

7. 所 感

今回の調査対象地域は、インドネシア国内において自然環境の厳しいところの一つとされており、困難な作業であった。しかし、撮影の一部を除き、その他は若干作業法等の変更を伴ったが無事終了することができたのは幸いであった。本作業を通じ、イ側カウンターパートにとっては学ぶところが大であったことと確信される。また、地元民とはトラブルもなく、多方面において多少なりとも日・イ友好親善の実をあげることができたことと思われる。

カリマンタン地方は、イ側政府により、各種の開発計画が急速に進められているが、計画に必要不可欠な地図が未整備なところが多く、総合的な開発計画に支障をきたしている。本調査地域においても、地図の完成をまって、総合計画の策定がなされる計画であり、本プロジェクト完成に大きな期待がかけられている。第2年次作業は、第1年次作業の経験を生かし、綿密な計画準備のもとに遂行されることを期待する。

作業実施にあたって、お世話になったインドネシア公共事業省水資源開発総局（DGWRD，DPU），地理院（BAKOSURTANAL），南カリマンタン州政府をはじめ、タンジュン市役所、警察署、並びに在インドネシア日本大使館、国際協力事業団（JICA），建設省国土地理院等の関係者の方々に厚く御礼申し上げる次第である。

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1000

1. 調査日程

- 昭和58年7月19日(火) JICA作業監理班(GSI小牧氏, JICA浮谷氏)五條団長ほか木村, 大徳, 清水団員日本出発, 同日ジャカルタ着
- 20日(水) JICA事務所, 日本大使館, インドネシア公共事業省(DPU)を訪問, 打合せ
- 21日(木) DPUにて作業計画(Plan of Operation)につき協議開始
- 22日(金) EXSA INTERNATIONAL社と空中写真撮影契約交渉開始
- 24日(日) 小牧, 浮谷, 五條, 村田, 木村バンジャルマシンに移動, 27日ジャカルタ帰還まで南カリマンタン州政府との協義並びに現地関係機関への協力依頼及び予備調査の実施
- 25日(月) 作業隊(富樫団員以下8名)日本出発, 同日ジャカルタ着。
- 26日(火) 作業隊, JICA事務所, 日本大使館, DPU訪問, 打合せ。
- 28日(木) DPUにて協議(作業隊はバンジャルマシンに移動)
- 29日(金) DPUにて議事録署名及びEXSA社にて撮影契約署名(契約期限10月28日)
作業隊タンジュンに移動(ベースキャンプの開設)
- 30日(土) JICA作業監理班(小牧, 浮谷)及び五條団長ジャカルタ発帰国
作業隊は選点及び対空標識設置を開始(8月9日に完了)
- 8月 1日(月) 作業隊の指揮により, インドネシア側埋石作業開始(24日完了)
- 2日(火) EXSA社と撮影に関する細部協議
- 6日(土) 調査用資機材無税通関業務完了, 貨物バンジャルマシンに発送開始
- 7日(日) 大徳, 清水バンジャルマシンに出発(8日タンジュンに移動)
- 9日(火) 木村, 村田バンジャルマシン着, バンジャルマシンDPUと協議
- 10日(水) 木村, 村田タンジュン着
- 11日(木) 木村, 村田タンジュン警察所等訪問
- 13日(土) 木村, 村田ほか2名, NNSS観測法等につきJICAと協議のためバンジャルマシンに出発
NNSS観測開始(9月13日完了)
間接水準測量開始(8月23日完了)
- 14日(日) 木村ほか2名 ジャカルタ行
- 15日(月) JICA事務所, DPUを訪問, NNSS観測法等につき協議

- 8月18日(木) 木村ほか2名, バンジャルマシン DPU にて報告後, タンジュンに帰還
- 19日(金) 清水団員撮影業務のため, バンジャルマシンに移動
- 23日(火) 木村 NNSS No.9 調査に出発(25日タンジュンに帰還)
- 24日(水) 村田 NNSS No.8 視察
2級水準測量開始(10月6日完了)
- 26日(木) 木村, 村田 バンジャルマシンDPUと打合せ(28日タンジュン帰還)
- 9月 1日(木) 木村, 大徳, カウンターパートと共にスラット・ジャランの件でタナグロゴットの警察署訪問(2日タンジュンに帰還)
- 4日(日) 木村, 村田調査報告, NNSS 観測法等についての協議のため, バンジャルマシン経由ジャカルタ行(12日タンジュンに帰還)
- 9日(金) 撮影機 バンジャルマシン空港に到着
- 12日(月) 3級水準測量開始(10月6日完了)
- 17日(土) イスラム生贄祭(休日)
- 18日(日) 木村, 村田 バンジャルマシン DPU 訪問打合せ(21日タンジュンに帰還)
- 22日(木) 内村重則団員高熱のため PERTAMINA 付属病院に入院
(10月2日 バンジャルマシンに移送)
- 27日(火) 木村, 村田 JICAジャカルタ事務所に連絡のため, バンジャルマシン行(28日 タンジュンに帰還)
- 10月 2日(日) 内村 バンジャルマシン SUAKA INSAN 病院に移送(木村同行)
- 7日(金) 調査用器材点検, 清掃, 梱包開始(内村退院)
- 8日(土) 大徳 バンジャルマシン行
- 9日(日) 木村, 大徳調査報告, 調査用器材の発送手配等のため, ジャカルタに出発(内村, メディカルチェックのため同行)
- 10日(月) 村田及び作業隊(8名)タンジュンを撤収し, バンジャルマシンに移動, 器材の発送(以降 15日までデータ整理)
- 16日(日) 富樫以下8名ジャカルタに移動(村田は20日まで撮影監督のためバンジャルマシンに残留)
- 17日(月) 内村 メディカルチェックの結果, 異常なしとの診断結果あり
- 21日(金) 村田 ジャカルタに移動

- 10月22日(土) 富樫以下9名 ジャカルタ発 帰国
- 24日(月) 空中写真仮検査(本日までの仮成果, 累計約85%)
- 25日(火) DPUにて第1年次作業成果等につき協議
- 26日(水) EXSA社にて, 撮影に関する協議
- 28日(金) JICA事務所, DPU等に帰国挨拶
EXSA社より一部撮影実施との報告があったが未確認(契約終了日)
- 29日(土) 木村, 村田, 大徳 ジャカルタ発 帰国
-
- 11月 9日(水) JICA作業監理班(GSI小牧氏, JICA馬渡氏)及び五條団長
日本出発。同日ジャカルタ着
- 10日(木) DPU及びJICA事務所訪問, 打合せ
- 11日(金) DPUにて打合せ, JICA事務所に経過報告
- 12日(土) DPUと協議
- 13日(日) パンジャルマシンに移動
- 14日(月) パンジャルマシン DPUにて打合せ
- 15日(火) タキソン(Takisung)の水準原点視察の後, ジャカルタに移動
- 16日(水) DPUにて打合せ, BAKOSURTANALにてNNSS観測データの
処理方法等につき打合せ, 及びJICA事務所に報告
- 17日(木) DPUにて議事録案につき協議
- 18日(金) JICA事務所へ報告
- 19日(土) DPUにて議事録調印及びJICA事務所に報告
- 20日(日) ジャカルタ発 帰国

2 インドネシア側との協議議事録

(1) 第1回協議(58年7月署名)

Minutes of the Meetings
on
the Topographic Mapping Project
of
the Upstream Area of the Negara
River Basin in South Kalimantan, Indonesia
held in July, 1983

1. The chairman, Mr. Mashudi, delivered an introductory speech for the meeting.
2. The supervisor of the Japanese team, Mr. Kazuo Komaki, briefed the draft of Plan of Operation for the topographic mapping project of the upstream area of the Negara river basin in South Kalimantan, Indonesia. (Attachment 4).
3. The following matters were discussed and confirmed:
 - 1) The Japan side suggested that the scale of aerial photography is changed from 1:60,000 to 1:50,000 due to the altitude of the covered area. The Indonesia side approved it.
 - 2) The Indonesia side recommended to set temporary signals for aerial photography on the control points. The Japan side agreed to set the signals on the horizontal control points.
 - 3) Both sides confirmed that the coordinates obtained by NNSS should be transformed to Padang Datum which adopts the GRS-67 ellipsoid.
 - 4) The Indonesia side suggested that the outline of the work of aerial photography be corrected as shown below:

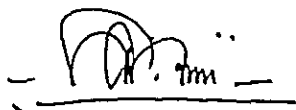
- i) overlap : more than 60%
- ii) sidelap : 30 \pm 5%
- iii) cloud coverage : meets the requirements of aerial triangulation processing and line map compilation.

The Japan side agreed it.

- 5) The Indonesia side suggested that the Doppler observations be conducted by the translocation mode. The Japan side insisted that both sides had agreed that the point positioning mode gives sufficient accuracy for the mapping in the preliminary discussions.
- 6) The Indonesia side confirmed that monumentation of all the horizontal control points and the vertical control points will be conducted by the Indonesia side. And the Indonesia side promised to finish the monumentation of the vertical control points, maximum 25, by the end of August, 1983.
- 7) The Indonesia side confirmed that the Indonesian counterparts, at least four, will take part in the survey.
- 8) The Indonesia side confirmed that DGWRD will be responsible to get all the necessary data to be used by the survey team.
- 9) The Indonesia side confirmed to give assistance for arranging vehicles, laborers and accommodation to the survey team.
- 10) The Indonesia side confirmed to secure clearance of entering the relevant Kalimantan provinces during the survey.

- 11) The Indonesia side expressed the willingness to give assistance for air cargo transportation from Jakarta to Banjarmasin and vice versa.

Jakarta, July 29th, 1983



Ir. Sarbini Ronodibroto
Director of the Directorate
of Planning and Programming,
Directorate General of
Water Resources Development,
Ministry of Public Works



Mr. Kazuo KOMAKI
Supervisor of the Survey Team
for the Mapping Project of the
Upperstream Area of the
Negara River Basin,
Japan International Cooperation
Agency

Attachment 1.

Memo of the Meeting

1. Date and Time: Thursday, July 21, 1983 11:00-14:00 WIST
2. Place : DPU Conference Room, Jl. Sriwijaya Raya 46
3. Attendants :

The Indonesia Side

- Mr. Sarbini Ronodibroto: Director of the Directorate of Planning and Programming, DGWRD.
- Mr. Mashudi : Chief of Sub Directorate of River Basin Planning, Directorate of Planning and Programming, DGWRD.
- Mr. Suharto : Head of Survey and Investigation Section, Dit. of Planning and Programming.
- Mr. Sudyanto : Ass. Region IV of P3SA, Dit. of Planning and Programming.
- Mr. Hariyanto : Staff of Dit. of Planning and Programming.
- Mr. Subandiyo : Staff of Dit. of Planning and Programming.
- Mr. Wrahastirto : Chief of Mapping of Centre Statistic and Processing, Dept. Public Works.
- Mr. Yaya Suyana : Chief of Surveying of Directorate of Swamps.
- Mr. Bambang Sapto : Staff Deputy I of BAKOSURTANAL.
- Mr. Azis Bockings : Staff of Foreign Affair Division, DGWRD.
- Mr. Soeminto : Chief of Mapping of SURTA ABRI.
- Mr. Toekino : JANTOP
- Mr. Mitsuyuki Yuasa : Senior Colombo Plan Expert, DGWRD.
- Mr. Syogo Hosaki : Colombo Plan Expert, South Kalimantan Design Unit.

The Japan Side

Mr. Kazuo KOMAKI : Supervisor of the Japanese Survey Team, JICA, Japan.

Mr. Eiji GOJO : Leader of the Japanese Survey Team.

Mr. Akira UKIYA : Coordinator of the Project, JICA, Japan.

Mr. Mamoru MURATA : Member of the Japanese Survey Team.

Mr. Hiroshi KIMURA : "

Mr. Yoshiaki OHYOKU : "

Mr. Tsutomu SHIMIZU : "

Attachment 2.

Memo of the Meeting

1. Date and Time: Saturday, July 23, 1983 9:30-11:30 WIST
2. Place : DPU Conference Room, Jl. Sriwijaya Raya 46
3. Attendants :

The Indonesia. Side

- Mr. Suharto : Head of Survey and Investigation
Section, Dit. of Planning and
Programming.
- Mr. Sudyanto : Ass. Region IV of P3SA, Dit. of
Planning and Programming
- Mr. Subandiyo : Staff of Dit. of Planning and
Programming.
- Mr. Kartono : Staff of Mapping Centre.

The Japan Side

Same with the Meeting of July 21, 1983.

Attachment 3.

Memo of the Meeting

1. Date and Time: Thursday, July 28, 1983 10:40-13:00 WIST
2. Place : DGWRD Meeting Room
3. Attendants :

The Indonesia Side

- Mr. Suharto : Head of Survey and Investigation Section, Dit. of Planning and Programming.
- Mr. Sudiyanto : Ass. Region IV of P3SA, Dit. of Planning and Programming.
- Mr. Hariyanto : Staff of Dit. of Planning and Programming.
- Mr. Beddi Juwadi : Staff of Dit. of Planning and Programming.
- Mr. Mitsuyuki Yuasa : Senior Colombo Plan Expert, DGWRD.
- Mr. Tamdjid : DPU, South Kalimantan.

The Japan Side

- Mr. Kazuo KOMAKI : Supervisor of the Japanese Survey Team, JICA, Japan.
- Mr. Eiji GOJO : Leader of the Japanese Survey Team.
- Mr. Akira UKIYA : Coordinator of the Project, JICA, Japan.
- Mr. Masayoshi ENOMOTO : Deputy Resident Representative, JICA, Jakarta.
- Mr. Mamoru MURATA : Member of the Japanese Survey Team.
- Mr. Hiroshi KIMURA : "
- Mr. Yoshiaki OHTOKU : "
- Mr. Tsutomu SHIMIZU : "

(Attachment 4)

PLAN OF OPERATION
FOR
TOPOGRAPHIC MAPPING PROJECT OF THE UPSTREAM AREA
OF
THE NEGARA RIVER BASIN IN SOUTH KALIMANTAN
IN
THE REPUBLIC OF INDONESIA

-- 1st Year --

July 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

(内容は省略)

(2) 第2回協議(58年11月署名)

Minutes of the Meeting
on
The Topographic Mapping Project
of
The Upstream Area of the Negara
River Basin in South Kalimantan, Indonesia


Following an introductory speech by Mr. Rachardjo Notosaputro, the Japan side briefed the progress report on the first phase survey and the tentative plan for the second phase survey of the topographic mapping project of the upstream area of the Negara river basin in South Kalimantan (Attachment III). And the following matters were discussed and confirmed by the both sides :

1. Numbering of the Doppler observation points on the final records which will be submitted by the Japanese survey team shall be done as specified by BAKOSURTANAL. And numbering of the vertical control points on the final records shall be done as specified by D.P.U. (Attachment IV,1).
2. The coordinates of the Doppler observation points which will be submitted by the Japanese survey team and used for the photogrammetry are computed with the broadcast ephemeris. And the Japanese survey team will send the data tapes to BAKOSURTANAL by January, 1984 so that BAKOSURTANAL will be able to recompute the coordinates with the precise ephemeris obtained by BAKOSURTANAL. If BAKOSURTANAL will finish the recomputation with the precise ephemeris by the end of July, 1984, the coordinates by the precise ephemeris may be used for the photogrammetry based on the discussion by the both sides which will be held at the end of the field identification (Attachment IV,2,3).

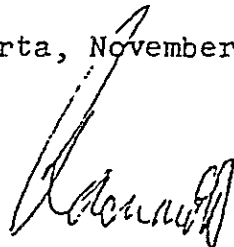
3. The Japan side requested that the clearance for carrying the aerial photos and the related data to Japan shall be completed by the beginning of December, 1983 so that the security officer will be able to come to Japan early in January, 1984. The Indonesia side promised to complete the clearance as soon as possible.

4. Concerning the field identification, field completion in the second phase survey, the Indonesian side requested to reduce the number of the Japanese survey team members and replace by Indonesian consultants in compliance with the government's policy of promoting the Indonesian technical capabilities. The Japan side indicated the difficulty to meet the request from a viewpoint of its policy for making national base maps. The request of the Indonesian side will be conveyed to the Japanese government.

Jakarta, November 19, 1983



Mr. KAZUO KOMAKI
Supervisor of the Survey
Team for the Mapping
Project of the Upstream Area
of the Negara River Basin,
Japan International
Cooperation Agency



Ir. RACHARDJO NOTOSAPUTRO
Acting Chief of Sub Directorate
of River Basin Development
Planning, Directorate of
Planning and Programming,
DGWRD.



Mr. EIJI GOJO
Leader of the Survey Team

Attachment I

Memo of the Meeting (1)

1. Date and Time : Saturday, November 12, 1983 10.00-14.00 WIST
2. Place : DPU Conference Room, Jl. Sriwijaya Raya 46
3. Attendants :

The Indonesian side

- Mr. Rachardjo Natosaputro : Acting Chief of Sub Directorate of River Basin Development Planning, Directorate of Planning and Programming, DGWRD.
- Mr. Suharto : Head of Survey and Investigation Section, Dit. of Planning and Programming.
- Mr. Sudyanto : Ass. Region IV of P3SA, Dit. of Planning and Programming.
- Mr. Hariyanto : Staff of Dit. of Planning and Programming.
- Prof. Jacob Rais : Deputy Chief of BAKOSURTANAL
- Mr. Wrahastirto : Chief of Mapping of Centre Statistic and Processing, Dept. Public Works.
- Mr. Soeminto : Chief of Mapping of SURTA ABRI.
- Mr. Toekino : JANTOP.
- Mr. Mitsuyuki Yuasa : Senior Colombo Plan Expert, DGWRD.

The Japan Side

- Mr. Kazuo Komaki : Supervisor of the Japanese Survey Team, JICA, Japan.
- Mr. Eiji Gojo : Leader of the Japanese Survey Team.
- Mr. Yoshiharu Mawatari : Coordinator of the Project, JICA, Japan.

Attachment II

Memo of the Meeting (2)

1. Date and Time : Thursday, November 17, 1983 10.00-11.30 WIST
2. Place : DGWRD Meeting Room
3. Attendants :

The Indonesian side

Mr. Sudiyanto : Ass. Region IV of P3SA,
Dit. of Planning and Programming.

Mr. Mitsuyuki Yuasa : Senior Colombo Plan Expert, DGWRD.

The Japan Side

Mr. Kazuo Komaki : Supervisor of the Japanese Survey Team,
JICA, Japan.

Mr. Eiji Gojo : Leader of the Japanese Survey Team.

Mr. Yoshiharu Mawatari : Coordinator of the Project, JICA, Japan.

Attachment III

TOPOGRAPHIC MAPPING PROJECT
OF
UPPER STREAM AREA OF THE NEGARA RIVER BASIN
SOUTH KALIMANTAN, INDONESIA

PROGRESS REPORT

FIRST PHASE SURVEY:

AERIAL PHOTOGRAPHY

GROUND CONTROL POINT SURVEY

OCTOBER 1983

JAPANESE SURVEY TEAM FOR TOPOGRAPHIC MAPPING
PROJECT OF UPPER STREAM AREA OF THE NEGARA
RIVER BASIN, SOUTH KALIMANTAN, INDONESIA

(内容は省略)

Attachment IV

Memo of the Details

1. Specifications of Numbering

i) Doppler observation points

temporary		specified
NS1	→	D-A600
:		:
NS7	→	D-A606
NS7'	→	D-A607
:		:
NS10	→	D-A610

ii) vertical control points

temporary		specified
2nd order BM.1	→	U - BM - II - 1
:		:
3rd order BM.1	→	U - BM - III - 1
:		:

2. Formula for Coordinate Transformation

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix} \text{ Padang Datum} = \begin{pmatrix} X \\ Y \\ Z \end{pmatrix} \text{ Broadcast} + \begin{pmatrix} -2^m 691 \\ +14^m 757 \\ -0^m 224 \end{pmatrix}$$

3. Specifications of Data Tape

Contents	Majority Vote Data (JMR)
Format	ASCII
Label	No
Density	1600 BPI

3. EXSA 社との撮影契約書及び同社からの提出文書

(A) 契約書

CONTRACT AGREEMENT

FOR
AERIAL PHOTOGRAPHY OF UPPER STREAM AREA
OF NEGARA RIVER BASIN IN SOUTH KALIMANTAN

BETWEEN
INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION
AND
P.T. EXSA INTERNATIONAL CO. LTD.



CONTRACT AGREEMENT

This contract entered into on this Friday, 29th of July 1983 by and between :

INTERNATIONAL ENGINEERING CONSULTANTS ASSOCIATION, a company - established under the laws of Japan, having its principle office at New Kojimachi Bldg. 3-23, Kojimachi 5-Chome Chiyoda-Ku, Tokyo 102, Japan, hereinafter referred to as IECA.

and

P.T. EXSA INTERNATIONAL CO. LTD., a company established under - the laws of Republic of Indonesia, with its office at Jalan Let. Jen.S. Parman No. 78, 3rd Floor, Slipi, Jakarta, Indonesia, - hereinafter referred as EXSA.

Whereas, IECA, wants to have aerial photography taken on the area of Upper Stream Area of Negara River Basin, South Kalimantan, for the purpose of Water Resources Development.

Whereas, the quotation submitted by EXSA on July 27th, 1983 - No. 558/Dir/EXSA/83, and has been accepted by IECA and therefore IECA has requested EXSA to carry out the aerial photo taking of above mentioned area which is delineated on an attached map.

Whereas, EXSA accepted in accordance with the specifications and the conditions set forth in this Agreement and annexes hereto, - to carry the aerial photo taking Work.

Now therefore, based on and in consideration of foregoing premises and of the term and conditions, herein after provides parties - hereto agree as follows :

ARTICLE 1 - Work

EXSA shall render to IECA and IECA shall accept and pay to EXSA for the services of taking the aerial photographs (hereinafter - referred to as Work) over the area hereinafter defined under the terms and conditions in this Contract Agreement.

ARTICLE 2 - IECA's Representative

IECA shall assign a representative, hereinafter referred to as - IECA's Representative to Work whose duty will be the supervision of Work.

IECA's Representative shall have the right to supervise at any - time during Work on the progress and result of Work described in Article 1.

ARTICLE 3 - Specification

Work shall be performed in accordance with the attached specification (technical Condition and Map 1 : 500.000) as Exhibit A.

ARTICLE 4 - Area to be covered by aerial photographs

Area to be covered is 10,000 Km².

ARTICLE 5 - Scale of aerial photography

Scale of photograph is 1 : 50,000.

ARTICLE 6 - Preparation for the Work

EXSA shall prepare all the necessary high skilled personnel in - taking aerial photographs and required materials, facilities and or equipment for the performance of Work at the air base (job - site). IECA shall have the right to check such materials, - facilities and or equipment at any time during the execution of Work through the IECA Representative or designated person.

ARTICLE 7 - Reporting

EXSA shall submit a written daily report of the Work in English to IECA (or IECA's Representative) and a copy to the Directorate General of Water Resources Development, Department of Public Work in Indonesia.

ARTICLE 8 - Inspection of Result

EXSA shall submit notice of completion to IECA through and with approval of Directorate General of Water Resources Development,

the following result of Work within 7 (seven) days after the completion of the work :

- . Positive film - 1 set
- . Contact Paper Print - 2 sets
- . Index map original - 1 set + copy 2 sets
- . Daily flight report - 1 set

IECA shall inspect such result within 2 (two) days after IECA - receipt of such notice of completion.

If and when such result area not accepted by IECA, EXSA shall make necessary correctional action at once submit them for IECA's - inspection.

ARTICLE 9 - Time of completion

EXSA shall start the work within 7 days after the Security Clearance has been obtained.

EXSA shall complete the work by 28th of October 1983.

ARTICLE 10 - Contract Price

Contract price shall be Japan Free ¥ 92,940,000.-- (Japanese Yen Ninety two million nine hundred and forty thousand) or equivalent in US dollars.

ARTICLE 11 - Payment

1. Advance Payment

An advance money 20% of the contract price shall be paid by - ICCA, in US dollars by telegraphic transfer to the bank account designated by EXSA.

2. Second Payment

Second payment 20% of the contract price shall be paid by IECA in US dollars by Telegraphic Transfer the bank account designated by EXSA, after half (50%) of the area has been covered by photos accepted by IECA.

3. Last Payment

Payment of remaining 60% of the contract price shall be effected in US dollars by Telegraphic Transfer to the bank account designated by EXSA after the Work is completed and accepted finally by JICA.

If the work cannot be completed within the period of the time mentioned on Article 9, then the last payment shall be settled only for the part completed by EXSA which shall be computed using the unit price (unit price is total contract price divided by 10,000 sq kms).

ARTICLE 12 - Force Majeure

EXSA shall not be responsible for any delay to any cause of Force Majeure such as change in laws and regulation of the Government of Republic of Indonesia or Japan, strike and sabotage, revolution, natural disorder, war with or without declaration, blockade, revolution, natural calamities beyond control of EXSA.

If and when such a Force Majeure has continued until the end the time of completion mentioned on Article 9, IECA shall have the right to terminate this contract at any time.

ARTICLE 13 - Liability

IECA shall be exempted from or kept harmless against any damage, loss and or accident incurred on or arisen on the third party in connection with any activity of EXSA during the period of the Work.

ARTICLE 14 - Termination of contract

IECA has the right to terminate Contract an any time in the following case :

1. If IECA judges that completion of Work can not be expected within time of completion as set forth in article 9 due to causes attributable to the default of EXSA.
2. If Work is not fully performed by EXSA in accordance with this Contract and Specification without, at IECA's discretion, justified reason.
3. If EXSA do not commence or suspend work for a certain period without, at IECA discretion, justified reasons after the effective date of this contract.
4. If EXSA violate any provision of this contract and shall not cure it within 10 (ten) days after the notice of breach from IECA.

ARTICLE 15 - Assignment and or subcontractor

Without written consent of IECA, EXSA shall not assign part or - all of this contract to the third party nor Subcontract any - portion of the Work.

ARTICLE 16 - Arbitration

Any dispute, difference or controversy arising out of the parties concerned in connection with this contract or the breach thereof- shall be finally settled in accordance with the rule of the Inter- national Chamber of Commerce, Paris, if amicable settlement can - not be made between the parties concerned.

The award thereof shall be final and binding on both parties.

ARTICLE 17 - Effective date of this contract

This contract shall become effective on the date when EXSA obtain all the necessary permits to perform Work from the Government of - Republic of Indonesia and other related official organizations on its own account and responsibility.

ARTICLE 18 - Changes in Work programme

IECA has the right to change the content of the Work at any time, if necessary, provided time of completion and contract price shall be determined by mutual agreement between both parties.

ARTICLE 19 - Doubt or not specified items

Any doubt in connection with this contract or any item not specified in this contract shall be determined by mutual agreement by both parties.

In witness whereof, the parties hereto have executed this contract by their duly authorized representative in Jakarta, Indonesia, as of the date above written.

For and on behalf of :

INTERNATIONAL ENGINEERING
CONSULTANTS ASSOCIATION



Mr. Eiji Gojo
Managing Director

For and on behalf of :

P.T. EXSA INTERNATIONAL CO. LTD.



Dr. ir. H. Soekotjo Tjokrosoewarno
President Director

SPECIFICATIONS FOR AERIAL PHOTO TAKING OF MAPPING WORK FOR
THE TOPOGRAPHIC MAPPING PROJECT OF UPPER STREAM AREA OF -
THE NEGARA RIVER BASIN, SOUTH KALIMANTAN.

I. General

1. Object

Object of work is to take aerial photo of the Topographic Mapping Project of Upper Stream Area of the Negara River Basin covering an area of approximately 1,000,000 Ha.

2. Others

Any other work not specified in the specification shall be done under instruction of ICEA.

II. Equipment to be employed

1. Airplane (s)

Airplane shall be of the type and capacity which can carry camera specified in II-2 of the Specifications and take - air photos specified in IV-1 of the Specification safely and economically.

Airplane to be employed shall be either Beechcraft SH-18 or air plane of equal performance or of superior performance. Airplane shall be the one which has been checked by regular Air Worthiness Certificate and furnished with an altimeter of high performance which shall be employed for recording altitude in all flying courses.

2. Camera (s) and lenses

Camera (s) and lenses to be used shall be the following ones : Zeiss MRB 9/2323, focal length 8.8 cm.

3. Photo Scale

Approximate photo scale should be in 1 : 50,000 scale.

4. Film

Film shall be Panchromatic Films.

5. Printing Paper

Printing paper shall be Kodak RC paper.

III. Preparation of Work

1. Selection of flying courses

Flying courses shall be arranged and selected under the following basis :

- 1) Flying courses shall be straight
- 2) Flying courses shall be so arranged as to cover prospected areas with minimum photos.
- 3) Flying program shall be so arranged as to facilitate for control points, aerial triangulation mapping, photo - interpretation, etc.

2. Approval of Work schedule

Prior of commencement of Work, Work schedule containing the following items shall be submitted to IECA for its approval.

- 1) Person responsible for work, name (qualifications and experience, etc.)
- 2) Machines and Apparatuses (film, camera and airplane)
- 3) Method of Work (Work schedule, base for work, date of commencement and of completion of work, place and method of development, etc.)

IV. Photo taking

1. Basic conditions

- 1) Flying altitude shall be in principle \pm (4,600 m + 5%) above average terrain height.

- 2) Over lapping of photos shall be more than 60% and side lapping of the photos shall be $30\% \pm 5\%$.
- 3) Total area of every five (5) successive prints in one (1) run should not be covered by cloud more than three (3) %.

2. Adjustment of Photos

Immediately after having taken photos, contract prints - shall be made and submitted to IECA, representative to - check if the photos fulfill all the foregoing conditions and those mentioned in the following. If they have any - defects, the defective parts shall be taken a new for - correction, provided, however, that this shall not apply to the case where the resident representative considers - that defects will neither effect survey works nor interpretation.

- 1) Blurs on the photos caused by vibration of camera, - disorder of shutter, inadequate emulsion improper development, etc.
- 2) Deformation of photos caused by irregular shrinkage of film outside pressure on film at the time of exposure, etc.
- 3) Lack of necessary marking on the photos.
- 4) Other defects which may obstruct survey works, interpretation, etc.
- 5) Record of flying altitude.
Prior to proceeding to flying course, altitude shall be marked clearly each time.

V. Development

1. Development of Panchromatic film shall be processed in the following manner :
 - 1) Development shall be according to the developing instruction given by manufacturer.

- 2) Fine-grain development shall be processed carefully so as to avoid extreme contrast, to obtain and sharp figures in darker parts.
 - 3) No stain not distorsion of the photos shall be made.
 - 4) Fixation shall be conducted perfectly so that no unexposed silver would remain.
 - 5) Films shall be sufficiently washed so that no chemicals will remain.
 - 6) Films shall be dried quickly
 - 7) In developing roll film, both ends of films shall retain more than one (1) metre before cutting.
2. Printing of contract prints shall be processed in the following manner :
- 1) No blur shall occur.
 - 2) Necessary markings of indicator, shall be printed clearly.
 - 3) Development shall be processed as specified in the foregoing paragraph V-1 through 6.
 - 4) Ferrotypes finish not be done.
3. Printing of positive film for plotting shall be processed in the following manner.
- 1) All stipulations for development mentioned in V-2-1 (through 3) shall be observed.
 - 2) Special care shall be taken against shrinkage of films.
 - 3) Density of the positive film, on the range of: 0.3 - 1.2.
 - 4) Density maximum - density minimum on each photographs, not less than 0.5.

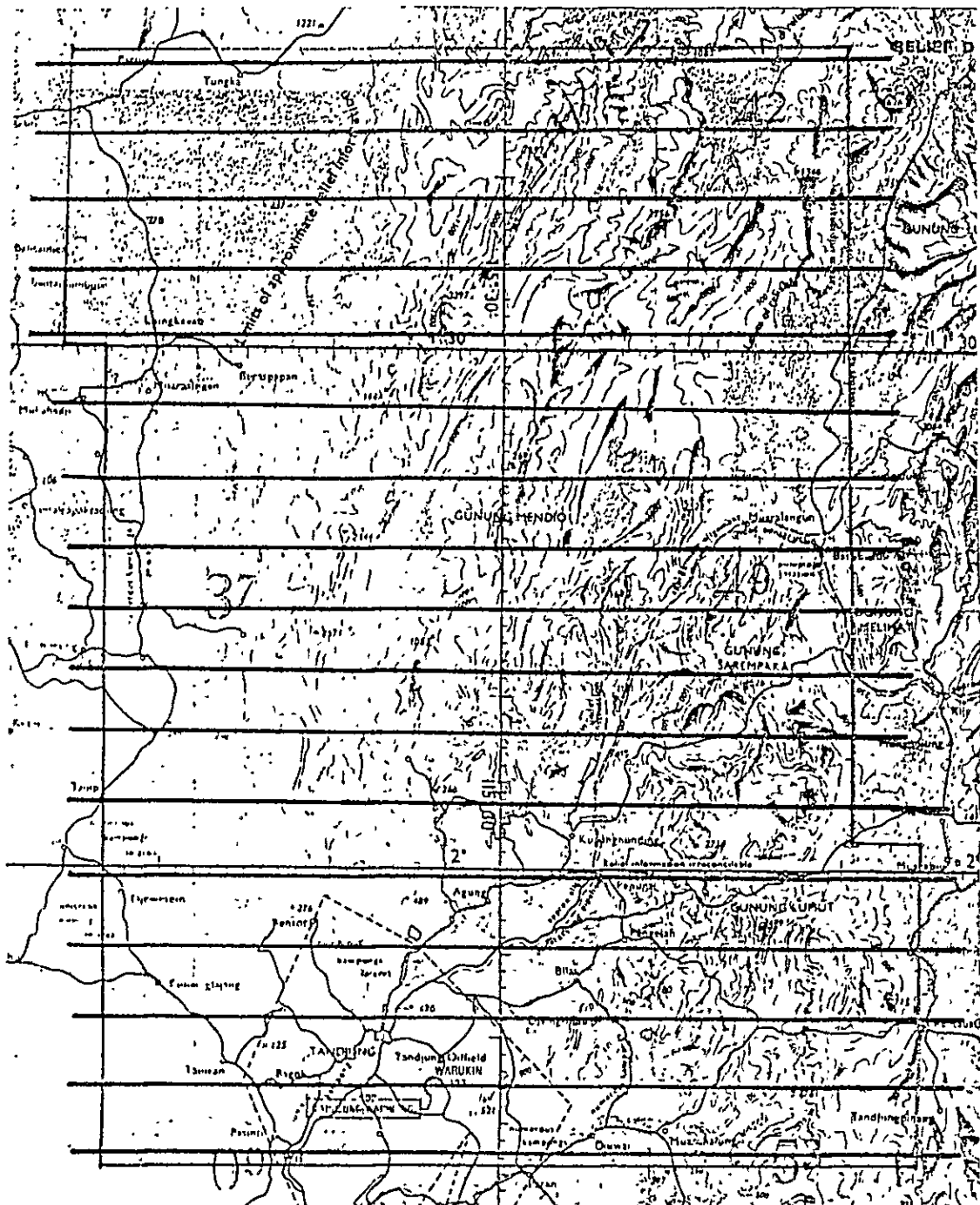
VI. Changes in schedule

In case when EXSA is obliged to effect, by force of circumstances, any changes to the schedule of work, EXSA shall discuss on the matter with IECA and obtain its approval.

VII. Result of Work to be submitted

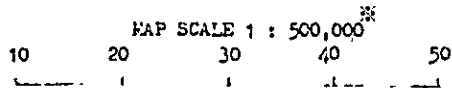
After completion of the whole the following shall be submitted to IECA :

- | | | | |
|-------------------------|---|--------|-----------------|
| 1) Positive film | - | 1 set | |
| 2) Contact Print | - | 2 sets | |
| 3) Index map - original | - | 1 set | (1 : 250,000) |
| - c o p y | - | 2 sets | |
| 4) Daily report | - | 1 set | |



REMARK :

- LOCATION** : UPPER STRAFAN AREA OF NEGARA RIVER BASIN
- SCALE** : 1 : 50,000 (10,000 km²)
- : AERIAL PHOTOGRAPHY AREA
- : FLIGHT COURSE (17 Course)
is to be referred to the 1 : 250,000 Flight Plan



(scale reduced)

(B) 提出文書

PT EXSA INTERNATIONAL CO LTD



Head Office : Jalan Raya Jakarta Puncak
Km. 72.6 Cibogo, Phone (0251) 4138-4256, P.O. Box 93 Bogor
Jakarta Office : Jalan Letjen S. Parman No. 78
3rd, Floor Slipi, Phone : 593675 - 542178,
Telex : 45808 Exsa 1A, Cable - KONEKSA Jakarta, Indonesia

Page

LIST OF PERSONNEL
FOR
AERIAL PHOTOGRAPHY OF UPPER STREAM AREA
OF NEGARA RIVER BASIN IN SOUTH KALIMANTAN

NO.	N A M E	POSITION	REMARK
1.	Martono	Capt. Pilot	
2.	Suparno	Capt. Pilot	
3.	Tan G.P.	Capt. Pilot	
4.	Utoyo	Co. Pilot / Mechanic	
5.	Turkan	Co. Pilot / Mechanic	
6.	Pudjono Ar.	Navigator	
7.	S u m a r d i	Cameraman	
8.	Subaryanto	Photo Laborant	

Approved by :
International Engineering
Consultants Association

(M. Murata)
Mamoru Murata

Aerial Photographic Supervisor

Jakarta, August 8, 1983

P.T. EXSA International Co. Ltd.

P.T. EXSA
INTERNATIONAL

(Signature)
Ir. Leo Nardy

Director

PT EXSA INTERNATIONAL CO LTD



Head Office : Jalan Raya Jakarta Puncak
 Km. 72.6 Cibogo, Phone (0251) 4138 4256, P.O. Box 93 Bogor
 Jakarta Office : Jalan Letjen S. Parman No. 78
 3rd, Floor Slipi, Phone : 593675 - 542178,
 Telex : 45808 Exsa IA, Cable : KONEKSA Jakarta, Indonesia

Page :

LIST OF EQUIPMENT AND MATERIAL
 FOR
 AERIAL PHOTOGRAPHY OF UPPER STREAM AREA OF
 NEGARA RIVER BASIN IN SOUTH KALIMANTAN

NO.	N A M E	MERK/TYPE	AMOUNT
1.	<u>EQUIPMENT</u>		
	- Aircraft	Beechcraft S.18	1 unit
	- Aerial Camera	MRB. 9/2323 F. 88 mm	1 unit
	- Contact Print	Gordon	1 unit
	- Film Dryer	-	1 unit
2.	<u>MATERIAL</u>		
	- F i l m	Kodax Double X	
	- Paper Print	R.C. Paper	
	- Chemical	DK. 50 Dektol Unifix	

Approved by :
 International Engineering
 Consultants Association

(M. Murata)
 (Mamoru Murata)
 Aerial Photographic Supervisor

Jakarta, August 8, 1983

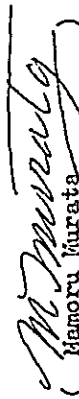
P.T. EXSA International Co. Ltd.

P. I. **EXSA**
 INTERNATIONAL
(Signature)
 Ir. Leo Nardy
 Director

SUNGAI NEGARA UPPER STREAM AERIAL PHOTOGRAPHY

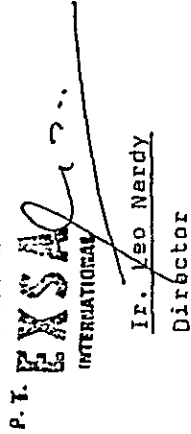
NO.	DESCRIPTION	J U L Y	A U G U S T	S E P T E M B E R	O C T O B E R	REMARK
1.	Contract Sign					• Signing Contract
2.	Preparation : - Security Clearance - Signalization - Mobilization		— — :			• Mobilization
3.	Air Photo Taking (1:50,000)		— — —			
4.	Film Processing		— — —			
5.	Navigation Print (Checking)		— — —			
6.	Devinitive Print					

Approved by :
International Engineering Consultants Association


(Mamoru Murata)

Aerial Photographic Supervisor

Jakarta, 8th August, 1983
P.T. EXSA International Co. Ltd.

P. T. **EXSA**
INTERNATIONAL

I.P. Yeo Nardy
Director

4. ネガラ河流域地図作成 Scope of Work

SCOPE OF WORK
FOR
THE TOPOGRAPHIC MAPPING PROJECT
OF
THE NEGARA RIVER BASIN
IN
SOUTH KALIMANTAN
IN
THE REPUBLIC OF INDONESIA

AGREED UPON BETWEEN
THE MINISTRY OF PUBLIC WORKS
OF
REPUBLIC OF INDONESIA
AND
JAPAN INTERNATIONAL COOPERATION AGENCY
AT JAKARTA
ON APRIL 14TH, 1983

Toshitomo Kanakubo

Mr. Toshitomo KANAKUBO

Head of the Preliminary Survey
Team for the Mapping Project of
Negara River Basin, Japan Inter-
national Cooperation Agency

Sarbini RonodibROTO

Ir. SARBINI RONODIBROTO

Director of the Directorate of
Planning and Programming,
Directorate General of Water
Resources Development,
Ministry of Public Works.

I. Introduction

In response to the request made by the Government of the Republic of Indonesia, the Government of Japan has decided in accordance with the relevant laws and regulations in force in Japan to conduct the topographic mapping project of the Negara River Basin, South Kalimantan, the Republic of Indonesia (hereinafter referred to as "the Project")

The Project is prerequisite for the planning of regional development, especially for the planning of water resources development mainly concerning agricultural development projects.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Project in close cooperation with the authorities concerned of the Republic of Indonesia.

The present document sets forth the scope of work with regard to the above mentioned Project.

II. Outline of the Project

The Project will be composed of the following works:

1. The Upper Stream Area of the Negara River Basin
 - Aerial photography at the scale of 1:60,000 covering an area of approximately 10,000 km².
 - 1:50,000 scale topographic mapping (contoured at 25 meter intervals) covering an area of approximately 6,500 km².

Note: 1) Aerial photographs at the scale of 1:100,000 taken by BAKOSURTANAL will be supplementaly used.

2) Location of the Project area is shown in Appendix I.

2. The Down Stream Area of the Negara River Basin

- Black and white panchromatic aerial photography in the dry season at the scale of 1:20,000 covering the area of approximately 1,200 km² in Amuntai region.
- Black and white panchromatic aerial photography for getting information of the land situation in the rainy season at the scale of 1:20,000 covering the area of approximately 1,200 km² in Amuntai region.
- Topographic mapping in the form of 1:10,000 scale controlled mosaic photo-map, which is produced based on the aerial photographs taken in the dry season and represents the necessary land information of the rainy season, in the above area.
- Black and white panchromatic aerial photography in the dry season at the scale of 1:20,000 covering the area of approximately 5,100 km² in the region between Amuntai and Banjarmasin.

Note: The location of the Project area is shown in Appendix II and Appendix III.

III. Working Plan

The entire work shall be carried out under a three-year program starting from the fiscal year of 1983 and shall consist of the following phases :

A. Phase 1. Aerial Photography and Ground Control Point Survey (Satellite Geodesy, Triangulation, Traversing and Leveling.)

1-1. Aerial Photography

1-1-1. Aerial photographs shall be taken at the scale of approximately 1:60,000 with a super wide angle camera and at the scale of approximately 1:20,000 with a wide angle camera in the Upper Stream Area and the Down Stream Area respectively.

1-1-2. Signalization shall be done prior to the aerial Photography when necessary.

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

Although established ground control points will be used for the photographic control and mapping, ground control point survey will be carried out according to the accuracy requirement as specified for mapping at the required scale.

1-2-1. Satellite Geodesy.

Geodetic controls by means of the artificial satellite doppler system shall be carried out in order to supplement basic geodetic control points.

1-2-2. Triangulation and Traversing.

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

1-2-3. Leveling

In the Upper Stream Area, second and third order and indirect leveling shall be carried out to obtain vertical controls necessary for aerial triangulation and mapping work starting from the existing bench marks.

In the Down Stream Area, fourth and minor order leveling shall be carried out to obtain vertical controls necessary for aerial triangulation and mapping work starting from the existing bench marks.

1-2-4. Monumentation

Monuments for control points and bench marks should follow the national specifications of Indonesia.

B. Phase 2. Pricking, Field Identification, Aerial Triangulation and Stereo-plotting.

2-1. Pricking.

Pricking in the field shall be done for aerial triangulation.

2-2. Field Identification.

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

Administrative boundaries and geographical names to be printed on the maps shall be identified in the field by the Indonesian team.

2-3. Aerial Triangulation.

Aerial triangulation shall be carried out by an analytical method using comparators and electronic computer.

Adjustment shall be carried out by a block adjustment method.

2-4. Stereo-plotting.

In the Upper Stream Area, the plotting shall be carried out using stereo-plotting instruments at the scale of 1:50,000 with 25 meter contour interval. The sheet line shall be 15' in longitude and 15' in latitude.

Map specifications shall be in principle the same as those of the national base map (of the same scale) of Indonesia.

In the Down Stream Area, the plotting of spot heights shall be carried out based on the field survey and by the photogrammetric method, and contour line shall be represented on the photo maps at 5 meter intervals. The sheet line shall be 5' in longitude and 3' in latitude.

C. Phase 3. Field Completion, Color Separation Drafting, Printing, Preparation of Photo-Map and Reproduction.

3-1. Field Completion

Topographic features, vegetation, etc., which cannot be plotted shall be supplemented on the compiled sheet of topographical maps in the Upper Stream Area. Administrative boundaries and geographical names shall be verified and supplemented, if necessary, on the paper copy of the compiled sheet by the Indonesian team.

3-2. Color Separation Drafting in the Upper Stream Area.

Based on the compiled sheet, scribing shall be carried out on a stable polyester base for each color separation plate. Style sheet, colors and symbols shall be those of the national base map of Indonesia.

3-3. Color Proof Prints and Printing in the Upper Stream Area. Color proof prints shall be inspected and approved by the Indonesian team prior to the final printing.

Plate-making shall be carried out using 1:50,000 scribed negatives and printing shall be carried out by the offset method.

3-4. Preparation and Reproduction of Photo-Map in the Down Stream Area.

Photo-map shall be prepared by conventional rectification. On the photo-map, contour lines, spot heights and other useful information shall be presented.

Original negatives of photo-maps shall be prepared for photographic reproduction.

IV. Time Schedule.

The whole work in the Upper Stream Area and in the Down Stream Area shall be conducted in accordance with the time schedule as shown in Appendix IV and Appendix V respectively. The whole work shall be completed within three years.

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

V. Reports and Final Results.

The reports will be presented to the Government of the Republic of Indonesia by JICA at the end of each phase. The materials mentioned in Appendix VI will be turned over to the Government of the Republic of Indonesia by JICA after the whole work is completed and they

shall be the property of the Government of the Republic of Indonesia.

VI. Undertaking of the Government of Indonesia.

1. To facilitate smooth implementation of the Project, the Government of Indonesia will take the following necessary measures :
 - (1) To secure the safety of the Japanese survey team.
 - (2) To exempt the Japanese survey team from the payment of local income tax for the salaries and allowance and to exempt from local security taxes, custom duties or other charges on equipment, machinery and other materials brought into Indonesia for the Project.
 - (3) To secure permission of entry into private properties and restricted areas and of felling trees for the purpose of the Project activity.
 - (4) To secure clearance of flight for aerial photography and use of airport related to the Project.
 - (5) To secure clearance for the use of communication facilities including transceiver with allocated frequency and electronic distance measuring instruments.
 - (6) To arrange for medical care when needed.
 - (7) To secure clearance for taking necessary materials, especially maps, aerial photographs and control points data, from Indonesia to Japan, subject to the security regulation of the Government of Indonesia.
2. The Government of Indonesia shall bear claims, if any arises, against the members of the Japanese survey team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese survey team.
3. The Directorate General of Water Resources Development of the Ministry of Public Works (hereinafter referred to as "DGWRD")

shall act as counterpart agency to the Japanese survey team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Project.

4. DGWRD shall, at its own expense, provide the Japanese survey team with the following items of (1) to (5) and shall arrange for or assist the Japanese survey team with the following items of (6) to (9), in cooperation with other agencies concerned, if necessary.

- (1) Available data, documents, materials and information related to the Project
- (2) Counterpart personnel
- (3) Suitable office with necessary equipment in the key towns
- (4) Credentials of identification cards
- (5) Establishment of the monuments of the control points and the bench marks in the Project area
- (6) Hiring of vehicles, boats, and other transportation facilities for field survey when necessary
- (7) Available necessary staying accommodation
- (8) Hiring of laborers as needed
- (9) Securing clearance of entering South Kalimantan, Central Kalimantan and East Kalimantan Provinces.

VII. Undertaking of the Government of Japan.

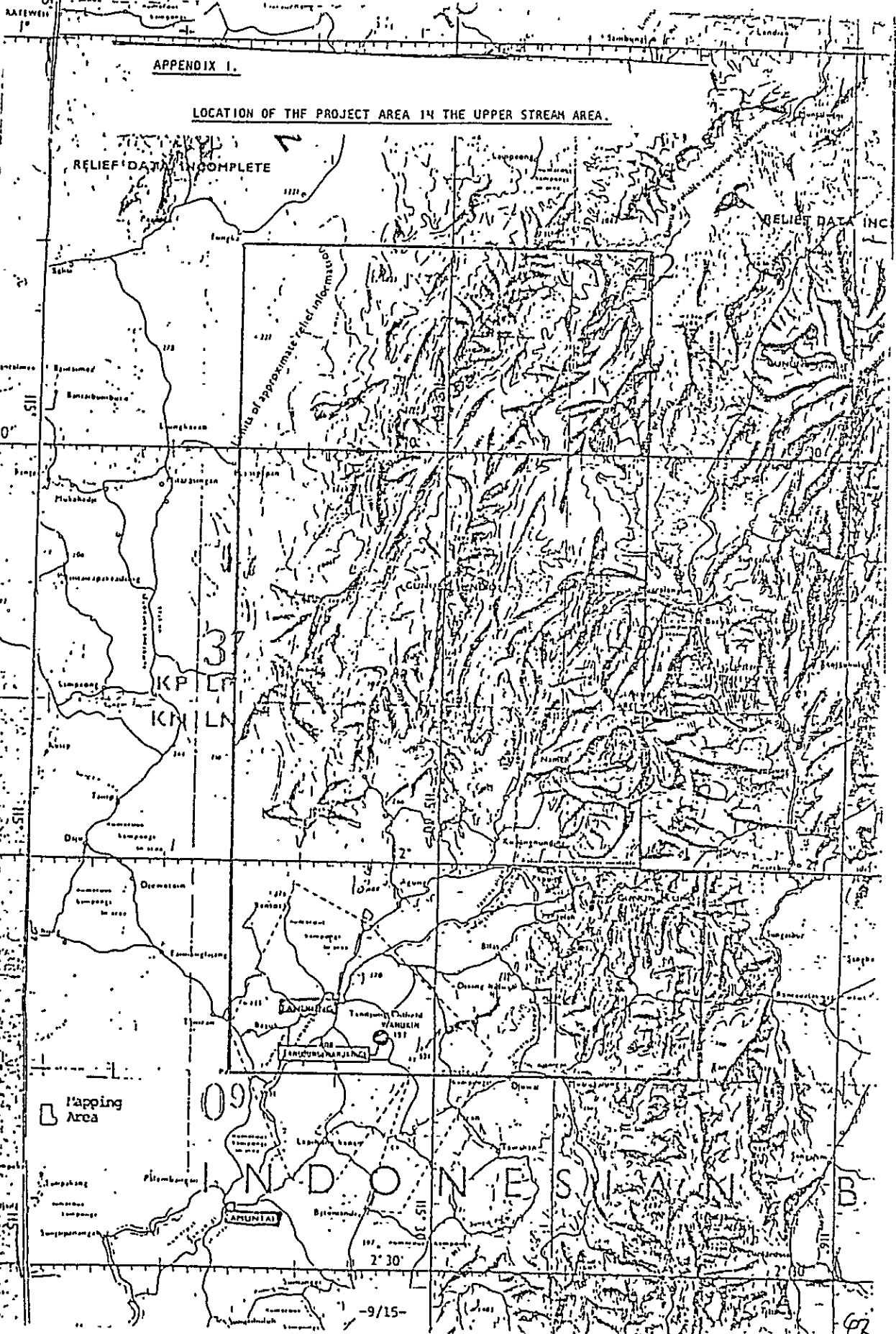
For the implementation of the Project, the Government of Japan will, in accordance with the relevant laws and regulations in force in Japan, through JICA, take necessary measures as follows :

- 1) To dispatch a Japanese survey team to carry out the Project.
- 2) To carry out necessary work in Japan.
- 3) To prepare necessary survey equipment and instruments as listed in Appendix VII and any other equipment and materials necessary for the Project.

- 4) To pursue technology transfer to the Indonesian personnel in the course of the Project.

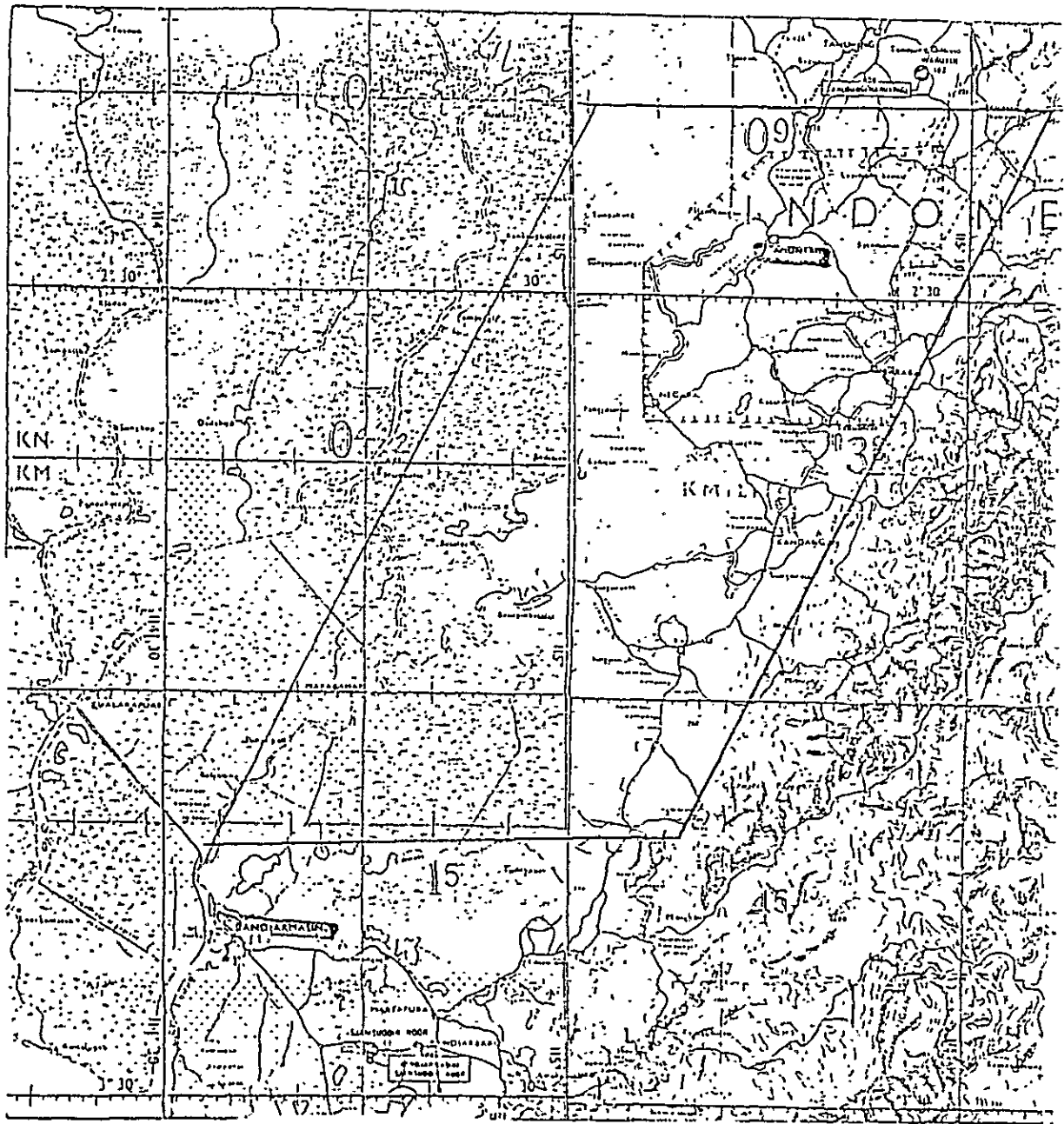
VIII. Modifications of the Scope of Work.


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




APPENDIX II.

LOCATION OF THE PROJECT AREA IN THE DOWN STREAM AREA (Aerial photography)

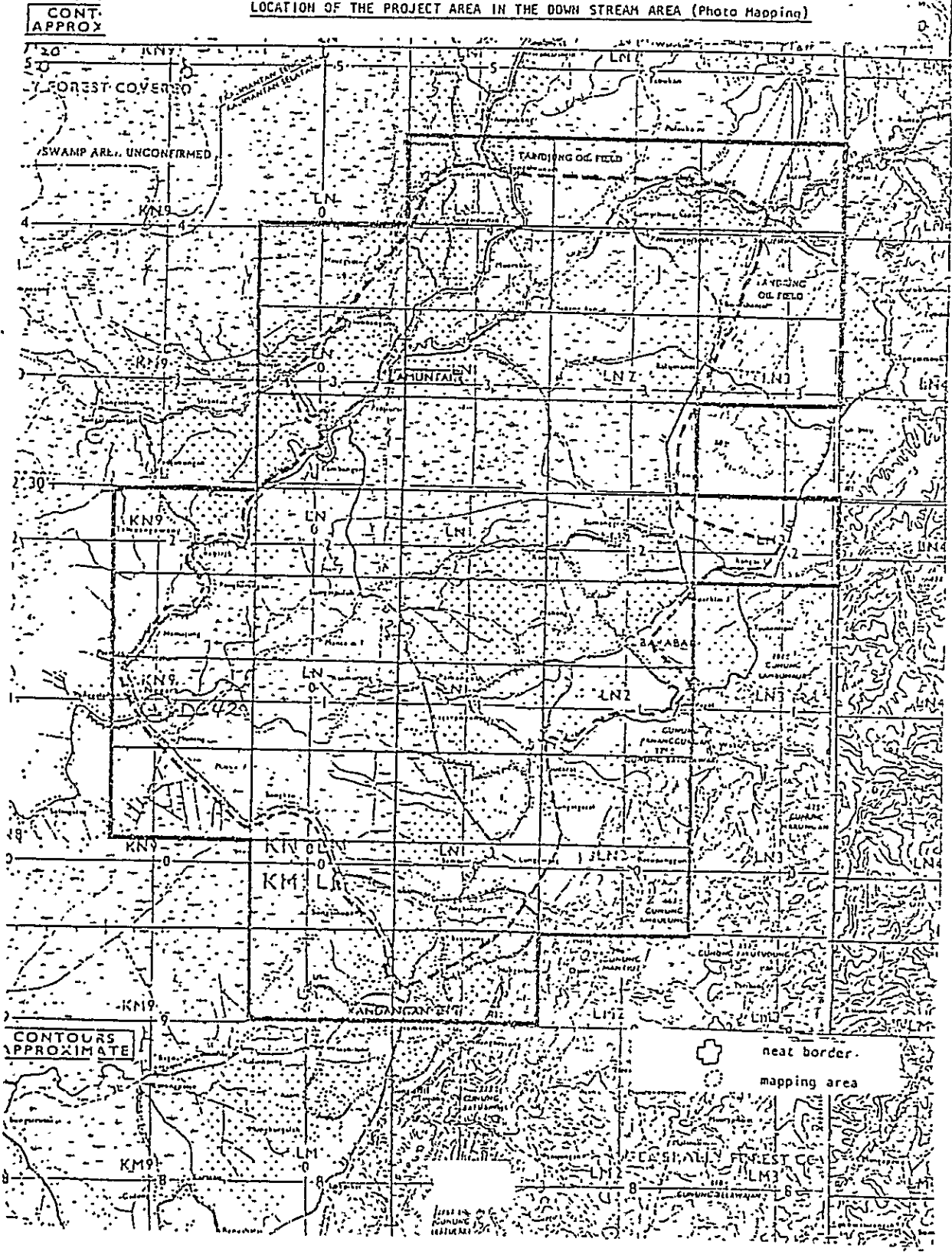


 Aerial Photography in Dry Season

 Aerial photography in Dry and rainy season

APPENDIX III.

LOCATION OF THE PROJECT AREA IN THE DOWN STREAM AREA (Photo Mapping)



APPENDIX IV

TIME SCHEDULE IN THE UPPER STREAM AREA

ITEM	1st Year			2nd Year			3rd Year					
	Apr. 1983	Mar. 1984		Apr. 1984	Mar. 1985		Apr. 1985	Mar. 1986				
SIGNALIZATION	4	5	6	7	8	9	10	11	12	1	2	3
AERIAL PHOTOGRAPHY	—	—	—	—	—	—	—	—	—	—	—	—
CONTROL POINT SURVEY	—	—	—	—	—	—	—	—	—	—	—	—
LEVELING	—	—	—	—	—	—	—	—	—	—	—	—
PRICKING	—	—	—	—	—	—	—	—	—	—	—	—
FIELD IDENTIFICATION	—	—	—	—	—	—	—	—	—	—	—	—
AERIAL TRIANGULATION	—	—	—	—	—	—	—	—	—	—	—	—
STEREO PLOTTING & DRAWING	—	—	—	—	—	—	—	—	—	—	—	—
FIELD COMPLETION	—	—	—	—	—	—	—	—	—	—	—	—
PRINTING	—	—	—	—	—	—	—	—	—	—	—	—

Note: Time schedule mentioned above is tentative and subject to change.

APPENDIX V

TIME SCHEDULE IN THE DOWN STREAM AREA

ITEM	1st Year	2nd Year	3rd Year
	Apr. 1983 - Mar. 1984	Apr. 1984 - Mar. 1985	Apr. 1985 - Mar. 1986
SIGNALIZATION	4 5 6 7 8 9 10 11 12 1 2 3	4 5 6 7 8 9 10 11 12 1 2 3	4 5 6 7 8 9 10 11 12 1 2 3
AERIAL PHOTOGRAPHY	(dry season)	(rainy season)	
CONTROL POINT SURVEY			
LEVELING			
PRICKING			
FIELD IDENTIFICATION			
AERIAL TRIANGULATION			
SPOT HEIGHTS, RECTIFICATION, MOSAICING			
PREPARATION OF PHOTO-MAP			
REPRODUCTION			

Note: Time schedule mentioned above is tentative and subject to change.

APPENDIX VI

FINAL RESULTS

- 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 in the Upper Stream Area
 1. Pricked photos and identified photos
 2. Original manuscripts
 3. Diapositives
 4. Aerial triangulation results
 5. Color separation scribed sheets
 6. 1:50,000 scale topographic maps (1,000 sets)

- IV. Photo-mapping in the Down Stream Area
 1. Pricked photos and identified photos
 2. Original manuscripts
 3. Diapositives
 4. Aerial triangulation results
 5. 1:10,000 scale photo-map (200 sets)
 6. Original negative of photo-map (1:10,000 scale)

•

APPENDIX VII

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

1. Theodolites
2. Electronic distance measuring equipment
3. Shortwave transmitter receivers
4. Transceivers
5. Heliotropes
6. Signal lamps
7. Doppler observation system
8. Auto-levels with staves
9. Electronic calculators
10. Camping materials
11. Generators
12. Small instruments, office equipment and consumables

Note: 1. Above list is tentative and subject to alteration.

2. Number and type of each equipment will be informed to the DGWRD prior to the implementation of the Project.

