

Appendix A

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2. Minutes of Meeting on the Scope of Work;	17 Aug. 2000
3. Minutes of Meeting on the Inception Report;	01 Feb. 2001
4. Modification Request from IGN;	01 Feb. 2001
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6. Survey Specifications 1;	09 Feb. 2001
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8. Agreement on Utilization of Photos and Films;	16 Mar. 2001
9. Minutes of Meeting on the Progress Report 1;	31 Mar. 2001
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11. Minutes of Meeting on the Progress Report 2;	14 Jun. 2002
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16. Technical Note for the Discussion on the Fifth Field Survey;	07 Jul. 2003
17. Receipt of Hurricane Mitch Disaster Maps;	27 Jul. 2003
18. Minutes of Meeting on the Draft Final Report;	28 Oct 2003



**SCOPE OF WORK
ON
THE STUDY
FOR
ESTABLISHMENT OF BASE MAPS AND HAZARD MAPS FOR GIS
IN
THE REPUBLIC OF GUATEMALA**

AGREED UPON BETWEEN

**NATIONAL GEOGRAPHICAL INSTITUTE
AND
NATIONAL INSTITUTE FOR
SEISMOLOGY, VOLCANOLOGY, METEOROLOGY, AND HYDROLOGY
AND
SECRETARIAT OF PLANNING AND PROGRAMMING FOR THE PRESIDENCY
AND
JAPAN INTERNATIONAL COOPERATION AGENCY
GUATEMALA CITY
17 AUGUST, 2000**

Fernando Amilcar Boiton Velasquez
Director General
National Geographical Institute (IGN)

Nobuo Nagai
Leader
Preparatory Study Team
Japan International Cooperation Agency (JICA)

Eddy Hardie Sanchez Benett
Director General
National Institute for Seismology,
Volcanology, Meteorology, and Hydrology
(INSIVUMEH)

(Witness)
Pedro Jose Asturias Montenegro
Vice Minister
Ministry of Communications, Infrastructure and
Housing

Jorge Mario Calvillo
Subsecretary of International Cooperation
Secretariat of Planning and
Programming for the Presidency (SEGEPLAN)

I. INTRODUCTION

In response to a request of the Government of the Republic of Guatemala, the Government of Japan has decided to conduct the "Study for Establishment of Base Maps and Hazard Maps for GIS in the Republic of Guatemala" (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

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

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are to:

1. prepare 1/50,000 topographic maps and GIS base maps covering the southwestern area of about 30,000 km² to be used by various users for different purposes including hazard maps;
2. prepare hazard maps for priority areas to be used for prevention and mitigation of hazards by earthquakes, volcano eruptions, land slides and floods; and
3. transfer technology.

III. STUDY AREAS

1. The 1/50,000 topographic maps and GIS base maps shall cover the southwestern area of approximately 30,000 km².
The Study area of the 1/50,000 topographic maps is shown in Appendix-1
2. Hazard maps shall cover the following areas.
 - (1) Earthquakes (1/10,000 approximately 600 km²)
Guatemala City, Quetzaltenango, Mazatenango, Escuintla and Puerto Barrios
 - (2) Volcano eruptions (approximately 1,700 km²)
Tacana (1/50,000), Santiaguito (1/10,000), Cerro Quemado (1/10,000) and Pacaya (1/10,000)
 - (3) Land slides
Guatemala City, Quetzaltenango and Antigua (1/10,000 approximately 1,400 km²),
Northwest region (El Quiche, Huehuetenango, San Marcos) and
Central region (Sacatepequez, Chimaltenango, Solola)
(1/50,000 slope classification only, approximately 5,000 km²)

(4) Floods (1/10,000 approximately 2,000 km²)

The Samala basin, Acome basin, Achiguate basin and Maria Linda basin.

IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study shall cover the following items.

1. 1/50,000 topographic maps and GIS base maps
 - (1) Aerial photography
Black and White aerial photographs covering necessary area in the Study area shall be taken at the scale of 1/40,000.
 - (2) Digitizing
Existing 1/50,000 scale topographic maps covering the Study area shall be digitized.
 - (3) Detection of topographic changes
Detection of topographic changes of importance shall be examined by aerial photographic interpretation.
 - (4) Field identification
Topographic information shall be identified through the field survey using the aerial photographs.
 - (5) Editing
Editing shall be carried out to update 1/50,000 scale topographic maps.
 - (6) Structurization
Digital topographic data shall be structurized.
 - (7) Symbolization
Structurized data shall be symbolized paying much attention to the conventional symbols.
 - (8) Preparation of printing films
Printing films shall be prepared using laser-plotter at the scale of 1/50,000.

2. Hazard Maps

(1) Preparation of digital orthophoto maps for the Study area

- 1) Aerial photography (Black and White 1/20,000)
- 2) Ground control point survey
- 3) Aerial triangulation
- 4) Plotting

(2) Review of the extent of damages caused by the past natural disasters Disaster records on damages shall be collected and reviewed.

(3) Review of the current physical conditions

Data on the current physical conditions necessary for hazard mapping shall be collected and reviewed.

(4) Review of the socio-economic information

Data on the socio-economic information necessary for hazard mapping shall be collected and reviewed.

(5) Geomorphological survey

Geomorphological survey necessary for hazard mapping shall be conducted.

(6) Hazard mapping

Hazardous area shall be mapped based on the information collected and reviewed under IV 2. (i), (2), (3), (4) and (5).

3. Technology transfer

(1) In order to facilitate technology transfer to the counterpart personnel, a part of the above-mentioned items shall be undertaken by the counterpart personnel under the technical supervision of the Japanese Study team.

(2) In order to disseminate the outcome of the Study, seminars and workshops shall be organized in the course of the Study.

V. STUDY SCHEDULE

The Study shall be implemented in accordance with the tentative Study schedule shown in Appendix 2. The schedule, including report submission dates stated in the next clause (VI), is tentative and subject to be modified when both parties agree upon and any necessity that arises during the course of the Study.

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VI. REPORTS AND FINAL PRODUCTS

JICA shall prepare and submit the following reports in English and Spanish to the Government of Guatemala. In case any contradiction arises in writing, the English text shall prevail.

1. Inception Report
20 copies At the commencement of the Study
 2. Progress Reports
20 copies At the end of the first, second and third years
 3. Draft Final Report
20 copies At the end of the fourth year
- The government of Guatemala will present its comments to JICA within one month after the receipt of the Draft Final Report.
4. Final Report
20 copies At the end of the Study
 5. Final products
 - (1) Aerial Photographs (Black and White 1/40,000 and 1/20,000)
 - a. Negative film of aerial photographs 1 set
 - b. Diapositive film of aerial photographs 1 set
 - c. Contact prints of aerial photographs 1 set
 - d. Photo index map 1 set
 - (2) Results of field survey 1 set
 - (3) Results of aerial triangulation 1 set
 - (4) Printing films for 1/50,000 scale topographic maps 1 set
 - (5) Digital data files (e.g. CD-ROM)
 - a. 1/50,000 scale topographic maps and GIS base maps 20 sets
 - b. Hurricane Mitch disaster maps 20 sets
 - c. Geomorphological maps 20 sets
 - d. Hazard maps 20 sets
 - (6) Print out of maps
 - a. 1/50,000 scale topographic maps 10 sets
 - b. Hurricane Mitch disaster maps 10 sets
 - c. Geomorphological maps 10 sets
 - d. Hazard maps 10 sets

VII. UNDERTAKING OF THE GOVERNMENT OF THE REPUBLIC OF GUATEMALA

1. To facilitate smooth conduct of the Study, the Government of the Republic of Guatemala shall take the following necessary measures:

- (1) to secure the safety of the Japanese Study team;
- (2) to permit the members of the Japanese Study team to enter, leave and sojourn in the Republic of Guatemala for the duration of their assignment therein and exempt them from foreign registration requirements and consular fees;
- (3) to exempt the members of the Japanese Study team from taxes, duties, fees and any other charges on equipment, machinery and other materials brought into and out of the Republic of Guatemala for the conduct of the Study;
- (4) to exempt the members of the Japanese Study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese Study team for their services in connection with the implementation of the Study;
- (5) to provide necessary facilities to the Japanese Study team for remittance as well as utilization of the funds introduced into the Republic of Guatemala from Japan in connection with the implementation of the Study;
- (6) to secure permission for the Japanese Study team for entry into private properties and restricted areas for the implementation of the Study;
- (7) to secure permission for the Japanese Study team to use necessary radio frequency for the implementation of the Study;
- (8) to secure permission for the Japanese Study team to take all data and documents including topographic maps, original manuscripts and aerial photographs related to the Study out of the Republic of Guatemala to Japan;
- (9) to secure necessary permission for aerial photography by a foreign registered aircraft for the implementation of the Study; and
- (10) to provide medical services as needed. Its expenses will be chargeable on the members of the Japanese Study team.

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

3. IGN and INSIVUMEH shall act as counterpart agencies to the Japanese Study team and also as coordinating bodies in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

4. IGN and INSIVUMEH shall act its own expense, provide the Japanese Study team with the following in cooperation with other organizations concerned:

- (1) available data and information related to the Study,
- (2) counterpart personnel,
- (3) suitable office space with necessary equipment in Guatemala City,
- (4) vehicles with drivers, and
- (5) credentials or identification cards.

VIII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

- (1) to dispatch, at its own expense, the Japanese Study team to the Republic of Guatemala; and
- (2) to pursue technology transfer to the Guatemalan counterpart personnel in the course of the Study.

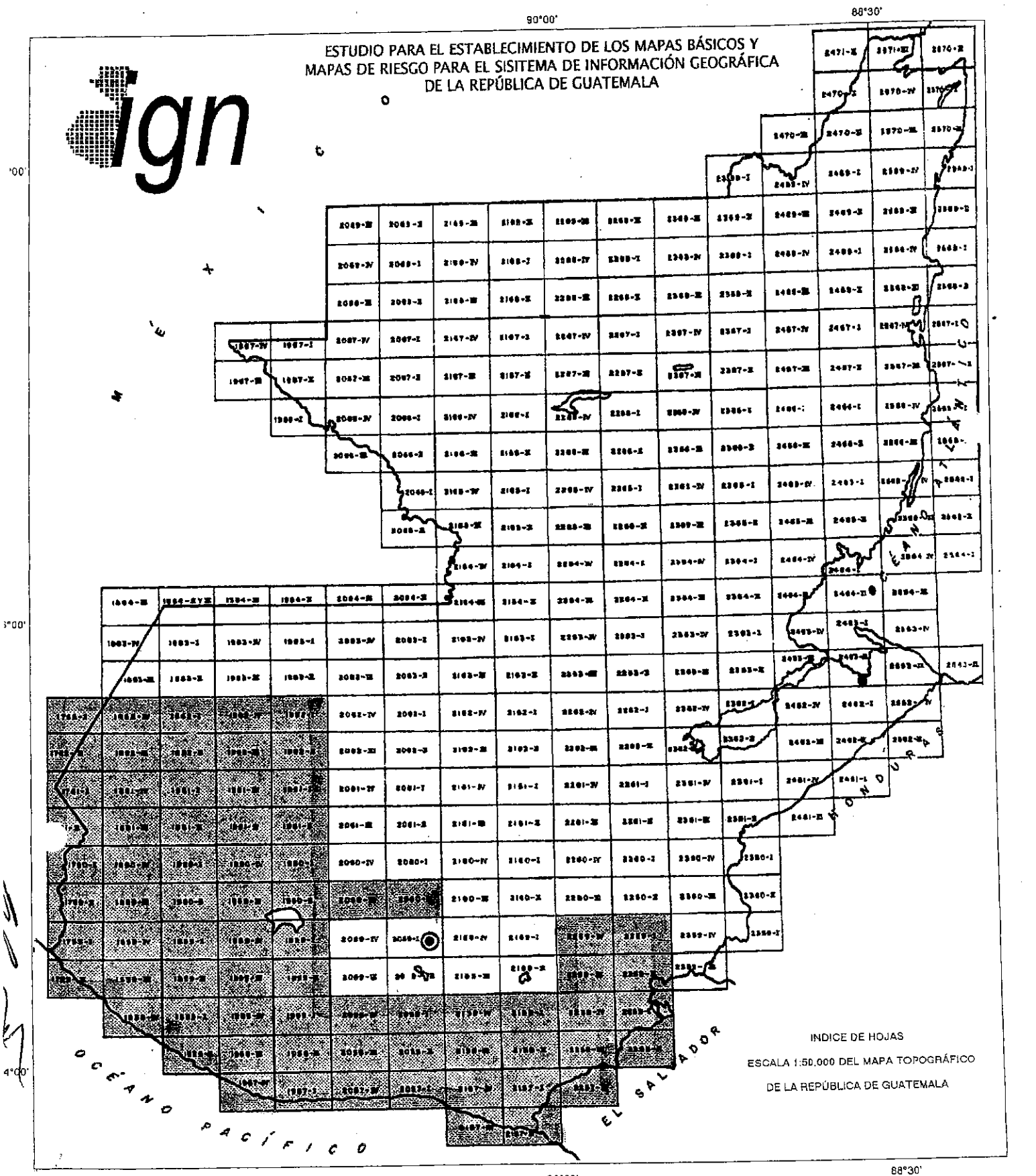
IX. OTHERS

1. JICA and IGN and INSIVUMEH shall consult with each other in respect of any matter that may arise from or in connection with the Study.
2. The Scope of Work was written in English and Spanish, and their validity should be equivalent. However, in case that any contradiction arises in writing, the English text shall be predominant.

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ESTUDIO PARA EL ESTABLECIMIENTO DE LOS MAPAS BÁSICOS Y MAPAS DE RIESGO PARA EL SISTEMA DE INFORMACIÓN GEOGRÁFICA DE LA REPÚBLICA DE GUATEMALA



INDICE DE HOJAS
ESCALA 1:50,000 DEL MAPA TOPOGRÁFICO
DE LA REPÚBLICA DE GUATEMALA

91°30'

90°00'

88°30'

85

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TENTATIVE SCHEDULE OF THE STUDY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Work in Guatemala	[]				[]												[]							[]												
Work in Japan	[]	[]															[]								[]						[]					
Report and Final Products	△ IC/R	△ PG/R1															△ PG/R2								△ PG/R3						△ DF/R	△ F/R	△ F/P			

IC/R : Inception Report
 PG/R : Progress Report
 DF/R : Draft Final Report
 F/R : Final Report
 F/P : Final Products

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**MINUTES OF MEETING
FOR
THE SCOPE OF WORK
ON
ESTABLISHMENT OF BASE MAPS AND HAZARD MAPS FOR GIS
IN
THE REPUBLIC OF GUATEMALA**

AGREED UPON BETWEEN

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AND
SECRETARIAT OF PLANNING AND PROGRAMMING FOR THE PRESIDENCY**

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

**GUATEMALA CITY
17 AUGUST, 2000**

**Fernando Amilcar Boiton Velasquez
Director General
National Geographical Institute (IGN)**

**Nobuo Nagai
Leader
Preparatory Study Team
Japan International Cooperation Agency (JICA)**

**Eddy Hardie Sanchez Benett
Director General
National Institute for Seismology,
Volcanology, Meteorology, and Hydrology
(INSIVUMEH)**

**Jorge Mario Calvillo
Subsecretary of International Cooperation
Secretariat of Planning and
Programming for the Presidency (SEGEPLAN)**

The Japanese Preparatory Study Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") headed by Mr. Nobuo NAGAI (Director, Topographic Department, Geographical Survey Institute, Ministry of Construction) visited the Republic of Guatemala from August 7th to 17th, 2000 in connection with the Study on "Establishment of Base Maps and Hazard Maps for GIS in the Republic of Guatemala " (hereinafter referred to as "the Study").

The Team had a series of discussions on the Scope of Work of the Study with officials of National Geographical Institute (hereinafter referred to as "IGN") and National Institute for Seismology, Volcanology, Meteorology and Hydrology (hereinafter referred to as "INSIVUMEH"). The attendance list is attached in Appendix-1.

Main items, which were agreed upon by both sides, are as follows:

1. Structurization

Digital topographic data shall be structurized on the basis of PAABANC (Proyecto de Asistencia tecnica a la Base Nacional Cartografica).

2. DEM (Digital Elevation Model)

In both studies of 1/50,000 topographic maps and hazard maps, DEM shall be created.

3. Digital orthophoto maps

Digital orthophoto maps for hazard mapping shall include the data such as contours, roads, public facilities, administrative boundaries and geographical names.

4. Study on Hurricane Mitch

The assessment of natural disasters caused by Hurricane Mitch shall be conducted by JICA and the counterpart agencies in cooperation with academic institutes in Guatemala.

5. Flood study

To estimate the extent and elevation of probable flooding for hazard maps, JICA shall investigate the feasibility of flood analysis for study areas.

6. Vehicles

IGN and INSIVUMEH explained the difficulty in providing the vehicles, and the study team promised to convey the situation to JICA Headquarters.

7. Alternation of schedule in aerial photography

Both sides agreed that if the aerial photography failed to be completed in one year after the

commencement of the Study, alternative measures shall be discussed by both sides.

8.Existing aerial photographs

All the existing aerial photographs over the Study Area can be used if they are dated at maximum one year before the date of the Scope of Work.

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**MINUTES OF MEETING
FOR
THE INCEPTION REPORT
OF
THE STUDY
FOR
ESTABLISHMENT OF BASE MAPS AND HAZARD MAPS FOR GIS
IN
THE REPUBLIC OF GUATEMALA**

AGREED UPON BETWEEN

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AND
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AND
SECRETARIAT OF PLANNING AND PROGRAMMING FOR THE PRESIDENCY**

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

**GUATEMALA CITY
FEBRUARY 1, 2001**

Fernando Amilcar Boiton Velasquez
Director General
National Geographical Institute (IGN)

Kazuo Furukata
Leader
JICA Study Team
Japan International Cooperation Agency (JICA)

Eddy Hardie Sanchez Benett
Director General
National Institute for Seismology, Volcanology,
Meteorology, and Hydrology (INSIVUMEH)

(Witness)
Kiyoshi Ishii
First Secretary
Embassy of Japan

Jorge Marco Calvillo
Subsecretary of International Cooperation
Secretariat of Planning and Programming
for the Presidency (SEGEPLAN)

Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Study Team to Guatemala for the implementation of the Study for Establishment of Base Maps and Hazard Maps for GIS in The Republic of Guatemala (hereinafter referred to as "the Study") from January 11, 2001, in compliance with the Scope of work for the Study, which was agreed among National Geographical Institute (hereinafter referred to as "IGN"), the National Institute for Seismology, Volcanology, Meteorology, and Hydrology (hereinafter referred to as "INSIVUMEH"), the Secretariat of Planning and Programming for Presidency (hereinafter referred as "SEGEPLAN") and JICA on August 17, 2000.

At the beginning of the 1st field survey for the Study, the Study Team held a meeting for the presentation and explanation of the Inception Report with the officials of IGN, INSIVUMEH and SEGEPLAN on January 17, 2001. The list of attendance is shown in Appendix.

A series of discussions concerning the study items, implementation plan and work schedule etc., have been carried out respectively at the IGN office for GIS database and INSIVUMEH office for Hazard maps.

As a whole, the Guatemala side (IGN, INSIVUMEH, SEGEPLAN) agreed on the Inception Report prepared by the Study Team.

However, INSIVUMEH submitted a request letter concerning the Simulation method that they wish to adopt in order to create the Hazard maps and increase in the numbers of the final products that are stated on the Scope of Work. In the meantime, IGN also submitted another request that they be allowed to use the aerial negative films as soon as possible. Both of the request letters are enclosed. JICA Study Team promised to convey this requests to the JICA headquarter.

B
C

Appendix

List of attendance

IGN

Fernando Amilcar Boiton Velásquez

General Director

Ronny Vicente Toledo Morales

Deputy Director General

Jorge Enrique Mansilla González

Photogrammetry Division Chief

Marcos Osmondo Sutuc Carrillo

Cartography Division Chief

Efraín López Morales

Geographic Information Division Chief

Ronal Vinicio Robles Pereira

Geodesy Division Chief

INSIVUMEH

Eddy Hardie Sánchez Benett

General Director

Sergio Isaias Hernandez

Deputy General Director

Pedro Tax

Hydric Investigation and Service Unit Leader

Jorge Mario Izaguirre

Hydrological assistant

Victor Manuel Perez

In charge of Hydrometeorological activities

Enrique Molina

Geophysical Investigation and Services Units Leader

Fulgencio Garavito

Climatic Investigation and Services Units Leader

Haroldo Arevalo

Climatological Technician

Leticia Tellez

In charge of Climatological Archive

Alberto Hernandez

In charge of Climatological Machinery and Instruments

SEGEPLAN

Jorge Mario Calvillo

Sub Secretary of International Cooperation

Eugenia de Rodríguez

Director of International Cooperation

René Lavidalie

Director of Data Processing

Juan Antonio Flores

Deputy Director of Bilateral International Cooperation

Lourdes Quinteros de Sandoval

Deputy Director of Sectional International Cooperation

Ricardo Miyares

Consulting Engeneer of Geographic Information

Leticia Ramírez de la Rosa

Consultant of Bilateral International Cooperation

Kazuhiro Fuse

Advisor for Planning & Evaluation of Technical & Financial Cooperation
Projects

Study Team

Kazuo Furukata

Leader

Satoru Tsukamoto

Sub-leader/Disaster prevention plan

Satoru Nishio

Sub-leader/Data structuralization design/Control point survey/Field survey
supervision

Daisaku Kiyota

GIS/Strucuralization supervision

Michiyasu Murata

Photography/Field survey supervision

Morten Strand

Control point/Field survey supervision 1

Mutsumi Hanada

Control point/Field survey supervision 2

Yumiko Sasaki

Symbolizing supervision

Chiyo Kigasawa

Digitization supervision

Hitoshi Takeuchi

Volcanic disaster survey

Hiroyoshi Ishikawa

Flood disaster survey

Valerio Gutierrez

Landslide disaster survey

James Wilkinson

Earthquake disaster survey

Hiroyuki Nakai

Coordination

Midori Oishi

Interpreter

OBSERVER

Embassy of Japan

Kiyoshi Ishii

First Secretary

JICA Tokyo Headquarter

Takahiro Kasai

Social Development Study Department, JICA headquarter

Yoshimitsu Yoshimura

Technical Consulting Advisor, JICA headquarter

JICA Guatemala Office

Takashi Ishizuka

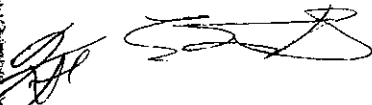
Representative

Antonio Ovalle

Cooperation Advisor

Ayumi Sakamoto

Secretary





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E-mail : ign@ign.gob.gt

MINISTERIO DE COMUNICACION
INFRAESTRUCTURA Y VIVIEND

February 1st, 2001

Mr. Takanori Jibiki
Managing Director
Social Development
Study Department
JICA

Dear Mr. Jibiki:

It is my honor to submit my request as follows:

It is known by the public knowledge that for the fulfilment of the Study for Establishment of Base Maps and Hazard Maps for GIS in the Republic of Guatemala, aerial photos of different scales will be taken, covering one of most populated and with the most economically developed zone of the country.

That is why, it is easy to deduce that this preliminary outcome of our study will be very useful for multiple users, as well for the public and service sector, as for the private sector. So, we consider preferable and strategic for the IGN and for our country, to share the information as soon as possible, since requests and consults have been made, about if this information can be given to the public.

Briefly, I inform you that we have had requests from Ministerio de Agricultura, Ganadería y Alimentación, Ministerio de Salud Pública y Asistencia Social, Ministerio de Gobernación, Sector Agrícola Privado, CONRED, investigators, economic and productive sectors, as well as individuals interested in obtaining updated information.



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MINISTERIO DE COMUNICACIONES
INFRAESTRUCTURA Y VIVIENDA

We consider that even if we know that the provision of the outcome from the study project is usually made at the end of the project, and knowing that all the negatives will be scanned for the further study, we consider it feasible. So we ask you to consider our request of giving us the negatives to provide the photo information to all interested sectors as soon as technically possible.

As described previously, we request authorization for our request, assuming that we are not modifying in any aspect what we agreed in the Scope of Work. We would like to emphasize that the negatives of the aerial photos be delivered sooner than it was established in the Scope of Work.

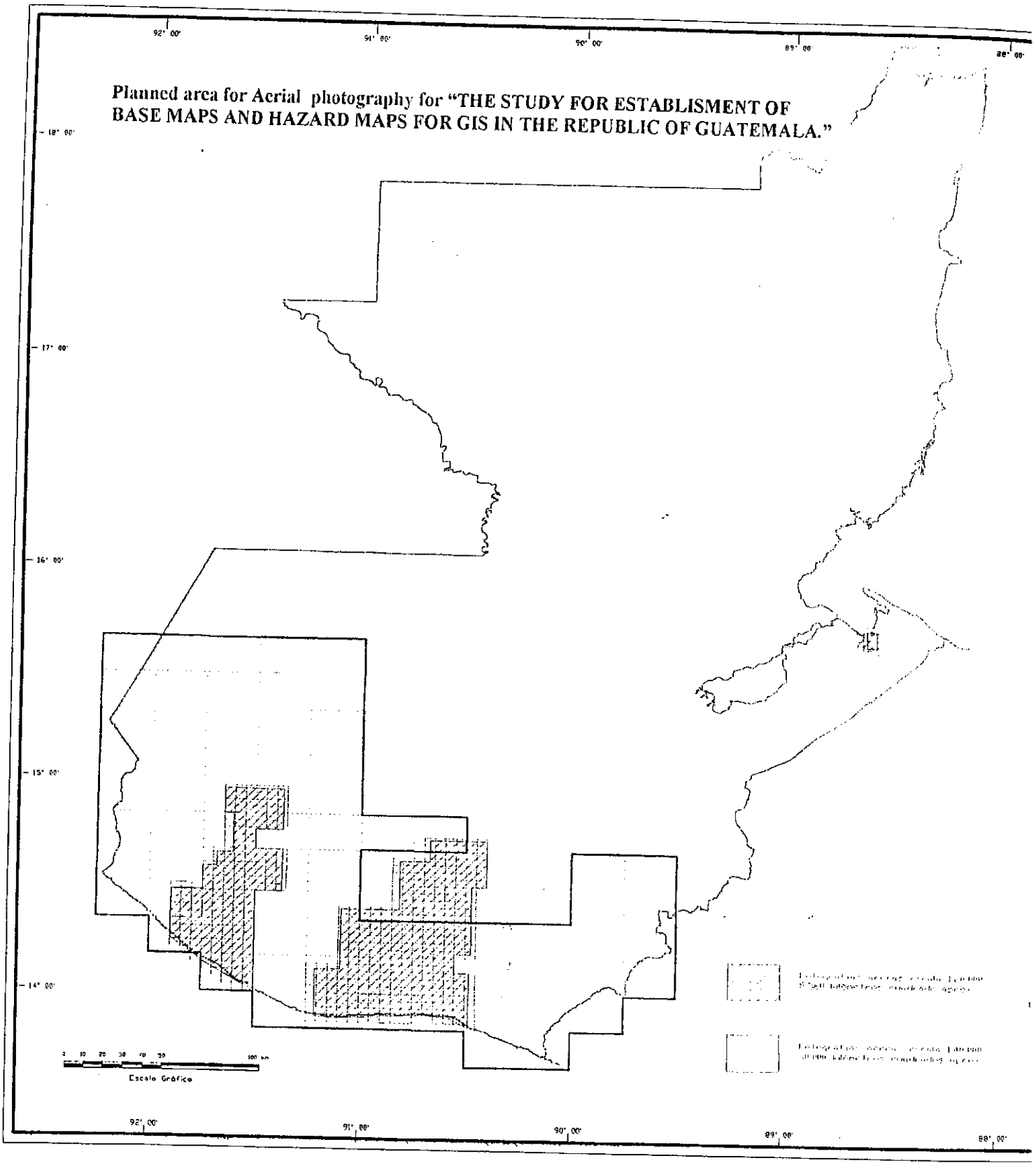
We would appreciate your cooperation and understanding.

Sincerely yours,


DIRECCION


Ing. Fernando Boiton
General Director

**Planned area for Aerial photography for "THE STUDY FOR ESTABLISHMENT OF
BASE MAPS AND HAZARD MAPS FOR GIS IN THE REPUBLIC OF GUATEMALA."**



**INSTITUTO NACIONAL DE SISMOLOGIA
VULCANOLOGIA METEOROLOGIA E
HIDROLOGIA INSIVUMEH
7 AVENIDA 14-57 ZONA 13
TEL: 3315005 - 3315944**

Guatemala January 30th 2001

Mr. Takanori Jibiki
Managing Director
Social Development Study Department
Japan International Cooperation Agency
TOKYO, Japan

Dear Mr. Jibiki:

According to the work meeting we had on Thursday January 25th, between the Japanese team for the study on HAZARD MAPPING and the counterpart of INSIVUMEH, with the purpose to understand the explanation on the INCEPTION REPORT ON HAZARD MAPS, I would like to request the following:

a) RESULTS AND PRODUCT/ FINAL PRODUCTS

We ask to increase the number of hazard map sets from 10 to 100.

This request comes from the need to distribute the hazard maps among all the Departmental and Municipal governments located within the study zone, and the central government institutions in charge of the planning and infrastructure work for the development of the zone.

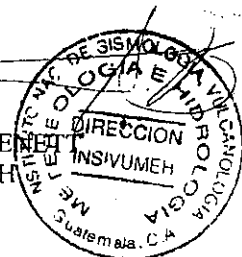
b) ELABORATION OF HAZARD/SIMULATION MAPS

It is required in the mapping of the different hazard types, that simulation models better adapted to the country's condition be used. Thus, they can be applied in the study zone by the Japanese experts and the counterparts from INSIVUMEH, with the further intention that they can be used for the hazard mapping in other zones of the republic, even after the mission has finished its work.

Hoping for the acceptance of our request,

Sincerely yours,


EDDY HARDIE SANCHEZ BENITEZ
DIRECTOR INSIVUMEH





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MINISTERIO DE COMUNICACIONES
INFRAESTRUCTURA Y VIVIENDA

OFICIO No. S-FABV-ca-091/2001

Guatemala, 9 de febrero del 2001.

Señor
Kazuo Furukata
JICA Study Team
Presente

Estimado Señor Furukata:

Tengo el agrado de dirigirme a usted, para hacer de su conocimiento que para todos los trabajos geodésicos a ser desarrollados en el ámbito del Proyecto de Estudio del Establecimiento de los Mapas Básicos y Mapas de Riesgo para el Sistema de Información Geográfica de la República de Guatemala, se considera conveniente la utilización del datum WGS84 con la Cuadrícula Plana Nacional.

Agradeciendo se tome en cuenta esta opinión, me suscribo de usted muy atentamente,


DIRECCION


Ing. Fernando A. Boifón
Director General



ESPECIFICACIONES GENERALES DE LA NUEVA PROYECCION PARA LA CUADRICULA PLANA NACIONAL

- **Proyección:** Transversa de Mercator (tipo Gauss Kruger) en una zona única local.
- **Esferoide:** WGS84.
- **Longitud de origen:** 90° 30' (Meridiano central de la proyección)
- **Latitud de origen:** 0° (el Ecuador)
- **Unidades:** metros
- **Falso norte:** 0 metros
- **Falso este:** 500,000 metros en el meridiano central.
- **Factor de escala en el meridiano central:** 0.9998.
- **Numeración de las zonas:** No está dentro de la numeración normal de zonas UTM. Se le puede llamar zona 15.5
- **Límites de latitud del sistema:** No es aplicable en el territorio Nacional.
- **Límites de las zonas:** No es aplicable en el territorio Nacional.

Nuevo Sistema de Referencia Geodésico: WGS84 aumentado, basado en ITRF94 época 1997.5 parámetros del elipsoide:

Semieje mayor 6378137.0 metros,

Semieje menor 6356752.3142 metros

Achatamiento: $1/f = 298.257223563$.

NOTA: El Día 22 de octubre de 1999 se modificó el elipsoide de referencia y su datum asociado, de GRS 80 a WGS84.



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MINISTERIO DE COMUNICACIONES
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OFICIO S-FABV-vrp-No. 154 /2001

Ciudad de Guatemala
15 de marzo del 2001

Señor
Satoru Nishio
Proyecto JICA
Ciudad.

Señor Nishio:

Tengo el agrado de dirigirme a usted, para entregarle los 7 parámetros de transformación de la Red Geodésica Nacional de Guatemala, los sistemas de referencia geodésicos que se utilizaron para el cálculo son WGS84(WGS84) y NAD27(CLARKE1866).


Adjunto al presente información de las estaciones geodésicas que se utilizaron y los 7 parámetros de transformación.

Atentamente, sin otro particular.


GEODESIA


Ronald Vinicio Robles Pereira
Jefe de la División de Geodesia


DIRECCION


Vo.Bo. Ing. Fernando Boiton Velázquez
Director General del IGN

ESTACIONES GEODESICA DE LA RED PRIMARIA DE GUATEMALA QUE SE UTILIZARON PARA EL CALCULO DE LOS 7 PARÁMETROS DE TRANSFORMACION

No.	NOMBRE
No.	ANCHIGUA
67	EL_PARAISO_II
73	EL_SITIO
72	FARO
119	GOBERNACION
2o Orden	GEO-5
36	JICARO
55	LOS_TARROS
29	MANABIQUE
54	SANTA_ANITA
61	TECPAN
70	TORTUGA
43	YUPI

NOTA:

Se utilizaron las coordenadas geográficas de las estaciones geodésicas en los elipsoides de referencia geodésicos WGS84 y Clarke 1866.

RESULTADOS DE LOS 7 PARAMETROS DE TRANSFORMACION CALCULADOS CON LA FÓRMULA ESTÁNDAR DE MOLODENSKY

Edit Seven Parameter Datum Conversion

Name: **GUAT WGS84-NAD27**

Datum: **Guatemala NAD 27**

X Translation [meters]: **64.9712323165**

Y Translation [meters]: **193.5225720651**

Z Translation [meters]: **58.3595349179**

X Rotation [seconds]: **3.6404982054**

Y Rotation [seconds]: **-0.4293259588**

Z Rotation [seconds]: **2.3124451702**

Scale Factor: **1.00001859859322**

Local -> WGS 84 WGS 84 -> Local

OK Cancel Help

GOBERNACION

● 1-60666022

GOBERNACION

MANABIQUE



423574

MANABIQUE

EL_SITIO

● 2.42958969

EL_SITIO

EL_PARAISO_II

● 0.75486047

EL_PARAISO_II

FARO

● 2.42082683

FARO

TORTUGA

● 1.73263936

TORTUGA

TECPAN

● 4.25693481

TECPAN

LOS_TARROS

● 2.00308963

LOS_TARROS

SANTA_ANITA

● 0.87953912

GEO-5 SANTA_ANITA

● 3.46275397

GEO-5

JTCARO

● 2.03606942

ANCHIQUA

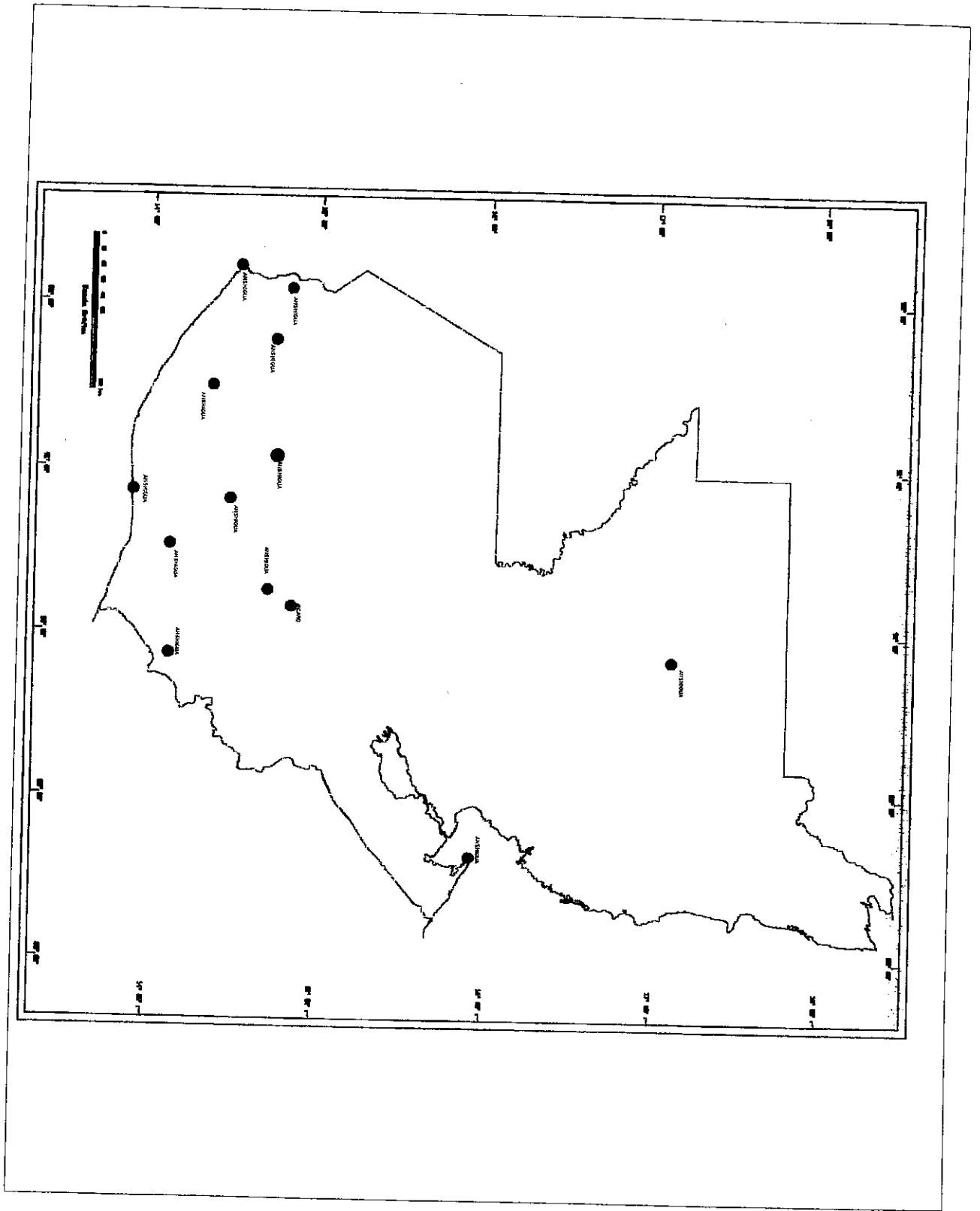
● 2.03568817

ANCHIQUA

YUPI

● 1.85234704

YUPI



Results 7 Parameter Transformation (Moldensky) NAD27->WGS84(ITR94), Co-ordinates displayed in UTM-Guatemala

	ITR94-UTMX	ITRF94-UTMY	ITRF94h	NAD27Trans->UTMX	NAD27Trans->UTMY	NAD27Trans->h	Residual X	Residual Y	Residual h	RMSXY
ANCHIUGA	1636522.590	558580.633	1967.575	1636521.511	558579.899	1966.013	1.079	0.734	1.562	1.305
EL_PARAISO_II	1627583.699	363865.568	1144.797	1627584.372	363865.227	1144.769	-0.673	0.341	0.028	0.754
EL_SITIO	1640748.916	329427.932	180.885	1640750.651	329426.563	181.894	-1.735	1.369	-1.009	2.210
FARO	1607686.939	314700.300	31.577	1607687.738	314701.498	33.523	-0.799	-1.198	-1.946	1.440
GOBERNACION	1872293.115	564804.271	128.853	1872293.564	564803.529	127.500	-0.449	0.742	1.353	0.867
GEO-5	1539532.602	467322.238	2.412	1539531.675	467324.667	4.622	0.927	-2.429	-2.210	2.600
JICARO	1648817.981	564508.948	281.560	1648817.335	564509.826	279.841	0.646	-0.878	1.719	1.090
LOS_TARROS	1590350.223	445536.003	637.359	1590350.410	445536.350	635.397	-0.187	-0.347	1.962	0.394
MANABIQUE	1766167.266	701091.037	-0.579	1766167.882	701089.871	3.643	-0.616	1.166	-4.222	1.319
SANTA_ANITA	1559082.822	489387.935	52.551	1559082.356	489387.595	53.215	0.466	0.340	-0.664	0.577
TECPAN	1634602.840	443690.207	3078.421	1634603.410	443691.675	3074.466	-0.570	-1.468	3.955	1.575
TORTUGA	1595623.731	360167.738	86.663	1595623.033	360167.146	88.134	0.698	0.592	-1.471	0.915
YUPI	1570905.672	575224.815	1441.692	1570904.462	575223.776	1440.751	1.210	1.039	0.941	1.595
						Standard Deviation	0.897	1.168	2.193	
									Sum RMSXY	16.641

7-parameter Transformation Parameters

X Translation	64.971 m
Y Translation	193.522 m
Z Translation	58.359 m
X-Rotation	3.64049820 Sec
Y-Rotation	-0.42932595 Sec
Z-Rotation	2.31244517 Sec
Scale Factor	1.000016598593

Results 3-Parameter Transformation NAD27->WGS84(ITR94), Co-ordinates displayed in UTM-Guatemala

	ITR94-UTMX	ITRF94-UTMY	ITRF94h	NAD27Trans->UTMX	NAD27Trans->UTMY	NAD27Trans->h	Residual X	Residual Y	Residual h	RMSXY
ANCHIUGA	1636522.590	558580.633	1967.575	1636521.881	558578.391	1965.068	0.709	2.242	2.507	2.351
EL_PARAISO_II	1627583.699	363865.568	1144.797	1627584.024	363867.373	1145.688	-0.325	-1.805	-0.891	1.834
EL_SITIO	1640748.916	329427.932	180.885	1640749.925	329429.291	183.407	-1.009	-1.359	-2.522	1.693
FARO	1607686.939	314700.300	31.577	1607687.575	314704.640	34.598	-0.636	-4.340	-3.021	4.386
GOBERNACION	1872293.115	564804.271	128.853	1872289.570	564800.686	130.612	3.545	3.585	-1.759	5.042
GEO-5	1539532.602	467322.238	2.412	1539533.436	467325.271	2.939	-0.834	-3.033	-0.527	3.146
JICARO	1648817.981	564508.948	281.560	1648817.537	564508.130	279.081	0.444	0.818	2.479	0.931
LOS_TARROS	1590350.223	445536.003	637.359	1590351.126	445537.133	634.835	-0.903	-1.130	2.524	1.446
MANABIQUE	1766167.266	701091.037	-0.579	1766166.625	701085.029	3.465	0.641	6.008	-4.044	6.042
SANTA_ANITA	1559082.822	489387.935	52.551	1559083.858	489387.706	51.653	-1.036	0.229	0.898	1.061
TECPAN	1634602.840	443690.207	3078.421	1634603.253	443692.317	3074.664	-0.413	-2.110	3.757	2.150
TORTUGA	1595623.731	360167.738	86.663	1595623.287	360169.488	88.542	0.444	-1.750	-1.879	1.805
YUPI	1570905.672	575224.815	1441.692	1570906.126	575222.276	1438.472	-0.454	2.539	3.220	2.579
						Standard Deviation	1.237	2.931	2.639	
									Sum RMSXY	34.467

3-parameter Transformation Parameters

X Translation	-2.251
Y Translation	4.06904

Z Translation

197.478

Results NIMA 3-parameter Transformation NAD27->WGS84(ITR94), Co-ordinates displayed in UTM-Guatemala

	ITR94-UTMX	ITRF94-UTMY	ITRF94h	NAD27Trans->UTMX	NAD27Trans->UTMY	NAD27Trans->h	Residual X	Residual Y	Residual h
ANCHILUGA	1636522.590	558580.633	1967.575	1636522.789	558580.651	1948.036	-0.199	-0.018	19.539
EL_PARAISO_II	1627583.699	363865.568	1144.797	1627584.908	363869.113	1128.593	-1.209	-3.545	16.204
EL_SITIO	1640748.916	329427.932	180.885	1640750.845	329430.939	166.305	-1.929	-3.007	14.580
FARO	1607686.939	314700.300	31.577	1607688.406	314706.250	17.488	-1.467	-5.950	14.089
GOBERNACION	1872293.115	564804.271	128.853	1872291.112	564802.963	113.628	2.003	1.308	15.225
GEO-5	1539532.602	467322.238	2.412	1539534.083	467327.288	-14.136	-1.481	-5.050	16.548
JICARO	1648817.981	564508.948	281.560	1648818.477	564510.407	262.054	-0.496	-1.459	19.506
LOS_TARROS	1590350.223	445536.003	637.359	1590351.910	445539.092	617.760	-1.687	-3.089	19.599
MANABIQUE	1766167.266	701091.037	-0.579	1766167.881	701087.671	-13.490	-0.615	3.366	12.911
SANTA_ANITA	1559082.822	489387.935	52.551	1559084.557	489389.783	34.588	-1.735	-1.848	17.963
TECPAN	1634602.840	443690.207	3078.421	1634604.155	443694.270	3057.594	-1.315	-4.063	20.827
TORTUGA	1595623.731	360167.738	86.663	1595624.085	360171.219	71.443	-0.354	-3.481	15.220
YUPI	1570905.672	575224.815	1441.692	1570906.857	575224.581	1421.438	-1.185	0.234	20.254
						Standard Deviation	1.035	2.660	2.641
									Sum RMSXY
									41.296

3-parameter NIMA Transformation Parameters

X Translation 0.000
Y Translation 125.000
Z Translation 194.000

**STUDY FOR ESTABLISHMENT OF BASE MAPS AND HAZARD MAPS FOR
GIS IN THE REPUBLIC OF GUATEMALA**

AGREEMENT BETWEEN THE GENERAL DIRECTOR OF INSTITUTO GEOGRAFICO
NACIONAL AND THE JICA STUDY TEAM

ON

PRELIMINARY DELIVERY OF AERIAL PHOTOGRAPHIES AND FILMS OF THE STUDY
AREA

The General Director of IGN, having requested the preliminary delivery of the aerial photography and negative films from JICA in order to provide the photo and film information to all interested sectors in our country.

The IGN undertakes to store the film safely and to effectively utilize this photos and films.

The JICA Study Team is leaving IGN the following:

- 1 Set of negative film 1:40,000 scale
- 1 Set of contact photographs 1:40,000 scale
- 1 Set of contact photographs 1:20,000scale


Signed at Guatemala City on the 16th of March, 2001
At IGN

For Instituto Geográfico Nacional:



Ing. Fernando Boiton
General Director

For JICA Study Team



Kazuo Furakata
Team Leader

63	Escarpment, cliff	Escarpada abrupta				●	●			
64	School	Escuela	TOP	P.					●	
65	Power transformer station	Estación de transformación de energía		P.				●		
66	Stadium	Estadio	TOP	L.					●	
67	Reservoir	Estanque		L.		●				●
68	Swage disposal and filtration beds	Evacuación de aguas cloacales y lechos de filtración		L.						●
69	Fault-line scarp	Falla geológica		L.						●
70	Railroad a: Normal or Broad gauge, single track b: Normal or broad gauge, single track c: Normal or Broad gauge, double or multiple track d: Normal or broad gauge, double or multiple track e: Narrow gauge single track f: Narrow gauge, double or multiple track	Ferrocarriles	RFE		L.			●		●
71	Railroad g: Railroads in juxtaposition h: Narrow gauge single track i: Railroad yard, widest part less than 4.0mm in width j: Siding, narrow gauge k: Turntable l: Railroad station; Location known Location unknown	Ferrocarriles	RFE		L.			●		●
72	Railroad m: Dismantled railroad n: none o: Railroad bridge p: none q: Car line, operating	Ferrocarriles	RFE		L.			●		●
73	Seaplane base Seaplane anchorage	Fondeadero para embarcaciones grandes pequeñas hidroplanos						●		
74	Gravel	Grava		A		●				
75	Large group of rock awash	Grupo de rocas al descubierto o a flor de agua				●				
76	Heliport	Helipuerto		P						●
77	Tropical grass	Hierba tropical sabana	OCS	A		●				
78	Boundary marker	Hito de límite	RCA	P						●
79	Boundary marker with number	Hitos de límites numerados	RCA	L			●			●
80	Hospital	Hospital o casa de salud	TOP	P						●
81	Plantation, orchard, and nursery	Huerto plantaciones permanentes y temporales	OCS	A		●				
82	Church	Iglesia	TOP	P.						●
83	Greenhouse	Invernadero		P.		●				●
84	Lakes and Ponds: Dry or cyclical in arid areas	Lago laguna ciclica temporal	HIL	A		●				
85	Lakes and Ponds: Intermittent	Lago laguna intermitente	HIL	A		●				
86	Lakes and Ponds: Perennial	Lago laguna perenne	HIL	A		●				
87	Boundary along edge of road	Límite a lo largo del borde del camino	DAD	L.				●		
88	Boundary coincident with single line stream	Límite coincidente con curso de agua de línea	DAD	L.				●		
89	Boundary coincident with shoreline	Límite coincidente con la línea costera	DAD	L.				●		
90	Reserve boundary	Límite de reserva	DAD	L.				●		
91	Military reservation boundary	Límite de reserva militar	DAD	L.				●		
92	Boundary in road	Límite en camino	DAD	L.				●		
93	Boundary in double line stream	Límite en curso de agua de doble línea	DAD	L.				●		
94	a: International boundary b: First-order administrative boundary c: Second-order administrative boundary d: Third-order administrative boundary	Límites	DAD		L.			●		
95	Shorline: Definite	Línea costera						●		
96	High tension power transmission line	Línea eléctrica	ACM					●		
97	Shorline: Indefinite or unsurveyed	Línea indefinida o sin levantamiento						●		
98	Telephone or telegraph line	Línea telefónica	ACM					●		
99	Lighthouse	Luz faro		P.						●
100	Seawall	Malecón muro de contención								●
101	Spring: a: perennial b: intermittent	Manantial	HIL		P.		●		●	
102	Mangrove	Manglares	OCS	A		●			●	
103	Scrub	Matorral	OCS	A		●			●	
104	Open-pit mine	Mina	TOP	A					●	
105	Mine, type unknown	Mina	TOP	A					●	
106	Strip mine	Mina abierta y material de desecho	TOP	A					●	
107	Lookout tower	Mirador		P.					●	
108	a: Windmill, windpump b: Water mill	Molino		P.					●	
109	Pier, dock, wharf: a: Not exceeding 0.4mm in width b: Exceeding 0.4mm in width	Muelle		P.					●	
110	a: Exposed wreck b: Exposed wreckage c: Sunken wreck, mast exposed	Naufragio expuesto		P.					●	
111	Name of the main road	Nombre de carreteras	RCA							●
112	Located object	Objeto localizado		P.					●	●
113	Aqueduct, penstock pipeline or flume	Paraderas						●		
114	Swimming pool and man made reservoir	Piscina						●		●
115	Airfield, loose surface runways	Pista de aterrizaje	ACM	L.				●		



**MINUTES OF MEETING
FOR
THE PROGRESSS REPORT 1
OF
THE STUDY
FOR
ESTABLISHMENT OF BASE MAPS AND HAZARD MAPS FOR GIS
IN
THE REPUBLIC OF GUATEMALA**

AGREED UPON BETWEEN

**NATIONAL GEOGRAPHICAL INSTITUTE (IGN)
AND
NATIONAL INSTITUTE FOR
SEISMOLOGY, VOLCANOLOGY, METEOROLOGY, AND HYDROLOGY (INSIVUMEH)
AND
SECRETARIAT OF PLANNING AND PROGRAMMING FOR THE PRESIDENCY (SEGEPLAN)
AND
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

**GUATEMALA CITY
MAY 31. 2001**

Fernando Amilcar Boiton Velasquez
Director General
National Geographical Institute (IGN)

Kazuo Furukata
Leader
JICA Study Team
Japan International Cooperation Agency (JICA)

Eddy Hardie Sanchez Benett
Director General
National Institute for Seismology, Volcanology,
Meteorology, and Hydrology (INSIVUMEH)

Jorge Mario Calvillo
Subsecretary of International Cooperation
Secretariat of Planning and Programming
for the Presidency (SEGEPLAN)

Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Study Team to Guatemala for the implementation of the 2nd phase of the Study for Establishment of Base Maps and Hazard Maps for GIS in The Republic of Guatemala (hereinafter referred to as "the Study") from May 20, 2001, in compliance with the Scope of Work for the Study, which was agreed upon by the National Geographic Institute (hereinafter referred to as "IGN"), the National Institute for Seismology, Volcanology, Meteorology, and Hydrology (hereinafter referred to as "INSIVUMEH"), the Secretariat of Planning and Programming for Presidency (hereinafter referred to as "SEGEPLAN") and JICA on August 17, 2000.

At the beginning of the 2nd phase of the field survey, the Study Team held a meeting for the presentation and explanation of the Progress Report 1, with the officials of IGN, INSIVUMEH and SEGEPLAN on May 25, 2001.

The attendance list is attached in the Appendix.

A series of discussions concerning Progress Report 1, about the special technical terms called "Mapa de Amenaza" and "Mapa de Riesgo" of the Spanish equivalent to Hazard Map and Risk Map of English, which became a pending subject at the time of the 1st phase Study in Guatemala, and safety control regarding the implementation of the field survey, has been carried out respectively at the IGN office for GIS database, INSIVUMEH office for Hazard Maps, and SEGEPLAN office for all of those matters.

As a whole, the Guatemala side agreed upon the Progress Report 1 prepared by the Study Team, and "Mapa de Amenaza" in Spanish has been decided as interpreted Hazard Map in English, and determined that it should be used for all subsequent reports and maps, without changes in the project title.

Furthermore, both sides also agreed upon the establishment of the mutual permanent communication and information network between Counterpart organizations with Study Team, JICA Guatemala office and Japanese embassy, for checking the security situation of the investigation area correctly in order to take appropriate measures to carry out the field survey safely.



Appendix

List of attendance

IGN

Fernando Amilcar Boiton Velásquez

General Director

Efraín López Morales

Geographic Information Division Chief

Jorge Enrique Mansilla González

Photogrammetry Division Chief

Marcos Osmondo Sutuc Carrillo

Cartography Division Chief

Victor Hugo Mansilla

Cadastral Division Chief

Ronal Vinicio Robles Pereira

Geodesy Division Chief

INSIVUMEH

Eddy Hardie Sánchez Benett

General Director

Sergio Isaias Hernandez

Deputy General Director

Pedro Tax

Hydric Investigation and Service Unit Leader

Victor Manuel Perez

In charge of Hydrometeorological activities

Enrique Molina

Geophysical Investigation and Services Units Leader

Fulgencio Garavito

Climatic Investigation and Services Units Leader

Manuel Mota

In charge of Geological Evaluation

Luis Santos

Supervisor of National Hydrological Network

SEGEPLAN

Jorge Mario Calvillo

Sub Secretary of International Cooperation

Eugenia de Rodríguez

Director of International Cooperation



Guisela Aragón

Director of Information

Juan Antonio Flores

Deputy Director of Bilateral International Cooperation

Lourdes Quinteros de Sandoval

Deputy Director of Sectional International Cooperation

Ricardo Miyares

Coordinator of Geographic Information System

Leticia Ramírez de la Rosa

Consultant of Bilateral International Cooperation

René Lavidalie

Deputy Director of Network

Kazuhiro Fuse

Advisor for Planning & Evaluation of Technical & Financial Cooperation
Projects

Study Team

Kazuo Furukata

Leader

Satoru Tsukamoto

Sub-leader/Disaster prevention plan

Satoru Nishio

Sub-leader/Data structuralization design/Control point survey/Field survey
supervision

Michiyasu Murata

Photography/Field survey supervision

Mutsumi Hanada

Control point/Field survey supervision 2

Hitoshi Takeuchi

Volcanic disaster survey

Hiroyoshi Ishikawa

Flood disaster survey

Valerio Gutierrez

Landslide disaster survey

James Wilkinson

Earthquake disaster survey

Midori Oishi

Interpreter



OBSERVER

JICA Guatemala Office

Takashi Ishizuka

Representative

Hisashi Matsui

Coordinator

Antonio Ovalle

Cooperation Advisor

JICA Tokyo Headquarter

Kozo Okumura

Technical Consulting Advisor, JICA headquarter





**TECHNICAL NOTE
FOR
THE MODIFICATION AND ADDITION OF INCEPTION REPORT
OF
THE STUDY
FOR
ESTABLISHMENT OF BASE MAPS AND HAZARD MAPS FOR GIS
IN
THE REPUBLIC OF GUATEMALA**

AGREED UPON BETWEEN

NATIONAL GEOGRAPHICAL INSTITUTE (IGN)


AND

**NATIONAL INSTITUTE FOR
SEISMOLOGY, VOLCANOLOGY, METEOROLOGY, AND HYDROLOGY (INSIVUMEH)**

AND

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

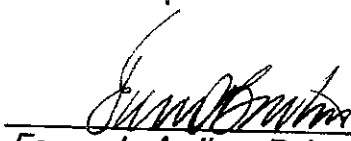
**GUATEMALA CITY
AUGUST 23, 2001**



Eddy Hardie Sanchez Benett
Director General
National Institute for Seismology, Volcanology,
Meteorology, and Hydrology (INSIVUMEH)



Kazuo Furukata
Leader
JICA Study Team
Japan International Cooperation Agency (JICA)



Fernando Amilcar Boiton Velasquez
Director General
National Geographical Institute (IGN)

C.C.
Jorge Mario Calvillo
Subsecretary of International Cooperation
Secretariat of Planning and Programming
for the Presidency (SEGEPLAN)