if it is judged by the CONSORTIUM that a suspension of the work by TACSA, will cause serious problems for the smooth implementation of the aerial photography work, regardless the length of such suspension.
- C) If the Work is not fully performed by TACSA in accordance with this contract and specifications and no rectification is done without justified reason.

CONSORTIUM may terminate this contract when they judge it necessary, by giving TACSA a written notice that will be delivered at least five (5) days before the date of termination

ARTICLE 20: ARBITRATION

All disputes arising in connection with this contract shall be finally decided under the Rules of Conciliation and Arbitration of



the International Chamber of Commerce by one or more arbitrators appointed in accordance with the rules.

ARTICLE 21: CHANGES IN THE WORK PROGRAM

CONSORTIUM has the right to change the contents of the WORK at any time, if necessary, subject to agreement with TACSA.

ARTICLE 22: EFFECTIVE DATE OF THIS CONTRACT

This contract shall become effective on the date when the contract is duly executed and signed by both PARTIES.

ARTICLE 23: FAIRNESS, DOUBT, OR ITEMS NOT SPECIFIED

In entering into this contract, the PARTIES recognize that it is impractical to make provision for every contingency that may arise in the course of the WORK. Accordingly, the PARTIES hereby confirm it to be their intention that this contract shall operate between them with fairness. Any doubt in connection with this contract, or any item not specified in this contract, shall be determined amicably by mutual agreement of the PARTIES.

IN WITNESS THEREOF, the PARTIES have executed this contract by their duly authorized representatives as of the date first written above.

INTERNATIONAL ENGINEERING  
CONSULTANTS ASSOCIATION  
(IECA)

TAXI AEREO CENTROAMERICANO, S.A.  
VUELOS NACIONALES INTERNACIONALES  
AEROPUERTO INTERNACIONAL  
TOBIAS BOLAÑOS

INTERNATIONAL ENGINEERING  
CONSULTANTS ASSOCIATION  
NEW KOJIMACHI BLDGS, No. 3-23  
KOJIMACHI 5-CHOME,  
CHIYODA-KU, TOKYO,  
JAPAN

TAXI AEREO CENTROAMERICANO, S.A.  
APARTADO No. 3941  
SAN JOSE, COSTA RICA.

*M/A*





1) AIRCRAFT

The survey aircraft to be used in the performance of the contract work should be equipped with all the essential navigational and photographic instruments. It must have the requisite photographic cruising speed and operating range, a high rate of climb, good stability while in flight, good field of view for visual navigation, and a service ceiling at full load equal to or higher than the highest altitude required for the project. The design of the aircraft shall be such that there should be an unobstructed field of view for the total image area of the camera, shielded from exhaust gasses, oil, and turbulence of airflow caused by propellers.

2) AERIAL CAMERA

The aerial camera to be used shall be RMK-A 15/23, which belongs to IGN.

3) FLIGHT PLAN

The flight plan is as presented in Appendix 1 and 2 of this specification. The flight plan in Appendix 1 was prepared at a scale of 1:200,000. A 1:50,000-scale flight plan will be prepared by CONSORTIUM after the contract with TACSA is made. If necessary the flight plan can be modified under the supervision of CONSORTIUM.

4) PHOTO SCALE AND ALTITUDE

Scale for the aerial photography shall be 1:20,000. The area of the aerial photography is divided into two blocks, Block A, and Block B. The flying altitude for Block A is approximately 4,000 m. The flying altitude for Block B is approximately 4,500 meter and the datum is 1,500 meter.

5) STEREOSCOPIIC COVERAGE

Aerial photography shall be undertaken so as to provide complete stereographic coverage of the area specified in Article 2. Above.

6) OVERLAP

The area shall be covered with straight strips of photograms. Standard forward overlap of photographs shall be 60% and the standard lateral overlap shall be 30%. The lateral overlap shall not be less than 10% on the area to be mapped. In the event of considerable variations in datum (reference level), a reasonable increase in the specified overlap shall be accepted.

7) CRAB, TIP, AND TILT

Crab shall not exceed 10 degrees. Tip and tilt shall not exceed 5 degrees.

8) FIRST AND LAST EXPOSURE OF A STRIP

The center of the first and the last photograph of a flight course shall fall outside the boundary of aerial photography.

9) BREAKS IN STRIPS

Where breaks in a flight strip are necessary, there shall be an overlap of at least two stereoscopic models. Any segment of a flight strip resulting from necessary breaks shall consist of more than eight (8) exposures.

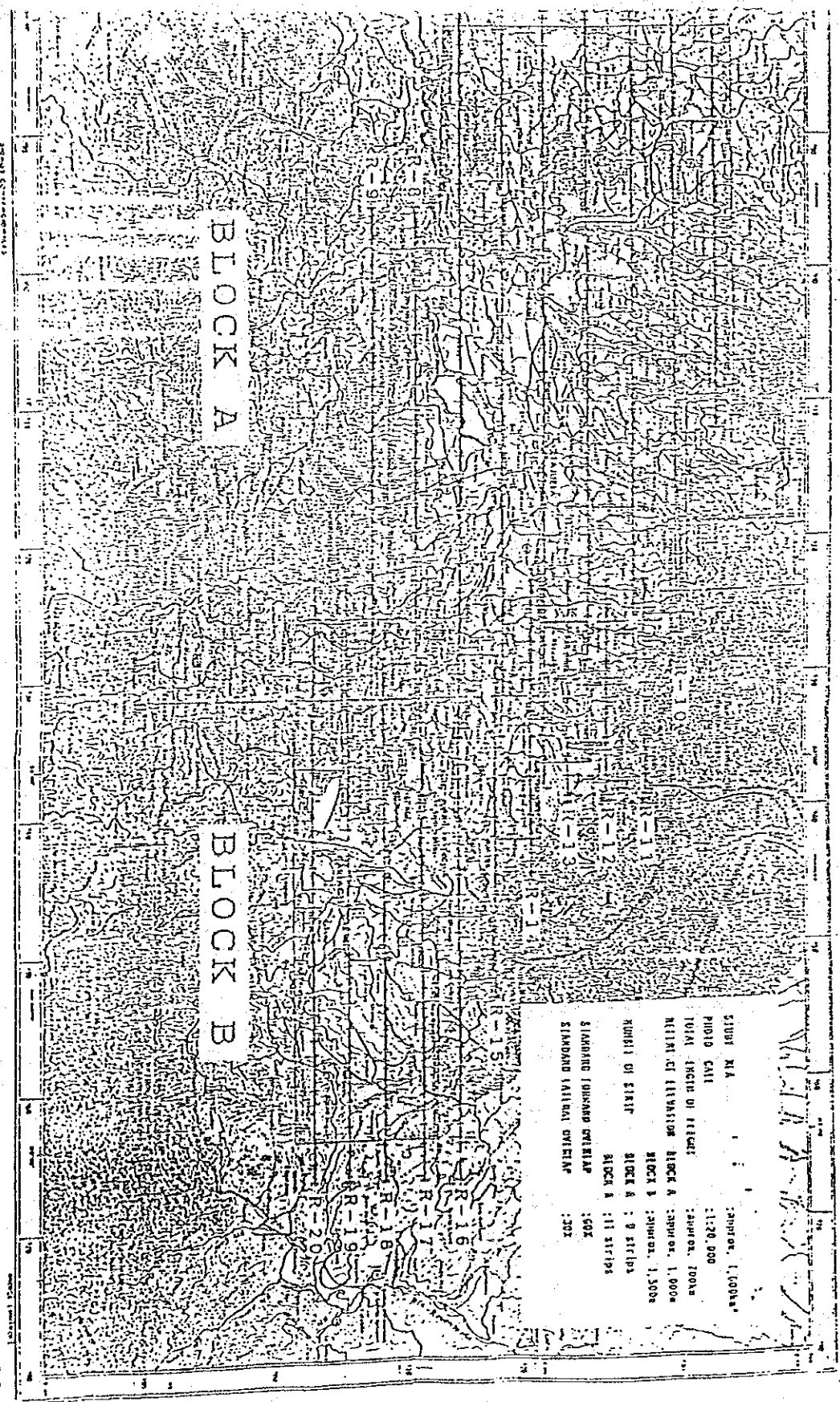
10) CLOUD COVERAGE

Reasonable effort shall be made to obtain cloud free photography free of clouds, cloud shadows, and smoke as much as possible. Photography shall not be attempted when smoke, haze, or any other conditions would impair the quality of the photographic image. When water surface is extensive in the area to be photographed, the solar altitude shall be such that sun's reflection does not appear in the photographic image.

*M/S*

*[Signature]*

FLIGHT PLAN [5] GRAN AREA METROPOLITANA [6]



STUDI M.A. : 1 : 5000  
 PROJEKSI : UTM  
 TOTAL AREA DI STUDI : 1.20.000  
 NETTO DI ELEVATION : 1.000m  
 BLOK A : 1.000m  
 BLOK B : 1.500m  
 KURSI DI SIRI : 11 SIRI  
 BLOK A : 11 SIRI  
 BLOK B : 11 SIRI  
 STANDARISASI : 100

SKALA : 1 : 5000  
 PROJEKSI : UTM  
 DATUM : 1974  
 ZONA : 48N  
 GARIS MERIDIENAL : 105° 30' 00" B  
 GARIS PARALEL : 6° 15' 00" S



GRAN AREA METROPOLITANA, COSIX RIR A

FLIGHT PLAN 1:20,000

F = 15.0 cm

Run No.	Distance of Each Run (km)	Number of Exposure	Flight Height (m) a.m.s.l.	Reference Elevation (m) a.m.s.l.
R 1	30.8	18	↑	↑
R 2	47.6	27		
R 3	47.6	27		
R 4	47.6	27		
R 5	53.2	28	4.000	1.000
R 6	53.2	28		
R 7	53.2	28		
R 8	39.0	22		
R 9	39.0	22	↓	↓
R10	12.4	9	↑	↑
R11	16.2	12		
R12	16.2	12		
R13	16.2	12		
R14	22.0	16		
R15	25.0	18	4.500	1.500
R16	38.2	27		
R17	38.2	27		
R18	38.2	27		
R19	44.0	25		
R20	34.0	19	↓	↓
Total	711.2	431		

METEOROLOGICAL AND FLIGHT RECORD

NAME OF PROJECT:  
 NAME OF AIRCRAFT:  
 AIRCRAFT ID. NO.:

PILOT:  
 SECONDARY:  
 NAVIGATOR:  
 CARLINA OP.:

DATE	WEATHER	METEOROLOGICAL RECORD			FLIGHT RECORD	FLIGHT TIME	WORKING DESCRIPTION OR SUPPLEMENTARY NOTE
		WIND DIR.	WIND FORCE	CLOUDINESS			
1987							
7/1988							
7/1988							
7/1988							
7/1988							
1986							

SIGNATURE

*MSA*

*[Handwritten mark]*

SPECIFICATIONS B

/APPENDIX 4/

SPECIFICATIONS FOR  
AERIAL PHOTOGRAPHY FOR THE TOPOGRAPHIC MAPPING  
OF  
SAN JOSE METROPOLITAN AREA  
IN  
THE REPUBLIC OF COSTA RICA

1) GENERAL

Aerial photography shall be carried out by IGN under the supervision of the CONSORTIUM according to the technical specifications stipulated below. Aircraft operation for this work will be subcontracted out to TACSA.

2) AREA

Aerial photography shall cover the area shown in Appendix 1. The area is divided into two adjacent blocks and their total coverage is approximately 1,600 sq.Km.

3) PERSONNEL AND EQUIPMENT

3.1 Aircrew

- (1) The aircrew consists of a pilot, a navigator and a camera operator.
- (2) The pilot shall be a member of TACSA. The navigator and the camera operator shall be members of IGN.

3.2 Aircraft

The survey aircraft to be used in the performance of the contract work should be equipped with all the essential navigational and photographic instruments. It must have the requisite photographic cruising speed and operating range, a high rate of climb, good stability while in flight, good field of view for visual navigation and a service ceiling at full load equal to or higher than the highest altitude required for the project. The design of the aircraft shall be such that there should be an unobstructed field of view for the total image area of the camera, shielded from exhaust gasses, oil and turbulence of airflow caused by propellers.

### 3.3 Aerial Camera

- (1) The camera to be used shall be RMK-A 15-23 which belongs to IGN. The camera shall be of high metric quality and comply with the following conditions:
  - a) It shall record on each exposure, the instrument panel of the camera which includes an exposure counter, serial number of the camera, and a clock set to local time.
  - b) The fiducial marks of the camera shall produce sharply defined registration of each mark on each negative film.
- (2) A valid calibration certificate of the camera shall be submitted to the CONSORTIUM. The certificate shall be considered as valid for a period of three years from the date of calibration. A calibration certificate should include:
  - a) The manufacturer's serial number of the camera and the serial number of the lens.



- b) The radial distortions of the image, with reference to the principal point as origin.
- c) The calibrated focal length at which these distortions apply.
- d) The name of the organization which calibrated the camera and the date of calibration.

3) FILTERS

Only optical filters provided by the lens manufacturer or those which comply with the same optical specifications shall be used.

3.4 Photo Processing

- (1) Photo laboratory of IGN shall be used for photo processing.
- (2) All the exposed films shall be processed by IGN personnel.

4) RE-FLIGHT

Re-flight shall be required if any photograph exposed does not comply with any part of the specifications or with any other written instruction of the CONSORTIUM.

5) FLIGHT PLAN

The flight plan has been prepared on a topographic map of the area at the scale of 1:200,00 and is attached as Appendix 1.

The flight plan shows the lines to be flown and the required coverage beyond the boundaries of the area to be mapped. A 1:50,000-scale flight plan will be prepared by CONSORTIUM after the contract with TACSA is made. If necessary the flight plan can be modified under the supervision of CONSORTIUM.

6) PHOTO SCALE AND ALTITUDE

The aerial photography shall be taken at average scale of 1:20,000 for the whole area consisting of Block A and Block B. Flying altitude for each lines are shown on the

list of flight lines in Appendix 2. The flying altitude for Block A is approximately 4,000 m above mean sea level while its datum is 1,000 m. The flying altitude for Block B is approximately 4,500 m above mean sea level while its datum is 1,500 m.

7) AERIAL FILM

The type of aerial film to be used shall be KODAK PLUS-X Aerographic Film 2402 to be supplied by the CONSORTIUM.

8) FLYING REQUIREMENTS

- (1) The photography should be carried out so as to provide complete stereoscopic coverage of the mapping area.
- (2) The area should be covered with straight strips of photographs of which standard forward overlap shall be 60%.
- (3) Standard lateral overlap shall be 30%. The lateral overlap should not be less than 10 percent on the area to be mapped. In the event of considerable variations in reference level, a reasonable increase in the overlaps shall be accepted.
- (4) Crab should not exceed 10 degrees.
- (5) Tip and tilt should not exceed 5 degrees.
- (6) The center of the first and the last photograph of a flight course should fall outside the boundary of aerial photography.
- (7) Where breaks in a flight strip are necessary each segment shall be overlapped with neighbouring segment on the same strip for at least two stereoscopic models. Any segment of a flight strip made by breaks should consist of more than eight (8) exposures.
- (8) Reasonable effort should be made to obtain cloud free photographs. Maximum five percent of cloud coverage in single, photograph may be considered as tolerable. In no case, however, should clouds fall in control points and principal points.

9) CONDITIONS OF PHOTOGRAPHIC FLYING

Photography shall be free of all cloud, cloud's shadow and smoke. Photography shall not be attempted when smoke, haze or any other condition would impair the quality of the photographic image. When water surfaces are extensive in the area being photographed the solar altitude should be such that the sun's reflection does not appear in the photographs.

10) NEGATIVE EXPOSURE

- (1) With due consideration of available shutter speeds and lighting conditions, all exposures shall be made with a lens aperture requiring an exposure time which produces minimal-image movement. In no case should image movement exceed 20 microns measured on negative film.
- (2) The exposure shall produce negatives which results in most of the image being on the approximately straight portion of the characteristic curve of the emulsion.
- (3) On each roll of film at least 1.5 meter before the first and after the last exposure shall not be used.
- (4) Exposure of photography should be adjusted so that clear image can be obtained even in shadow areas caused by topographic relief.

11) REPORTING

Details of aerial photography shall be reported to the CONSORTIUM in the forms of the following two types of records.

- (1) Meteorology and flight record.

To be used to record meteorology and flight conditions of each day.

- (2) Aerial Photography log

To be used to record data concerning aerial photography (as for the sample please refer to Appendix A)

12) SUPPLY AND MATERIAL

CONSORTIUM shall supply photographic materials and processing chemicals required for the WORK. All material supplied become the property of IGN.

13) FILM PROCESSING

All exposed film shall be processed as soon as possible after exposure at the laboratory of IGN. Special care shall be taken to ensure proper development, fixing and washing of film during the processing procedures.

Processing method shall be rewind spool system and the following chemical are used:

-Developer : KODAK DK-50  
-FIXER : KODAK rapid fixer or equivalent.

All negative film shall be free from light streaks, static marks, scratches, stains and the blemishes which might interfere with their intended use. Drying of the film shall be carried out without affecting its dimensional stability.

14) INITIAL PRINTS

In order to make preliminary inspection of the results, all the negatives of developed film immediately shall be made a complete set of paper prints.

15) INSPECTION OF PHOTOGRAPHS

Inspection shall be carried out in three stages as follows:

(1) Initial prints shall be inspected to check to see if they comply with the following three items of specifications.

- Forward overlap
- Side overlap
- Camera tilt

For the record of the inspection "Preliminary Quality Check Sheet" in Appendix B shall be used.

(2) Each film shall be checked for its photographic image quality. "Quality check of Aerial Photograph" (Appendix C) will be used to record the inspection results. Items to be inspected are-

follows:

- Date of processing
- Method of development
- Developer used and dilution
- Time and temperature of development
- Length of film processed
- Manufacturer of film
- Type of film
- Emulsion number
- General check of quality
- Other items

- (3) Each photograph shall be checked according to the article of specifications. For the record of the inspection - "Check list of aerial photograph sheet" in Appendix D shall be used.

Re-Flight is required if any of the inspected photograph does not comply with any part of the specifications or with any other written instructions of the CONSORTIUM.

16) FILM ANNOTATION

Each roll of ilm shall be identified by a film number. Both ends of a roll of film shall not be exposed and shall be used as leaders and spaces for film annotation. Contents of the annotation will be as follows:

- Name of project
- Name of area
- Film No.
- Data of photography
- Flying height
- Camera/lens

- Scale
- Run No./Compiled No.

17) NEGATIVE ANNOTATIONS

Data and information about the photography will be annotated in the marginal area of accepted negative film sheets. Data and information to be annotated are as follows:

- Name of Project
- Scale of photography
- Date of photography

A modification of negative annotations shall be made under the supervision of the CONSORTIUM.

18) PAPER PRINT

One set of contact prints of annotated and approved negative film shall be made. Special care shall be exercised to ensure the proper development and the thorough fixing of contact prints. Prints shall be uniformed in density. Further, all prints shall be clean and free from stains, blemishes, uneven spots, light fog, and finger prints and shall be thoroughly washed to completely eliminate the hypo or any other chemicals which impair their permanency.

19) FLIGHT INDEX

A photo coverage index of the project should be prepared using 1:200, 000 scale reproducible flight plan sheet to check overlaps and placement of flight strips against the approved flight plan.

AERIAL PHOTOGRAPHY LOG

NAME OF PROJECT:									
DATE OF PHOTOGRAPHY:					AIRCRAFT ID NO.:				
DEPARTURE TIME		h. m. TEK.		° QNH:		PILOT:			
ARRIVAL TIME		h. m. TEK.		° QNH:		NAVIGATOR:			
OUTSIDE AIR TEMP.				ft		°		CAMERA OP.:	
PLANNING FLYING HEIGHT:					ft		AVERAGE PHOTO SCALE:		
INDICATED FLYING HEIGHT:					ft		TYPE OF PHOTOGRAPHY:		
CAMERA					FILM				
CAMERA TYPE :			SERIAL NO. :			TYPE :			
CALIBRATED F. L. :			SERIAL NO. :			EMULSION NO. :		EXPIRY DATE :	
SUN NO.	FLT. DIR.	DRIFT ANGLE	TIME START   FINISH		FILTER TYPE	SHUTTER SPEED	APER- TURE	COUNTER NO. START   FINISH	REMARKS

FILM NO.	RUN NO.	MAGAZINE NO.

ROUGH SKETCH

METEOROLOGY CONDITION

CLOUD: \_\_\_\_\_

VISIBILITY: \_\_\_\_\_

TURBULENCE: \_\_\_\_\_

*M/S*

*[Handwritten signature]*

PRELIMINARY QUALITY CHECK

Date Flown :			Photo Scale (Approx.):	
Camera :		Focal Length:		File No.:
Run No.	Photo Number From-To	Number of Photographs	Result of Check	Remarks
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	
			OK	
			NG	

*M.S.*



## QUALITY CHECK OF AERIAL PHOTOGRAPH

Project Name:				Area Name:			
Date of Photography				Film Number:			
Aerial Camera				Film			
Camera	Type:			Manufacturer:			
	Serial No.:			Type:			
Lens	Type:			Emulsion Number:			
	Serial No.:			Length:		in	
	Focal Length:			Processing			
Filter	Type: <span style="float: right;">F18</span>			Date:			
	Serial No.:			Method of Development:			
Serial No. of Magazine				Equipment:			
Exposure				Developer:			
Lens Aperture		f/		Temperature:		°C	
Shutter Speed:		1/ sec		Time:			
Run	Counter Number	Run	Counter Number	Run	Counter Number	Run	Counter Number
	~		~		~		~
	~		~		~		~
	~		~		~		~
	~		~		~		~
Development		Under	Normal	Over			
Exposure		Under	Normal	Over			
Gradient		Low	Normal	High			
Fiducial Marks							
Counter Number							
Clock							
Altimeter							
Vibration							
Dust							
Scratches							
Haze							
Smoke							
Clouds							
Cloud Shadows							
Leader							

*M.S.*







JICA