

ペル ー 国

フニン県サティポ地区地図作成事業

報 告 書

(第一年次作業)

空 中 写 真 撮 影

昭和 57 年 12 月

国 際 協 力 事 業 団

開 一

J R

82-154

国際協力事業団		
受入 月日	'84. 3. 30	709
		61
登録No.	02310	SDF

伝 達 状

昭和 5 7 年 1 2 月

国際協力事業団

総裁 有 田 圭 輔 殿

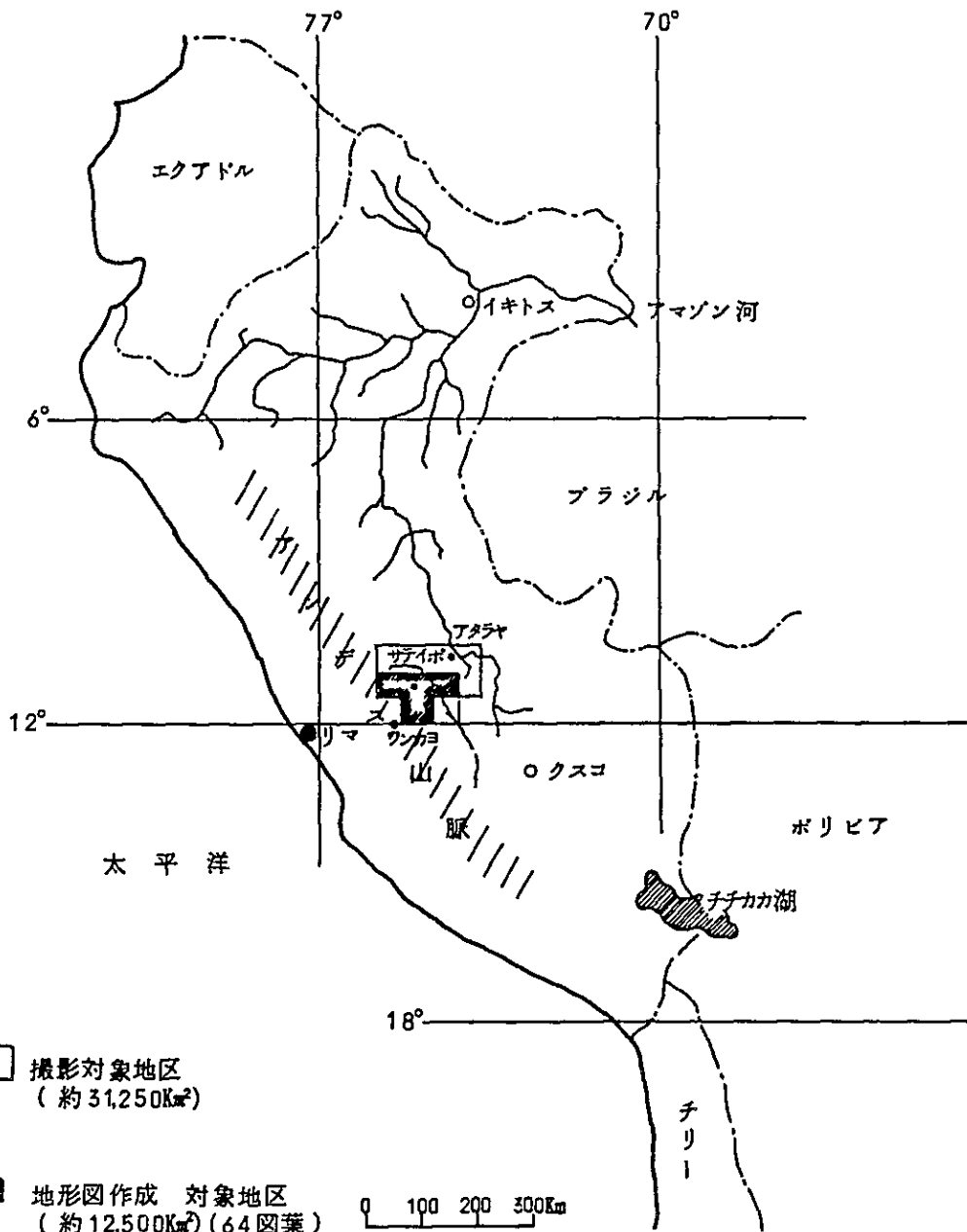
貴事業団との契約に基づき、昭和 5 7 年 6 月から 1 2 月まで実施しましたペルー国フニン県サティボ地区地図作成事業第 1 年次作業が終了しましたので、報告書を提出致します。

本報告書は、第 1 年次に実施された上記作業の内容を明らかにしたものであります。第 1 年次の作業結果は、後続作業の基礎としての役割りを果たすと同時に、現地作業の過程においてペルー国の測量技術の進展のために大きな寄与をなしたものと確信致します。

現地調査実施にあたり、御協力をいただいたペルー国関係省庁の職員並びに在ペルー日本大使館、国際協力事業団をはじめ日本政府関係官の方々に厚く御礼申上げるとともに、第 2 年次以降の調査が速やかに実施されることを祈ってやみません。

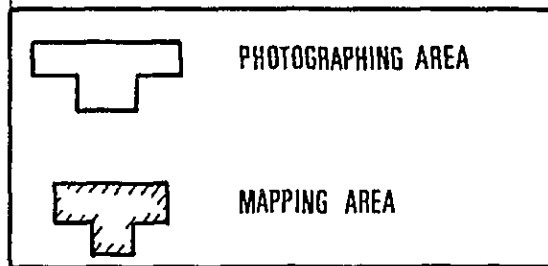
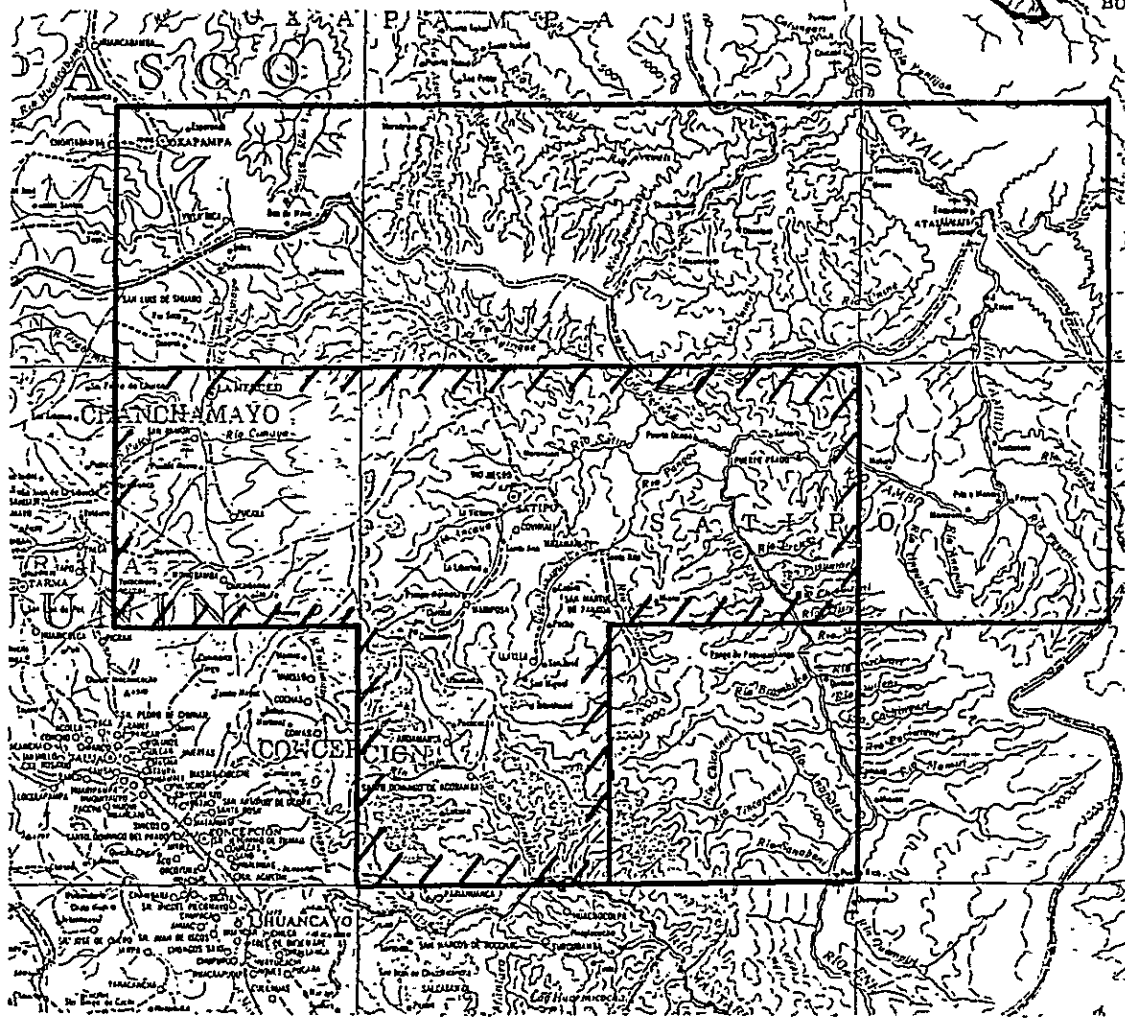
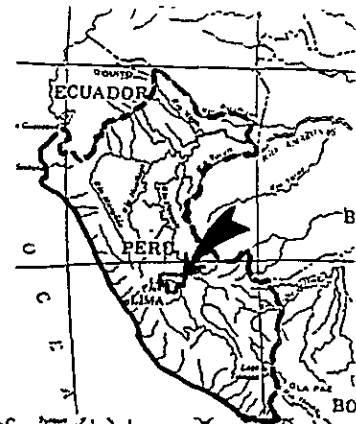
社団法人 国際建設技術協会
ペルー国フニン県サティボ地区地図作成事業
調査団長 高 崎 正 義

ペルー国フニン県サテイボ地区
 地図作成プロジェクト位置図



TOPOGRAPHIC MAPPING PROJECT OF SATIPO AREA

LOCATION MAP





ペルー国土地理院 (IGN) における会議



ペルー撮影公社 (SAN) における契約書の調印



アンデス山地
(測地西部)

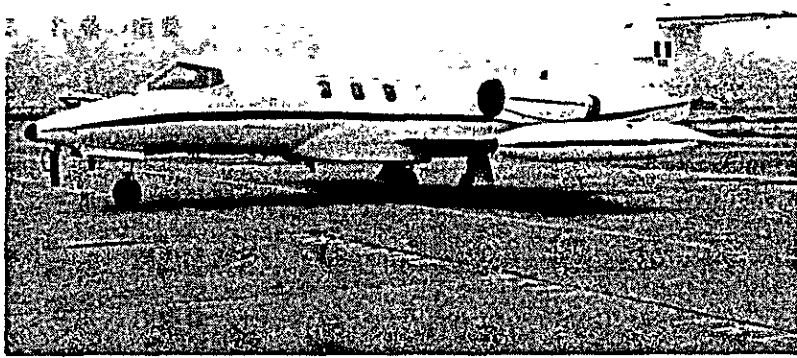


アンデス山ろく
(測地中央部)



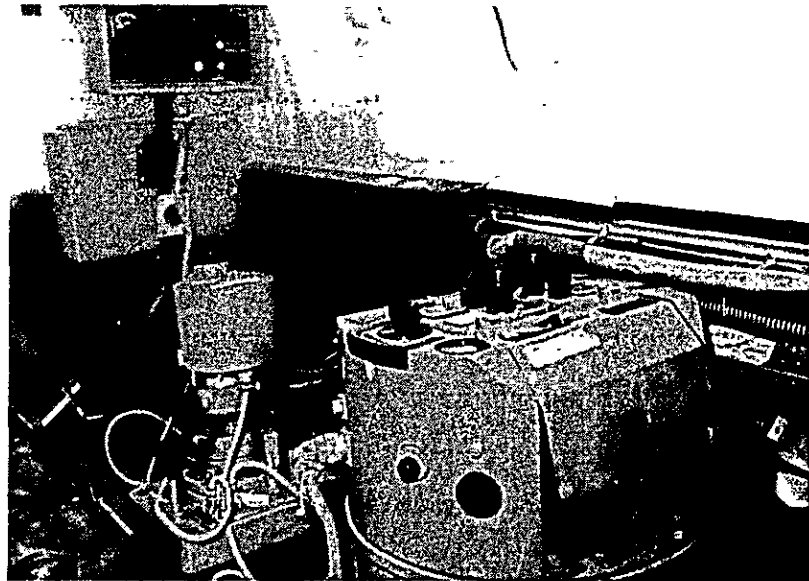
セルバ地帯
(測地東部)

100



ラス パルマス空軍基地
における撮影機

撮影用カメラ
RC-10



気象観測員の通報状況



目 次

1	作業の経緯	1
2	作業の概要	2
2-1	目的	2
2-2	作業地域	2
2-3	作業期間	2
2-4	調査団員	2
2-5	作業量	2
2-6	計画と実績	3
2-7	作業の主な経過	3
2-8	現地作業監理要員	3
3	現地作業	
3-1	空中写真撮影作業	5
3-1-1	撮影計画の概要	5
3-1-2	撮影作業に使用した資機材	5
3-1-3	撮影作業従事者の編成	5
3-1-4	気象観測員の編成	6
3-1-5	撮影作業全般の概要	6
3-1-6	撮影日報	8
3-1-7	作業期間中の天候	10
3-2	写真処理作業及び現地仮検査	11
3-2-1	写真処理作業に使用した資機材	11
3-2-2	写真処理作業及び仮検査従事者の編成	12
3-2-3	写真処理作業及び仮検査の概要	12
3-3	基準点調査	14
3-3-1	三角点調査	14
3-3-2	水準点調査	14
3-4	ペルー政府機関の協力	15

4	作業状況の視察と作業整理	16
5	I G Nとの協議事項	17
6	第2年次作業への所見	18
7	所 感	20

付 図

1.	撮影計画図	21
2.	撮影標定図	22
3.	撮影最適期間	23
4.	撮影最適時間帯	24

付 表

1.	精度管理表(英文)	25
----	-----------	----

参考資料

1. SCOPE OF WORK FOR TOPOGRAPHIC MAPPING PROJECT OF SATIPO AREA, DEPARTMENT OF JUNIN, THE REPUBLIC OF PERU
2. PROCEEDING OF THE MEETING. (JULY 19, 1982)
3. PROCEEDING OF THE MEETING (OCTOBER 4, 1982)
4. CONTRACT BETWEEN THE INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION AND THE SERVICIO AEROFOTOGRAFICO NACIONAL FOR THE AERIAL PHOTOGRAPHY OF THE SATIPO AREA DEPARTMENT OF JUNIN-PERU

1. 作業の経緯

昭和56年2月、ペルー国政府は、フニン県サティボ地区の地形図作成計画に関する技術協力(FUNIN)(SATIPO)要請を日本政府に対して行った。同地区は、未だ1/10万国土基本図が整備されておらず、エネ河の水力発電のためのダム建設、食糧基地としての灌漑施設の整備、道路の建設、石油鉱物等の地下資源や、木材等の資源開発等、同地帯の総合開発の計画策定に支障をきたしており、これらの前提となる地形図の作成が急がれていた。

日本政府は本要請に応じて、昭和57年1月コンタクトミッション、引き続き同年2月事前調査団を派遣し、ペルー国の測量機関であるINSTITUTO GEOGRAFICO NACIONAL(IGN)との協議を行うとともに、現地調査及び各種資料の収集を行い、サティボ地区の地図作成事業を、昭和54年8月20日調印された日本とペルー政府間の技術協力に関する基本協定に基づき、昭和57年度より開始することとした。

プロジェクトの概略は、以下のとおりである。

作業期間 昭和57年度よりおおむね4ケ年間

作業内容 空中写真撮影 縮尺1/60,000 面積 約31,250 km²

地形図図化 縮尺1/25,000 面積 約12,500 km²

本年度は、本プロジェクトの第1年次作業として、空中写真撮影及び写真処理作業を実施した。国際建設技術協会(IECA)は、指導監督に必要な技術者を全期間にわたって現地に派遣し、その指導監督のもとに、両作業をペルー国唯一の空中写真撮影機関であるSERVICIO AEROFOTOGRAFICO NACIONAL(SAN)に委託し実施させた。また国際建設技術協会は、空中写真撮影こそ当プロジェクトの“Key Factor”であるとの観点からSANの気象観測システムを補うため、前記の指導監督要員に加えて気象観測要員を派遣し、配置した。

2. 作業の概要

2-1 目的

ペルー国フニン県サティボ地区の $1/25,000$ 国土基本図作成に必要な空中写真(縮尺 $1/60,000$)の撮影及び写真処理を実施する。

2-2 作業地域

フニン県サティボ地区を主体とする低地森林地帯から山岳地帯にかかる面積約 $31,250\text{ km}^2$ の地域である。(附図1)

2-3 作業期間

自 昭和57年6月28日 ~ 至 昭和57年10月7日

2-4 調査団員

団 長(総 括)	高 崎 正 義 (タカサキ マサヨシ)	自昭和57年7月2日~至昭和57年7月22日 自昭和57年9月20日~至昭和57年10月7日
副団長(撮影監督)	荒 井 洸 (アライ キョウシ)	自昭和57年6月28日~至昭和57年10月7日
団 員(渉 外)	宮 下 寿 峰 (ミヤシタ トシミネ)	自昭和57年6月28日~至昭和57年7月26日
" (写真検査)	増 田 実 (マスタ ミノル)	自昭和57年6月28日~至昭和57年10月7日
" (気象観測)	河 野 信 一 (コウノ シンイチ)	自昭和57年7月5日~至昭和57年9月29日
" (")	清 水 祥 男 (シミズ ナカオ)	同 上
" (")	斉 藤 秀 作 (サイトウ シュウサク)	同 上

2-5 作業量

空中写真撮影	面 積 $31,250\text{ km}^2$	コース数 26コース
	コース総延長距離 $4,220\text{ km}$	

2-6 計画と実績

計 画	実 績	出来高
4,220 km	863 km	20.45 %

2-7 作業の主な経過

57年6月28日	荒井副団長、宮下団員、増田団員リマ到着
29日	撮影契約交渉開始
7月 2日	高崎団長リマ到着
5日	河野団員、清水団員、斉藤団員リマ到着
13日	高崎団長、SANとの撮影作業契約書に調印
15日	斉藤団員サンラモンで気象観測開始
17日	河野団員サティボで気象観測開始
19日	清水団員ウアンカヨで気象観測開始
#	高崎団長IGNとの議事録に調印
20日	高崎団長リマ発日本へ
#	河野団員マサマリに移動して気象観測開始
#	SAN撮影作業開始
25日	宮下団員リマ発日本へ
29日	清水団員オクサバンバに移動して気象観測開始
9月20日	高崎団長リマ到着
24日	河野団員、清水団員、斉藤団員現地よりリマに引きあげ
27日	河野団員、清水団員、斉藤団員リマ発日本へ
28日	SANから写真等の成果品納入
10月 4日	SANからの成果品を検査領収 高崎団長IGNとの議事録に調印
5日	高崎団長、荒井副団長、増田団員リマ発日本へ

2-8 現地作業監理要員

現地作業期間中の作業監理及び作業指導、現地視察、IGNとの本年度作業及び次年度作業に関する協議等のため、作業開始時及び終了時を中心に、現地作業監理要員がペルー（リマ及びサティボ地区）に滞在された。

作業監理要員 建設省国土地理院企画部測量指導課長 野々村 邦夫
(ノノムラ クニオ)

〃 国際協力事業団社会開発協力部参事 木村 博
(キムラ ヒロシ)

自昭和57年7月2日 ～ 至昭和57年7月22日

自昭和57年9月20日 ～ 至昭和57年10月7日

3-1-4 気象観測員の編成

河野 信一 (IECA)	観測地点	サティボ、マサマリ
清水 祥男 (#)	＃	ウアンカヨ、オクサパンバ
斉藤 秀作 (#)	＃	サンラモン

3-1-5 撮影作業全般の概要

(1) 撮影作業の契約

7月1日社国際建設技術協会は、SERVICIO AEROFOTOGRAFICO NACIONAL (SAN)と撮影交渉を開始した。この交渉の過程で、紛争解決手段に関する条項について、SANは「ペルー国憲法第136条の規定により、社国際建設技術協会は同国の法律及び裁判所に従うとともに、外交上の異議申し立ては一切行わない」という案を出してきた。日本側は当事業が昭和54年8月に調印された両国政府間の技術協力に関する基本協定に基づいて行われるもので、同協定では紛争は外交経路を通じて協議することになっていると主張したため、交渉が難航した。日本側は、SANに対しこの事業の性格の理解と国際協定の尊重を求めて交渉を続けた結果、SANはほぼ全面的に日本側の主張をとり入れ、7月13日円満に契約を結び、SANは直ちに撮影準備に入った。このような理由で、撮影作業の契約は、当初予定より1週間遅れた。

(2) 撮影基地

撮影地区内には、ジェット機が離着陸できる飛行場がないため、最も近いラス パルマ (AEROPUERTO DE LA BASE AEREA DE LAS PALMAS) 空軍基地を主基地とした。しかし、冬期のリマは霧の日が多く甚だしい場合は、離着陸ができないため、このような天候が予想されるときはブカルバ空港を使用することとした。(AEROPUERTO DE LA CIUDAD DE PUCALLPA)

(3) 気象観測員

撮影地区の天候を把握し、撮影の好機を逃さないようにするため、SANは7月20日気象観測員をサティボ、アタラヤ、サントドミンゴデアコバンバに配置した。観測員は7 (SATIPO) (ATALAYA) (SANTO DOMINGO DE ACOBAMBA) 時より1時間毎に気象情報を無電で通報してきた。アタラヤの気象観測員は同地点の周辺の撮影が終了したため、8月31日プエルトベルムデスに移動した。(PUERTO BERMUDES)

またSANの気象観測網を補うため、社国際建設技術協会の気象観測員3名をサンラモン、マサマリ、オクサパンバに配置した。現地は通信事情が悪いため、観測結果は日本から持参した無線機を使用してリマ本部に通報し、本部よりSANのRADIO OPERADOR DE

SERVICIOに連絡した。さらに毎日1回日付入りカメラで雲の状況を撮影、気象観測記録簿に貼付した。

(4) 撮影作業

撮影航法に使用できるサティボ地区の適切な地図がないため、撮影航法は米コリンズ社(COLLINS)製慣性航法装置INS-61-Bを使用し、撮影開始点と終了点の座標をINS-61-Bにインプットして、撮影飛行を行った。

慣性航法装置の調整は出発する空港で行うが、誤差は時間とともに増加するため撮影地区上空でも点検した。撮影計画に用いた地図の精度があまり良くないこともあって航跡のずれが大きく、再撮影の主な原因の一つとなった。

撮影カメラの露出はPEM自動露出計を使用した

撮影高度が12,120 mと高く、また撮影基地の空港から撮影地区(平均距離、300 km)に到達するのに平均40分を要し、撮影機の航続時間は3時間20分程度のため、実際の撮影時間は、2時間弱程度しかとれなかった。

撮影作業日数及び飛行回数は次の通りであった。

撮影作業日数	75日		
撮影飛行回数	15回	総飛行時間	28時間55分
(内訳)			
撮影	5回	飛行時間	10時間59分
引返し	8回	"	14時間51分
基地移動	2回	"	3時間5分

3-1-6 撮影日報

日順	月 日	作業状況	飛行状況	備 考
1	7. 16	準備作業		
2	17	"		
3	18	"		
4	19	"		
5	20	撮影作業	10:02~11:42 1時間40分	L-24、35枚撮影
6	21	"	10:25~12:00 1時間35分	L-24、26 38枚撮影
7	22	待 機		晴 積雲多し 雲量5~3
8	23	"		曇一時霧雨
9	24	"		曇
10	25	"		曇
11	26	"		曇一時晴
12	27	"		曇
13	28	"		曇一部霧雨
14	29	"		曇
15	30	"		曇一部雨
16	31	"		晴一部雨
17	8. 1	"		晴 積雲多し雲量7~4
18	2	"		曇
19	3	"		雨
20	4	"		雨
21	5	"		曇一部雨
22	6	"		晴 積雲3~7
23	7	"		晴 " 3~7
24	8	"		雨
25	9	"		雨
26	10	"		雨
27	11	"		曇
28	12	引 返 し	11:40~14:00 2時間20分	晴 積雲2~6撮影不能
29	13	"	10:25~11:50 1時間25分	晴 " 5~3 "
30	14	撮影作業	07:55~11:03 3時間08分 12:25~13:55 1時間30分	L-1,2,3,4,5,6 100枚撮影
31	15	待 機		曇後晴
32	16	"		曇一部雨
33	17	"		雨後曇
34	18	"		晴 積雲多し雲量3~7
35	19	"		曇後晴
36	20	"		曇後晴
37	21	基地移動	08:30~10:25 1時間55分	ラスパルマス空軍基地→ブカルバ空港

日順	月 日	作業状況	飛行状況	備 考
38	8. 22	待 機		曇一時雨
39	23	引 返 し	07:30~10:00 2時間30分	積雲散在 撮影不能
40	24	"	08:35~10:00 1時間25分	" "
41	25	待 機		曇
42	26	"		曇
43	27	"		曇後晴
44	28	撮影作業	08:45~11:45 3時間 0分	L-25,24,23 81枚撮影
45	29	待 機		晴 雲量2~5
46	30	"		晴 " 2~7
47	31	"		曇一部雨
48	9. 1	"		晴一時曇
49	2	"		雨
50	3	"		曇一部雨
51	4	"		曇
52	5	"		曇後晴
53	6	"		雨
54	7	"		曇
55	8	"		曇後晴
56	9	"		曇後晴
57	10	引 返 し	08:45~10:25 1時間40分	高積雲あり 撮影不能
58	11	待 機		曇後晴
59	12	撮影作業	08:55~10:31 1時間36分	L-23 41枚撮影
60	13	待 機		晴 雲量2~6
61	14	"		晴 " 2~5
62	15	"		曇
63	16	"		曇
64	17	"		曇
65	18	"		雨後曇
66	19	"		雨後曇
67	20	"		雨
68	21	"		曇一部雨
69	22	"		曇一部雨
70	23	"		曇
71	24	"		曇
72	25	"		曇
73	26	"		曇
74	27	"		曇
75	28	"		曇

3-1-7 作業期間中の天候

気象集計表(7~9月)

観測地点	天候		快晴		晴		曇		雨		計
	月	日	%	日	%	日	%	日	%		
SAN RAMON	7月	2.5	15	6	35	6	35	2.5	15	17	
	8月	1	3	13	42	10	32	7	23	31	
	9月	0.5	2	6	26	12.5	54	;	17	23	
	計	4	6	25	35	28.5	40	13.5	19	71	
MAZAMARI	7月	0	0	5	33	9	60	1	7	15	
	8月	0	0	14	45	12.5	40	4.5	15	31	
	9月	0	0	7.5	38	9	45	3.5	18	20	
	計	0	0	26.5	40	30.5	46	9	14	66	
OXAPAMPA	7月	0	0	2	67	1	33	0	0	3	
	8月	0	0	9.5	31	15	48	6.5	21	31	
	9月	0	0	6	29	11	52	4	19	21	
	計	0	0	17.5	32	27	49	10.5	19	55	
SATIPO	7月	0	0	0	0	11	92	1	8	12	
	8月	0	0	11	35	16	52	4	13	31	
	9月	0	0	10.5	38	13	46	4.5	16	28	
	計	0	0	21.5	30	40	56	9.5	14	71	
SANTO DOMINGO DE ACOBAMBA	7月	2	17	3	25	7	58	0	0	12	
	8月	2	6	16	52	7.5	24	5.5	18	31	
	9月	1	4	13	46	13.5	48	0.5	2	28	
	計	5	7	32	45	28	39	6	8	71	
ATALAYA	7月	0	0	5	42	5	42	2	17	12	
	8月	0.5	2	12.5	45	13	46	2	7	28	
	計	0.5	1	17.5	44	18	45	4	10	40	
PUERTO BERMUDEZ	9月	0.5	2	6.5	23	15	54	6	21	28	
HUANCAYO	7月	3	50	2	33	1	17	0	0	6	

(上表には局地的、短時間のしゅう雨は雨とせず曇又は晴とした)

本年度の撮影期間中の気象状況等は、次の通りであった。

- (1) 本年度は異常気象とのことで、天候が極めて悪く、全期間を通じ、サティボ、マサマリ、オクサバンバでは快晴日は1日もなかった。
- (2) 盆地では一般に風が弱いため、天候の良い日は夜間の放射冷却により放射霧が発生し、9時頃には消滅するが、その頃には山岳部には積雲が発生し、発達しながら増加するといふ最悪の傾向が続いた。
- (3) 事前にランドサットの映像をモザイクしたものを用意したが、今回撮影した写真をみると、ランドサットの映像に積雲が入っている場所は、今回も必らず積雲が入っていた。
- (4) 8月に入ると焼畑耕作等のため山焼きの季節となり、晴天が2～3日続くと、盆地部では視程が極端に悪くなった。
- (5) 9月中旬になると、雨の日が増加した。

3-2 写真処理作業及び現地仮検査

3-2-1 写真処理作業に使用した資機材

(1) フィルム現像

現像機	モース社製	プロセッシングキット(リワインド型)
乾燥機	ロウ	プロウァ社製 A-10 ドラムドライヤー
処理薬品	(a)現像液	コダック社 DK-19、DK-50
	(b)定着液	# フィクサー
	(c)安定液	# ハイポクリーニング エージェント

(2) 印画紙焼付け

プリンター	ログ	エレクトロニック電子プリンター
処理薬品	(a)現像液	コダック社 D72
	(b)停止液	2%酢酸
	(c)定着液	コダック社 フィクサー
使用印画紙	(a)標定検査用	コダック社 シングルウエイト AZO 2号、3号

(b)納品用 コダック社 ダブルウエイト AZO 2号、3号

乾燥機 PAKO 乾燥機

3-2-2 写真処理作業及び仮検査従事者の編成

写真処理及び検査監督員 増田 実 (IECA)

プロジェクト責任者 COR. FAP R. MARIN R. JEFE, DPTO, CONTROL Y

EVALUACION

OAP. FAP W. GAMARRA. M. DPTO, PRODUCCION

写真処理責任者 COM. FAP VINDROLA

3-2-3 写真処理作業及び仮検査の概要

(1) 写真処理

撮影終了後、フィルムを切断、直ちに現像処理を行った。現像はリワインド現像のため、リーダー、トレーラーを十分にとり、現像ムラが出ないように注意したが、一部現像ムラの出たフィルムがあった。また撮影条件により現像液を変え、最適の画像を得るよう努めた。

処理に要した時間は、乾燥終了迄、約2時間位であった。現像処理終了後、1枚おきに標定用写真のプリントを行った。

(2) 仮検査

標定用密着写真をコース毎に略モザイクしてテープでとめ、雲、雲影、サイドラップ、オーバーラップ、その他後続作業への支障の有無を略検査し、規定にはずれた場合には、直ちに再撮影を指示した。撮影範囲の確認、写真の主点位置のプロットには、撮影計画に使用した地図の精度が悪いため、ランドサットの映像をモザイクにしたものを使用した。

略検査に合格した部分については、精度検査用の密着写真を作成し、国際協力事業団の海外測量(基本図用)作業規程に基づいて作成した仕様書に従って精度検査を行い、精度管理表を作成した。この精度管理表は、上記作業規程に示されたものを英訳して使用した。

今回撮影に使用したRC-10カメラにはレベルが画面に写し込まれていないため、 ϕ 、 ω の測定ができなかった。また標定に使用した地図には標高が記入されていないため、写真からの撮影高度の点検も不可能であった。

再撮影の主な理由は、次の2点であった。

- ① 航跡のずれが大きい。
- ② 雲、雲影が規定より多い。

低地森林地帯では、水蒸気のため、視程があまり良くなく、撮影高度が高いことも加わり、ネガのコントラストが少なかった。撮影地域には、河川、池等が多く、ハレーションを起しているものがあつたが、いずれも小さく、隣接の写真で補うことが可能であつた。

(8) フィルム注記及び標定図作成

フィルム注記は、SANと協議の結果、次の様式とした。

(撮影年月日) (プロジェクト番号) (プロジェクト名) (コース、写真番号) (撮影縮尺)

21-7-82	342-82-A	SATIPO	L-1	1	1:60,000
⋮	⋮	SATIPO	L-1	2	⋮
⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮
21-7-82	342-82-A	SATIPO	L-1	7	1:60,000

コースの最初と最後の写真には、撮影年月日、プロジェクト番号、プロジェクト名、コース及び写真番号、撮影縮尺を記入し、その他の写真にはプロジェクト名、コース及び写真番号のみを記入した。同一コースで撮影が2回以上にわたつた場合は、北側よりABCのアルファベット文字をコース番号の次に記入した。

標定図用地図として、縮尺の異なつた分県図を1/50万の縮尺でモザイクしたが、フニ MAPAS DEPARTAMENTALES DEL PERU
ン県の地図(特に東部)の位置精度が悪く、標定図として使用できないため、1/100万全
国図を1/50万に引き伸ばし使用した。標定図には、コースの最初と最後の写真の撮影範
MAPA DEL PERU Fisico-Politico
囲、コース番号、編集写真番号を記入した。

(4) 撮影結果

撮影作業は7月20日より開始し、9月28日納期日まで待機したが、天候に恵まれず、全コースの撮影を完了することができなかつた。本年度の撮影成果は次の通りである。なお、撮影標定図は附図2に示しておいた。

フィルム本数	1本
撮影枚数	233枚
最終成果写真枚数	160枚

コース別撮影枚数

コース名	写真名	編集名	枚数
L-1	1893~1900	1~8	8
2	1924~1934	1~11	11
3	1950~1938	1~13	13
4	1955~1971	1~17	17
5	1920~1902	1~19	19
6	1889~1867	1~23	23
23B	2528~2520	1~9	9
24A	1661~1655	1~7	7
24B	1716~1690	1~27	27
25A	2166~2149	1~18	18
26	1718~1725	1~8	8
計			160

3-3 基準点調査

次年度作業の設計のため、既設基準点の調査を実施した。

3-3-1 三角点調査

事前調査の際、三角点 SANTA ANA を調査したが亡失しており、測地内に三角点が今迄確認されていなかったため、今回三角点 JUTISHE を調査し標石を確認した。本三角点は標高約 1,440 m であるが、調査には 3 日間を要した。

3-3-2 水準点調査

タルマ ~ ラメルセ ~ サティボ ~ マリボサア間の水準点を調査、5 2 点を確認した。(TARMA) (LA MERCED)(SATIPO) (MARIPOSA)

- (1) タルマ ~ オクサパンパ間は埋設年度が 1959 年と古く、道路の経年変化が激しく、タルマ市街地附近以外は、ほとんど確認できなかった。
- (2) ラメルセ ~ サティボ ~ マリボサア間は埋設年度が 1974 年と新しく、2 ~ 3 点おきに確認できた。
- (3) マリボサア ~ ファウファ間は、1960 年と古く、亡失の可能性が大きい上、目印となる (JAUJA) 民家等も少なく、橋脚などに設置したものしか発見できないのではないかとと思われる。

- (4) 水準点は直経約 6 cm の穴の中にブロンズの円盤が埋め込まれており、標尺が立つかどうか疑問である。第 2 年次作業のため、現地に出発する前に、充分にその対策をたてる必要がある。

3-4 ペルー政府機関の協力

IGN には SAN との撮影契約交渉、無線機の使用許可、資機材の引取り、その他問題が生じた際の解決に協力してもらった。また気象観測員の現地進入の際、関係機関への協力要請に同行してもらった。また無線室の使用、事務室の提供、ID カードの発給、必要な資料（地図、基準点成果、点の記など）の提供、タイプライター、コピーサービス等の便宜供与をうけた。IGN は、これらの協力をいし便宜供与に関し、極めて誠実かつ迅速であった。

また SAN も、契約締結後は、契約に従い誠意をもって作業の遂行に努力してくれた。

その他マサマリでは、市民警察（48 - COMANDANCIA G.C "LOS SINCHIS"）が施設を利用させてくれた他、基準点調査の際は案内、警備、通報等に当たってくれた。

政府機関及び市民とも、日本側の今回の作業には、全般にわたり協力的であったが、サティボなど反政府のゲリラ活動も若干あり、次年度以降は現地での地上の調査が多くなるので、保安上の留意をゆるがせにはできないであろう。

4. 作業状況の視察と作業監理

調査団の作業監理及び作業指導、IGNとの協議、現地事情の視察のため、JICA作業監理要員である建設省国土地理院企画部測量指導課長 野々村邦夫氏、JICA社会開発協力部参事 木村博氏が7月2日RG833便にてリマに到着、3日先発隊より撮影契約交渉経過を聴取、5日日本大使館、JICAリマ海外事務所、IGNと協議、6日よりSANとの撮影契約交渉の監理13日契約調印に立会われた。14日空路サンラモンに入れ、同地にて航空機をチャーターして撮影地域全般の状況を視察し、16日リマに帰られIGN、JICAリマ海外事務所と協議、19日IGNとの議事録調印、日本大使館、JICAリマ海外事務所に報告を行い、20日RG322便で帰国された。

作業終了に伴い、撮影成果等の調査、IGNとの次年度作業についての協議のため、9月20日再度 野々村邦夫氏、木村博氏がRG833便にてリマに到着され、21日 日本大使館、JICAリマ海外事務所、IGNと協議、22日空路サンラモンに入れ、現地関係機関に挨拶し、また気象観測員より観測経過などの事情を聴取され、24日リマに帰られ、27日よりIGNと次年度作業について協議、SANとの協議及び成果品の点検をされ、10月4日IGNとの議事録調印、日本大使館、JICAリマ海外事務所と協議され、5日RG844便にて帰国された。

5. I G N と の 協 議 事 項

第1年次作業の開始時及び終了時、I G N との間で本作業を円滑に実施するための協議を行った。協議内容については、附録の議事録を参照されたい。

6. 第2年次作業への所見

第2年次作業は、第1年次作業において完了しなかった空中写真撮影を継続し、さらに基準点測量及び現地調査（判読キーの作成）等の作業が実施される予定である。

(1) 空中写真撮影

空中写真撮影作業は、初年度の経験及び過去数年の気象データ（サンラモン、サティボ、オクサパンバの気象観測表及び付図3,4参照）の解析から、5月～9月に実施するのが最も適していると考えられる。また、撮影方式として出来高払いを採用しており、この地区が気象等の理由で、撮影の困難が予測されることから、この方式の最大の効果を得るためには、十分な気象観測の実施が必要であり、数少ないチャンスを適確に捕えるシステムを考慮する必要がある。このためには初年度の気象観測点に加え、基準点測量のために、各所に分散したパーティを利用して、キメの細かい、しかも広範囲な情報を入手する必要がある。この情報をベースキャンプ及びサブキャンプで収集し、リマの撮影本部に速やかに伝達し、撮影機の適確、迅速なフライトを促進する必要がある。

撮影を担当した“SAN”は、初年度の経験からみて、かなり水準の高い技術を有し、作業に対する積極性も見られ、今後撮影作業を委託することに問題はない。

また、初年度の撮影契約では、SANの事業の中で本プロジェクトを最優先とすること、日本側の判断で適宜フライトさせる権利を有すること、などの項目を含んでおり、作業実施上、問題はなかった。

第2年次の契約については、初年度の契約内容とほぼ同様で良いと思われるが、契約の時期は5月ごろからの気象条件の良くなる時期をのがさないため、できる限り早い時期とする必要がある。

(2) 基準点測量

基準点測量については、その成果を単独でペルー側に提供しても、ペルー国政府の永久的な財産として、将来、充分かつ有効に活用できるように、その配点、精度、埋標、記録方式等をペルー側の方式とできるだけ近似させる必要がある。特に、配点については、将来ペルー国政府が撮影地域全体の地形図を作成することも考慮して、撮影地区全体をカバーすることが望ましいと考える。

作業実施上で一番問題になるのは、測地内に5,000mを超える高山地帯とアマゾン上流の

500～1,000mのジャングル地帯を包含することにある。前者においては作業員の高度順化にかなりの日数を必要とするし、後者の場合は原住民に対するアプローチを含め、野生動物（ピューマ、野犬、毒蛇など）対策等を考慮する必要がある。また、両地域共アクセス及び器材運搬にかなりの困難が伴う。前者には一般車輛の他に高山用ヘリコプター及び酸素マスク等が必要であり、後者にはモータボートが威力を発揮すると思われる。

また、緊急事態を想定して、事故者のピックアップ用としてヘリコプターの確保も必要であろう。

(8) 現地調査

初年度の撮影作業において、高山地帯及びアマゾン上流のジャングル地帯の一部について撮影が完了している。この成果を利用して後続の現地調査作業を効率良く実施するために、現地調査基準（判読キー）の作成が有効であろう。

(4) ベルー政府機関等との協力体制

第1年次作業においては、IGNを中心とするペルー国政府側の積極的協力により、作業実施に多大の便宜を得るとともに、相互理解を深め、強固な信頼関係を築くことができたものと確信する。

第2年次作業においては、日本側調査団だけでは実施困難な面も予想されるので、ペルー側の一層緊密な協力体制を確立することが望ましい。これらの点に関しては、かなり細かい点までペルー国政府側（主としてIGN）と、再三にわたって打ち合せ、要点は議事録としてまとめておいた。（議事録 参照）

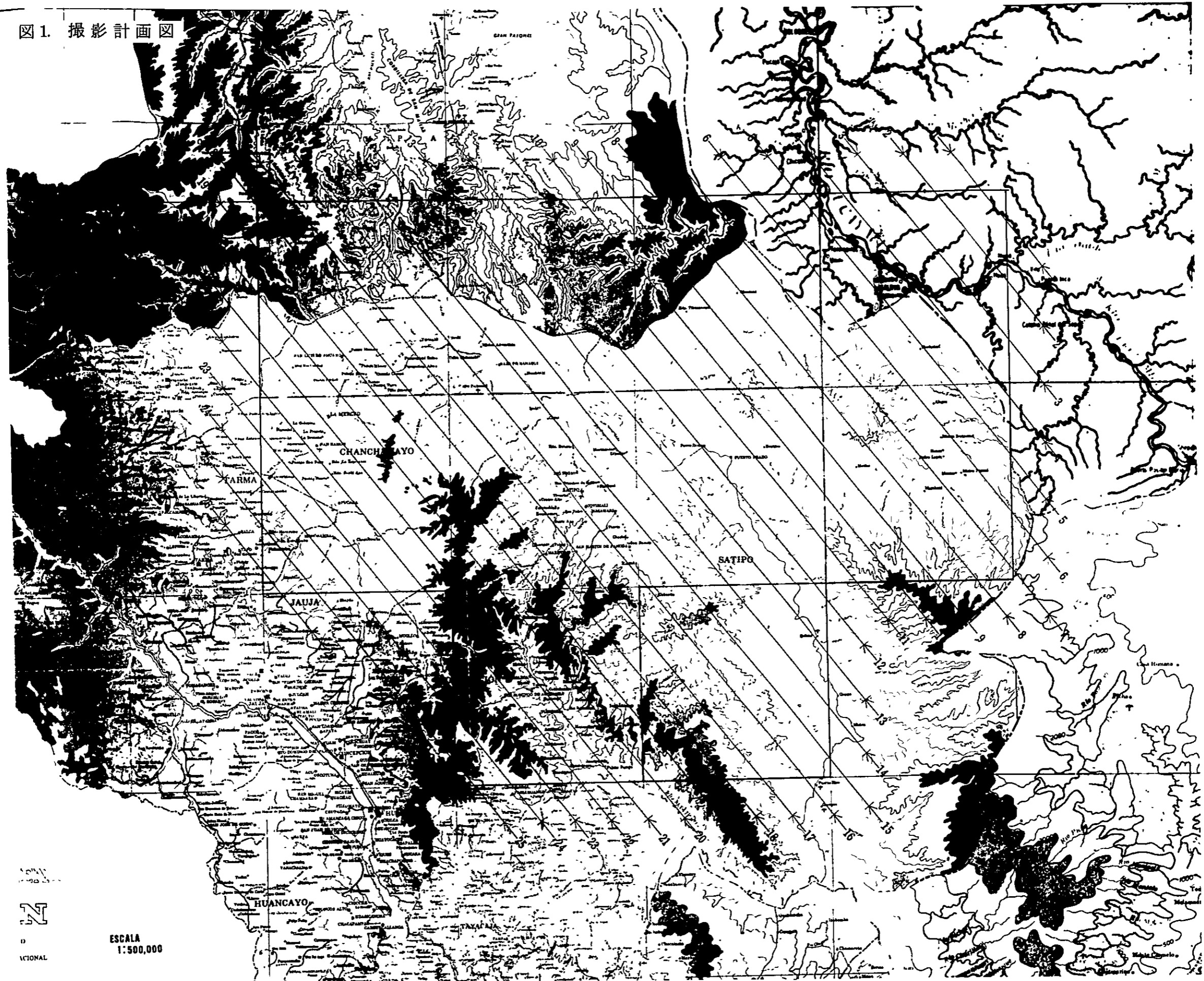
7. 所 感

今回の測量作業対象地域は、アンデス山脈及びアマゾン上流のジャングル地帯を包含する極めて厳しい自然条件下にあり、特に、今年度は異常気象のため、撮影作業の一部分しか完了できなかったことは、まことに遺憾であった。

作業の実施にあたっては、安全管理、住民との相互理解等に重点を置いて進めた。作業の遂行上、事故の発生、住民との摩擦等も皆無であり、この面ではほぼ所期の目的は達せられたものと思われる。

作業実施に当って御世話になったペルー国関係省庁の職員並びに在ペルー日本大使館、国際協力事業団、建設省国土地理院の関係者の方々に厚く御礼申上げる次第である。

図1. 撮影計画図



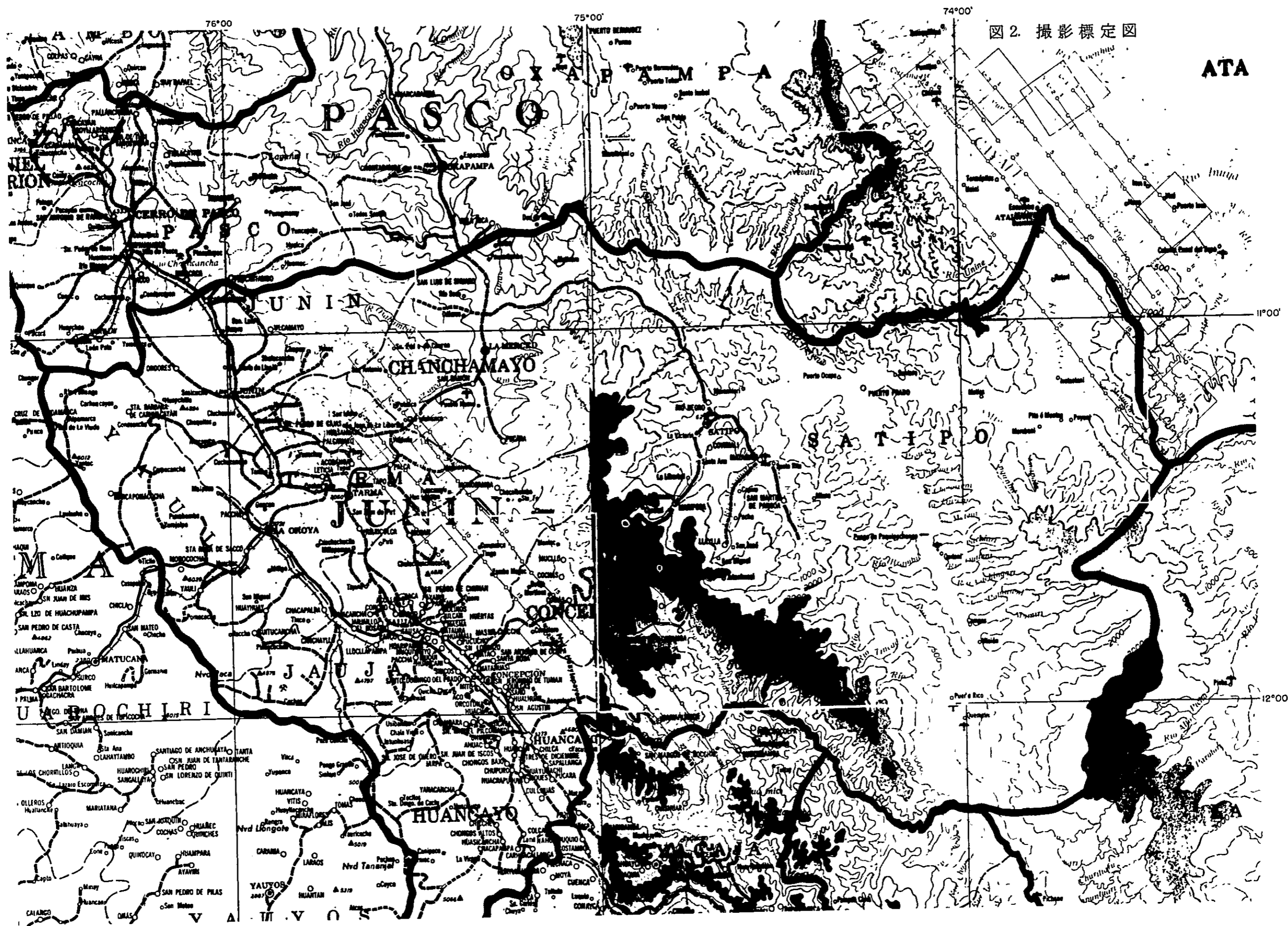


図2. 撮影標定図

ATA



図3. 撮影最適期間(最近3年間の統計)

Points: 雲量 $\frac{4}{8}$ を1点、 $\frac{3}{8}$ を2点、 $\frac{2}{8}$ を3点、 $\frac{1}{8}$ を4点、
0を5点として、その合計をPointsとして表現した。

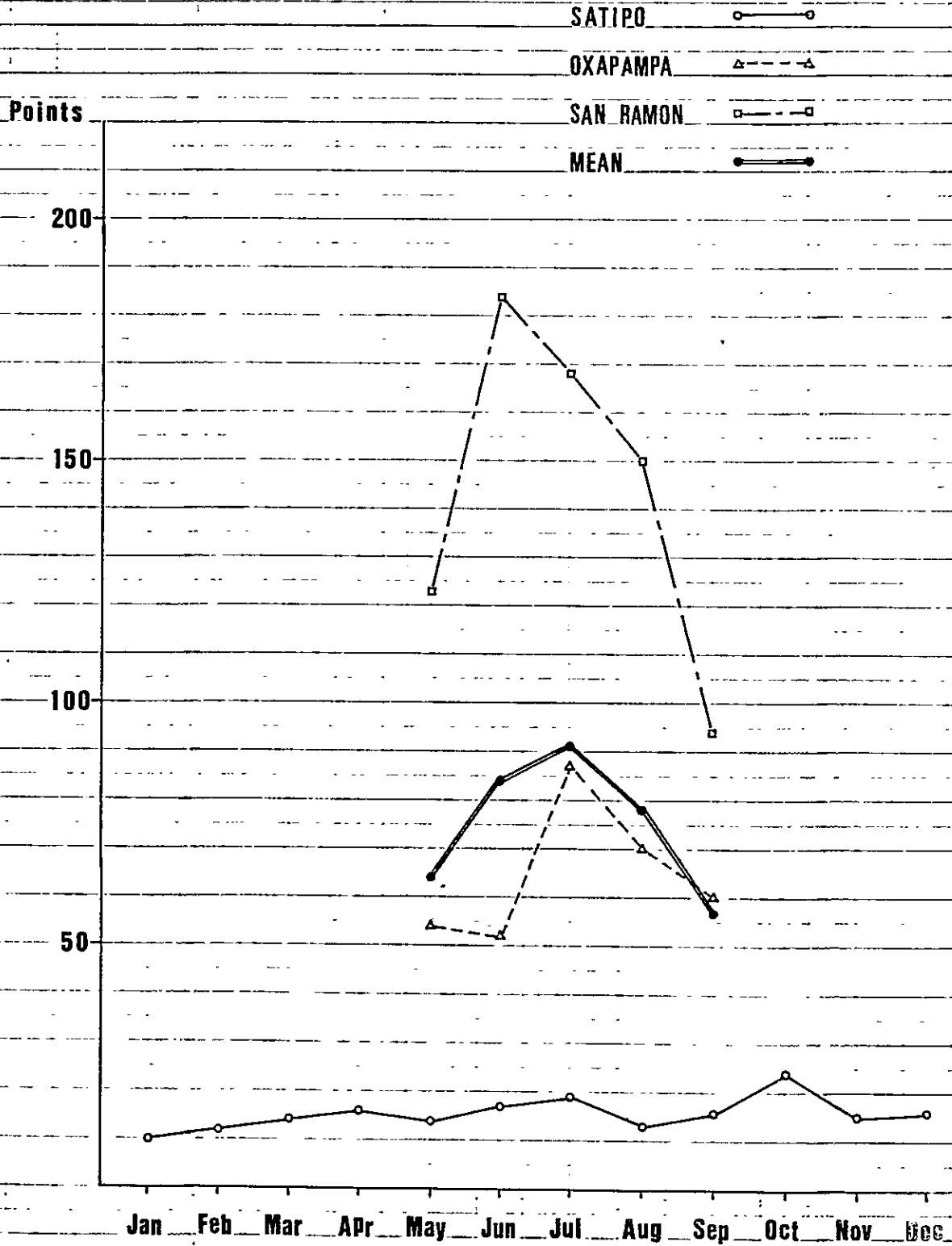
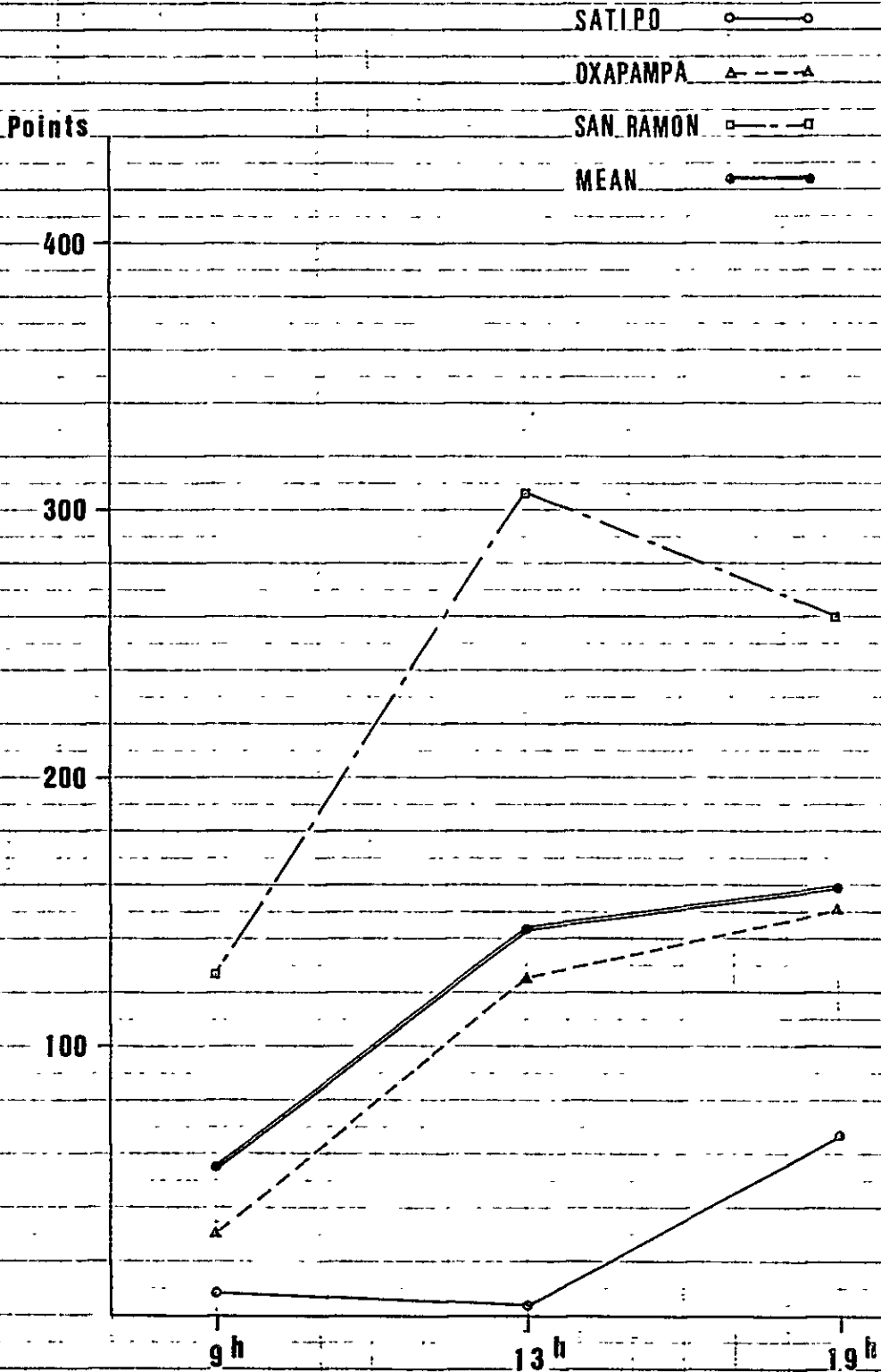


図4. 撮影最適時間帯(最近3年間の統計)

Points: 雲量 $\frac{4}{8}$ を1点、 $\frac{3}{8}$ を2点、 $\frac{2}{8}$ を3点、 $\frac{1}{8}$ を4点、
0 を5点として、その合計を Points として表現した。



附表 1 QUALITY CONTROL SHEET BY FLIGHT STRIP

Project Designation			Planned		Photographic Scale		Altitude above Ground		Mean Ground Elev.		Flight Altitude		Minimum Side Lap		No		Processing Record		Length of Film					
Flight Line No.	Camera / / mm	Flight Direction	Y		Y		m	m	m	m	m	m	m	No	No			Roll No						
Photographed on		Date	Time from/to	Difference	No.	No	Y	Y	m	m	m	m	m	Developer		Paper	C		Electro static	Fiducial Mark	Instru-ment	Other Faults		
End Lap Minimum	End Lap Principle													Process Time	min		%	Smoke and haze					Vibrating	Cloud
Photo No	Editing No.			%	%	g	m																	
5																								
10																								
15																								
20																								
25																								
30																								
Mean, Min																								
Remarks of Contractor													Remarks of IECA Representation.											
													Contractor											
													IECA											
													Company											
													Checked on											
													Checked by											
													Inspected on											
													Inspected by											

SCOPE OF WORK FOR
TOPOGRAPHIC MAPPING PROJECT OF
SATIPO AREA, DEPARTMENT OF JUNIN
THE REPUBLIC OF PERU

April 1982

JAPAN INTERNATIONAL COOPERATION AGENCY
INSTITUTO GEOGRAFICO NACIONAL



C O N T E N T S

- I. Introduction
- II. Outline of the Project
- III. Working Plan
- IV. Time Schedule
- V. Reports and Final Products
- VI. Contribution to the Mapping Project
- VII. Settlement of Disputes
- VIII. Modification of the Scope of Work
- IX. Signature

I. Introduction

In response to the request by the Government of the Republic of Perú, the Government of Japan expressed its intention to cooperate in preparing topographic maps of Satipo area, department of Junin of the Republic of Peru, which are prerequisite for the planning of various development projects in this area.

The Japan International Cooperation Agency (hereinafter referred to as "the JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, dispatched a contact mission in January and a preliminary survey mission in February 1982, to Peru for the preliminary study of the topographic mapping project of Satipo area, department of Junin of the Republic of Peru (hereinafter referred to as "THE PROJECT").

The Preliminary survey mission made from february to April discussions with the ^{5/}staffs of the National Geographical Institute (Instituto Geografico Nacional, hereinafter referred to as "the IGN"), Ministry of Military of the Republic of Peru and carried out field reconnaissance including aerial inspection, and collection of data and information necessary for the implementation of the Project.

The present document sets forth the Scope of Work for the Project which is to be implemented in close collaboration between the JICA and the IGN, the counterpart organization for the Government of the Republic of Peru.

The entire work of the Project will be conducted under the Basic Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Peru signed on August 20, 1979 in Lima, Peru.

II. Outline of the Project

The Project will be composed of the following works: Aerial photography (1/60,000) covering an area of approximately 31,250 Km² and Topographic mapping (1/25,000 contoured 25 mts. intervals) covering an area of approximately 12,500 Km².

The location of the Project area is shown in Appendix I.

III. Working Plan:

The entire work shall be carried out under a four year program starting from the fiscal year of 1982 and shall consist of the following phases:

Phase 1. Aerial Photography

Phase 2. Ground Control Survey
(Satellite Geodesy, Triangulation and Traversing), Leveling and Classification.

Phase 3. Aerial Triangulation, Stereo-Plotting and Field Completion.

Phase 4. Color Separation Drafting and Printing.

A. Phase 1. Aerial Photography

1-1 Aerial Photography

1-1-1 Aerial photographs shall be taken at the scale of approximately 1/60,000 including the Mapping area with a wide angle precision camera.

B. Phase 2. Ground Control Survey (Satellite Geodesy, Triangulation and Traversing), Leveling and Classification.

2-1 Ground Control Survey (Satellite Geodesy, Triangulation and Traversing).

2-1-1 Although existing ground control stations will be used for photographic control and mapping, establishment of new ground control stations will be carried out when necessary.

2-1-2 **Satellite Geodesy**

Geodetic controls by means of the artificial satellite Doppler System shall be carried out in order to establish basic geodetic control stations.

2-1-3 **Triangulation and Traversing**

Supplementary map control stations necessary for aerial triangulation and mapping work shall be established by triangulation or traversing.

2-2 **Leveling**

2-2-1 Minor order leveling (including barometric leveling if necessary) shall be carried out to obtain vertical controls necessary for aerial triangulation and mapping work starting from the existing 1st or 2nd order bench marks or triangulation stations.

2-3 **Classification**

2-3-1 The topographic information related to land classification, vegetation, etc. on the aerial photographs shall be verified in the field.

Style sheet and symbols shall be those adopted by the IGN.

Geographical names shall be surveyed by the IGN with the collaboration of the JICA survey team and the IGN shall take full responsibility to confirm them.

C. **Phase 3. Aerial Triangulation, Stereo-Plotting and Field Completion.**

3-1 Aerial Triangulation

3-1-1 Aerial Triangulation shall be carried out by an analytical method using stereo-comparators and electronic computer. Adjustment shall be carried out by a block adjustment method.

3-2 Stereo-Plotting

3-2-1 The plotting shall be carried out using stereo-Plotting instruments at the scale of 1/25,000 with 25 meter contour intervals.

The sheet line shall be 7.'5 in longitude and 7.'5 in latitude. The map evaluation criterion shall be by the IGN standard specifications for the scale 1/25,000.

3-3 Field Completion

3-3-1 Topographic features, vegetation, etc., which cannot be plotted shall be supplemented on the compiled sheet in the field.

Geographical names shall be verified and supplemented, if necessary, on the paper copy of the compiled sheet by the IGN.

D. Phase 4. Color Separation Drafting and Printing

4-1 Color Separation Drafting

4-1-1 Based on the compiled sheet, scribing shall be carried out on a stable polyester base for each color separation plate.

Style sheet and symbols shall be those adopted by the IGN.

4-2 Color Proof Prints

4-2-1 Color proof prints shall be inspected and approved by the IGN prior to the final printing.

4-3 Printing

4-3-1 Plate making shall be carried out using 1/25,000 scribed negatives, and printing shall be carried out by the offset method in five colors adopted by the IGN.

IV. Time Schedule:

The whole work will be conducted in accordance with the time schedule as shown in Appendix II. In case the aerial photography not completed in 1982, the both parties shall settle the further programmes of the project.

The detailed work plan and the schedule of each phase will be settled by both parties before commencement of the work for each phase.

V. Reports and Final Products:

The reports will be presented to the Government of the Republic of Perú by the JICA at the end of each phase.

The materials mentioned in Appendix III will be presented to the Government of the Republic of Perú by the JICA after having completed the whole work.

VI. Contribution to the Mapping Project:

A. Japanese Contribution

The JICA will contribute to the Project by providing the IGN at its cost and expenses with the followings:

- a) Dispatch and return of the Japanese Technical Mission, and its equipment listed on the appendix IV, including expenses for lodging, maintenance, local transportation and other related expenses while staying in Perú.
- b) The aerial photography which will be carried out with the Servicio Aerofotografico National, to take place during the period May - August 1982.

In case the Servicio Aerofotografico National couldn't carry out such contract, an authorization to fly by a foreign cartographic company will be arranged through the Peruvian Authorities.

- c) Submission of a detailed list of all materials, vehicles and equipment to be used on the Project to the Government of the Republic of Perú for its consideration and approval before shipment (to be referred to the Appendix IV).
- d) Training of Peruvian technicians in Japan at each phase of Appendix II for the transfer of cartographic technology. Expenses for transportation to and from Japan, lodging, maintenance, local transportation and sundry expenses will be borne by the JICA according to its regulations on traveling allowance.
- e) On-the-job training of the counterparts in Perú during the execution of the Project.

B. Peruvian Contribution

The IGN will contribute to the Project by providing the Japanese Technical Mission, including the aerial photography enterprise and its employees contracted with the JICA, with the following conveniences, facilities and services for the smooth and effective implementation of work:

- a) To secure exemption from all direct taxes on the income and any other emoluments received from the JICA for the execution of the Project.
- b) To secure exemption from custom duties, taxes and government charges of any kind other than normal custom clearance expenses, with respect to the equipment, vehicles, machineries, materials.

The same exemption will be applied to personal effects and medical supplies.

- c) To arrange for no restrictions on funds introduced into Perú from external sources by the members of the survey team for the purpose of the Project. Bank account opened in Perú by the survey team members shall remain at their exclusive disposal, and balance on such accounts shall be freely transferable into Japan in any other convertible currency.
- d) To supply available data and information related to the Project.
- e) To arrange for smooth transfer of data and materials including the rolls of negatives of aerial photography from Perú to Japan and vice versa for the execution of the Project.
- f) To arrange for hiring of vehicles, boats, helicopters, air planes and other transportation facilities when necessary.
- g) To arrange for hiring of convenient office and appurtenant facilities, garage and space for storage in the Project area.
- h) To secure Permission of flight for aerial photography and use of airports related to the Project area.
- i) To secure permission for the use of communication facilities including transceiver with allocated frequency and electronic distance measuring instruments.
- j) To secure permission of entry into private properties and restricted areas and of felling of trees in the Project area when necessary.
- k) To secure necessary arrangements for the safety of the Japanese Technical Mission.
- l) To arrange for the hiring of laborers as needed.
- m) To arrange for medical care when needed.

- n) To provide, at the cost and expenses of the IGN, assigned Peruvian counterparts consisting of a project coordinator and technicians.
- o) To provide identification card to the members of the Japanese Technical Mission for the execution of their activities.

VII. Settlement of Disputes:

Both parties shall strive to settle any disputes arising in connection with the interpretation of application of this Scope of Work through mutual negotiation.

VIII. Modification of the Scope of Work:

During the execution of the Project, changes considered useful by both parties for facilitating the implementation of the Project can be made in the text of this Scope of Work by mutual agreement.

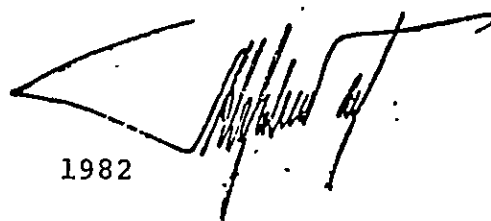
IX. Signature

The undersigned confirm that the foregoing is understanding of the JICA and the IGN. The two originals, texts of the present Scope of Work one each in English and Spanish languages, are equally authentic.

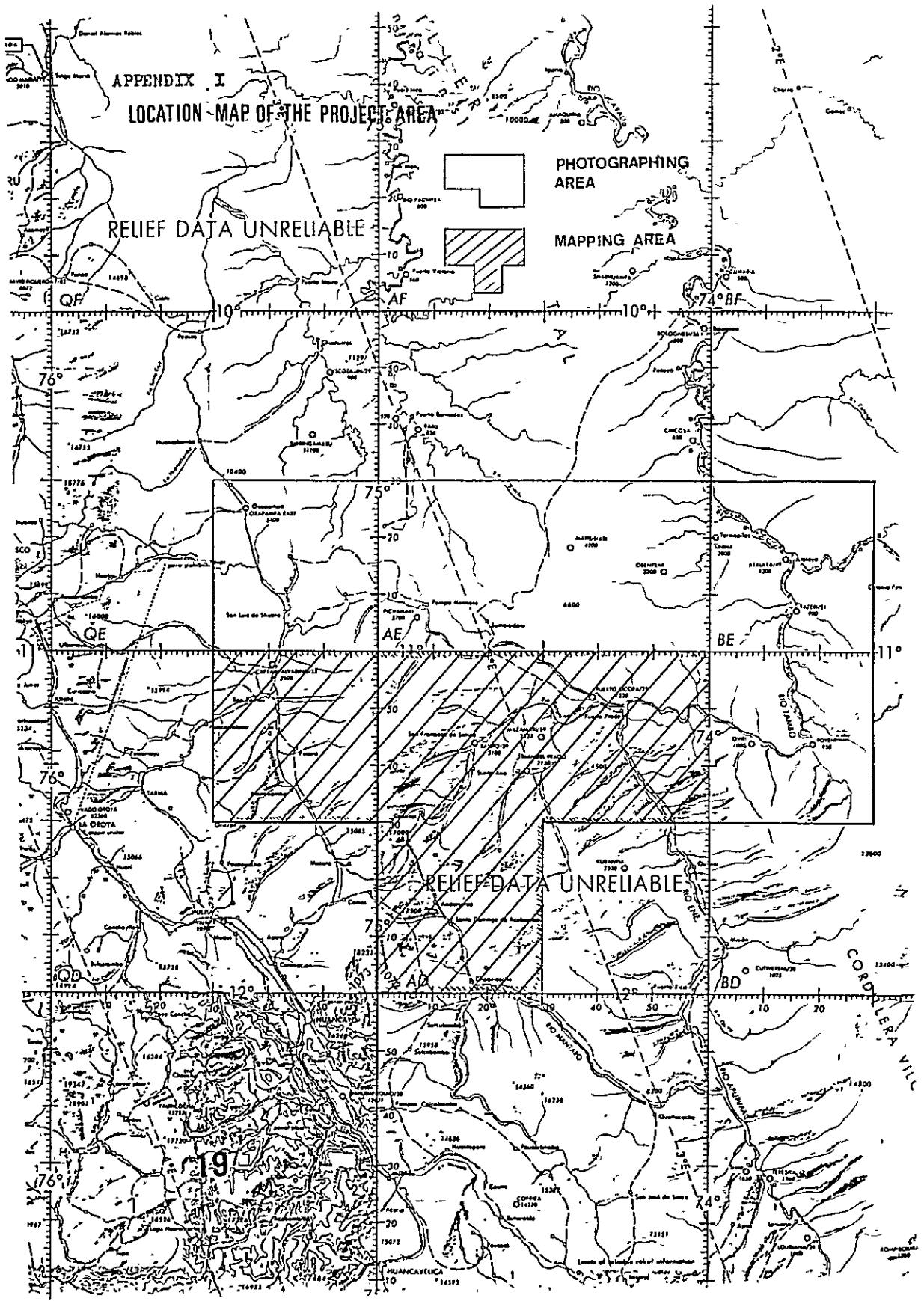
Lima City, April 8th 1982

Minoru Tajima

Dr. MINORU TAJIMA
Leader of the Preliminary
Survey Mission, the Japan
International Cooperation
Agency



Sr. Gral Brig ALBERTO DELGADO V.
Director del Instituto Geo-
gráfico Nacional



APPENDIX II

TIME SCHEDULE

I T E M	Phase 1 (Apr. 1982-Mar 1983)	Phase 2 (Apr. 1983-Mar 1984)	Phase 3 (Apr. 1984-Mar 1985)	Phase 4 (Apr. 1985-Mar 1986)
AERIAL PHOTOGRAPHY	—			
GROUND CONTROL SURVEY		—		
LEVELING		—		
CLASSIFICATION		—		
AERIAL TRIANGULATION			—	
STEREO PLOTTING & EDITING			—	
FIELD COMPLETION			—	
DRAFTING AND PRINTING				—

Time schedule mentioned above is tentative and subject to change.

APPENDIX III.

FINAL PRODUCTS

- I. Aerial Photography
 1. Original negatives
 2. Contact paper prints (one each)
 3. Photo index sheets

- II. Geodetic Control Survey
 1. Horizontal control results
 2. Vertical control results
 3. Computation sheets
 4. Field notes
 5. Description of points

- III. Topographic mapping
 1. Pricked photos and identified photos
 2. Original manuscripts
 3. Diapositives
 4. Aerial triangulation Data
 5. Color separation scribed sheets
 6. 1/25,000 topographic maps (64 sheets x 1,000 copies)

APPENDIX IV.

LIST OF EQUIPMENT TO BE USED FOR
FIELD SURVEY BY THE JAPANESE TECHNICAL MISSION

1. Theodolites
2. Electronic distance measuring equipment
3. Short wave transmitter receivers
4. Transceivers
5. Heliotropes
6. Signal lamps
7. Doppler observation system
8. Leveling instruments
9. Electronic calculators
10. Vehicles including trucks
11. Camping materials
12. Materials and components of observation towers
13. Generators
14. Small instruments, office equipment and consumables
15. Boats with engine

Note: Above list is tentative and subject to alteration

TOPOGRAPHIC MAPPING PROJECT OF THE SATIPO
AREA DEPARTMENT OF JUNIN, PERU

PROCEEDING OF THE MEETING
BETWEEN

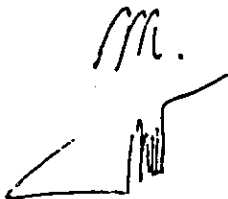
THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) AND THE IN-
STITUTO GEOGRAFICO NACIONAL (IGN)

IN LIMA, CAPITAL CITY OF THE REPUBLIC OF PERU, A MEETING
WAS HELD ON JULY 19, 1982 IN THE OFFICE OF IGN BETWEEN THE JICA
MISSION AND IGN IN RELATION TO THE 1st. PHASE WORK (AERIAL
PHOTOGRAPHY) OF THE TOPOGRAPHIC MAPPING PROJECT OF THE SATIPO
AREA, DEPARTMENT OF JUNIN, PERU, IN A SINCERE AND FRIENDLY AT-
MOSPHERE.

THE FOLLOWING ITEMS WERE DISCUSSED AND CONFIRMED BY THE
BOTH PARTIES:

JICA MISSION : Mr. MASAYOSHI TAKASAKI, LEADER
Mr. KUNIO NONOMURA, TECHNICAL ADVISOR
Mr. HIROSHI KIMURA, ADVISOR
Mr. KIYOSHI ARAI, DEPUTY-LEADER
Mr. TOSHIMINE MIYASHITA, COORDINATOR

I G N : Gral Brig ALBERTO DELGADO V. DIRECTOR
COL. ENGINEER JOSE TASAICO DEL SOLAR DEPUTY-
DIRECTOR
LT. COLONEL ENGINEER VICTOR MONTOYA ASTULLE,
HEAD OF PHOTOGRAMMETRY DIV.



4.8

1. CONTRACT FOR THE AERIAL PHOTOGRAPHY OF THE SATIPO AREA

THE CONTRACT WHICH HAD BEEN NEGOTIATED SINCE THE BEGINNING OF JULY 82 BETWEEN THE INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION (IECA) AND THE SERVICIO AEROFOTOGRAFICO NACIONAL (SAN), WAS FINALLY AGREED AND SIGNED ON JULY 13 AT THE SAN'S OFFICE BY THE REPRESENTATIVES OF IECA, SAN AND JICA LIMA OFFICE WITH THE ATTENDANCE OF THE MEMBERS CONCERNED OF JICA MISSION, IGN AND SAN INCLUDING GRAL BRIG A. DELGADO V., DIRECTOR OF IGN IN A VERY FRIENDLY ATMOSPHERE.

IT IS TO BE NOTED HEREWITH THAT THIS CONTRACT FUNDAMENTALLY DEPENDS UPON THE BASIC AGREEMENT ON TECHNICAL COOPERATION BETWEEN THE GOVERNMENTS OF JAPAN AND PERU.

(TO BE REFERRED TO THE APPENDIX: THE CONTRACT BETWEEN IECA AND SAN).

2. COMMENCEMENT OF THE FIELD WORK

ON JULY 14, NEXT DAY OF EFFECTUATION OF THE CONTRACT, JICA MISSION COMMENCED IN THE PROJECT AREA THE PREPARATORY WORK FOR WEATHER OBSERVATION TO BE CONDUCTED AT SAN RAMON, SATIPO AND HUANCAYO UNTIL MID-SEPTEMBER WITH THE COOPERATION OF IGN COUNTERPART, THE 2nd. LIEUTENANT GUILLERMO QUINTANA B., HEAD OF REPRODUCTION DEPT.

AT THE SAME TIME, ADVISOR GROUP (NONOMURA, KIMURA) MADE AERIAL RECONNAISSANCE OF THE PROJECT AREA INCLUDING THE ABOVE WEATHER OBSERVATION POINTS. ON ADDITION TO THE WEATHER OBSERVATION, THE JICA MISSION WILL CARRY OUT SUPERVISION, INSPECTION AND OTHER WORKS NECESSARY FOR THE AERIAL PHOTOGRAPHY UNTIL MID-SEPTEMBER IN COOPERATION WITH IGN.

3. DATA COLLECTION AND PLANNING FOR THE 2nd. PHASE WORK

CONCURRENTLY WITH THE PRESENT AERIAL PHOTOGRAPHIC WORK, THE JICA MISSION WILL CARRY OUT DATA COLLECTION NECESSARY FOR THE 2nd. PHASE WORK (GROUND CONTROL SURVEY, LEVELLING, ETC.) TO BE CONDUCTED IN 1983.

THE JICA MISSION WILL ALSO STUDY THE 2nd. PHASE WORK PLAN BASED ON RESULT OF THE AERIAL PHOTOGRAPHY OF THIS YEAR AT ITS TERMINATION IN SEPTEMBER.

IGN WILL MAKE A CLOSE COOPERATION TO THE ABOVE DATA COLLECTION AND STUDY.


4. JICA'S TRAINING IN JAPAN

THE TRAINING FOR TECHNOLOGICAL TRANSFER OF AERIAL PHOTOGRAPHY WILL BE CONDUCTED IN JAPAN IN/AROUND NOVEMBER '82. IGN WILL ARRANGE NECESSARY PROCEDURE IN CLOSE CONTACT WITH THE JICA LIMA OFFICE AS SOON AS POSSIBLE.

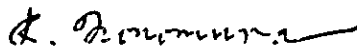
Lima, JULY 19, 1982



MASAYOSHI TAKASAKI
LEADER, JICA MISSION



GRAL BRIG ALBERTO DELGADO V.
DIRECTOR IGN



KUNIO NONOMURA
TECHNICAL ADVISOR
JICA MISSION

APENDICE:

Contrato IECA-SAN

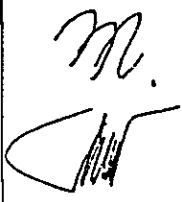
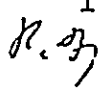
TOPOGRAPHIC MAPPING PROJECT OF THE
SATIPO AREA DEPARTMENT OF JUNIN, PERU

PROCEEDING OF THE MEETING
BETWEEN

THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) AND THE
INSTITUTO GEOGRAFICO NACIONAL (IGN)

IN LIMA, CAPITAL CITY OF THE REPUBLIC OF PERU, MEETINGS
WERE HELD FROM SEPTEMBER 21 OCTOBER 4, 1982, IN THE OFFICE
OF IGN BETWEEN THE JICA MISSION AND IGN IN RELATION TO THE 1ST.
PHASE WORK (AERIAL PHOTOGRAPHY) OF THE TOPOGRAPHIC MAPPING PRO-
JECT OF THE SATIPO AREA, DEPARTMENT OF JUNIN, PERU, IN A SINCERE
AND FRIENDLY ATMOSPHERE.

JICA MISSION : Mr. MASAYOSHI TAKASAKI, LEADER
Mr. KUNIO NONOMURA, TECHNICAL ADVISOR
Mr. HIROSHI KIMURA, ADVISOR
Mr. KIYOSHI ARAI, DEPUTY LEADER
Mr. MINORU MASUDA, CHIEF SURVEYOR


I G N : Gral Brig ALBERTO DELGADO VELASCO, DIRECTOR
 COL. Eng. JOSE TASAICO DEL SOLAR, DEPUTY-
DIRECTOR
Lt.Col Eng VICTOR MONTOYA ASTULLE, HEAD OF
PHOTOGRAMMETRY DIV.

THE FOLLOWING ITEMS WERE DISCUSSED AND CONFIRMED BY THE
BOTH PARTIES:

1. EVALUATION OF THE 1ST YEAR'S WORK

IN THE 1ST YEAR (1982) OF THE TOPOGRAPHIC MAPPING PROJECT OF THE SATIPO AREA, AERIAL PHOTOGRAPHY WAS SCHEDULED TO BE CARRIED OUT FOR THE 1ST PHASE OF THE WORK.

FOR THIS WORK, THE JICA MISSION, IGN AND SAN (EXECUTING ORGANIZATION OF THE AERIAL PHOTOGRAPHY) HAVE PERFORMED THEIR DUTIES IN CLOSE COOPERATION. SAN EXECUTED THE WORK WITH ITS BEST EFFORT FROM JULY 16 TO SEPTEMBER 28, 1982, ACCORDING TO THE SPECIFICATIONS OF THE CONTRACT WITH IECA (INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION). MEANWHILE, THE JICA MISSION CARRIED OUT SUPERVISION, INSPECTION, AND OTHER WORKS, INCLUDING THE DISTRIBUTION OF THREE WEATHER OBSERVERS IN THE PROJECT AREA, NECESSARY FOR THE AERIAL PHOTOGRAPHY, IN COOPERATION WITH IGN. NEVERTHELESS, APPROXIMATELY 80 PER CENT OF THE AREA REMAINS INCOMPLETED DUE TO THE UNFAVORABLE WEATHER CONDITIONS.

CONCURRENTLY WITH THE AERIAL PHOTOGRAPHIC WORK, THE JICA MISSION COLLECTED NECESSARY DATA FOR THE 2ND PHASE WORK (GROUND CONTROL SURVEY, LEVELLING, ETC), ALSO IN CLOSE COOPERATION WITH IGN.

2. BASIC PLAN OF THE 2ND YEAR'S WORK

2.1 AERIAL PHOTOGRAPHY

AERIAL PHOTOGRAPHY OF THE REMAINING AREA WHICH WAS NOT COVERED BY THE 1ST YEAR'S WORK WILL BE CONTINUED IN THE 2ND YEAR (1983).

2.2 GROUND CONTROL SURVEY, LEVELLING AND CLASSIFICATION


IN THE SCOPE OF WORK, GROUND CONTROL SURVEY, LEVELLING AND CLASSIFICATION ARE SCHEDULED TO BE COMPLETED IN 1983 AS THE 2ND PHASE WORK. HOWEVER, TAKING INTO ACCOUNT THE RESULT OF THE AERIAL PHOTOGRAPHY IN THE 1ST. YEAR, PART OF THE 2ND PHASE WORK WILL BE CONDUCTED IN 1983 AS FOLLOWS:

a. GROUND CONTROL SURVEY

ESTABLISHMENT OF NEW GROUND CONTROL STATIONS WILL BE CARRIED OUT MAINLY BY MEANS OF THE ARTIFICIAL SATELLITE DOPPLER SYSTEM WITH THE SUPPLEMENTARY WORK OF TRIANGULATION OR TRAVERSING.

b. LEVELLING

IN ORDER TO OBTAIN VERTICAL CONTROL, INCLUDING THOSE OF NEWLY ESTABLISHED GROUND CONTROL STATIONS, MINOR ORDER LEVELLING AND TRIGONOMETRIC LEVELLING WILL BE CARRIED OUT.

M.

K.S.
c. PRELIMINARY CLASSIFICATION

FOR THE EFFECTIVE EXECUTION OF CLASSIFICATION WORK TO BE CARRIED OUT IN THE FUTURE, CLASSIFICATION CHECKS WILL BE CONDUCTED THROUGHOUT THE TRIAL WORK, INCLUDING THE FIELD SURVEYS AT SOME TYPICAL SITES IN THE PROJECT AREA.

3. CONTRIBUTIONS OF IGN NECESSARY FOR THE EXECUTION OF THE 2ND YEAR'S WORK

FOR THE SMOOTH AND EFFECTIVE IMPLEMENTATION OF THE 2ND YEAR'S WORK, IGN WILL PROVIDE ALL THE NECESSARY CONTRIBUTIONS SET FORTH IN THE SCOPE OF WORK.

PARTICULARLY, IGN WILL PAY DUE ATTENTIONS ON THE FOLLOWING ITEMS:

- 3.1 TO ARRANGE FOR REGISTRATION AT THE PERUVIAN AUTHORITY FOR VEHICLES AND BOATS TO BE BROUGHT INTO PERU IN 1983.
- 3.2 TO SECURE SUFFICIENT PARKING SPACES FOR SAFE CUSTODY OF ABOUT 10 VEHICLES IN LIMA AND IN THE BASE CAMP IN THE PROJECT AREA (SATIPO).
- 3.3 TO SECURE SUFFICIENT MOORING SPACE FOR SAFE CUSTODY OF ABOUT 3 MOTOR BOATS IN THE PROJECT AREA.

- 3.4 TO SECURE NECESSARY WAREHOUSES FOR SAFE CUSTODY OF SURVEY MATERIALS AND EQUIPMENTS IN LIMA AND IN THE BASE CAMP.
- 3.5 TO ARRANGE FOR SMOOTH AND QUICK CLEARANCE AND TRANSFER OF THE SURVEY MATERIALS AND EQUIPMENTS TO BE BROUGHT INTO PERU FROM JAPAN.
- 3.6 TO PROVIDE PERUVIAN COUNTERPARTS.
- 3.7 TO ARRANGE FOR HIRING DRIVERS OF VEHICLES AND BOATS.
- 3.8 TO ARRANGE FOR HIRING SECURITY GUARDMEN AND GUIDES IN THE PROJECT AREA.
- M.* 3.9 TO SECURE QUICK AND ADEQUATE ARRANGEMENTS IN CASE OF EMERGENCY, SUCH AS SUDDEN ILLNESS, INJURY, ACCIDENTS, BITE OF POISONOUS SNAKE, ETC.
- R.3* 3.10 TO NOTIFY TO THE LOCAL AUTHORITIES IN THE PROJECT AREA, INFORMING THEM OF THE PURPOSE OF THE ACTIVITIES OF THE JICA MISSION IN ORDER TO INSURE A SMOOTH AND SAFE OPERATION.

4. TRANSFER OF CARTOGRAPHIC TECHNOLOGY IN JAPAN

IGN INFORMED JICA MISSION THAT THE FOLLOWING PERUVIAN OFFICERS WERE ALREADY APPOINTED AS THE APPLICANTS FOR JICA'S TRAINING IN JAPAN AND THE APPLICATION WOULD BE SUBMITTED TO THE EMBASSY OF JAPAN AS SOON AS POSSIBLE:

NAMES OF THE APPLICANTS:

- Gral Brig Alberto DELGADO VELASCO,
 DIRECTOR OF THE NATIONAL GEOGRAPHIC
 INSTITUTE, FOR A PERIOD OF TWO WEEKS.
- Crl FAP Mario SANCHEZ MORENO JIMENEZ,
 CHIEF OF OPERATION OF THE NATIONAL
 AEROPHOTOGRAPHIC SERVICE, FOR A PERIOD
 OF FOUR WEEKS.
- Major Eng. Gerardo PEREZ DEL AGUILA,
 CHIEF OF GEODESY DEPARTMENT OF THE NA-
 TIONAL GEOGRAPHIC INSTITUTE, FOR A PE-
 RIOD OF FOUR WEEKS.

Handwritten mark or signature.

AT THE CLOSING OF THE MEETING, IGN EXPRESSED ITS SINCERE HOPE FOR CLOSE AND CONTINUOUS COOPERATION OF THE JAPANESE GOVERNMENT FOR THE COMPLETION OF THIS PROJECT. ALTHOUGH THE 1ST YEAR'S WORK (AERIAL PHOTOGRAPHY) HAS NOT SATISFACTORILY PROGRESSED DUE TO THE UNFAVORABLE WEATHER CONDITIONS, DESPITE OF THE STRENUOUS EFFORTS OF THE PARTIES CONCERNED, THE IMPORTANCE OF THE DEVELOPMENT OF THE PROJECT AREA REMAINS. AT THE SAME TIME, IGN HAS REQUESTED THAT THE 2ND YEAR'S WORK BE COMMENCED AS EARLY AS POSSIBLE IN 1983, AS THE WEATHER CONDITIONS IN THE PROJECT AREA WILL BE MORE FAVORABLE.

IN RESPONSE TO THE ABOVE REQUEST, THE JICA MISSION STATED THAT IT HAS FULLY RECOGNIZED LGN'S REQUEST, AND INTENDS TO EXERT ITS BEST EFFORTS FOR COMPLIANCE.

LIMA, OCTOBER 4, 1982



MASAYOSHI TAKASAKI
LEADER, JICA MISSION



GRAL BRIG ALBERTO DELGADO V.
DIRECTOR IGN



KUNIO NONOMURA
TECHNICAL ADVISOR JICA
MISSION

C O N T R A C T
BETWEEN
THE INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION
AND
THE SERVICIO AEROFOTOGRAFICO NACIONAL FOR THE AERIAL PHOTOGRAPHY
OF
THE SATIPO AREA DEPARTMENT OF JUNIN - PERU

THIS DOCUMENT IS TO REGISTER THE SIGNATURE OF THE CONTRACT OF SERVICES FOR THE AERIAL PHOTOGRAPHY OF THE SATIPO AREA IN THE DEPARTMENT OF JUNIN, PERU, WHICH WILL BE SIGNED FOR ONE PARTY, BY THE INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION, HEREINAFTER REFERRED TO AS IECA, REPRESENTED BY MASAYOSHI TAKASAKI WITH THE PASSPORT NUMBER B1157373, WHO IS DULY AUTHORIZED ACCORDING TO THE POWERS CONFERRED TO HIM, AND WHOSE CERTIFIED COPY IS PART OF THIS CONTRACT, WITH PRINCIPAL OFFICE AND PLACE OF BUSINESS IN NEW KOJIMACHI BLDG., 3-23 KOJIMACHI 5-CHOME, CHIYODAKU, TOKYO, JAPAN, AND WITH LEGAL RESIDENCE IN PERU AT IGN BUILDING AT 1198 AV. ARAMBURU - SURQUILLO, AND BY THE OTHER PARTY, THE SERVICIO AEROFOTOGRAFICO NACIONAL, HEREINAFTER REFERRED TO AS SAN, REPRESENTED BY ITS DIRECTOR, MAJOR GENERAL FAP PABLO VARELA NOVELLA WITH IDENTIFICATION NUMBER 9119152, WITH LEGAL RESIDENCE IN LAS PALMAS, DISTRICT OF SURCO OF THIS CAPITAL TOWN; IN THE TERMS AND CONDITIONS HEREINAFTER SET FORTH:

f.
M.
Car.
FIRST: UNDER AN AGREEMENT WITH THE JAPAN INTERNATIONAL COOPERATION AGENCY, IECA IS TO EXECUTE THE AERIAL PHOTOGRAMETRIC SURVEY OF THE SATIPO AREA, PERU, BASED ON THE JAPAN TECHNICAL ASSISTANCE PROGRAM, WHICH INCLUDES THE PRODUCTION OF TOPOGRAPHIC MAPS AT A SCALE OF 1/25,000 OF THE PROJECT AREA FOR THE GOVERNMENT OF PERU, SAN WILL EXECUTE THE AERIAL PHOTOGRAPHY OF THE SATIPO AREA, CONTRACTED WITH IECA.

SECOND: SAN WILL UNDERTAKE AERIAL PHOTOGRAPHY OF AN AREA OF APPROXIMATELY 31,250 SQ. KM. OF THE SATIPO AREA, USING ITS OWN AIRCRAFT OR ONE WHICH IT HAS IN CURRENT POSSESSION; ALSO ITS OWN PLANT, EQUIPMENT, MATERIAL AND SUPPLIES ACCORDING TO THE NATURE OF THE WORK INVOLVED AND REQUIREMENTS AS STATED IN ANNEX 1, WHICH IS ALSO PART OF THIS CONTRACT, AS WELL AS TECHNICAL PERSONNEL.

THIRD: SAN HAS A TIME SCHEDULE OF 75 (SEVENTY FIVE) CALENDAR DAYS FOR THE EXECUTION OF THIS CONTRACT, COMPUTED FROM THE DATE IN WHICH THE WORK WILL BEGIN.

FOURTH: THE LUMP SUM FEE THAT IECA WILL PAY SAN FOR PERFORMING THIS SERVICE AS STATED UNDER THIS CONTRACT IS THREE HUNDRED THOUSAND US DOLLARS (US\$300,000). THE PAYMENTS WILL BE MADE AS FOLLOWS:

- TWENTY (20) PERCENT WITHIN THIRTY (30) DAYS AFTER THE SIGNATURE OF THIS CONTRACT AND AFTER THE COMPLETION OF ON-SITE MOBILIZATION OF PERSONNEL AND EQUIPMENT TO THE WORKING AREA.
- THIRTY (30) PERCENT WITHIN SIXTY (60) DAYS, COMPUTED FROM THE DATE IECA REPRESENTATIVE APPROVES THE PRELIMINARY EVALUATION OF FIFTY (50) PERCENT OF THE ADVANCE OF THE AERIAL PHOTOGRAPHY.
- THE REMAINING FIFTY (50) PERCENT WITHIN SIXTY (60) DAYS AFTER FINAL INSPECTION AND ACCEPTANCE BY IECA.

IN THE EVENT THAT SAN FOR REASONS BEYOND THEIR CONTROL IS UNABLE TO COMPLETE THE WORK WITHIN THE TIME SPECIFIED IN THE CONTRACT, SAN WILL BE ALLOWED PARTIAL PAYMENT FOR THE COMPLETED WORK ON THE BASIS OF THE FOLLOWING FORMULA:

AMOUNT PAYABLE:

J.
M.
Cor.

$$\frac{TA}{TF} \times \text{CONTRACT AMOUNT} - \text{ADVANCE PAYMENT}$$

TA IS THE TOTAL KILOMETERS OF ACCEPTABLE FLIGHT LINE (THE MINIMUM UNIT OF ACCEPTABLE FLIGHT LINE IS EQUIVALENT CORRESPONDING TO EIGHT (8) COMPLETED EXPOSURES): TF IS THE TOTAL KILOMETERS OF FLIGHT LINE OF 4,220 KM. FOR THE CONTRACT.

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
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
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

FIFTH: SAN IS OBLIGED TO SUPPLY IECA ALL THE MATERIALS, AND REPORTS OBTAINED, BY WRITTEN NOTICE OR BY OTHER MEANS PREVIOUSLY AGREED UPON BETWEEN BOTH PARTIES.

IECA RECOGNIZES THE RIGHTS OF OWNERSHIP BY THE PERUVIAN GOVERNMENT OF ALL MATERIALS, AND INFORMATION, AND SAN WILL NOT DISCLOSE TO THIRD PARTIES IN WHOLE OR IN PART FOR ANY PURPOSE, EXCEPT BY SPECIAL PERMISSION OF THE PERUVIAN GOVERNMENT.

SIXTH: IN ORDER TO INSURE THAT THE AERIAL PHOTOGRAPHY WILL BE FLOWN IN ACCORDANCE WITH THE SPECIFICATION OF ANNEX 1, THE FOLLOWING CONDITIONS WILL BE FOLLOWED:

- a) SAN SHOULD ESTABLISH THREE (3) OR MORE WEATHER OBSERVATION POINTS IN THE PROJECT AREA WITH OBSERVERS AT EACH POINT.
- b) IECA MAY ALSO HAVE JAPANESE METEOROLOGICAL OBSERVERS IN THE AREA.
- c) IF THE JAPANESE WEATHER OBSERVERS CALL FOR FLYING, EVEN WHEN SAN'S OBSERVERS REPORT BAD WEATHER CONDITIONS, THE FLIGHT WILL BE EXECUTED BY SAN:

J.
M.
C.
- IN CASE THE AERIAL PHOTOGRAPHY IS NOT OBTAINED DUE TO BAD WEATHER, IECA SHALL PAY A PENALTY OF ONE THOUSAND AND FIVE HUNDRED US DOLLARS (US\$1,500) PER FLIGHT HOUR TO SAN IN ADDITION TO THE CONTRACT SUM.

- IF THE AERIAL PHOTOGRAPHY IS OBTAINED, IT SHALL BE CONSIDERED AS A NORMAL PART OF THE PROGRESS OF THE WORK PERFORMED BY SAN.

- d) WHENEVER NECESSARY, AND AT THEIR REQUEST, JAPANESE EXPERTS SHALL MAKE ACCOMPANYING FLIGHTS WITH PERUVIAN PERSONNEL.
- e) IF THE AIRCRAFT UTILIZED FOR THE AERIAL PHOTOGRAPHY IS GROUNDED FOR MAINTENANCE OR PERIODIC INSPECTION, SAN WILL HAVE ANOTHER AIRCRAFT FOR SUBSTITUTION IN ORDER TO COMPLETE THE WORK WITHIN THE CONTRACTED TIME.

1000

SEVENTH: THE FOLLOWING ARE CAUSES FOR THE RESCISSION OF THE CONTRACT, WITHOUT OBLIGATION TO IECA TO PAY ANY SUM OF MONEY TO SAN:

- a) IF SAN DOES NOT START THE WORK WITHIN THE ESTABLISHED DATE OF THIS CONTRACT, AS SPECIFIED IN ANNEX 1.
- b) IF SAN SUSPENDS THE EXECUTION OF THE WORK FOR A DETERMINATED AND UNJUSTIFIED LAPSE OF TIME.
- c) IF SAN IS UNABLE TO FULFILL THE TERMS OF THE PRESENT CONTRACT OR ABANDONS THE WORK FOR ANY REASON AND DOES NOT REINITIATE WORK WITHIN THE DATE AFTER HAVING RECEIVED WRITTEN NOTICE FROM IECA.

EIGHTH: SAN MAY HAVE THE RIGHT TO RESCIND THE CONTRACT IN THE FOLLOWING CASES:

- a) IF IECA DOES NOT CARRY OUT THE PAYMENTS IN THE WAY PRESCRIBED IN ARTICLE FOUR.
- b) IF IECA DOES NOT CARRY OUT ANY OF THE OBLIGATIONS ASSUMED BY THIS CONTRACT.

NINTH: IT IS NOT A CAUSE OF RESCISSION IN CASE OF NATURAL DISASTERS OR FORCE MAJEURE. IT IS UNDERSTOOD THAT UNCONTROL ACTS OF NATURE OR OF HUMAN BEINGS, RESPECTIVELY, AND AS A CONSEQUENCE, MAKE IT PHYSICALLY IMPOSSIBLE FOR SAN TO ACCOMPLISH ITS OBLIGATIONS.

J. IN SUCH CASES, SAN SHALL NOTIFY IECA IN WRITING STATING THE CAUSE AND BOTH PARTIES SHALL ENDEAVOR TO SOLVE OR OVERCOME THE PROBLEM.

M. NEITHER PARTY SHALL BE OBLIGATED TO RESOLVE OR TERMINATE ANY DISAGREEMENT WITH THIRD PARTIES, INCLUDING LABOR DISPUTES, EXCEPT UNDER CONDITIONS ACCEPTABLE FOR BOTH PARTIES.

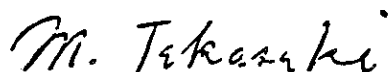
C.S. IF SUCH LABOR CONTROVERSIES CAN BE RESOLVED BY COMPETENT AUTHORITIES OR BY AN ARBITRATOR, THEY SHALL BE ACCEPTED BY BOTH PARTIES IN SUCH A WAY THAT THE CONTINUATION OF THE EXECUTION OF THIS CONTRACT SHALL PROCEED.

THE APPEARANCE OF THESE FORTUITIOUS CAUSES OR FORCE MAJEURE SHALL SUSPEND THE COMPLETION OF THIS CONTRACT IN ITS PRESENT STATE. WITHOUT ANY BLAME OF DELAY TO SAN, NOR ANY REQUEST OF FINANCIAL COMPENSATION OR CONTRACT RESCISSION BY IECA.

TENTH: IECA AND SAN AGREE THAT THE SIGNATURES ON THIS CONTRACT CONSTITUTE MUTUAL AGREEMENT AND GOOD FAITH IN THE TEXT OF THE CONTRACT, NEVERTHELESS, SHOULD THERE BE ANY DISAGREEMENT THAT CAN NOT BE SOLVED BY BOTH PARTIES, THIS DISAGREEMENT SHALL BE REFERRED TO THEIR RESPECTIVE GOVERNMENTS FOR A SOLUTION, ACCORDING TO THE BASIC AGREEMENT ON TECHNICAL COOPERATION BETWEEN THE GOVERNMENTS OF JAPAN AND PERU.

ELEVENTH: THE CONTRACTING PARTIES DECLARE THAT THE SIGNATURES TO THE PRESENT CONTRACT DOES NOT INCLUDE ANYTHING IN CONTRARY THAT WOULD MAKE IT NULL OR VOID, BUT RATIFY THE ELEVEN ARTICLES THAT IT CONTAINS.

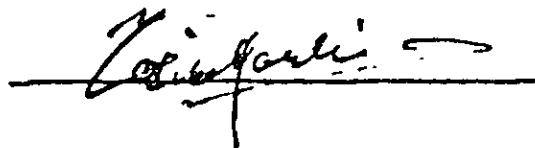
THEREFORE, BOTH PARTIES HEREBY SIGN THE PRESENT DOCUMENT, THE ORIGINALS BEING MADE IN THE ENGLISH AND THE SPANISH LANGUAGES, IN LIMA, ON JULY 13TH., 1982.



MASAYOSHI TAKASAKI
INTERNATIONAL ENGINEERING
CONSULTANTS ASSOCIATION (IECA)



MAJOR GENERAL FAP
PABLO VARELA NOVELLA
GENERAL DIRECTOR OF
NATIONAL AEROPHOTOGRAPHY
SERVICE (SAN)



TAKEHISA HIRABAYASHI
RESIDENT REPRESENTATIVE OF
JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)

REQUIREMENTS AND SPECIFICATION
FOR
THE AERIAL PHOTOGRAPHY
OF
SATIPO AREA, DEPARTMENT OF JUNIN, PERU

1. GENERAL

Aerial photography shall be carried out by SAN for the photographic mapping project of the Satipo Area, of which the survey and mapping have been entrusted to the International Engineering Consultants Association (IECA) by the Japan International Cooperation Agency (JICA).

2. AREA

The area to be photographed is outlined on attached Flight Map marked as Appendix 1, and covers approximately 31,250 sq. Km.

3. COMMENCEMENT OF THE WORK

All arrangement for the personnel of high-skill, materials facilities and/or equipment necessary for this work shall be prepared quickly by SAN so that the flying can be commenced from the Las Palmas Air Base and/or Pucallpa airport within seven (7) days after receipt of the notice of commencement from the International Engineering Consultants Association (IECA). IECA will make every effort to give SAN preliminary notice to start mobilization as far in advance of the notice of commencement as possible. SAN should be in condition to perform with the first priority, the flights requested by IECA.

The whole work shall be complete within seventy five (75) calendar days after receipt of the notice to start the work.

4. REPRESENTATIVE OF IECA ON SITE:

IECA will dispatch its personnel in Peru as its representative in order to supervise and check the photoflights of SAN.

Detail indication and minor modification of the specification as set forth below, within the extent of not affecting contract amount will be made on site by the IECA representative, in mutual agreement by both parties.

5. EQUIPMENT TO BE UTILIZED:

5.1 Aircraft

The survey aircraft to be used in the performance of the contract work shall 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 shall be an unobstructed field of view for the total image area of the camera, shielded from exhaust gases, oil and turbulence of airflow caused by propellers.

J.
M,
P.

5.2 Aerial Camera

Aerial Camera to be used for the photography shall be a modern aerial survey camera such as ZEISS RMK A15/23 or WILD RC-8, RC-10 type with wide angle lens (6 inches focal length), which has a calibration report.

The calibration report should include:

- a) The maker's serial number of the camera and the serial number of the lens.

Handwritten marks or scribbles on the right side of the page.

- b) The coordinates of the principal point with reference to the fiducial marks.
- c) The radial distortions of the image, with reference to the principal point as origin.
- d) The calibrated focal length at which these distortions apply.
- e) The certificate as by whom and when the camera was calibrated.

5.3 All equipment and copies of the last calibration certificate of the above equipment should be agreed on and submitted to IECA before commencement of the work.

5.4 Laboratory

The SAN's laboratory shall be spacious enough to meet the expected operational requirements and shall be adequately equipped and staffed with sufficient qualified personnel to facilitate high quality production in such a volume as the contract may require.

6. PERSONNEL TO BE EMPLOYED:

M.
Z.
SAN should employ or hire skilled and well-trained personnel for this kind of work, and submit to IECA their experience previously for the acceptance of IECA.

7. SPECIFICATION

7.1 Flight Plan

The flight plan is attached as Appendix 1, and was prepared on a topographic map of the area at scale 1/1,000,000. The flight plan shows the lines to be flown and the required coverage beyond the boundaries of the area to be mapped. The directions of the flight lines area shown as such on the flight plan.



7.2 Photo Scale and Altitude

The Aerial photography shall be taken at average scale of 1/60,000.

Flying altitudes for each line are shown on the list of flight line marked as Appendix 2.

7.3 Aerial Film

- a) The aerial film to be used shall be with a fine grain freshly coated emulsion and the base shall have minimum differential distortion.
- b) Negatives shall be clear and sharp in details and of uniform density. They shall be free from tears, scratches and other blemishes.
- c) To ensure dimensional stability, the film shall not be stretched or otherwise deformed in any way. Special care shall be exercised to ensure proper development and thorough fixing and washing of all films, and to avoid rolling of film tightly on drums during processing and drying. About one meter at each end of a roll shall remain unexposed.

7.4 Flying Requirements

- a) The photography will be undertaken so as to provide complete stereoscopic coverage over the specified area.
- b) The area will be covered with straight strips of photographs having overlap of about 60 ± 7 percent. The sidelap (overlap of parallel strips of photography) shall average 30 percent. In no case shall the sidelap be less than 10 percent on the area to be mapped. In the event of considerable variations in ground level, a reasonable increase in the specified overlaps will be accepted.



- c) Crab shall not exceed 10°.
- d) Tip and tilt should not exceed 4°.
- e) The centers of the first one and the last one photograph shall fall outside the required area boundary.
- f) Exposure of photography should be so that even in the shadows caused by topographic relief, satisfactory identification of details is possible.
- g) Where breaks in a flight strip are necessary, the minimum overlap between segments of the strip shall be at least three (3) exposures.

Any segment of a flight strip resulting from necessary breaks shall consist of no fewer than eight (8) exposures.

- h) Reasonable effort will be made to obtain cloud free photographs and five percent of clouds appearing in each photography may be considered as tolerable. In no case, however, shall clouds fall on principal points.

*M.
Ca.*

- i) All flight strips shall be centered as close as possible over flight lines plotted.
- j) Attention of SAN is directed to all existing regulations concerning restrictions and procedures on photography of classified installations and/or reproducing, publishing or selling photographs of such installations.
- k) A flight report has to be delivered for each film containing the following information (see appendix 3).
 - 1) The name of the contract.
 - 2) The name of contractor.
 - 3) The number of the roll.
 - 4) The time of the first and last exposure for each run.

- 5) The date exposed.
- 6) The serial number of the camera, magazine and the lens.
- 7) The calibrated focal length given in the calibration report.
- 8) Lens aperture, filter, shutter speed (average).
- 9) Type of film.
- 10) Type of aircraft.
- 11) Height above sea level.
- 12) Weather conditions, etc.

7.5 Indexing and numbering of films shall be made in mutual agreement by both parties. Each film and each aerial negative shall be marked clearly of the block type lettering approximately one sixth (1/6") inch high and positioned so that each group will not be less than 1/8" or more than 1/4" from the related image edge of the negatives.

- J.*
M.
Car.
- a) Film markings - Each negative roll shall be numbered consecutively starting with No. 001.

Each end of each roll shall be clearly marked with:

1. Contract number of project designation.
2. The name of the area.
3. Roll number.
4. Dates on which exposed, together with relevant negative numbers.
5. Serial number of camera optical unit and the principal distance as shown in the calibration certificate.
6. Corrected height (not indicated height) above mean sea level at which exposed, together with relevant negative numbers.

10

When a roll is exposed at more than one height all heights should be shown against the relevant numbers: e.g.:

011-075 flown at	m above m.s.l.
076-110 flown at	m above m.s.l.
111-200 flown at	m above m.s.l.

b) Negative Numbering

Negative Numbering will be instructed later.

7.6 Contact Prints

a) Contact prints from the negatives of the aerial photography shall be made on double weight semi-matte standard commercial grade photographic paper and shall be trimmed with a margin of approximately one-fourth (1/4) inch outside of the photographic image including the space necessary to show the registering instrument clearly.

b) Special care shall be exercised to ensure the proper development and the thoroughly fixing of contact prints. All prints shall be clean and free from stains, blemishes, uneven spots, light fog, and finger marks, and shall be thoroughly washed to completely eliminate the hypo or any other chemicals which would impair their permanency.

J.
M.
C.

7.7 Photo Index

A photo coverage index of the project shall be prepared to check for overlaps and placement of flight strips against the approved flight plan. The coverage index shall be a line index which shall be prepared on the master reproducible 1:500,000 flight plan sheet.

Handwritten scribble or mark on the right side of the page.

8. PROCESSING AND INSPECTION:

- 8.1 SAN shall process aerial films and make contact prints immediately after every photographic flight are completed in order to make preliminary inspection of the result and instruct re-flight if it is needed.
- 8.2 Quality Control Sheet, to be used for record of the result (Appendix 4) will be inspected by the representative of IECA.
- 8.3 SAN shall follow any reasonable instructions or technical advices given by the representative of IECA.

9. FINAL MATERIALS TO BE DELIVERED

9.1 Negatives, Prints and Reports

The following photographic materials and reports shall be delivered or supplied by SAN:

- a) All original aerial negatives exposed during the aerial photography under this contract. These shall be returned to SAN within 90 (ninety) days after leaving the country, by means of the IGN.

The films are to be on metal spools in original containers properly labelled. The label shall be of durable materials and contain the following information:

- Contract Number of Project Designation.
- Name of Contractor.
- Date Exposed
- Roll Number
- Numbers of First and Last Negatives.

- b) One contact print from every negative of the photography for evaluation.

J.
M.
Z.

- c) One contact print from every negative of all accepted photography.
- d) One set of the photo index in reproducible materials.
- e) All report required by the specifications.

9.2 Shipment of Photographic Materials

J.
M.
Ex
All films shall be thoroughly cleaned, placed on spools and original containers, and sealed with emulsion facing the core of the roll and the outside edge secured to prevent unrolling. Contact prints shall be arranged and bound by flight strip and shall be identified by flight strip number, and relevant roll and negative numbers. Photo index and prints shall be delivered in flat position.

10. DELIVERY POINT:

All finished products and material to be completed by SAN and required under this contract, and all records, drawings and other technical data used by SAN shall be delivered at SAN's expense to the IGN, Lima. Attn.: IECA Representative.

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
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
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

June 28, 1982

To whom it may concern:

Power of Attorney

This is to certify that Mr. Masayoshi Takasaki, Leader of the Japanese survey team for Aerialphotography of Satipo area, Department of Junin in Peru, whose signature is attested below, is fully authorized to sign all documents concerning agreements on the operation for the Aerialphotography of Satipo Area, Department of Junin in Peru, on my behalf.

f.
M.
C.

M. Takasaki

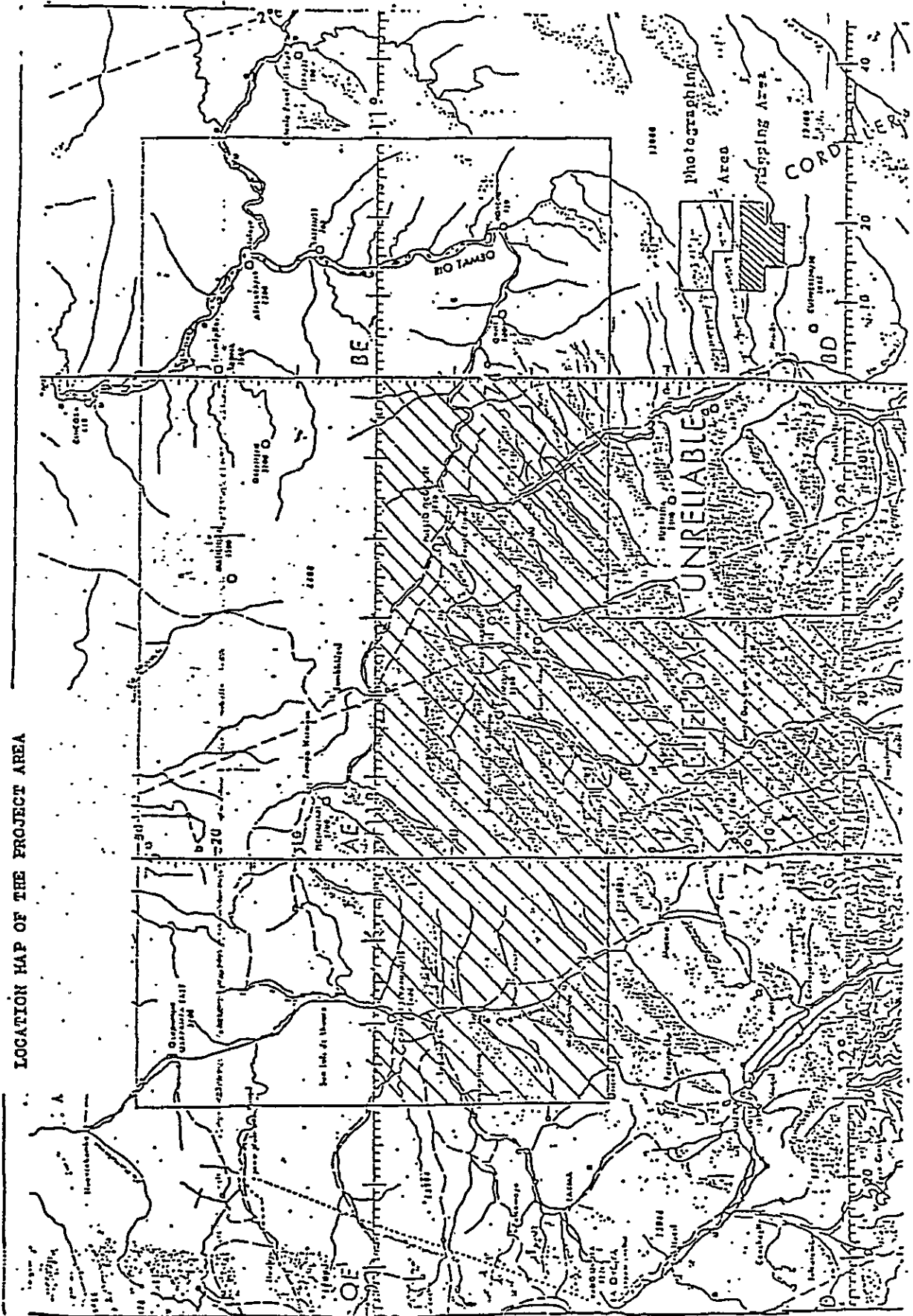
Masayoshi Takasaki

Yoshitomo Oguri

Yoshitomo Oguri
Director in Chief
International Engineering
Consultants Association

APPENDIX I

LOCATION MAP OF THE PROJECT AREA



APPENDIX 2

Line No.	Mean Ground Level	Flight Height (A.M.S.L.)	Line Distance	No. of Exposure (approx.)
	m	m	km	
1	2,000	11,120	42	9
2	2,000	11,120	63	13
3	2,000	11,120	85	17
4	2,000	11,120	106	21
5	2,000	11,120	127	24
6	2,000	11,120	148	29
7	2,000	11,120	168	31
8	2,000	11,120	168	34
9	2,000	11,120	168	34
10	2,000	11,120	168	34
11	2,000	11,120	168	34
12	2,000	11,120	178	34
13	2,000	11,120	198	40
14	2,000	11,120	217	43
15	2,000	11,120	236	50
16	3,000	12,120	239	55
17	3,000	12,120	239	55
18	3,000	12,120	238	55
19	3,000	12,120	224	52
20	3,000	12,120	208	48
21	3,000	12,120	191	42
22	3,000	12,120	175	39
23	3,000	12,120	158	36
24	3,000	12,120	142	32
25	3,000	12,120	126	29
26	3,000	12,120	40	10

 TOTAL

4,220

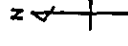
900

J.
M.
Co.

Flight Report

No.

Project Designation	Project No.	Photo-grapher	Pilot	Mechanic	No.
Date of Exposure	Air Base		Type	Take off	:
	Aircraft Regi. Mark		No.	Landing	
Flight Altitude	ft	Field Elevation	Focal Length	Flight Time	hr
	m	(Air Base)	No.	I A S	min
Photo - Scale	1	Mean Ground Elev.	Type	T A S	(Indicated Air Speed)
		Indicated Flight Altitude	Emulsion No.	T A S	(True Air Speed)
Meteorology	Weather	True Flight Altitude	Ground Temp	Altimeter Setting	T/O
	Turbulence	Direction	°C	Ldg.	Ldg.
	Wind Velocity	°C	°C		
	Exp. Counter	Remarks			
	Frame -- To				
	Crab Correct				
	Aperture				
	Shutter Speed				
	Filter				
	Time Start				
	Time Finish				
	Magazine No.				
	Magazine No.				
Roll No.	Line No.				
	Line No.				
	Total Number of Exposure				



QUALITY CONTROL SHEET BY FLIGHT STRIP

Project Designation		Planned		Photographic Scale		Altitude above Ground		Mean Ground Elev		Flight Altitude		Minimum Side Lap		No. No.		%					
Flight Line No		Executed		y		m		m		m		m		No.		%					
Camera / f mm		No.		y		m		m		m		m		No.		%					
Flight Direction		Photographed on		y		m		m		m		m		No.		%					
Date		Time from/to		Difference		m		m		m		m		No.		%					
Photo No	Editing No.	End Lap		Crab	Tilt	Displacement of Line	Gradient	Halation	Shadow Spot	Blur	Emulsion Blemish	Dust and Scratch	Cloud	Smoke and Haze	Vignetting	Electrostatic	Fiducial Mark	Instrument	Other Faults		
		Minimum	Principal																	%	%
5																					
10																					
15																					
20																					
25																					
30																					
Mean, Max, Min																					
Remarks of Contractor										Remarks of IECA Representation											
										Contractor											
										IECA											
										Company											
										Checked on											
										Checked by											
										Inspected on											
										Inspected by											

JICA

1