5. Detailed Plan of Operations

5.1 Projection, Coordinates and Datum Elevation

Projection to be used for the topographic surveying and mapping shall be Universal Transverse Mercator (UTM) with the Bessel Spheroid.
Horizontal coordinates shall be UTM. Coordinates system, zone 47 with its central meridian 99 ° E and 0° (equater) as the origin of coordinates.
Datum elevation for the vertical control shall be mean sea level (MSL.) at the Gunung Sitoli Port.

5.2 Aerial Photography

Details of the aerial photographs to be taken are as follows:

Type of photograph	: Panchromatic black and white.
Photo scale	: 1/20,000
Lens	: F=150 *mm*
Flinght lines	: 8 courses
Stereo Models	: 57 models
Areas to be covered	: 200 *Km²*

These areas and flight lines are shown in Fig. 2.

5.3 Ground Control Survey

5.3.1 Monumentation and Signalization

Nineteen (19) monuments of vertical and Horizontal ground controls will be established with concrete piles.
Signals to identify these ground controls on the aerial photographs shall be attached on the monuments and/or their eccentric points. Descriptions of the monuments and signals shall be prepared.
Planned location of the monuments are shown in Fig. 3.

5.3.2 Tidal observation

Tidal observation to determine mean sea level (MSL.) shall be carried out at a sea shore near the Gunung Sitoli Port.

Minimal duration of the tidal observation shall be one month. Obtained observation data will be processed with the harmonic analysis methods. The MSL. determined by the tidal observation will be used as the datum elevation for the vertical ground controls.

5.3.3 Leveling

Direct leveling to connect all the vertical ground controls shall be carried out along main roads. The leveling shall be started at and ended on a bench mark established by the tidal observation.

The level points approximately every 1km along the leveling routes shall be pricked and shown on the aerial photographs.
The specifications are as follows:

Length of the leveling routes : Approximately 210km
Number of points to be measured : 20 points
Number of points to be pricked : Approximately 150 points
Accuracy : 10mm $\sqrt{S}$ on paved roads,
20mm $\sqrt{S}$ on unstable land.
(S is the length of a leveling route in km)

Planned leveling routes are shown in Fig. 3 .

5.3.4 Traversing

Traversing to establish horizontal ground controls shall be carried out along main roads. Reference points for the traversing shall be existing GPS stations established by Bakosurtanal in 1989～90.
The specifications are as follows:

Length of the traversing routes : Approximately 210km
Number of points to be observed : 19 points
Accuracy : Liner misclosure shall not be over 1/10,000 of traversed distance.
Anguler misclosure shall not be over 10" $\sqrt{N}$ (N is number of turning points)

Astronomical observation to establish azimuth shall be carried out approximately every 25 stations along the traversing routes.

Planned traversing routes are shown in Fig. 3 .

5.3.5 Field Identification

Field identification to identify natural and artificial terrain features which are difficult or impossible to interpret on the aerial photographs shall be carried out in the mapping areas.

5.3.6 Spot Leveling

Spot leveling to establish spot heights shall be carried out in flat areas in the mapping areas.
The specifications are as follows:

Density : One point per hectare
areas : Approximately 12,000ha
Accuracy : within ±5cm

The spot leveling shall be started at and ended on points previously established by the direct leveling.

5.4 Photogrammetric Mapping

5.4.1 Aerial Triangulation

Analytical aerial triangulation for photo control shall be carried out.
The specification are as follows:

Number of stereo models : 49 models
Number of flight lines : 8 courses
Accuracy : Vertical and Horizontal misclosures shall not be over 0.8‰ of the flight altitude.

5.4.2 Photogrammetric Plotting

1:5,000 topographic maps shall be prepared by the photogrammetric plotting.
The specifications are as follows :

Contour lines interval : 1 meter (to be plotted by using the results of the spot leveling as supplementary data)
Spot heights : Every 2cm on the 1/5,000 maps.
Mapping areas : 120㎢

The mapping areas are shown in Fig. 2. .

5.4.3 Editing and Drawing

Editing of plotting manuscripts shall be carried out to prepare pencil manuscripts. Fair drawing shall be carried out to prepare the original 1:5,000 topographic maps.
The specifications are as follows:

Mapping sheets : 80cm ×60cm, 19 sheets

Field completion shall be carried out with plotting manuscripts before the fair drawing is started.

Reproductions will be produced after the fair drawing is completed.

5.5 Reporting

Technical report on the topographic surveying and photogrammetric mapping shall be prepared by the JICA Survey Team and submitted to DGWRD. at the end of the surveying and mapping work. Monthly progress report shall also be prepared by the JICA Survey Team and submitted to DGWRD. every month during the working period.

6. Schedule

1) Work schedule : Shown in Table 1.
2) Assignment schedule : Shown in Table 2.

7. Final Products to be Delivered

1)	1/5,000 original topographic maps	1 set
2)	1/5,000 topographic maps, second original	2 sets
3)	1/5,000 topographic maps, blue print	10 sets
4)	1/20,000 aerial photographs, negatives	1 set
5)	1/20,000 aerial photographs dia positives	1 set
6)	1/20,000 aerial photographs, contact prints	3 sets
7)	Aerial triangulation results	1 set
8)	Tidal observation results	1 set
9)	Leveling results	1 set
10)	Traversing results	1 set
11)	Spot leveling results	1 set
12)	Description of ground controls	1 set
13)	Field identification results	1 set

8. Undertaking of The Government of Indonesia

For this Project, it is requested that the Government of Indonesia agrees to the followings:

8.1 To provide following data and information for JICA Survey Team:

- List of geographical names and administrative borders in the project area.
- List of coordinates of existing control points which have been established by the Government of Indonesia.

8.2 To relieve the members of the Survey Team from income tax and from import/export duties for the goods necessary for the Project.

8.3 To arrange necessary permits for the Survey Team.

8.4 To arrange to assign counterparts to the Survey Team during the survey period.

8.5 To provide the Survey Team with suitable office space and office equipment necessary for the Project.

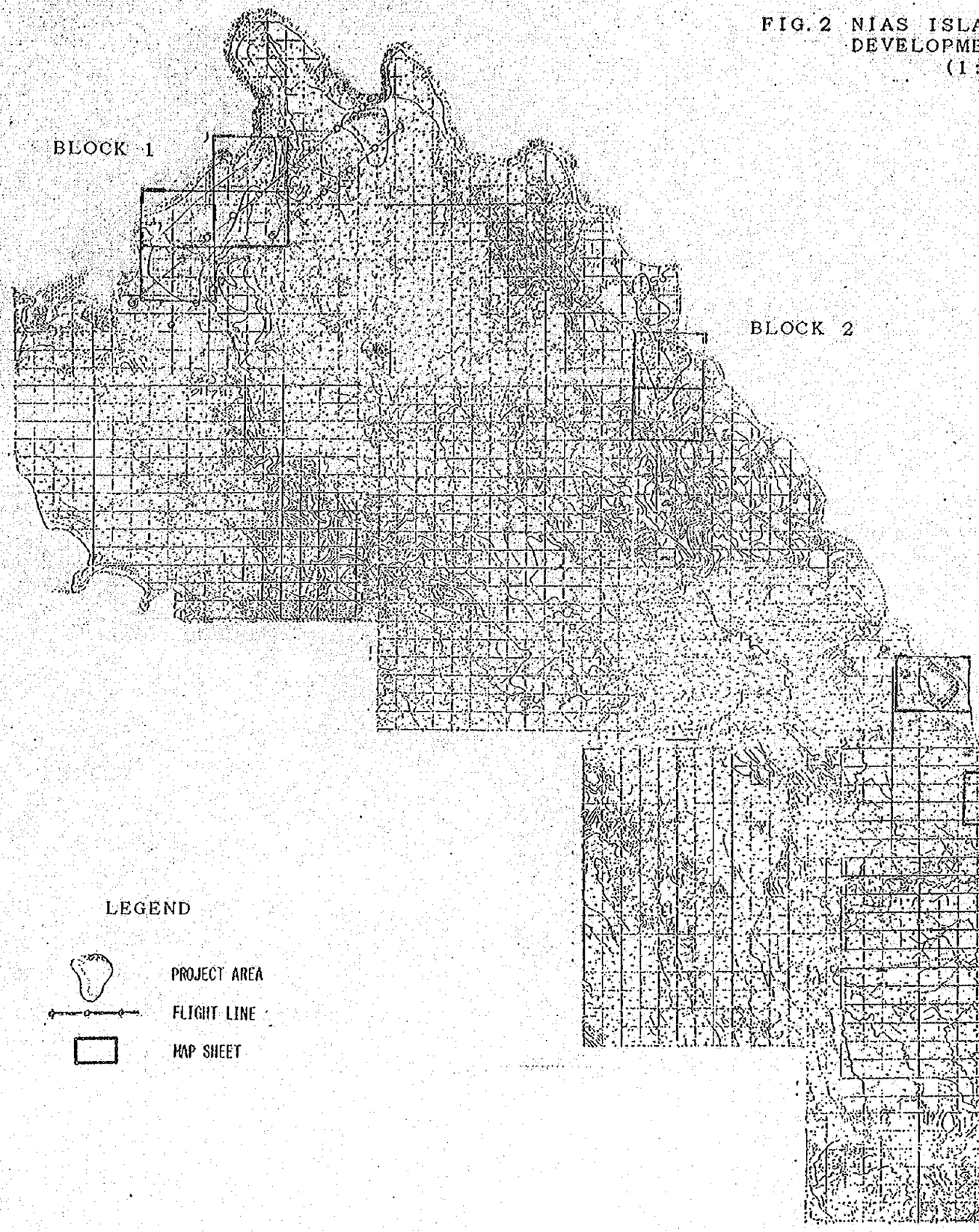
8.6 To make arrangement for accommodations for the Survey Team.

8.7 To make arrangement for drivers, local laborers, and vehicles for the Survey Team.

8.8 To provide medical services for the Survey Team when necessary.

8.9 To ensure the security of the Survey Team and its equipment to the greatest extent possible.

FIG. 2 NIAS ISLAND IRRIGATION AGRICULTURE DEVELOPMENT PROJECT (TOPOGRAPHIC MAPPING) (1:250,000)



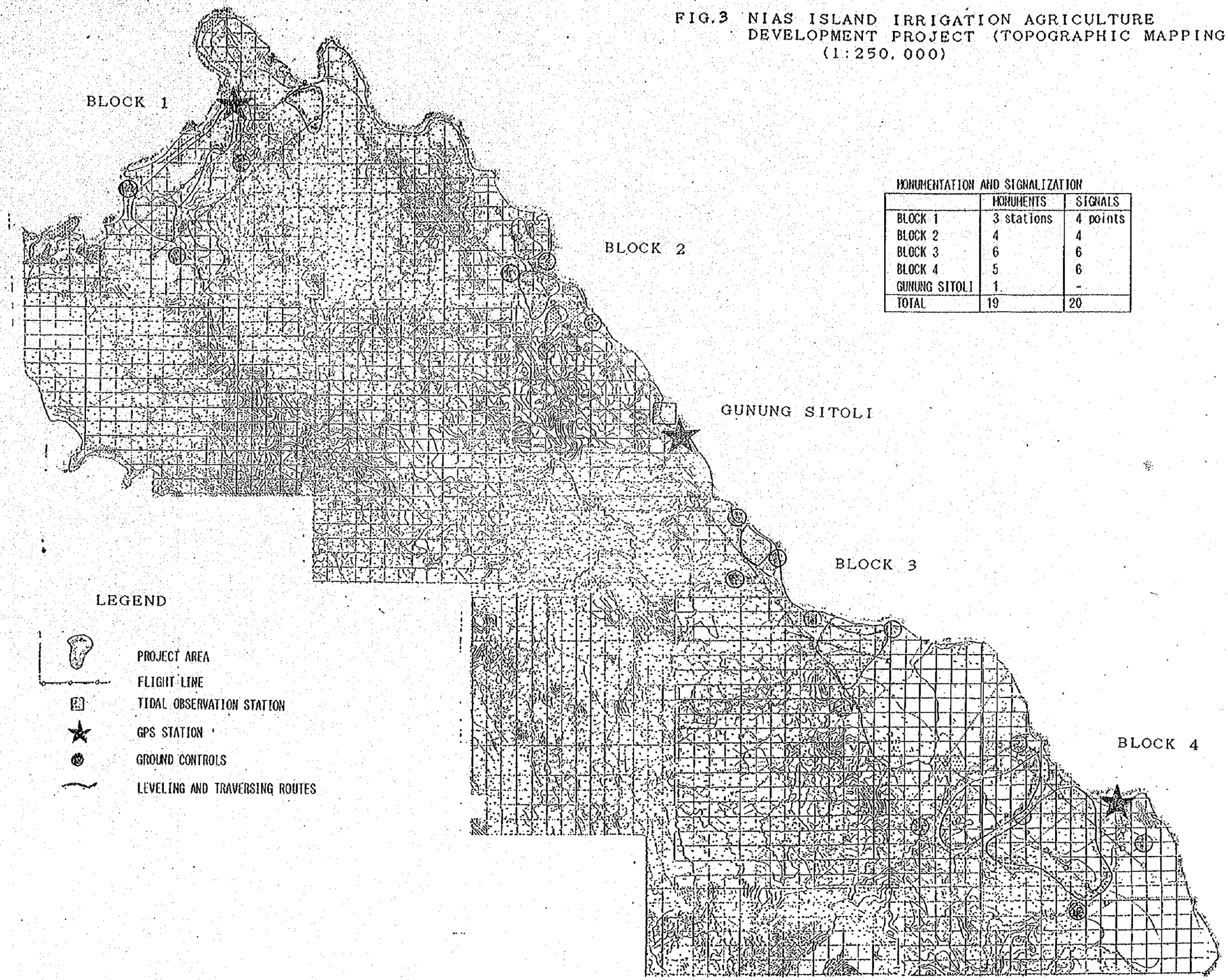
MAPPING AND PHOTOGRAPHY AREAS

	MAPPING AND PHOTOGRAPHY	PHOTOGRAPHY
BLOCK 1	HUZOI HUHIAZA (2600ha)	TOROWA (262ha)
BLOCK 2	AFIA (713ha) TO'O HILIMBOWO (150ha)	LEWUOMBANUA (360ha)
BLOCK 3	NDRA HUMENE (314ha) GIDO ZEBUA (1,438ha)	——
BLOCK 4	MEZAWA I (2,300ha) MEZAWA II (3,500ha)	——

FLIGHT LINES AND STEREO MODELS

	FLIGHT LINES	STEREO MODELS	TO BE USED FOR AERIAL TRIANGULATION
BLOCK 1	2	18	12
BLOCK 2	1	6	4
BLOCK 3	2	13	13
BLOCK 4	3	20	20
TOTAL	8	57	49

FIG.3 NIAS ISLAND IRRIGATION AGRICULTURE DEVELOPMENT PROJECT (TOPOGRAPHIC MAPPING) (1:250,000)



MONUMENTATION AND SIGNALIZATION

	MONUMENTS	SIGNALS
BLOCK 1	3 stations	4 points
BLOCK 2	4	4
BLOCK 3	6	6
BLOCK 4	5	6
GUNUNG SITOLI	1	-
TOTAL	19	20

TABLE 1

WORK SCHEDULE

ITEMS	YEAR	1990								1991	
	MONTH	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.
PREPARATORY, CONTRACT, ETC.											
AERIAL PHOTOGRAPHY											
MONUMENTATION AND SIGNALIZATION											
TRAVERSING											
TIDAL OBSERVATION											
LEVELING											
SPOT LEVELING											
FIELD IDENTIFICATION & FIELD COMPLETION											
AERIAL TRIANGULATION											
PHOTOGRAMMETRIC PLOTTING											
EDITING											
DRAWING											
DELIVERY IN JAKARTA											
DELIVERY IN TOKYO											

NOTE : ——— FIELD WORK ····· WORK IN JAPAN △ REPORTING

TABLE 2

ASSIGNMENT SCHEDULE

ASSIGNMENT	NAME	1990								NOTE
		MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	
TEAM LEADER	H. GOTO			9					26	
GEODETIC ENGINEER	S. SATO			23			5			
PHOTOGRAMMETRIC ENGINEER	T. WATANABE						19		26	

NOTE —— FIELD WORK

APPENDIX - 2 TENDER DOCUMENTS

PRE-QUALIFICATION QUESTIONNAIRE

1. Name of company, addresses of head office and branch offices, telephones, telex and faximile number.

2. Names of key persons : Chairman of the board, President and Directors.

3. Year of the establishment of the company.

4. Issued and authorized capitals.

5. Total number of employees.

6. Technical staff : Number of qualified persons, their education and experiences.

7. Major equipment and instruments owned by the company :

   Equipment for the field survey ;
   Electro optical distance meter (EDM), Theodolites,
   Levels and their accessaries.

   Instruments for the photogammetry;
   Aircraft for aerial photography, aerial cameras.
   Electonic computer, soft wares for the field survey and the photogrammetry
   Stereo pricking devices
   Stereo comparators
   Stereo Plotters
   Photo laboratory facilities

8. Major photogrammetric mapping projects executed by the comany in the recent five years.

9. Financial statements in the recent two years.

Japan International Cooperation Agency (JICA)
Nias Island Irrigation Agricultural Development project
(Topographic Mapping)
Feasibility Study Team

July , 1990
Ref. No.

To : Messrs.

Re: Invitation to Tender for survey and topographic mapping for the Feasibility Study on Nias Island Irrigation Agricultural Development Project

The Nias Island Irrigation Agricultural Development Feasibility Study Team (hereinafter called the Employer), which is entrusted the Feasibility Study on the Nias Island Irrigation Agricultural Development by the Japan International Cooperation Agency (JICA), invites a sealed Tender for the survey and topographic mapping work for the captioned Project(hereinafter called the Work).

If you are interested and in a position to undertake the Work, you are requested to submit to us your tender as specified in the Tender Documents.

Your tender will be received at the following address at 10:00 a.m. July, 1990.

Team Leader
JICA Study Team for Feasibility Study on Nias Island Irrigation Agricutural Development C/O Directorate Irrigation I, Ministry of Public Works.
Jl. Pattimuta 20 Kby. Baru Jakarta Selatan

Your kind attention to this matter will be highly appreciated.

Vere truly yours,

Hajime GOTO
Team Leader

INSTRUCTION TO TENDERERS

1. The Tender herein called for is on Survey and Topographic Mapping Work and other subordinate works for the Feasibility Study on Nias Island Irrigation Agricultural Development which is carried out by the Nias Island Irrigation Agricultural Development Feasibility Study Team (hereinafter called Employer) entrusted by the Japan International Cooperation Agency (JICA) and the Directorate General of Water Resources Development(DGWRD).

2. The outline of the Work

(1) Name of the Work:

Survey and topographic mapping work for the Feasibility Study on Nias Island Irrigation Agricultural Development.

(2) Location of the Work:

Areas in Nias Island along the East Coast, Sumatra Utara Province.

(4) Period of the Work:

The survey and photogrammetric mapping shall be started from July , 1990 and completed by December , 1990.

(5) Scope of the Work:

See the Specifications.

3. The Tenderer is provided with Form of Agreement and Specifications for the preparation of the Tender. The Tenderer can visit and inspect the site at their own cost before tendering.

4. The Tenderer shall submit to the Employer his Tender at 10:00 a.m. July , 1990.

5. The Tenderer shall briefly describe in his Tender the plan of operation including time schedule, the serial number, model names, capacity, accuracy and other particulars of the air craft, aerial cameras, the survey equipment and photogrammetric instruments including electronic computer with its softwares as well as the intended and reliable time of mobilization.

The tender shall also include description about number of engineers and assistants for the Work and the curricula vitae of the engineers in charge and the chief engineers who will be resident in the site.

6. The Tender shall be made in accordance with the indicated items and work quantities in the attached form which will be the basis of measurement and payment. The Tenderer shall submit to the Employer the breakdown of unit prices and lump sum prices quoted when required by the Employer.

7. At the time of signing of the Contract Agreement, the Contractor shall deliver to the Employer of Performance Guarantee in an amount equal to ten percent (10%) of the total Contract Price, which shall be executed by a bank acceptable to the Employer and shall be valid until the date of completion of the Work. The cost incurred for establishing the Performance Guarantee shall be borne by the Contractor. Such Performance Guarantee shall bear no interest and shall be released upon written request of the Contractor after completion of the Works.

8. After the Tender is submitted, the Tenderer may be called for the negotiation about the Tender Price. However, no increase of the Tender Price will be negotiable.

9. All costs necessitated for the tendering in the part of the Tenderer shall be due to the Tenderer's expenses.

PERFORMANCE GUARANTEE FORM

Ref. No.
Date
Guarantee No.of Bank

Team Leader
JICA Study Team for
Feasibility Study for
Nias Island Irrigation Agricultural Development

In accordance with the provisions of the Tender Documents dated July, 1990 for the Survey and Topographic Mapping Work for the Feasibility Study on Nias Island Irrigation Agricultural Development, Messrs./Mr. having its principal office at represented by are/is required to submit a bank guarantee for the amount of Indonesian Rupiahs (Rp.), valid for ( ) months which include the estimated period from the date of signing of the said Contract.

Accordingly, the undersigned does hereby guarantee and undertake during the above mentioned period to immediately pay to you upon your demand the amount of Indonesian Rupiahs (Rp.) without any reservations.

The guarantee will remain valid until 4:00 p.m. of ,1990 and the undersigned hereby consents to any extension of such validity upon receiving instructions from the Team Leader of the JICA Study Team for the Feasibility Study on Nias Island Irrigation Agricultural Development on whose behalf this guarantee has been issued.

Bank

By
Title

TENDER FORM

Team Leader
JICA Study Team for
Feasibility Study on
Nias Island Irrigation Agricultural Development
C/O

Having carefully examined and understood the Tender Documents dated July, 1990 for the Survey and Topographic Mapping Work for the Feasibility Study on Nias Island Irrigation Agricultural Development, we hereby offer to do and complete the Work in accordance with the said Tender Documents and the schedules and documents submitted herewith and to perform all the obligations to be performed by the Contractor under the terms of the said Tender Documents for the sum of Japanese Yen (Yen.)

In the event this Tender is accepted, we undertake to execute, when called upon to do so, a formal contract for the due execution of the Work in terms of the annexed Agreement.

And we further agree, in the event of our failure to execute such Contract within fifteen (15) days of being so called upon to do or failure to provide a Performance Guarantee specified in the Instructions to Tenderers that any acceptance of this Tender may be revoked by you.

This Tender shall be valid for a period of_____
( )Days From July, 1990.

Signed this th day of July ,1990.

Signature :
Title :
Name of Tenderer :

Address of Tenderer

Seal of Tenderer :

FORM OF AGREEMENT

THIS AGREEMENT is made on the th day of , 1990 between the JICA Study Team for the Feasibility Study on Nias Island Irrigation Agricultural Development (Hereinafter called the Employer) of the one part and x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x (hereinafter called the Contractor) of the other part.

WHEREAS the Employer is desirous that survey and mapping work should be undertaken for the Survey and Topographic Mapping Work (hereinafter referred to as the Work) for the Feasibility Study on Nias Island Irrigation Agricultural Development.

WHEREAS the quotation and proposal submitted by the Contractor have been accepted by the Employer.

NOW THEREFORE, it is hereby agreed by and between the parties hereto as follows:

1. The following documents, although not limited thereto, shall be deemed to form and be read and construed as parts of this Agreement viz:

   (1) Invitation to Tenderers
   (2) Instruction to Tenderers
   (3) Tender Form and Appendices
   (4) Performance Guarantee Form
   (5) Form of Agreement
   (6) Specifications

2. The Contractor shall commence the Work within seven (7) days after the Employer issued a Work Order.

3. The Contractor shall complete the Work by December , 1990.

4. The Contractor shall obtain all insurance required by all relevant Indonesian Government regulations.

5. It shall be understood that, to acquire permits for carrying out the aerial photography and the field survey at the site, the Contractor shall arrange necessary procedures with the government sections and the third parties concerned.

6. Scheduled quantity of the Work is as shown in the Bill of Quantities attached to the Specifications. The location and area to be survey and mapped are shown on the location map.

The quantity and the location mentioned above may be subject to revision in the course of the Work depending on new findings. However, the total mapping area will not be changed. No claim shall be entitled to the Contractor with regard to the revision of the plan.

7. The total contract amount shall be the sum of the contract amounts of all work items to be calculated based on the work actually performed. The contract amount of each work item shall be product of the unit price set forth in the Bill of Quantities attached to the Specifications and the work quantity which will have been approved by the Employer's Representative for the specified work item. Costs for insurances shall be proportioned to the sum of the contract amounts of all the work items.

8. The entire work shall be completed within the period as prescribed in the Specifications. If the Contractor fails to accomplish the entire work within the specified period, the Employer shall have the right to terminate this Agreement regardless of the cause of the failure.

9. In case that the termination of the Agreement is declared by the Employer, payment shall be made only for the work done by the time of declaration.

10. The payment to the Contractor shall be made within thirty (30) days after the acceptance of bills submitted together with necessary documents by directed the Employer. The mode of payment are as follows.

The First Installment : Fourty percent (40%) of the total amount set forth in the Bill of Quantities within thirty(30) days after signing of the Contract, provided that all necessary arrangements and mobilization at the site shall have been completed in the opinion of the Employer's Representative and the survey work shall have been started.

The Second (Final) installment : The rest of the contract amount shall be paid upon completion of the aerial photogrammetric mapping, provided that the maps and necessary survey data shall be satisfactory to the Employer's Representative.

11. The Employer is entitled to shift a part of the Work to the other contractor if work progress dose not cover fifteen percent (15%) in the first one month after issuance of the Work Order.

12. The Employer agrees to pay to the Contractor in consideration of the fulfillment of the Work, the Contract Price of Japanese yen XXXXXXX X XXXXXXXXXXXXXXXXXXX(Yen) in accordance with the terms and conditions specified in the Agreement.

13. This Agreement shall become effective on the date of signing of the Agreement.

IN WITNESS WHEREOF, the Parties hereto have caused this agreement to be signed in their respective names, as of the day and year entered first above written.

For and behalf of	For and behalf of
The CONTRACTOR :	The EMPLOYER :
	Team Leader(Survey and Mapping) JICA Study Team

SPECIFICATIONS FOR SURVEY AND TOPOGRAPHIC MAPPING WORK

FEASIBILITY STUDY

ON

NIAS ISLAND IRRIGATION AGRICULTURAL DEVELOPMENT

IN

THE REPUBLIC OF INDONESIA

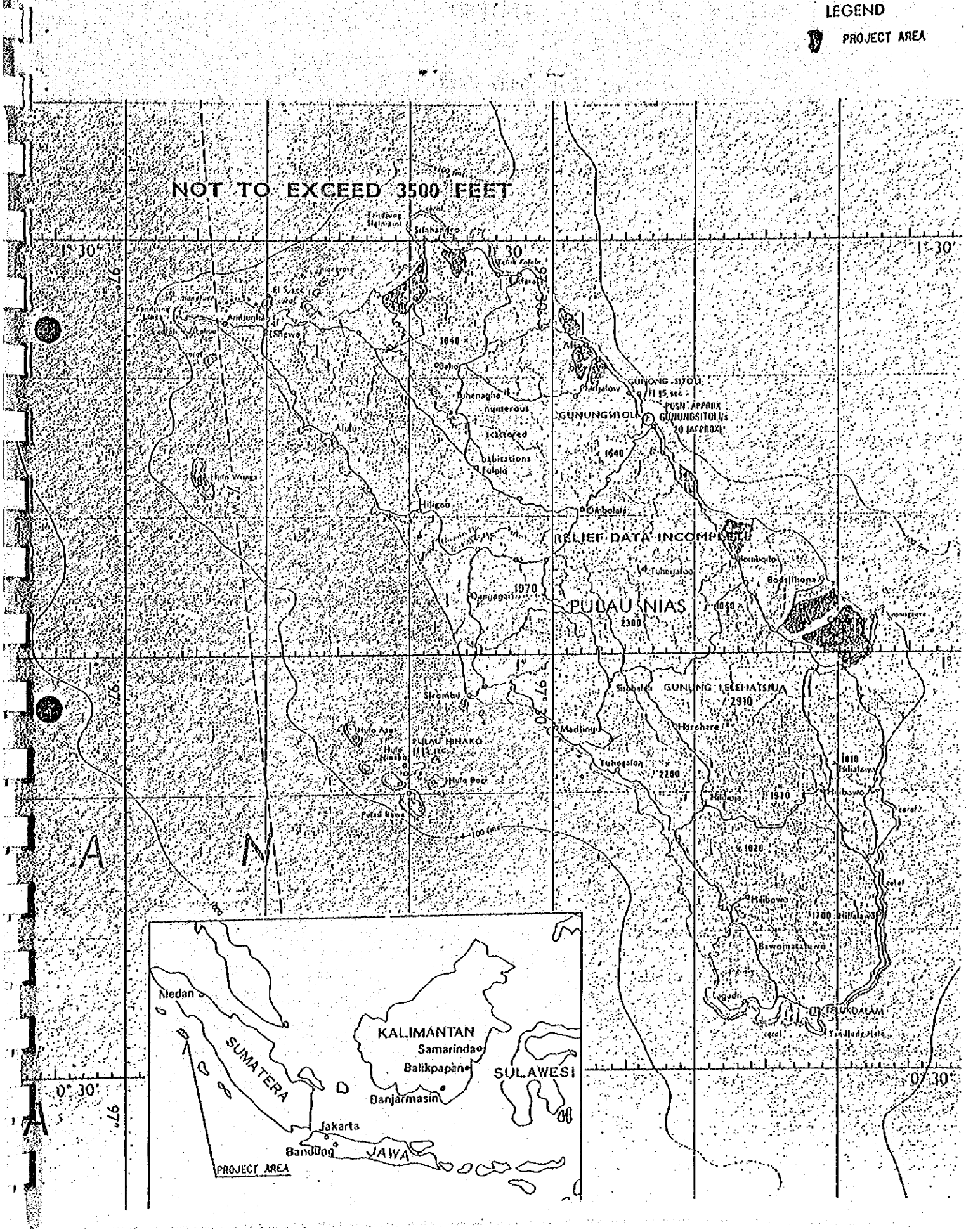
JULY, 1990

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

FIG. 1

NIAS ISLAND IRRIGATION AGRICULTURE DEVELOPMENT PROJECT (TOPOGRAPHIC MAPPING)

PROJECT AREA



SPECIFICATIONS FOR SURVEY AND MAPPING WORK

CONTENTS

Figures and Tables

1. GENERAL SPECIFICATIONS

1.1. Description of Work

1.1.1. Work

This survey and mapping work (hereinafter referred to as the Work) is schemed to prepare 1/5,000 scale topograhic maps by aerial photogrammetry. The maps will be used for the "Feasibility Study on Nias Island Irrigation Agricultural Development" (hereinafter referred to as the Project). The Work includes aerial photography, ground control survey, field investigation and photogrammetry.

1.1.2. Location

The subject area of the Work is in the Nias Island, 130km off shore to the west of Sumatra Island, administratively situated in the Sumatra Utara Province, the Republic of Indonesia. The area is accessible by one hour flight from Medan, the capital city of the province. Major town near the subject area is Gunung Sitoli.

1.2. Scope of Work

1.2.1. Scope

The followings are the scope of the Work.

(1) Aerial Photography	200 Km^2
(2) Ground Control	
1) Monumentation	19 points
2) Signalization	20 points
3) Traversing	210 Km
4) Levelling	210 Km
5) Field Identification	120 Km^2
6) Spot Levelling	120 Km^2 (1 point/ha)
(3) Photogrammetric Mapping	
1) Aerial triangulation	49 models
2) Photogrammetric plotting	120 Km^2
3) Field completion	120 Km^2
4) Editing and drawing	120 Km^2

Figure 1 through 3 show the areas of the mapping, the aerial photography, the location of vertical and horizontal ground controls and the routes of traversing and levelling.

The 1:5,000 scale topographic maps shall be prepared by photogrammetry by using 1:20,000 aerial photographs to be taken by the Work.

The Contractor shall execute the Work in accordance with the General Specifications and the Technical Specifications stipulated herein. The Work covered by the Specifications includes furnishing all technical staff, laborers, materials, equipment and supplies required to perform the Work.

1.2.2. Purpose

The Feasibility study of the Project is planned to be carried out in two stages as follows:

1) Stage I : Survey and mapping
2) Stage II : Master plan study

The Work covered by this Specifications is the topograhic survey and mapping to be carried out in the Stage I.

1.2.3. Period

The Contractor shall complete the Work and submit all topograhic maps and survey data by December ,1990. The Aerial Photography and ground control susrvey except for the spot levelling, therefore, shall be completed by the middle of September, 1990.

1.2.4. Supervision

All the Contractor's work shall be carried out under the supervision of the Employer and the Ministry of Public Works staff and Directorate of Irrigation I staff or their representative.

1.3. Survey and Mapping Plans and Reports

1.3.1. Survey Plans

The survey plans and schedule shown in the Figures in these Specifications are solely attached to assist tenderers. The Contractor shall submit his detailed survey and mapping plan and schedule to the Employer for approval prior to the commencement of the Work. The Contractor's survey and mapping schedule will be adjusted by the Employer from time to time, if required, in accordance with the new findings obtained during the Work. The approved survey and mapping schedule shall be monitored and kept updated by the Contractor throughout the Contract period. All revisions shall be accompanied by a detailed explanation of the reasons for such changes.

1.3.2. Field Progress Report

The Contractor, on the fifth (5th) day of each month or at any time designated by the Employer, shall submit three (3) copies of written report in a form furnished by the Employer on the progress of the Work during the preceding month. The report shall show the percentage of each survey and mapping items during the preceding month and the total percentage of completion as of the date of the report. The report shall include the following matters:

1) Progress of the Work
2) Number of technical staff and laborers engaged in the Work on daily basis.
3) Equipment and apparatus used for the aerial photography, field survey and mapping
4) Findings
5) Accidents
6) Other data required by the Employer

1.3.3. Aerial Photographs, Maps, Survey Data, and Report

The Contractor shall submit all the aerial photographs, maps, survey data and reports to the Employer in accordance with the provisions stipulated in the Technical Specifications. The original traced 1:5,000 maps for the Work area and other original sheets of the survey data to be submitted by the Contractor shall be the property of the Employer.

The expenses for the reports shall be included in the unit prices of various items stipulated in the Technical Specifications so that no separate payment for the reporting will be made.

1.4. Materials and Equipment

All the materials and equipment required for the aerial photography, field survey and mapping, and for the completion of the Work shall be prepared by the Contractor as soon as practically possible after the signing of the Contract. The Contractor shall submit, for the approval of the Employer, catalogs and other descriptive data of the survey and mapping equipment designated by the Employer. All the materials and equipment will be subject to inspection or test by the Employer at any time both off-site and on-site as deemed necessary.

All expenses, such as the costs of fuel, lubricant, operators and consumables entailed by the use of equipment duirng the Contract period shall be borne by the Contractor.

1.5. Variations

The plans and schedule shown on the attached Figures and Tables and described herein are tentative and presented for the purpose of obtaining the comparative Tenders. The actual location and boundaries of the aerial photography, mapping areas and survey lines will be fixed by the Employer taking the findings and geological conditions encountered as the work progresses into consideration. However, the total mapping and photography areas will not be changed.

Quantities shown in the Bill of Quantities attached to the Technical Specifications will be changed without the changing unit prices quoted by the Contractor.

2. TECHNICAL SPECIFICATIONS

2.1. General

(1) Area

The areas to be photographed at a scale of 1:20,000 are approximately 200 ㎢ and to be mapped at the scale of 1:5,000 are approximately 120㎢ in total as outlined in Fig. 2. The actual mapping areas will be fixed by the Employer by the middle of August, 1990.

(2) Outline of work

The work to be carried out by the Contractor is the 1:20,000 aerial photography, horizontal and vertical ground control survey for aerial triangulation ; feild identification; photogrammetric mapping at the scale of 1:5,000 including the aerial triangulation; field completion and drawing.

(3) Plan of Operations

A plan of operation with a time schedule shall be submitted to the Employer by the Contractor before the commencement of the Work for the approval of the Employer.

(4) Projection and Coordinate System

The projection shall be Universal Transverse Mercator and the coordinate system shall be UTM, Zone 47.

(5) Standard of Mapping

Style of map sheets, marginal information, legend and symbols will basically follow those of the maps previously prepared for the DGWRD projects. Special legend and symbols may be prepared for the maps of this project, if any.

2.2. Aerial Photography

(1) Areas and Scale

The areas to be covered by the aerial photography shall be 200㎢ as shown in Fig.2. The scale of the aerial photographs shall be 1:20,000.

(2) Camera

The camera to be used for the photography shall be Zeiss RMK-15/23, Wild RC-8 or equivalent and has a calibrated focal length between 151.00㎜ and 155.00 ㎜.

(3) Type of Photographs

Black and white panchromatic photographs shall cover the whole areas stereoscopically with a quality and precision suitable for the photogrammetric mapping.

(4) Calibration

A valid calibration certificate shall be submitted to the Employer before commencement of flying.

(5) Flying Direction

The Direction of Flight lines will vary depending on the shapes of areas as shown in Fig. 2.

(6) Overlap and Sidelap

The fore and aft overlap between succesive exposures in each strip shall be 60 % and the sidelap between adjacent strips shall be 30%.

(7) Crab and Tilt

Crab shall not exceed 5 ° when measured between the base line and a line parallel to the frame of the negative, nor create stereoscopic gaps in the photography.
Tilt shall not normally exceed 2° . Isolated exposure with up to 4 ° will be permitted in turbulent conditions.

(8) Conditions of Photographic Flying

Cloud, dense cloud shadow or smoke shall not lie over the principal point of any photograph or its homologues in adjacent photographs. Nor shall any single mass of cloud, dense cloud shadow, or smoke, obscure more than three per cent of the total area of any negative. Nor shall the aggregate of cloud, dense cloud shadow and smoke obscure more than five per cent of the total area of a negative.

Photography will only be accepted when the altitude of the sun is higher than 25 degrees.

(9) Aerial Film

(a) The type of aerial film to be used on the contract shall be KODAK DOUBLE X AEROGRAPHIC 2405 or equivalent. The film should be handled and stored in accordance with the manufacturer's recommendation.

(10) Processing

All processed negatives shall be substantially free of blisters, bubbles, inclusions, coating lines, stress or static marks, bar marks, pin holes, abrasions, streaks, stains and dying marks.

Some tolerance in this respect shall be allowable where processing has to be carried out in substandard conditions, provided the intended purpose of the negatives is not impaired.

All fiducial marks shall be clearly visible on every negative.

The camera panel of instruments should be clearly legible on all processed negatives.

(11) Documentation and Annotation

Film Annotation

The following information shall be supplied as leaders at the start and the end of erch film:

START or END (as appropriate).
Contract Number and/or designation (if any).
Film Number.
Date of Photography.
Effective negative numbers and run numbers.
Approximate scale of photography.
The calibrated focal length of the lens.
Contractor's name.

Negative Numbering and Annotation

(a) Numbering of negatives shall be carried out using heat foil or indelible ink. The numbers shall be printed in a neat and clearly legible type.

(b) Each film shall be provided with the following annotation which shall appear on the prints:

Contractor identification.
Contract Number (if any).
Film Number.
Year, Month and Day of photography.
Height above mean sea level or ground level or nominal.
Scale of photography.
The focal length of the lens.

Processed Film

(a) Each processed film shall be supplied in roll form on a spool and in a metal or plastic container as supplied by the film manufacturer.

(b) The outside of each film container shall show clearly:
- Contract Number (if any)
- Film Number.
- Date of photography.
- Effective negative numbers and run numbers.
- Scale of photography.
- Contractor's name.
- The focal length of the lens.

Film Report

A report shall be include with each film giving the following information:

- Film Number.
- Camera type and number, lens number, filter type and number.
- Magazine number or cassette and cassette hold unit numbers.
- Film type and manufacturer's emulsion number.
- Lens aperture and shutter speed.
- Run number and flight direction.
- Date of photography.
- Start and end time for each run in local time.
- Negative numbers of all of the photographs.
- Indicated flying height.
- Computed flying height above sea level.
- Scale of photography.
- outside air temperature.
- Weather conditions-cloud, visibility, turbulence.
- Date of processing.
- Method of development.
- Developer used and dilution.
- Time and temperature of development or film transport speed.
- Length of film processed.
- General comment of quality.

2.3. Ground control survey

2.3.1. Monumentation and Signalization

(1) Monumentation

Nineteen(19) ground control points shall be marked with concrete monuments. The size of the concrete monument shall be 10*cm* × 10*cm* × 100*cm* with an iron nail projected on the top. (See Fig. 4) Approximate location of the monumentation are shown in Fig. 3.

(2) Signalization

These twenty(20) ground controls and/or their eccentric points shall be signalized to identify the monument on the aerial photographs.
The design and sizes of the signal are shown in Fig. 5.

(3) Description of Points

Description of the ground control points shall be prepared. The description shall include name, number, type and size of monument, coordinates and elevation, date of establishment, surveyor's name, sketches of plan and profile of the point. A photograph of the point and aerial photographs on which the point is shown by a signal shall be attached to the description of each point.

2.3.2. Tidal Observation

(1) Location

Tidal observation shall be carried out to determine the mean sea level (MSL.) at the gunung sitoli port. The MSL shall be used as a datum elevation for the vertical ground controls survey.

(2) Equipment and Measurement

Equipment to be used for the tidal observation will be a tide pole with a 5 *mm* graduated plate securely fixed in the sea.
The measurement of the water level shall be carried out at every one hour, twenty four hours a day. Duration of the continuous measurment shall be minimal one month.

(3) Bench Mark

A bench mark shall be established on stable land near the tidal observation station and vertical distance between the tide pole and the bench mark shall be measured.

(4) Data processing

Data obtained by the tidal observation shall be processed to determine the mean sea level(MSL). The harmonic analysis shall be applied to the data processing.

2.3.3. Traversing

(1) Routes and reference points.

Nineteen(19) horizontal ground controls shall be established by traversing to provide coordinate data for aerial triangulation. Locations of reference points, horizontal ground controls to be established, and traversing routes are shown in Fig. 3.

(2) Route selection

Before starting the observation and measurement, traversing routes shall be carefully selected in the field so that the traverse lines can be set as long as 1 to 2km to maintain accuracy as well as efficiency of the traversing. The traversing routes selected by the Contractor shall be inspected and approved by the Employer before the start of observation and measurement.

(3) Observation and measurement

Observation and measurement of the traversing shall be started at and ended on the existing GPS stations established by Sakosurtanal in 1989 ~90.

Horizontal angles:
A minimum of two(2) sets of horizontal angles shall be observed at each end of the traverse line. The difference between two(2) values of obtained angles shall not exceed 10 " . One set of observation consists of right and left faces observation.

Vertical angles:
One set of vertical angles shall be observed at each end of the traverse line to reduce slope distance to horizontal. The difference between right and left faces shall not exceed 15 " .

Distance measurement:
Distance measurement shall be carried out by electro-optical distance meters (EDM) with 3Km measuring capacity. A minimum of two(2) sets of measurement shall be carried out at each end of the traverse line. One(1)set of measurement consists of three (3) readings. The difference between the readings shall not exceed 10 mm + 10ppm x D, where D is measured distance. Temperature and atmospheric corrections shall be applied to the measurement.

Azimuth observation:
To check the angle measurement of the traversing, the azimuth determination by the astronomical observation shall be carried out at intervals of 25 stations along the traverse lines and azimuth marks shall be established. The sun altitude and/or hour angle methods can be used for the azimuth determination.

(4) Equipment

Equipment to be used for the traversing shall be:

Theodolite	:	1" direct reading
EDM	:	3Km measuring capacity 5mm + 5ppm x distance
Accessaries	:	tripods, targets, reflectors, transceivers, Reoloff prism, thermometer, barometer, etc.

Before being used, these equipment shall be thoroughly tested and adjusted. The results of these tests shall be submitted to the Employer for his approval.

(5) Accuracy

Angular misclosure on the azimuth shall be within 10" $\sqrt{n}$, where "n" is the number of observed angles. Linear misclosure shall be within 1:10,000 of the total length of traversing.

(6) Data Processing

The reduction of distance shall include the correction of slope, mean sea level and scale factor. The reduction of angles shall include the direction angle correction.

2.3.4. Levelling

(1) Routes and reference points

210 Km of direct levelling shall be carried out to determine the elevation of the twenty (20) vertical ground controls. Datum elevation for the levelling shall be derived from the bench marks established by the tidal observation. Routes of the levelling are shown in Fig. 2.

To provide elevation data for the aerial triangulation, height (elevation) points shall be pricked and shown on aerial photographs at every 1Km along the levelling routes.

To provide reference for spot levelling, wooden pegs with projected nails shall be established at every 250 m along the levelling routes and their elevation shall be determined by the levelling.

(2) Measurement

The direct levelling shall be started at and ended on the bench mark established by the tidal observation. Lines of sights shall not exceed 60m and length of back and fore sights shall be equalised.

(3) Equipment

Equipment to be used for the direct levelling shall be:

Automatic level : 30" /2mm second order level
Metric staves : 3 or 5m wooden or metal staff with base plates

Before starting the observation, the equipment shall be tested and abjusted.

(4) Accuracy

The accuracy of the direct levelling shall be:

Misclosure in double run : within 10$mm\sqrt{s}$ on paved roads
within 20$mm\sqrt{s}$ on unstable land

("s" is the length of levelling in kilometer)

2.3.5. Field Identification

Field identification for natural and artificial features difficult or impossible to interpret on the aerial photographs such as administrative boundaries; names of province, county, city, town, village, mountain, hill, river, valley and lake; land use; and name and type of public buildings shall be carried out and the information collected in the field shall be shown on the 1:5,000 maps.

2.3.6. Spot Levelling

The spot levelling shall be carried out to establish spot heights at the density of one point in one (1) hectare throughout the mapping area. The spot levelling shall be started at and ended on the reference points established by the levelling. Contour lines at intervals of one (1) meter and fifty (50) centimeter shall be drawn by refering to these spot heights on the 1:5,000 topographic maps. Accuracy of relative heights of spot levelling shall be ± 5 cm.

2.4. Photogrammetric Mapping

2.4.1. Aerial Photographs

Aerial photographs to be used for the photogrammetric mapping will be 1:20,000 aerial photographs to be taken by the Work with an aerial camera of 23*cm* x 23 *cm* format and F=152 *mm* forcal length. Fifty seven (57) sheets of fourty nine (49) models of eight (8) flight lines can cover the whole mapping area and necessary ground controls.

2.4.2. Aerial Triangulation

(1) Area, models and flight lines

Areas to be covered, and stereo models and flight lines necessary for the aerial triangulation are shown in Fig. 2. fourty nine(49) stereo models in eight (8) flight lines shall be used for the aerial triangulation.

(2) Marking of photo points

A minimum of six (6) pass points and two (2) tie points for every stereo model shall be chosen and marked on diapositives of the aerial photographs.
The marking shall be carried out with a precision stereoscopic point transfer instrument.

(3) Measurement of photo coordinates

Photographic coordinates of the marked pass points, tie points, vertical and horizontal ground controls and fiducial marks on the dia positives shall be measured with a stereo comparator.

(4) Adjustment and coordinate computation

Adjustment and computation shall be carried out as follows:

1) Model restitution by the pass points' photo coordinates.
2) Bridge and block restitution by the pass points' and the tie points' photo coordiantes.
3) Conversion from the photo coordinates into the UTM Zone 47 coordinates system and into height from mean sea level by using the horizontal and vertical ground controls.

The adjustment and computation shall be carried out with an electronic computer and a certificated computer program for the aerial triangulation.

(5) Instruments

The instruments to be used for the aerial triangulation shall be:

Pricking devise	:	Precision stereo point transfer PUG-II or equivalent
Comparator	:	Stereo comparator with 1 micron measurement and automatic recording
Computer	:	Electronic computer with PAT-H program package for the block adjustment

(6) Accuracy

Residuals of the horizontal and vertical ground controls and the tie points used for the adjustment shall be:

Standard deviation of residuals in horizontal : 2.4 *m*
Standard deviation of residuals in vertical : 2.4 *m*

2.4.3. Photogrammetric plotting

(1) Area and scale

The area to be plotted at the scale of 1:5,000 is approximately 120 *Km²* as shown in Fig. 2.

(2) Stereo model restitution

Relative and adsolute orientations to restitute stereo models in a stereo plotter shall be done with the aerial photographs using the results of aerial triangulation.

(3) Plotting of grids and photo controls

Grid lines of UTH (Zone 47) coordinate system shall be plotted at every 1 *Km* on polyester bases. All the photo controls such as pass points, tie points together with the ground controls shall be plotted on this grid system at the mapping scale.

(4) Datail plotting

All natural and artificial features such as rivers, streams, forests, paddy fields, farms, plantations, roads, paths, houses, schools, public buildings, mosques, cemeteries, etc. shall be interpreted and plotted.

To detect errors in the spot levelling and the contouring, photogrammetric contour lines and spot heights shall be plotted.
Interval of the photogrammetric contour lines shall be five (5) meters.

Spot heights shall be measured and plotted at places such as intersecitons of roads and paths, tops of hills, saddles of ridges and other characteristic terrain features.
Distribution of the spot heights shall be one at every 4 to 5 *cm* on the scaled map.

(5) Instruments

Instruments to be used for the plotting shall be:
Coordinategreaph : 0.01 *mm* plotting gradiation
Stereo plotter : Second order class A stereo plotter

(6) Accuracy

Residuals of the photo controls in the absolute orientation shall be:
Residuals in horizontal controls : within 0.3 *mm* on the scaled map
Residuals in vertical controls : within 2 *m*
Materials to be used for the plotting shall be transparent polyester bases with a thickness of ₹300.

2.4.4. Field Completion

Manuscripts prepared by the photogrammetric plotting shall be checked and if necessary corrected in the field before proceeding to the fair drawing.
All the data and information collected by the field completion shall be show on the 1:5,000 scale maps.

2.4.5. Editing, drawing and reproductions

(1) Annotation and symbolization

Annotation and symbolization systems, basically following those of the maps previously prepared for the DGWRD development projects, shall be applied to prepare the manuscripts. Information necessary for the annotation and symboli -zation shall be collected from existing maps and the field identification.

(2) Fair Drawing

Fair drawing with black ink shall be prepared from the edited pencil manuscripts. Materials to be used for the fair drawing shall be transparent polyester bases with a thickness of ₹300. Size and style of the map sheet will be shown by the Employer.

Marginal information such as title, sheet No, scale, legends, etc. shall be attached to the map sheets. A sample sheet to show the marginal information will be provided by the Employer.

(3) Reproduction

Second originals (photographic copies on polyester bases #300) and blue prints of the original 1:5,000 maps shall be prepared.

2.5. Aerial Photographs, Maps and Survey Data to be delivered

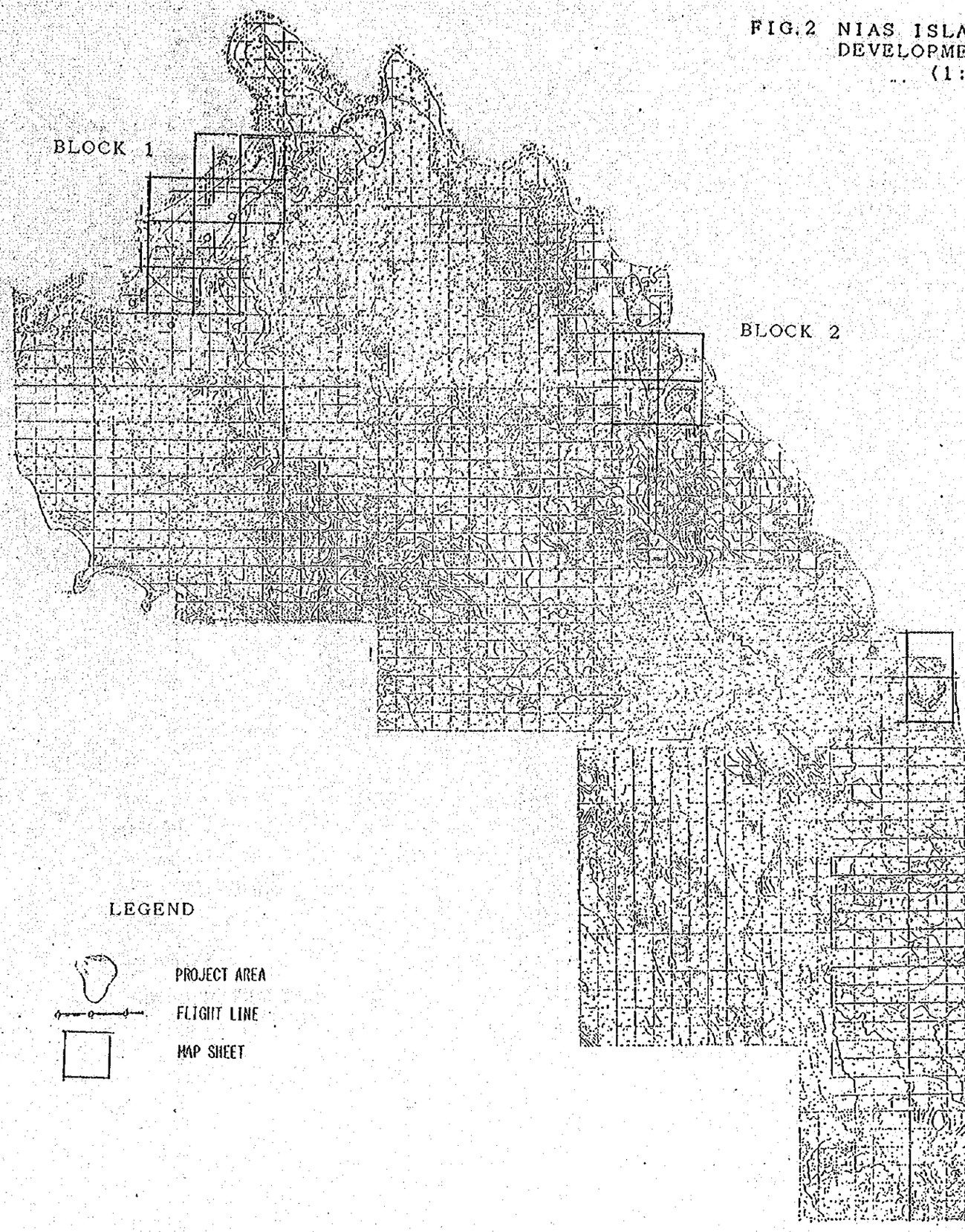
The following materials shall be delivered to the Employer before the end of September 1990.

(1) 1/20,000 Aerial photographs, contact prints	:	1 set
(2) 1/20,000 Aerial photographs, dia positives	:	1 set
(3) Description of ground controls	:	1 set
(4) Reults of tidal observation	:	1 set
(5) Results of traversing	:	1 set
(6) Results of levelling	:	1 set
(7) Aerial photographs on which level points are pricked	:	1 set

The following materials shall be delivered to the Employer before December 20, 1990.

(1) 1/20,000 Aerial photographs, negatives	:	1 set
(2) 1/20,000 Aerial photographs, contact prints	:	2 sets
(3) Results of tidal observation (copies)	:	2 sets
(4) Results of traversing (copies)	:	2 sets
(5) Results of levelling (copies)	:	2 sets
(6) Results of Aerial triangulation (1 original, 2 copies)	:	3 sets
(7) 1/5,000 Topographic maps, original	:	1 set
(8) 1/5,000 Topographic maps, Second original	:	3 sets
(9) 1/5,000 Topographic maps, Blue prints	:	10 sets
(10) Field Identification Data	:	1 set
(11) Field Completion Data	:	1 set

FIG.2 NIAS ISLAND IRRIGATION AGRICULTURE DEVELOPMENT PROJECT (TOPOGRAPHIC MAPPING) (1:250,000)



MAPPING AND PHOTOGRAPHY AREAS

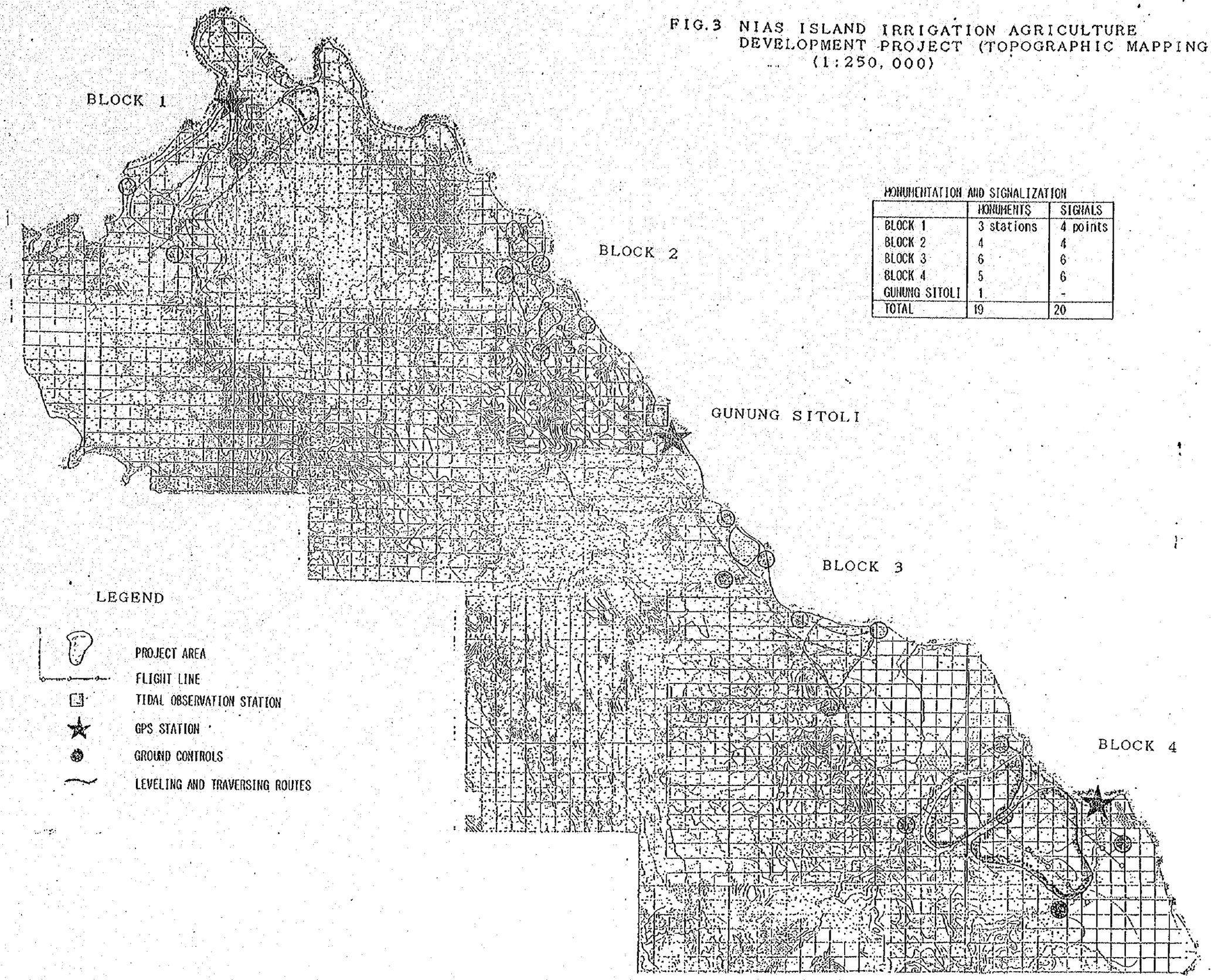
	MAPPING AND PHOTOGRAPHY	PHOTOGRAPHY
BLOCK 1	MUZOI HUMAZA (2600ha)	TOROWA (262ha)
BLOCK 2	AFIA (713ha) TO'O HILIMBOKO (150ha)	LEWUOGHBANUA (360ha)
BLOCK 3	NORA HUMENE (314ha) GIDO ZEBUA (1,438ha)	———
BLOCK 4	MEZAWA I (2,300ha) MEZAWA II (3,500ha)	———

FLIGHT LINES AND STEREO MODELS

	FLIGHT LINES	STEREO MODELS	TO BE USED FOR AERIAL TRIANGULATION
BLOCK 1	2	18	12,
BLOCK 2	1	6	4'
BLOCK 3	2	13	13
BLOCK 4	3	20	20
TOTAL	8	57	49

N

FIG.3 NIAS ISLAND IRRIGATION AGRICULTURE DEVELOPMENT PROJECT (TOPOGRAPHIC MAPPING)
(1:250,000)



MONUMENTATION AND SIGNALIZATION

	MONUMENTS	SIGNALS
BLOCK 1	3 stations	4 points
BLOCK 2	4	4
BLOCK 3	6	6
BLOCK 4	5	6
GUNUNG SITOLI	1	-
TOTAL	19	20

Table 1

WORK SCHEDULE

ITEMS	YEAR	1990								1991	
	MONTH	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.
PREPARATORY, CONTRACT, ETC.											
AERIAL PHOTOGRAPHY											
MONUMENTATION AND SIGNALIZATION											
TRAVERSING											
TIDAL OBSERVATION											
LEVELING											
SPOT LEVELING											
FIELD IDENTIFICATION & FIELD COMPLETION											
AERIAL TRIANGULATION											
PHOTOGRAMMETRIC PLOTTING											
EDITING											
DRAWING											
DELIVERY IN JAKARTA											
DELIVERY IN TOKYO											

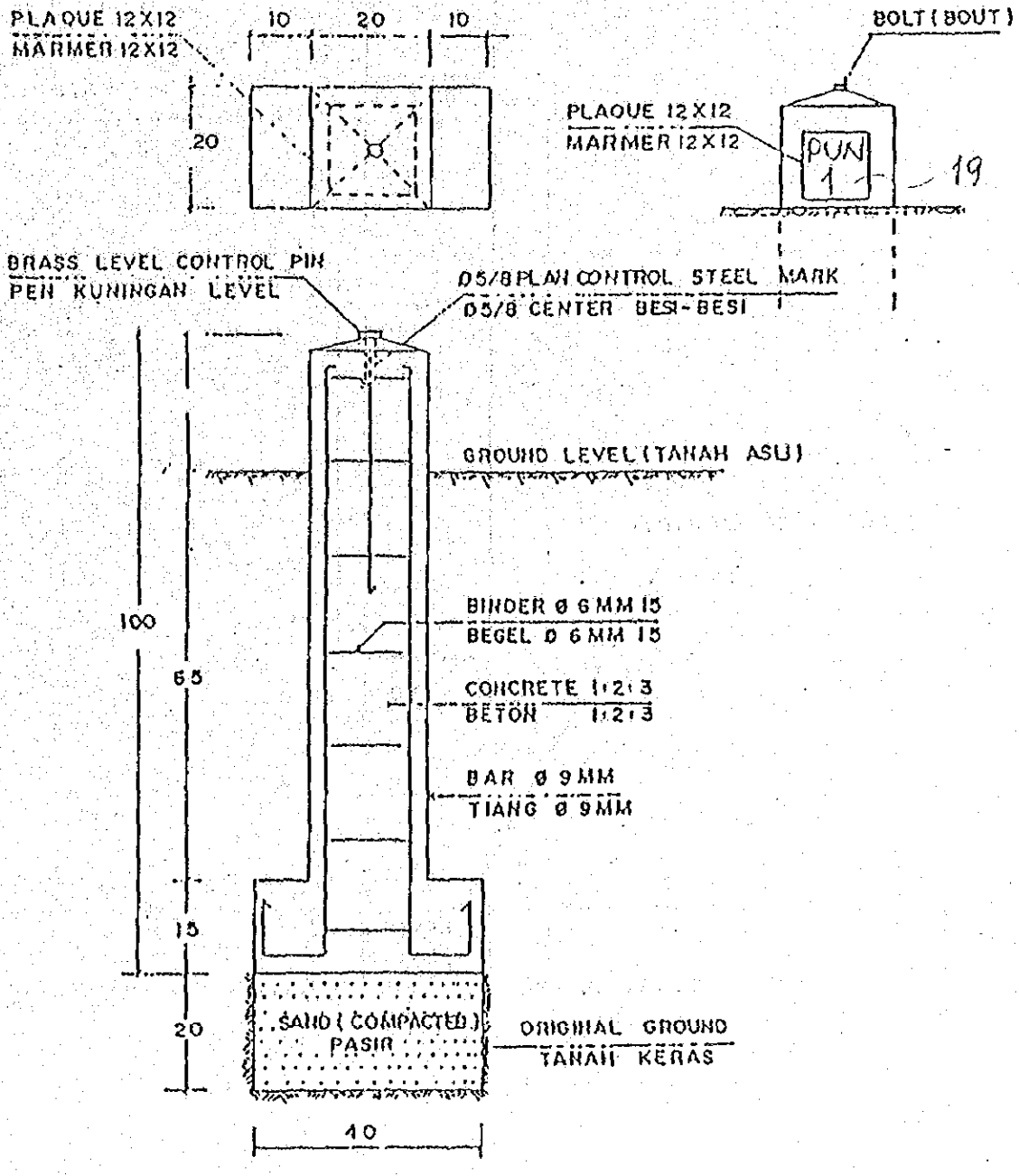
NOTE : ——— FIELD WORK ····· WORK IN JAPAN △ REPORTING

Table 2

Bill of Quantities

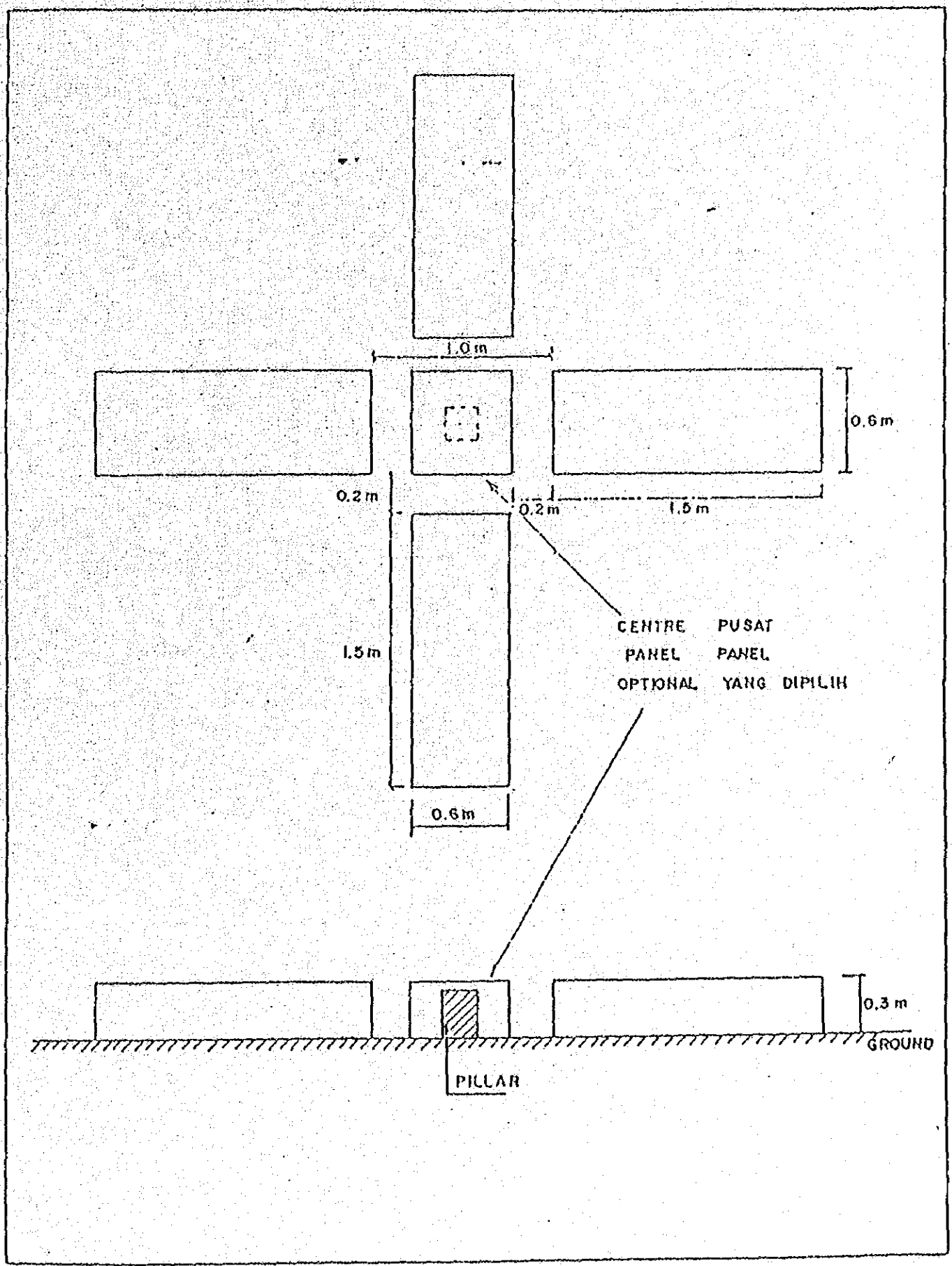
No. Work	Unit	Qty.	Unit Price	Amount (Yen)	Ref. No in Spec.
1. Preparatory Work	Lump sum	1			
2. Aerial Photography	ha	20,000		-	2.2.
3. Graund control					2.3.
Monumentation	Point	19			2.3.1.
Signalization	Point	20			2.3.1.
Tidal Observation	Point	1			2.3.2.
Traversing	*Km*	210			2.3.3
Levelling	*Km*	210			2.3.4.
Stop Levelling	ha	12,000			2.3.6
Field Identification and Field Completion	ha	12,000			2.3.5. 2.4.4
4. Photogrammetric Mapping					2.4.
Aerial Triangulation	Model	49			2.4.2.
Photogrammetric Plotting	ha	12,000			2.4.3.
Editing & Drawing	ha	12,000			2.4.5.
Second Original	Sheet	105			2.4.5.
Blue Print	Sheet	350			2.4.5.

FIG. 4 CONTRUCTION OF CONCRETE BENCH MARK
KONTRUKSI BETON MARK



SCALE (SKALA) 1 : 10

DIMENSIONS / UKURAN Cm



KONTRUKSI TANDA LAPANGAN

FIG. 5 PREMARK CONSTRUCTION

APPENDIX - 3 EVALUATION REPORT

THE FEASIBILITY STUDY ON THE NIAS ISLAND IRRIGATION AGRICULTURAL DEVELOPMENT PROJECT

EVALUATION REPORT ON THE TECHNICAL AND COST PROPOSALS FOR THE TOPOGRAPHIC SURVEY AND MAPPING

JULY 1990

JAPAN INTERNATIONAL COOPERATION (JICA)

FEASIBILITY STUDY TEAM (TOPOGRAPHIC MAPPING)

Japan International Cooperation Agency (JICA)
The Nias Island
Irrigation Agricultural Development Prject
Feasibility Study Team (Topographic Mapping)

Date: July 27 1990
Ref.No.Nias-F-002-90

Ir. Mashudi Dipl.HE

Direktorat Irigasi I
Departomen Pekurjaan Umum
Jakarta

Dear Ir. Mashudi

I would like to report you that the results of the Tendering of the Topographic Mapping and Surveying for the Feasibility Study on the Nias Island Irrigation Agricultural Development Poject.

Please find a copy of the Evaluation Report herein attached.

I always appreciate your kind cooperation for our Project.

Very truly yours

Hajime GOTO
Team Leader
Feasibility Study Team
(Topographic Mapping)

cc. -Bina Program
Pengairan
-JICA Tokyo
-JICA JKT

The Feasibility Study On The Nias Island Irrigation Agricultural Development Project
Evaluation Report On The Technical and Cost Proposal For The Topographic Survey and Mapping

1. Tender Procedures
   1.1. Short list and pre-qualification
   1.2. Tender Documents
   1.3. Briefing
   1.4. Technical and cost proposals

2. Evaluation
   2.1. Evaluation methods
   2.2. Evaluation of technical proposal
   2.3. Evaluation of cost estimation
   2.4. Negotiation

3. Conclusion

Attachments
   1. Tender Documents
   2. Request letter for issuarance of short list
   3. Short list

1. Tender Procedures

1.1. Short list and pre-qualification

The JICA Study Team sent a letter to Directorate of Irrigation I to ask to recommend some of Indonesian survey and mapping companies as candidates for Tender to choose a Contractor for topographic mapping for the Feasibility Study on the Nias Island Irrigation Agricaltural Development Project on July 10, 1990.

In response to the JICA Study Team request, DOI-I issued a short list on July 11, 1990.

The Study Team sent pre-qualification questionnaires to the candidates recommended in the short list i.e. to PT. Exsa International Co.,Ltd. PT. Geo Jaya Tehnic and PT. Megaplana Nusa Indonesia on July 12, 1990.

Those letters and questionnaire are attached hereafter.

1.2. Tender Documents

The Tender Documents consited of the following letters, forms and specifications.

1) Invitation to Tender
2) Instruction to Tenderers
3) Tender Form
4) Performance Guarantee Form
5) Form of Agreement
6) General and Technical Specifications

These Documents are attached hereafter.

1.3. Briefing

The JICA Study Team held a meeting with representatives of the companies to explain and clarify the details of the topographic survey and mapping on

July 16, 1990 at the PT. Exsa International Office. The Tender Documents were delivered to the companies representatives and the companies were requested to submit their technical and cost proposals to the JICA Study Team at 10:00am on July 24, 1990 at the DOI-I Office.

1.4. Technical and cost proposals

The technical proposal described the engineers and technicians to participate and the methods, instruments and facilities to be used for the Work. The work schedule and the final results were also shown in the proposal.

The cost for the each work item and their breakdown as well as the total cost were shown in the cost estimation.

2. Evaluation

2.1. Evaluation methods

The technical evaluation was done in the following manners:

1) Qualification of company

a. Experience in the aerial photography
b. Experience in the photogrammetric mapping
c. Facilities for the aerial photography
d. Facilities for the photogrammetric mapping
e. Financial stability

Maximal point for each item is 40, the total 200.

2) Methodology

a. Aerial photography
b. Ground control survey
c. Photogrammetric mapping

Maximal point for each item is 100, the total 300.

3) Technical personnel

a. Team leader

b. Aerial photography engineer

c. Geodetic engineer

d. Photogrammetric engineer

e. Cartographic engineer

Maximal point for each personnel is 50 on educational background and 75 on practical experience, total 625.

The maximal point for the technical evaluation of each company is totally 1,125.

2). Cost evaluation

The cost evaluation is comparison of cost for each item, its breakdown and the total cost.

2.2. Evaluation of technical proposal

1) Qualification of companies

	Exsa	Geo Jaya	Megaplana
Experience aerial photo	40	30	20
Experience photogrammetry	35	35	20
Facilities aerial photo	40	30	20
Facilities photogrammetry	35	35	20
Financial stability	35	35	35
Total	185	165	115

2)Methodology

	Exsa	Geo Jaya	Megaplana
Aerial photo-graphy	90	70	70
Ground controls survey	80	80	50
Photogrammetric mapping	80	70	50
Total	250	220	170

3) Technical personnel

	Exsa		Geo Jaya		Megaplana	
Team leader	50	75	50	70	50	35
Aerial photo-graphy engineer	50	60	50	60	50	35
Geodetic engineer	50	55	40	30	50	25
Photogrammetric engineer	40	75	30	75	50	37
Cartograraphic engineer	50	45	30	45	30	25
Total	550		480		3[illegible]	

The total points for the technical evaluation for each company were as follows:

Exsa	985/1,125
Geo Jaya	865/1,125
Megaplana	672/1,125

2.3. Evaluation of cost estimation

The cost proposals of the three companies were shown in the attached Bill of Quantities.

The total Project amounts were as follows:

Exsa	¥40,372,000.-
Geo Jaya	¥43,668,000.-
Megaplana	¥45,727,000.-

2.4. Negotiation

In both the technical and cost proposals, PT.Exsa International Co.,Ltd. showed the first rank. However, the cost estimated by PT. Exsa International still slightly exceeded the JICA Projct budget. The JICA Study Team negotiated with PT. Exsa representative and agreed the cost shown in the attached revised Bill of Quantities.

3. Conclusion

The topographic survey and mapping project including the aerial photography in the Nias Island was awarded to the PT. Exsa International Co.,Ltd. with the highest technical evaluation and the lowest cost estimation.

PT. Exsa International Co., Ltd.
Jalan Tomang Raya No. 74, Tomang, Jakarta 11430, Indonesia
Phone: (021) 5604361 to 5604365 • Telex: 45808 EXSA IA
Fax: (62) 21-592734 • Cable: KONEKSA Jakarta

BILL OF QUANTITIES

Item No.	Work	Unit	Qty	Unit Price (Yen)	Amount (Yen)	Ref.No. in Spec.
1.	Preparation	L.S			300,000.00	
2.	Aerial Photography	ha	20000	445.31	8,906,166.67	2.2
3.	Ground Control					2.3.5
3.1	- Monumentation	Point	19	27,596.49	524,333.33	2.3.1
3.2	- Signalization	Point	20	16,866.67	337,333.33	2.3.1
3.3	- Tidal Observation	Point	1	876,666.67	876,666.67	2.3.2
3.4	- Traversing	km	210	25,559.52	5,367,500.00	2.3.3
3.5	- Levelling	km	210	16,500.00	3,465,000.00	2.3.4
3.6	- Spot Levelling	km	12000	655.42	7,865,000.00	2.3.6
3.7	- Field Ident.	ha	12000	127.50	1,530,000.00	2.3.5
3.8	- Field Comp.	ha	12000	142.50	1,710,000.00	2.4.4
4.	Photogrammetric Mapping					2.4
4.1	- Aerial Triangulation	Model	49	15,476.19	758,333.33	2.4.2
4.2	- Photogrammetric Plotting	ha	12000	336.67	4,040,000.00	2.4.3
4.3	- Editing & Drawing	ha	12000	275.78	3,309,333.33	2.4.5
4.4	- Second Original	sheet	105	11,500.00	1,207,500.00	2.4.5
4.5	- Blue print	sheet	350	500.00	175,000.00	2.4.5
	T O T A L				¥ 40,372,167	
	R O U N D E D				¥ 40,372,000	

(Say : Fourty million, three hundred and seventy two thousand Yen)

Jakarta, July 24, 1990
PT. EXSA International Co. Ltd.

P.T. EXSA INTERNATIONAL

Ir. Leo Nardy
Director

P.T. GEOJAYA - TEHNIK

SURVEYING, DESIGNING AND CONSULTING ENGINEERS
JALAN KAPTEN TENDEAN NO. 9 B – P.O. BOX 883 KBY
PHONE : 7995100 - 7995200 TELEX : 47200 GAT IA
JAKARTA 12790

Bill of Quantities

Item No.	Work	Unit	Qty	Unit Price (Yen)	Amount (Yen)
1	Preparation			L.S	750,000.00
2	Aerial Photography	Ha.	20,000	457.04	9,140,833.33
3	Ground Control				
	- Monumentation	Point	19	32,026.32	608,500.00
	- Signalization	Point	20	25,175.00	503,500.00
	- Tidal Observation	Point	1	760,000.00	760,000.00
	- Traversing	Km.	210	27,840.48	5,846,500.00
	- Levelling	Km.	210	19,455.56	4,085,666.67
	- Spot Levelling	Ha.	12,000	654.31	7,851,666.67
	- Field Ident. and Field Completion	Ha.	12,000	282.93	3,395,166.67
4	Photogrammetric Mapping				
	- Aerial Triangulation	Model	49	39,098.64	1,915,833.33
	- Photogrammetric Plotting	Ha.	12,000	278.75	3,345,000.00
	- Editing & Drawing	Ha.	12,000	370.88	4,450,500.00
	- Polyester Copy	Sheet	105	5,500.00	577,500.00
	- Blue print	Sheet	350	1,250.00	437,500.00
	T o t a l				¥ 43,668,167
	R o u n d e d				¥ 43,668,000

(Say: Fourty three million six hundred and sixty eight thousand Yen)

Jakarta, July 24, 1990

PT. GEOJAYA - TEHNIK

Ir. H. ISKANDAR HIDAYAT

Director

pt. Megaplana. Nusa. Indonesia.
SURVEY - MAPPING - CONSULTING ENGINEERING SERVICES
Cilandak KKO Raya No. 3 Ragunan, Jakarta Selatan ☎ 781605

BANKERS
- BANK BUMI DAYA
- BANK PEMBANGUNAN DAERAH DKI
- BANK DUTA EKONOMI

Bill of Quantities

Item No.	Work	Unit	Qty	Unit Price (Yen)	Amount (Yen)	Ref.No. in Spec.
1	Preparation	L.S	1	-	1,000,000	
2	Aerial Photogr.	ha.	20.000	449.67	8,993,333	2.2.
3	Ground Control					2.3.5
	- Monumentation	Point	19	46,666.67	886,667	2.3.1
	- Signalization	Point	20	34,083.33	681,667	2.3.1
	- Tidal Observ.	Point	1	3,186,750.00	3,186,750	2.3.2
	- Traversing	km	210	20,723.81	4,352,000	2.3.3
	- Levelling	km	210	13,317.86	2,796,750	2.3.4
	- Spot Levelling	ha	12.000	736.22	8,834,667	2.3.6
	- Field Identi.	ha	12.000	202	2,428,000	2.3.5
	and Field Comp				4.000	2.4.4
4	Photogrammetric Mapping					2.4
4.1	Aerial Triangu.	Model	49	18,707.48	916,667	2.4.2
4.2	Photogrammetric Mapping	ha	12.000	312.47	3,749,667	2.4.3
4.3	E d i t i n g & D r a w i n g	ha	12.000	556.33	6,676,000	2.4.5
4.4	Second Original	sheet	105	10,000.00	1,050,000	2.4.5
4.5	Blue Print	sheet	350	500.00	175,000	2.4.5
	T O T A L				45,727,167	
	R O U N D E D				45,727,000	

S a y : Fourty five million seven hundred and twenty seven thousand Yen.

Jakarta, July 24,1990
PT. MEGAPLANA NUSA INDONESIA

Ir. Jarot Ibnu Prabowo

D i r e k t u r

PT. Exsa International Co., Ltd.
Jalan Tomang Raya No. 74, Tomang, Jakarta 11430, Indonesia
Phone: (021) 5604361 to 5604365 • Telex: 45808 EXSA IA
Fax: (62) 21-592734 • Cable: KONEKSA Jakarta

BILL OF QUANTITIES

Item No.	Work	Unit	Qty	Unit Price (Yen)	Amount (Yen)	Ref.No. in Spec.
1.	Preparation	L.S			300,000.00	
2.	Aerial Photography	ha	20000	450.00	9,000,000.00	2.2
3.	Ground Control					2.3.5
3.1	- Monumentation	Point	19	22,000.00	418,000.00	2.3.1
3.2	- Signalization	Point	20	12,000.00	240,000.00	2.3.1
3.3	- Tidal Observation	Point	1	600,000.00	600,000.00	2.3.2
3.4	- Traversing	km	210	25,000.00	5,250,000.00	2.3.3
3.5	- Levelling	km	210	16,000.00	3,360,000.00	2.3.4
3.6	- Spot Levelling	km	12000	650.00	7,800,000.00	2.3.6
3.7	- Field Ident.	ha	12000	120.00	1,440,000.00	2.3.5
3.8	- Field Comp.	ha	12000	120.00	1,440,000.00	2.4.4
4.	Photogrammetric Mapping					2.4
4.1	- Aerial Triangulation	Model	49	15,000.00	735,000.00	2.4.2
4.2	- Photogrammetric Plotting	ha	12000	336.67	4,040,000.00	2.4.3
4.3	- Editing & Drawing	ha	12000	275.78	3,309,333.33	2.4.5
4.4	- Second Original	sheet	105	11,500.00	1,207,500.00	2.4.5
4.5	- Blue print	sheet	350	500.00	175,000.00	2.4.5
	T O T A L				¥ 39,314,833	
	R O U N D E D				¥ 39,315,000	

(Say : Thirty nine million three hundred fifteen thousand yen)

Jakarta, July 26, 1990
PT. EXSA International Co. Ltd.

Ir. Leo Nardy
Director

Japan International Cooperation Agency (JICA)
The Nias Island
Irrigation Agricultural Development Project
The Feasibility Study Team (Topographic Mapping)

July 11, 1990

Ir. Mashudi, Dipl.HE
Kasubdit Perencanaan Teknis
Direktorat Irigasi I
Departmen Pekurjaan Umum
Jakarta

Dear Ir. Mashudi

I would like to ask your help to recommend me some of Indonesian companies who specialise in the survey and mapping and are suitable as the candidates for a contractor to execute the topographic survey and mapping including the aerial photography for the feasibility study on the Nias Island Irrigation Agricultural Development Project.

Your kind cooperation to the Project is highly appreciated.

Very sincerely yours

Hajime GOTO
Team leader

DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
DIREKTORAT IRIGASI I
Jl. Pattimura No. 20/Perc. 7 Kebayoran Baru Kotak Pos 205 Kebayoran Telp. 773803, 714260
JAKARTA – KODE POS. 12180–A
TELEX 47430 IRGASI IA

No : IK.01.01.01/Ai/C/04. Jakarta, July 11, 1990

Mr. Hajime Goto
Team Leader
JICA The Nias Island
Irrigation Agricutural Dev. Project
The Feasibility Study Team
(Topographic Mapping)
J a k a r t a .

Subject : Shortlist of Some Indonesian Companies For Survey Work in Nias Island

Dear Mr. Hajime Goto,

Refering to Your letter dated July 11, 1990 about the subject above, here I inform you the names of the Companies to be recommended :

1. PT. EXSA International Co.Ltd
   Jl. Tomang Raya No. 74. Jakarta Barat.
2. PT. Megaplana Nusa Indonesia
   Jl. Cilandak KKO Raya No.3 Ragunan Jakarta Selatan
3. PT. Geojaya
   Jl. Kapten Tendean No.9 B Jakarta Selatan

Those Companies are qualified enough to participate the tender of Survey Work.

Your Sincerely,

DEPARTEMEN PEKERJAAN UMUM ☆ DIREKTORAT IRIGASI-I ☆ DIREKTORAT JENDERAL PENGAIRAN

Ir. Mashudi, Dip.HE.
Chief of Sub Directorate
of Planning & Design

C.C.
1. Director of DOI– I
   (as report)
2. F i l e.

APPENDIX - 4 LETTEPS CONCERNING TO THE TENDER AND CONTRACT

DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
DIREKTORAT IRIGASI I
Jl. Pattimura No. 20/Perc. 7 Kebayoran Baru Kotak Pos 205 Kebayoran Telp. 773803, 714260
JAKARTA – KODE POS. 12180-A
TELEX 47430 IRGASI IA

No : IK.01.01.01/Ai/C/04. Jakarta, July 11, 1990

Mr. Hajime Goto
Team Leader
JICA The Nias Island
Irrigation Agricutural Dev. Project
The Feasibility Study Team
(Topographic Mapping)
J a k a r t a .

Subject : Shortlist of Some Indonesian Companies For Survey Work in Nias Island

Dear Mr. Hajime Goto,

Refering to Your letter dated July 11, 1990 about the subject above, here I inform you the names of the Companies to be recommended :

1. PT. EXSA International Co.Ltd
   Jl. Tomang Raya No. 74. Jakarta Barat.
2. PT. Megaplana Nusa Indonesia
   Jl. Cilandak KKO Raya No.3 Ragunan Jakarta Selatan
3. PT. Geojaya
   Jl. Kapten Tendean No.9 B Jakarta Selatan

Those Companies are qualified enough to participate the tender of Survey Work.

Your Sincerely,

DEPARTEMEN PEKERJAAN UMUM ☆ DIREKTORAT IRIGASI-I ☆ DIREKTORAT JENDERAL PENGAIRAN

Ir. Mashudi, Dip.HE.
Chief of Sub Directorate
of Planning & Design

C.C.
1. Director of DOI- I
   (as report)
2. F i l e.

Japan International Cooperation Agency (JICA)
The Nias Island
Irrigation Agricultural Development Project
Feasibility Study Team (Topographic Mapping)

Date: August 4, 1990
Ref.No.Nias-F-002-90

PT. Exsa International Co.,Ltd.
Jl. Tomang Raya No.74 Jakarta

Subject: 1:5,000 Topographic Mapping for the Feasibility Study on The Nias Island Irrigation Agricultural Development Project

Dear Sirs

This is to certify that the mobilization and preparation of the field operations for the mapping and surveying for the Feasibility Study on the Nias Island Irrigation Agricultural Development Project have been successfully carried out and the field operation are started on August 3, 1990.

Your attention and cooperation to the Project are highly appreciated.

Very truly yours

Shinichi SATO
Representative
JICA Feasibility Study Team
(Topographic Mapping)

Japan International Cooperation Agency (JICA)
The Nias Island
Irrigation Agricultural Development Project
Feasibility Study Team (Topographic Mapping)

Date: July 27,1990
Ref.No.Nias-F-001-90

PT. Exsa International Co.,Ltd.
Jl. Tomang Raya No.74 Jakarta

Subject: 1:5,000 Topographic Mapping for the Feasibility Study on The Nias Island Irrigation Agricultural Development Project

NOTICE TO PROCEED

Dear Sirs

Pursuant to our Invitation to Tender dated July 16 1990 on the above subject, we hereby confirm the intention of the JICA Feasibility Study Team (Topographic Mapping) on the Nias Island Irrigation Agricultural Development Project to assign PT.Exsa International Co., Ltd. to carry out the 1:5,000 Topographic Mapping and Surveying in North Sumatra, in accordance with your Tender Documentsand as have been agreed upon by the JICA Feasibility Study Team(Topographic Mapping).

You are therefore kindly requested to commence the preparation of the Work on 27th of July 1990 while waiting for the signing of the anticipated contract.

Your attention and cooperation to the Project are highly appreciated.

Very truly yours

Hajime GOTO
Team Leader
JICA Feasibility Study Team
(Topographic Mapping)

cc. -JICA Tokyo
-JICA JKT.
-AAS. Tokyo

APPENDIX - 5 SECURITY CLEARANCE FOR THE AERIAL PHOTOGRAPHY

DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
DIREKTORAT IRIGASI I
Jl. Pattimura No. 20/Perc. 7 Kebayoran Baru Kotak Pos 205 Kebayoran Telp. 773803, 714260
JAKARTA - KODE POS. 12180-A
TELEX 47430 IRGASI IA

Nomor : PL.01.02/Ai/C/05 Jakarta, 16 Juli 1990

Kepada Yth.:
Bpk. Direktur Bina Program
di tempat

Perihal : Security Clearance Pemetaan dengan Photogrametry Daerah Irigasi Pulau Nias Propinsi Sumatera Utara

Dengan ini kami mohon bantuan Bapak dengan hormat perihal tersebut dalam pokok surat ini akan hal-hal sebagai berikut :

1. Pemerintah Indonesia mendapat bantuan hibah (grand) dari Pemerintah Jepang melalui Jica untuk Feasibility Study Pengembangan Irigasi dan Pertanian di Pulau Nias (The Feasibility Study on The Nias Island Irigation Agriculture Development Project).
2. Salah satu kegiatan yang juga dibiayai Jica adalah Pemetaan dengan Foto udara.
3. Feasibility Study telah disepakati harus diselesaikan dalam 9 bulan (10 Juli 1990 - 31 Maret 1991).
4. Sehubungan dengan skedule tersebut dalam butir 3 Kegiatan Mapping harus diselesaikan dalam waktu 6 (enam) bulan dimana kegiatan foto udara harus dilakukan dalam waktu 3 (tiga) minggu yang diperkirakan mulai tanggal 20 Agustus 1990 - 20 September 1990 .
5. Pengadaan Jasa Konsultan Foto Udara dilakukan oleh Jica untuk 3 (tiga) perusahaan melalui prakwalifikasi yang telah disetujui oleh Direktorat Irigasi I yaitu P.T. Exsa Internasional Co.Ltd., P.T. Geo Jaya Teknik dan P.T. Megaplana Nusa Indah .
6. Hasil Evaluasi Tender , pemenang Tender adalah P.T.Exsa Internasional Co.Ltd. Jl.Tomang Raya no.74 Jakarta Barat.
7. Untuk dapat segera dimulai kegiatan Foto Udara oleh Konsultan P.T.Exsa Internasional Co.Ltd. sesuai dengan jadwal yang telah disepakati , mohon bantuan pengurusan Security Clearance .

Demikian permohonan kami agar Bapak maklum adanya .

DEPARTEMEN PEKERJAAN UMUM ★ DIREKTORAT JENDERAL PENGAIRAN ★ DIREKTORAT IRIGASI-I

DIREKTORAT IRIGASI I
Kasubdit. Perencanaan Teknis

Ir. Mashudi Dipl. HE

Nip.[illegible]

Tembusan Kepada Yth. :
1. Direktur Irigasi I (Sebagai Laporan),
2. Mr. Hajime Goto (JICA).
3. Direktur PT. Exsa Int.Co. Ltd.
4. Pertinggal.

MARKAS BESAR
ANGKATAN BERSENJATA REPUBLIK INDONESIA
HEAD QUARTER OF INDONESIAN ARMED FORCES

NO. : SC-053/P/SPA/VIII/9

LEMBAR KE
SHEET NO

FORMULIR : A
FORM : A

SECURITY CLEARANCE BAGI KEGIATAN SURVEI & PEMETAAN
SECURITY CLEARANCE FOR SURVEY & MAPPING

PERMOHONAN SURVEI DARAT/LAUT/UDARA
APPLICATION FOR LAND SURVEY/SEA SURVEY/AERIAL SURVEY

A. INSTANSI YANG MENGAJUKAN :
APPLYING AUTHORITY

Nama / Name : Direktorat Bina Program Pengairan, Direktorat Jenderal Pengairan, Departemen Pekerjaan Umum.

Alamat / Address : Jalan Pattimura No. 20, Kebayoran Baru, Jakarta Selatan.

Dalam rangka Proyek/Program / Within the Project/Program : Proyek Pengembangan Irigasi Pulau Nias, Sumatera Utara.

Anggaran / Budget — Rutin / Routine [ ] Pembangunan / Development [ ] Asing/Bank Dunia / Foreign/World Bank [ ]

B. PENGUMPULAN DATA
DATA COLLECTING

1. Pelaksana / Executor

a. Kontraktor Utama / Main Contractor : PT. EXSA International Co. Ltd.

Alamat / Address : Jalan Tomang Raya No. 74, Jakarta Barat.

b. Sub Kontraktor / Subcontractor : .....

Alamat / Address : .....

2. Sarana / Means

a. Wahana / Vehicle : Pesawat Udara

1) Callsign/Bendera/Reg. letter / Callsign/Flag/Reg. letter : PK-BIE/PK-BIF/PK-BIB/PK-BIG/PK-BIH/PK-VKY/PK-VKZ/PK-WWC/PK-WWJ/PK-WWK/PK-WWI

2) Type/Ukuran/Isi / Type/Size/Capacity : Beechcraft SH-18/King Air/Piper Aztecs/Dakota DC-3/C.47

3) Kualifikasi/Captain / Captain : 1 dengan / With 3 crew / crew

b. Peralatan Survei / Survey Equipment : Kamera Udara Zeiss MRB 15/2323/Wild RC-10

c. Personil ahli / Experts : .....

v. Personil ahli / Experts

	Nama / Name	Kebangsaan / Nationality	Keahlian / Expertise
1).	Martono/Marzal/Hadi Utomo/Gatot/ Mulyono/Suhardjo/Widyastuty/J.Burhani/ Johan/Jacob/Suparno/Rusdy A./Aris N.	Indonesia	Pilot
2).	E.Siswanto/T.Okke L.S/B.A.S.Tarumasely.		
3).	Sutoyo/Turkan/Ismail Y./Herman/ Inata/Ansor/Suhartono/D.Sinanu/	Indonesia	Mekanik
4).	E.Sofyan/Suwarko/Buyung/Darmawan.		
	Pudjono A./Sumardi/Soesarwono	Indonesia	Navigator
5).	Bambang Sugiono/Maryadi Anis	Indonesia	Cameraman

3. Basis / Base : Polonia Medan / Padang / Pakanbaru / G. Sitoli

4. Route/singgah/keperluan/ketinggian / Route/call at/purpose/altitude : ± 10.000 feet

5. Daerah pelaksanaan / Area of operation : Daerah Irigasi Pulau Nias, Sumatera Utara.

6. Tanggal pelaksanaan survei / Date of survey operation : 20 Agustus 1990 s/d 20 Nopember 1990

C. PENGOLAHAN DATA / DATA PROCESSING

1. Pelaksanaan / Execution

a. Kontraktor Utama / Main Contractor : PT. EXSA International Co. Ltd.

Alamat / Address : Jalan Tomang Raya No. 74, Jakarta Barat.

b. Subkontraktor / Subcontractor : -

Alamat / Address : -

2. Processing di / Processing to be done : Indonesia.

a. Oleh / By : PT. EXSA International Co. Ltd.

b. Alamat proses / Address of processing : Jalan Tomang Raya No. 74, Jakarta Barat.

c. Waktu/lamanya proses / Duration of processing : 3 (tiga) bulan

3. Personil / Personnel

a. Indonesia / Indonesia : 4 (empat) orang — Orang / man

b. Asing / Expatriate : - — Orang / man

	Nama / Name	Kebangsaan / Nationality	Keahlian / Expatriate
1)	Dayat S. / Muhidin	Indonesia	Photo Laborant
2)	Subaryanto	Indonesia	Photo Laborant
3)	Sutrisno	Indonesia	Photo Laborant

(Dapat ditambahkan dengan lampiran) / (Additional sheet can be attached if needed)

SC-053/P/SPA/VIII/90

Pemohon/Applicant

Ir. Martono
NIP. 110007117

CATATAN & VERIFIKASI TEKNIS
NOTE & TECHNICAL VERIFICATION

(Ruangan ini tidak diisi oleh Pemohon)
(Applicant shall not fill in this space)

- Pelaksana survei dilapangan harus melaporkan rencana kegiatannya kepada Pejabat setempat.
- Dalam jangka 2 minggu setelah selesai survei dilapangan semua hasil pengumpulan data perekaman wilayah harus diserahkan ke Pussurta ABRI untuk penetapan klasifikasi.
- Penggunaan, Pendistribusian dan Penyimpanan data hasil rekaman kewilayahan harus disertai clearance yang ditentukan Mabes ABRI.
- Kegiatan ini diikuti oleh security officer (S.O) dari Mabes ABRI

Tanggal / Date : 1 - AGUSTUS - 1990

Nomer / Number : SC-053/P/SPA/VIII/90

SURVEI DAN PEMETAAN ABRI
ARMED FORCES SURVEY & MAPPING

KEPALA

DRS. BENNY SOEPARNO
MARSEKAL PERTAMA T N I

Tanggal / Date : 14 Agustus 1990.

Nomer / Number : 050/UD/VIII/90/CBS

Mengetahui
Approved

A.N. ASISTEN OPERASI KASUM ABRI
ASSISTANT FOR OPERATION TO THE CHIEF OF GENERAL STAFF INDONESIAN ARMED FORCES

R. ISKANDAR
KOLONEL INF NRP. 18980

Tanggal / Date : 08 AUG 1990

Nomer / Number : 0284/VIII/1990/a

Mengizinkan/Tidak mengizinkan
Approved/Not approved

KEPALA BADAN INTELIJEN STRATEGIS ABRI
CHIEF OF STRATEGIC INTELLIGENCY AGENCY INDONESIAN ARMED FORCES

AMIN SUMARSONO
BRIGADIR JENDERAL TNI (MAR)

SC A 03

APPENDIX - 6 LETTERS CONCERNING TO THE SURVEY DATA

DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
DIREKTORAT IRIGASI I
Jl. Pattimura No. 20/Perc. 7 Kebayoran Baru Kotak Pos 205 Kebayoran Telp. 773803, 714260
JAKARTA – KODE POS. 12180–A
TELEX 47430 IRGASI IA

No. : PL.03.02.03/Ai/c/06 Jakarta, 16 Juli 1990

Kepada Yth.
Kepala Badan Koordinasi
Survey dan Pemetaan Nasional
di
Cibinong

Perihal : Permohonan data Global Positioning System dan Foto Udara Skala 1 : 50.000 P.Nias Propinsi Sumatera Utara .

Dengan ini kami mohon bantuan Bapak dengan hormat perihal tersebut dalam pokok surat ini akan hal hal sebagai berikut :

1. Pemerintah Indonesia mendapat bantuan hibah (grand) dari pemerintah Jepang melalui Jica untuk Feasibility Study pengembangan Irigasi dan Pertanian di Pulau Nias (The Feasibility Study on The Nias Island Irigation Agriculture Development Proyect).
2. Feasibility Study telah disepakati harus diselesaikan dalam 9 (sembilan) bulan dari tanggal 10 Juli 1990 s/d 31 Maret 1991 termasuk Pemetaan Fotogrametris Skala 1 : 5.000
3. Sehubungan dengan Skedule tersebut dalam butir (2) kami membutuhkan Foto Udara Skala 1 : 50.000 dan data koordinat Global Positioning System untuk menunjang Pekerjaan Feasibility Study diatas .

Demikian permohonan kami agar Bapak maklum adanya

DIREKTORAT IRIGASI I
Kasubdit Perencanaan Teknis

Mashudi Dipl.HE
Nip.110008147

Tembusan kepada Yth. :
1. Direktur Irigasi I (Sebagai Laporan)
2. Team Leader JICA
3. Tertinggal

Cibinong, 13 Agustus 1990.

Nomor : 01.01/34.13/02.01/08.90
Lamp : -
Perihal : Informasi Data.

K e p a d a
Yth. Direktorat Irigasi I
U.p. Ir. Mashudi Dipl.HE
di-
JAKARTA.

Dengan Hormat,

Menunjuk surat Saudara nomor PL.03.02.03/Ai/C/06 tertanggal 16 Juli 1990 perihal : Permohonan Data Global Positioning System dan Fota Radar P.Nias , bersama ini dapat kami sampaikan bahwa :

1. Titik GPS untuk daerah termaksud baru dalam tahap perhitungan base line. Namun demikian bila diperlukan diskripsi titik tersebut, BAKOSURTANAL dapat memberikannya.

2. Untuk peta mosaik radar skala 1 : 50.000 untuk daerah tersebut telah tersedia. Data tersebut dapat diperoleh dengan cara meminta Security Clearance penggunaan data tersebut ke KA.PUSSURTA ABRI dengan tembusan ke KA.BAKOSURTANAL.

Demikian informasi yang dapat kami berikan, atas perhatiannya diucapknan terima kasih.

BADAN KOORDINASI SURVEY DAN PEMETAAN NASIONAL

Pusat Pembinaan Data
Kepala,

Ir. Lintang Suharto
NIP. 370000046

Tembusan Yth :

1. Ketua BAKOSURTANAL.
2. Deputy Bidang Pemetaan.
3. Ka. Dinas Geodesi.

Japan International Cooperation Agency (JICA)
The Nias Island
Irrigation Agricultural Development Project
Feasibility Study Team(Topographic Mapping)

September 6, 1990
Ref.No. NF-005-90

Ir. Mashudi Dipl.HE
Kasubdit Perencanaan Teknis
Direktorat Irigasi I
Departmen Pekurjaan Umum

Dear Ir. Mashudi

I would like to inform you the present situation of coordinates data in Nias Island. There are three GPS stations namely D957, D956 and D953 around the mapping areas established by BAKOSURTANAL in 1989.

We intend to use the stations for our ground control survey as horizontal reference. According to BAKOSURTANAL, as of the end of August, coordinates data of these stations are still under processing and not available. However, coordinates data obtained by the Doppler Satellite Observation are available for these stations.

We believe that those are presently the most reliable horizontal coordinates data available in this area.

Therefore, we would like to obtain your approval to use the DSO coordinates data for the ground control survey of topographic mapping for the Nias Island Irrigation Agricultural Development Project.

Your kind cooperation to the Project is highly appreciated.

Very truly yours

Hajime GOTO
Team Leader

cc.
- JICA Head Office
- JICA JKT Office
- Bina Program Pengairan
- PT.Exsa International

DEPARTEMEN PEKERJAAN UMUM
DIREKTORAT JENDERAL PENGAIRAN
DIREKTORAT IRIGASI I
Jl. Pattimura No. 20/Perc. 7 Kebayoran Baru Kotak Pos 205 Kebayoran Telp. 773803, 714260
JAKARTA - KODE POS. 12180-A
TELEX 47430 DIRGASI IA

Ref. No. : PL.02.01.01/Ai/C/09 Jakarta, September 6, 1990.

Mr. Hajime Goto
Team Leader
J I C A The Nias Island
Irrigation Agricultural Development Project
Feasibility Study Team (Topographic Mapping)

Subject : Approval to use the DSO (Doppler Satellite Observation) coordinates data.

Dear Mr.GOTO,

Refering to your letter dated September 6, 1990 about the subject above, here I inform you :

1. Base on the letter from BAKOSURTANAL No.01.01/34/13/02.01/08.90 dated August 13, 1990, mentioned that the GPS for Nias Island is being under observation .
2. The DSO coordinates data can be used as a control.
3. Therefore , it is agreed to apply the DSO coordinates data for the ground control survey of topographic mapping for The Nias Island Irrigation Agricultural Development Project.

Thank you for close cooperation.

Your Sincerely

DEPARTEMEN PEKERJAAN UMUM ☆ DIREKTORAT IRIGASI-I ☆ DIREKTORAT JENDERAL PENGAIRAN

Ir.Mashudi, Dipl.HE.
Chief of Sub Directorate
of Planning & Design

C.C.to :

1.Director of DOI - I (as report)
2.F i l e.

APPENDIX - 7 MEMBERS AND EQUIPMENTS OF THE EXSA SURVEY TEAM

DAFTAR PERSONIL PELAKSANA

A. KOORDINATOR

1. Deden Wijaya
2. Dadang Sopandi

B. TEAM POLIGON

1. Maya
2. Sobur
3. Kodiran
4. Dedi

C. TEAM WATERPASS/SPOT LEVEL

1. Wasiman
2. Tata
3. Harja
4. Ade Mukti

D. Computasi

1. Yanto H.

E. Pemasangan Patok BM/PM

1. Mulyadi

F. Pengamatan Pasang Surut

1. Apep
2. Ayi

DAFTAR PERALATAN

No.	Peralatan	Merk	No. Seri/banyaknya
1.	Theodolite		
	Theodolite T2	Wild	264002
		Wild	229446
2.	Waterpass NAK 1	Wild	457745
		Wild	466381
		Wild	442638
		Wild	466262
		Wild	468253
		Wild	466466
		Wild	466313
		Wild	467731
3.	EDM Red 2A	Sokisha	26016
	EDM Red 2L	Sokisha	25303
4.	Reflektor 3 Prisma	Sokisha	4 set/box
5.	Batery Charger DCD 15		2 Buah
6.	Roeloffs GSP 1	Wild	2 Buah
7.	Tripod Poligon		6 Buah
	Tripod Waterpass		8 Buah
8.	Staatpot		16 Buah
9.	Handy Talky IC2N	ICOM	
	IC2N		217254
			37568
			69375
			44655
10.	Computer PC/XT	IBM	1 Unit

APPENDIX - 8 EQUIPMENT TESTS REPORT.

TEST FOR SURVEY EQUIPMENT

Before being used for the field survey, every equipment was tested and adjusted to avoid instrumental errors in observation and measurement.

1. Members, date and place

Members participated were as follows:

JICA members; Messers. H. Goto, S. Sato and Edi kesuma Nasution BE.

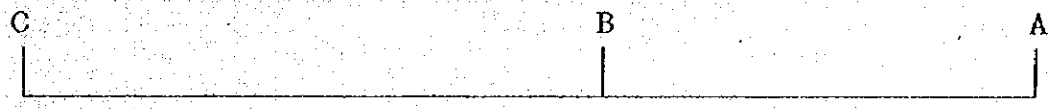
Exsa members; Messers. Ir. Saidi Pranoto, Ir. Aribono Hendarto and several surveyors.

The tests were carried out in the street in front of the Exsa base in Gunung Sitoli on 4 August 1990.

2. Methods and results

1) Tests for EDM

After having adjusted the constants of EDMs and reflectors EDMs of RED-2A No.26016 and RED-2L No.25303 were tested by measuring the distances between A and B, B and C and A and C as follows:



The results were as follows:

EDM	A~B(m)	B~C(m)	A~C(m)	AC-(AB+BC)
RED-2A	64.405	87.457	151.862	0mm
RED-2L	64.406	87.457	151.862	1mm

Measurement accuracy of the EDMs were confirmed to be sufficient for the surveying.

2) Tests for theodolites

To test the accuracy of theodolites, two sets of observation(one set consists of right and left face observation) of horizontal and vertical angles were done and the difference were inspected.

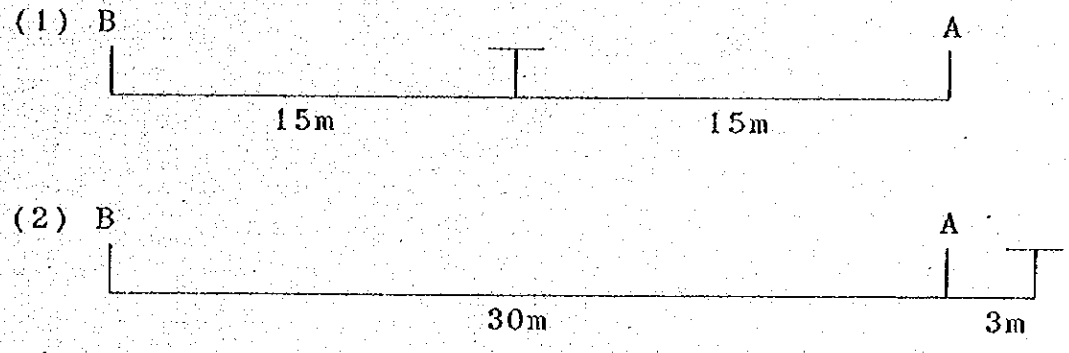
The results were as follows:

Theodolite (T2 Wild)	Horizontal difference	Vertical difference
No.264002	2"	3"
No.229446	3"	3"

The accuracy of the theodolites were confirmed to be sufficient for the surveying.

3) Tests for automatic levels

To assure the accuracy of the automatic levels, the peg adjustment was done in the following manner:



The results were as follows:

Observation in condition (1) by an automatic level NAK-1 Wild No.466313 was A=0.872m, B=1.206 and A-B=-0.334.

Observation in condition(2) by every automatic level NAK-1 Wild were as follows:

Levels	A(m)	B(m)	A-B(m)	Difference (1)/(2)
No.466313	0.873	1.207	-0.334	0mm
No.456282	0.858	1.192	-0.334	0

Levels	A(m)	B(m)	A-B(m)	Difference (1)-(2)
No.466381	0.857	1.192	-0.335	- 1mm
No.457745	0.860	1.192	-0.332	+ 2
No.466466	0.858	1.193	-0.335	- 1
No.468253	0.857	1.193	-0.336	- 2
No.442638	0.901	1.234	-0.333	+ 1
No.457731	0.874	1.206	-0.332	+ 2

Accuracy of these automatic levels were confirmed to be sufficient for the surveying.

APPENDIX - 9 FLIGHT OPERATIONS RECORD

AERIAL PHOTOGRAPHY RECORD

Exsa International Co. Ltd.

Project : Irrigation/PU. JICA
Location : Nias Island SUM.UTR
Aircraft : Beacheraft S-18
Call sign: PK BIH
Pilot : Jaharon Burhani
Mechanic : Ganda

Security clearance
No. Sc.053/P/SPA/VIII/9
Navicator: Maryadi Anis
Cameraman: Subaryanto
Security Officer : Peltu. Ik. Gitra

Areas: 20,000ha Scale: 1:20,000 Ground height: 500ft
Fly.altitude: 10,300ft Overlap: 60% Sidelap: 30%
Camera: Zeiss MRB 15/23x23 Forcal length: 152.22mm
Diafragm: 5.6 Filter: Yellow Shutter speed: 1/300

23 Aug. Aircraft ferry from Jakarta to Padang.

Date	Run	Track	Drift	Counter on	/ off	Total	Roll
24 Aug.	(Camera test)			010	014	5	I
25 Aug.	-	-	-3	015	022	8	I
	1	310/130	+3	023	031	9	I
	2	310/130	+3	032	041	10	I
	3	210/130	-3	042	051	10	I
29 Aug.	4	275/ 95	+3	063	072	10	I
	5	275/ 95	+3	073	084	12	I
	6	330/150	-4	089	092	4	I
	7	330/150	+3	093	099	7	I
6 Spt.	8	235/ 55	+4	112	124	13	I
	9	233/ 55	-3	125	138	14	I
	7	330/150	+3	145	152	8	I
	8	235/ 55	-2	153	167	15	I
	4	275/ 95	+2	168	174	7	I
7 Spt.	5	275/ 95	-2	179	182	4	I
	6	330/150	+2	183	191	9	I
	3	310/130	+5	192	199	8	I
8 Spt.	3	310/130	0	210	219	10	I
	6	330/150	+2	220	228	9	I
	4	275/ 95	+3	229	236	8	I
	4	275/ 95	+3	237	244	8	I
	5	275/ 95	0	245	248	4	I
	3	310/130	-9	249	257	9	I
	2A	310/130	+3	258	262	5	I

9 Spt. Aircraft ferry from Padang to Jakarta.

AERIAL PHOTOGRAPHY FLYING HOUR REPORT

PT. EXSA International Co.,Ltd.

Project : Irrigation PU Location: Nias Island Scale : 1:20,000 From : 23 Aug. 1990 Until : 9 Sept.1990 Duration: 18 days	Aircraft : Beachcraft S-18 Call Sign: PK BIH Pilot : J. Burhani Mechanic : Ganda Navigator: Maryadi Anis Cameraman: Subaryanto

No.	Date	Take off	Land-ing	Flying hours	Remarks
1	23 Aug.			3:55	Mobilization from Jakarta to Padang via Palembang
2	24 Aug.	7:35	11:05	3:30	Orientation flight
3	25 Aug.	7:30	11:15	3:45	Flight for photo-graphy,Run-1,2,3 are taken
4	26 Aug.	-	-	-	Aircraft trouble grounded
5	27 Aug.	-	-	-	-ditto-
6	28 Aug.	-	-	-	-ditto-
7	29 Aug.	7:25	11:15	3:50	flight to take Run-5,6,7
8	30 Aug.	-	-	-	Aircraft trouble grounded
9	31 Aug.	-	-	-	-ditto-
10	1 Spt.	-	-	-	-ditto-
11	2 Spt.	7:25	9:20	1:45	Flight but rain and clouds
12	3 Spt.	-	-	-	Aircraft trouble grounded
13	4 Spt.	-	-	-	-ditto-
14	5 Spt.	-	-	-	-ditto-
15	6 Spt.	7:25	11:45	4:20	Flight to take Run-4, 7, 8, 9.
16	7 Spt.	9:35	12:50	3:15	Flight to take Run-3, 5, 6.
17	8 Spt.	7:35	11:15	3:50	Flight to take Run-2A, 3, 4, 5, 6.

9 Spt. the aircraft was ferried from Padang to Jakarta via Palembang.