

REPORT ON ESTABLISHMENT OF
GRAPHIC INFORMATION BASE PROJECT OF
THE NATIONAL CAPITAL REGION
REPUBLIC OF THE PHILIPPINES

(THIRD YEAR WORK)

Land Use Map
Compilation
Field Completion

Land Condition Map
Compilation
Field Completion

MARCH 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

SDF

JR

88-042

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THE NATIONAL CAPITAL REGION
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**Land Condition Map
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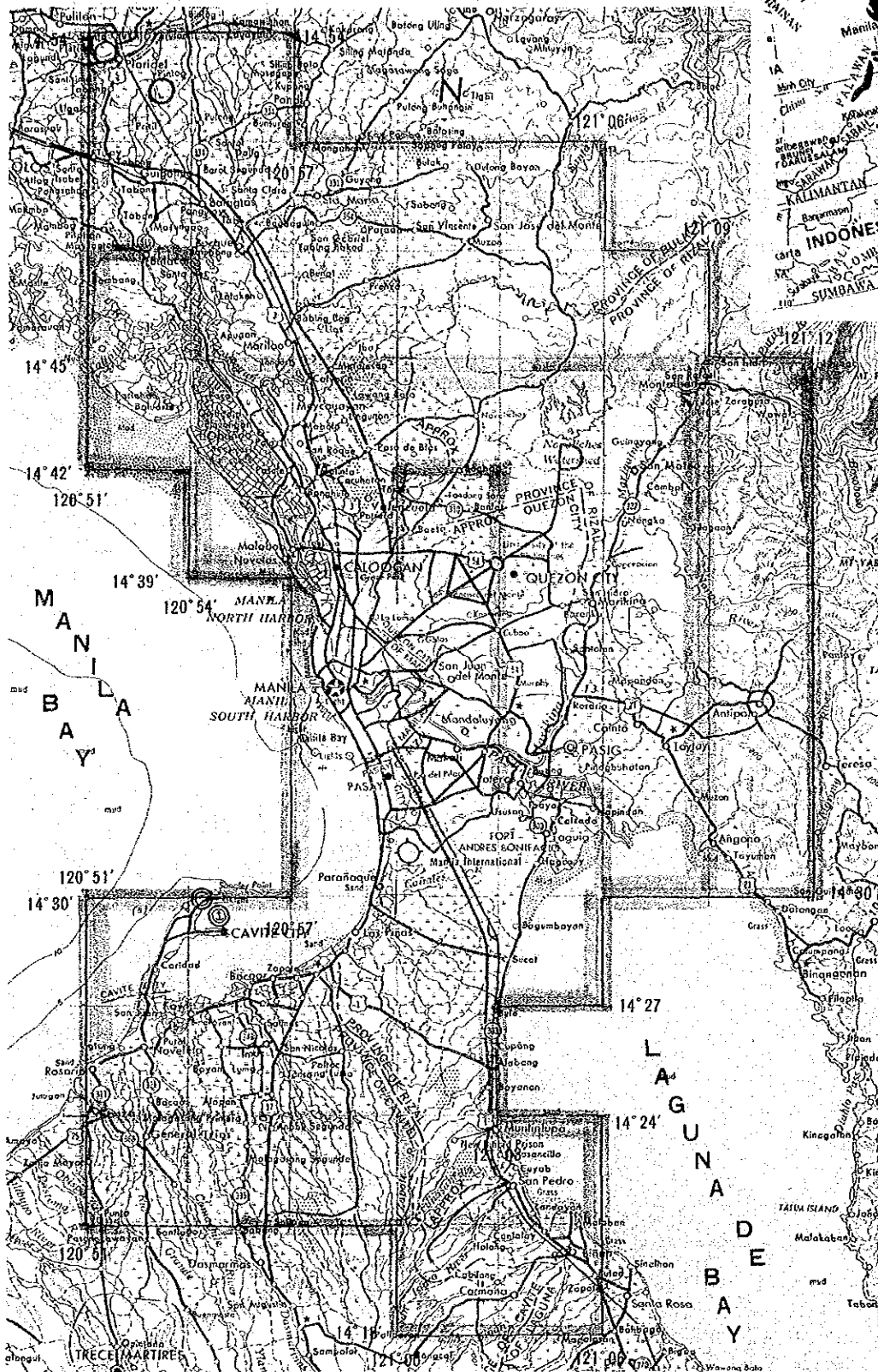
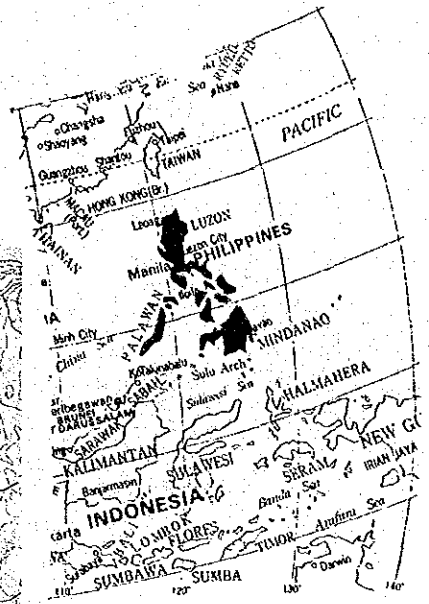
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JAPAN INTERNATIONAL COOPERATION AGENCY



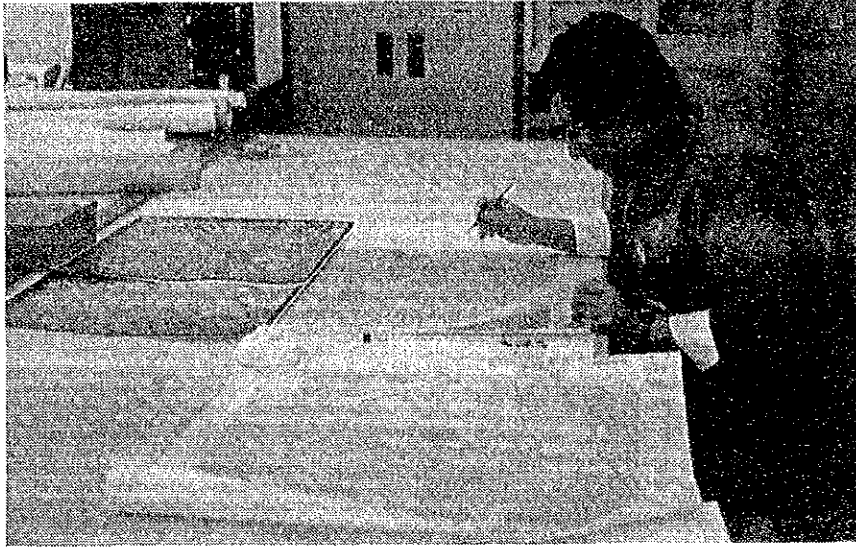
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Location Map for Establishment of Graphic Information Base Project of National Capital Region

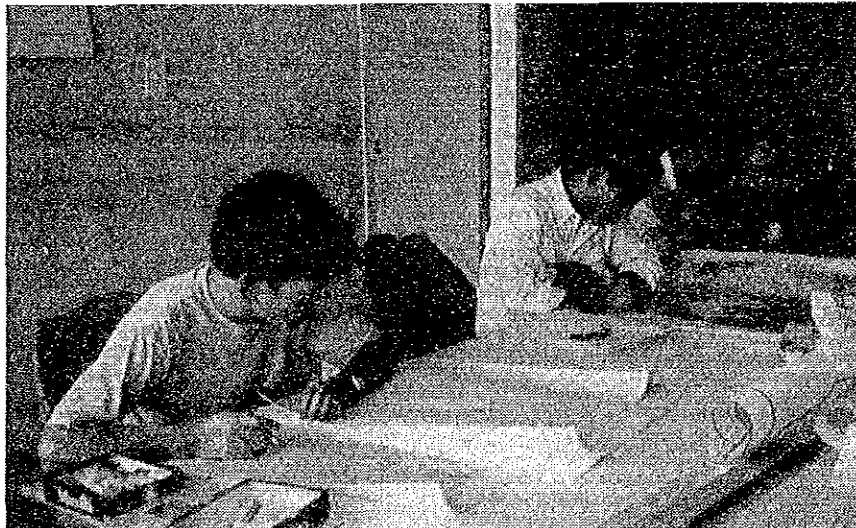


- Contoured map : [Symbol]
- Planimetric map : [Symbol]
- Land use map : [Symbol]
- Land Condition map : [Symbol]

1. Compilation (Land Use Map and Land Condition Map)



Compilation work

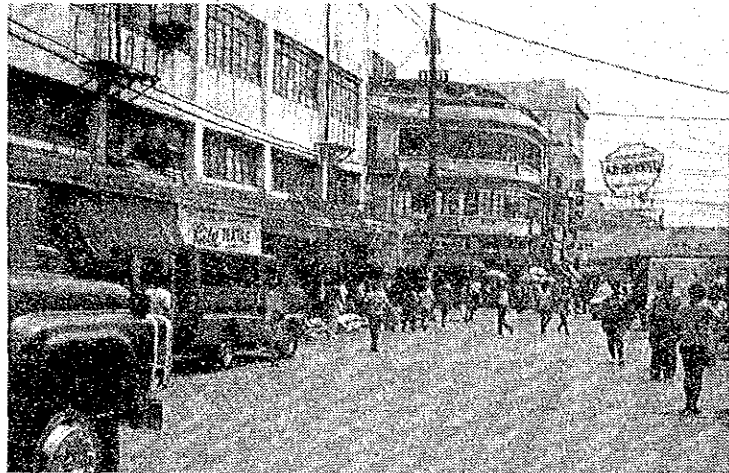


2. Field Completion [Land Use Map (1)]



Subdivision
(Makati area)

Commercial area
(2-storey buildings)
(San Paloc area)

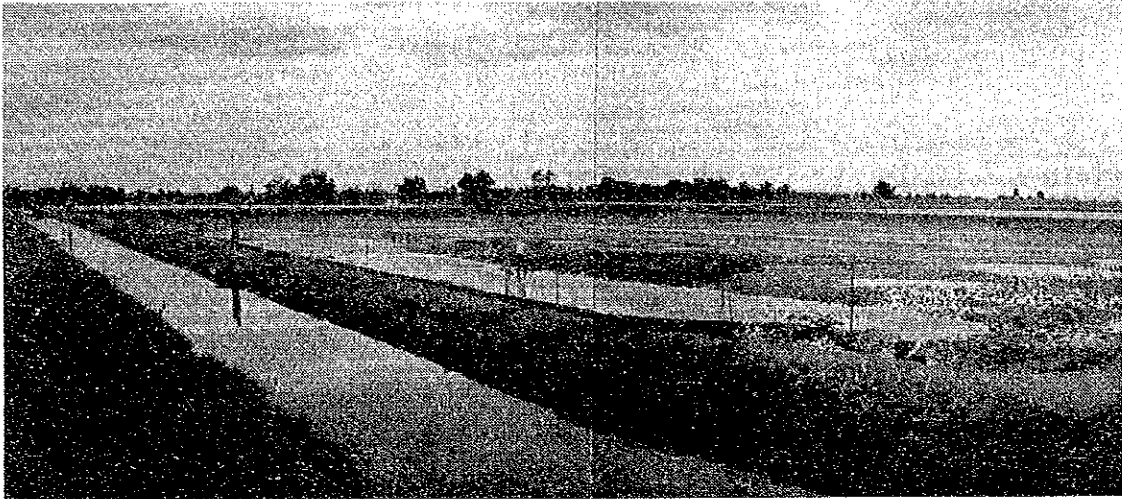


Mixed business-commercial
area
(3-storey building)
(Quiapo area)

[Land Use Map (2)]

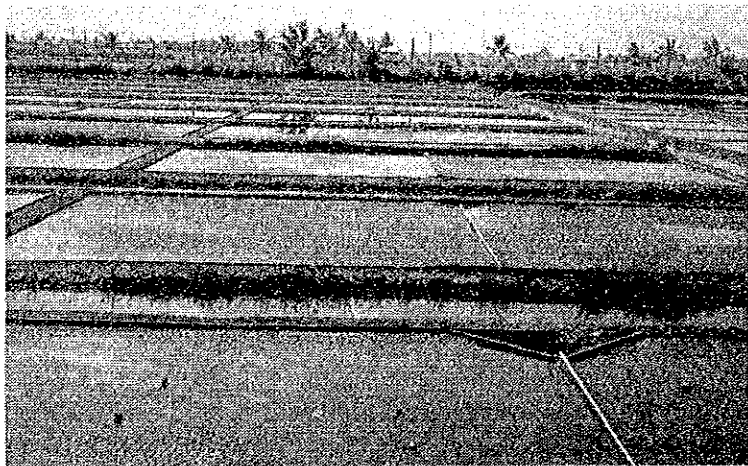


Small-scale
industrial area
(2-storey buildings)



Marine pond where water is being refreshed. (Bambang area)

Salt bed (Cavite area)



[Land Condition Map (1) Landform Classification]



Mountains in the eastern part of the project area
(Left bank of Marikina river)

Field completion of
landform classification
(Suburbs of Quezon City)



Artificially deformed land
(Under construction)

{Land Condition Map (2) Ground Elevation}

Survey on the past flood level
level
(Valenzuela area)

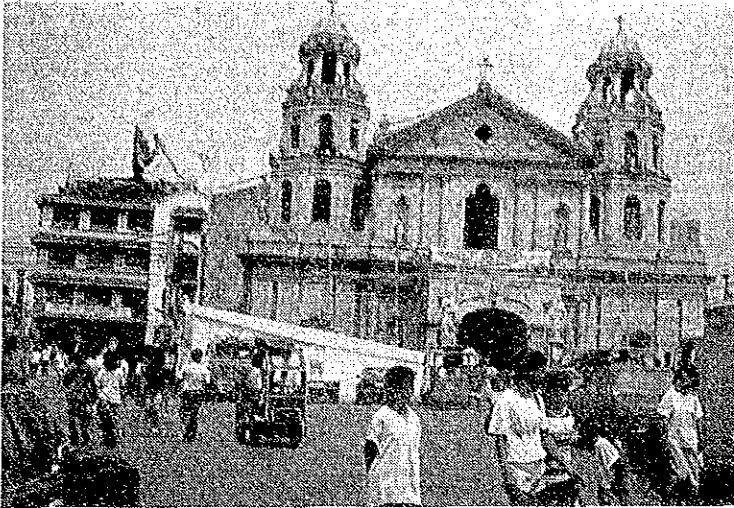


Minor order leveling
(Maycauayan area)

Road whose surface elevation is around zero meter.
(Malabon area)

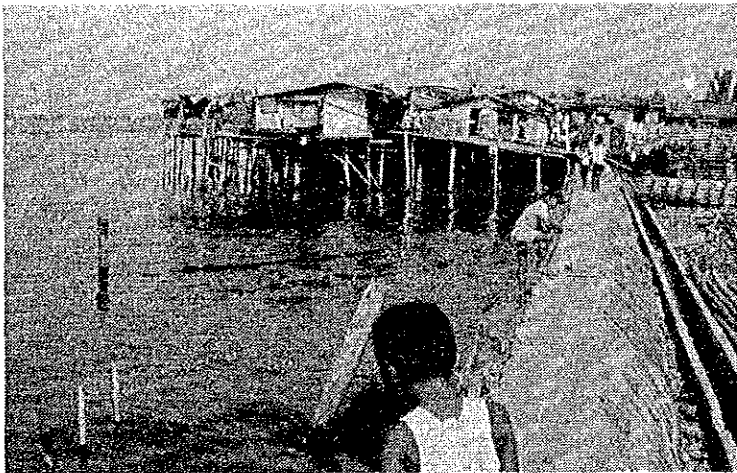
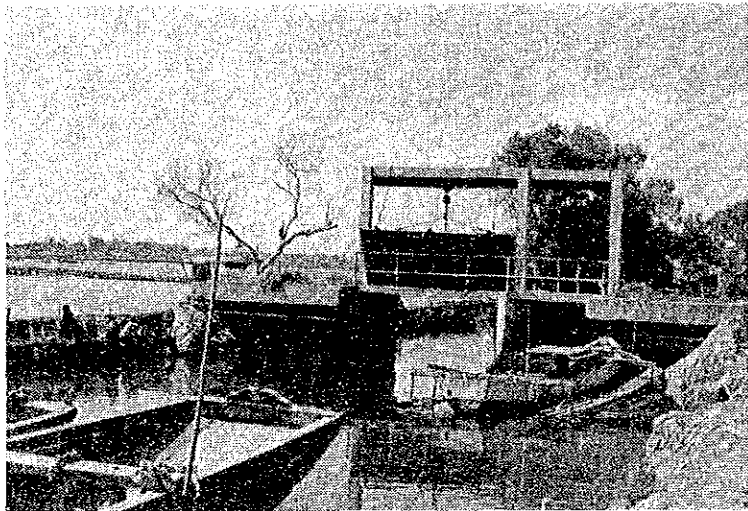


[Land Condition Map (3)]



Church, one of facilities
for rescue and relief
(Quiapo Church)

Water gate and
marine pond

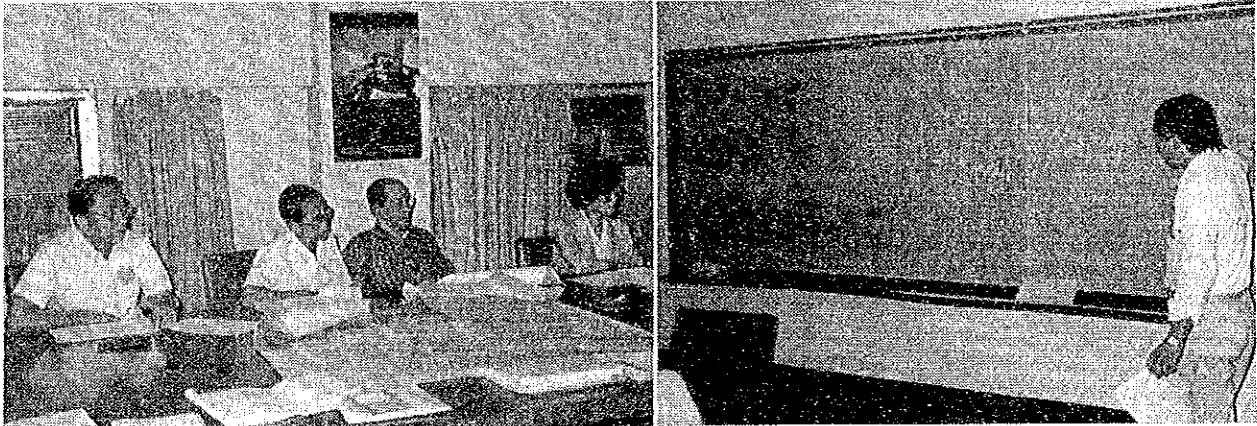


Housing fixed on
water and revetment
(Navotas area)

3. Signing on Minutes, Technical Meeting, etc.



Signing on Minutes of Discussion (at BCGS)

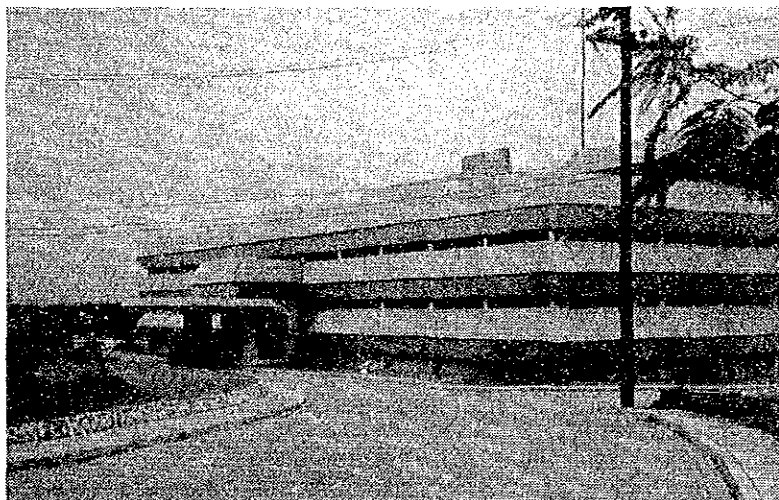
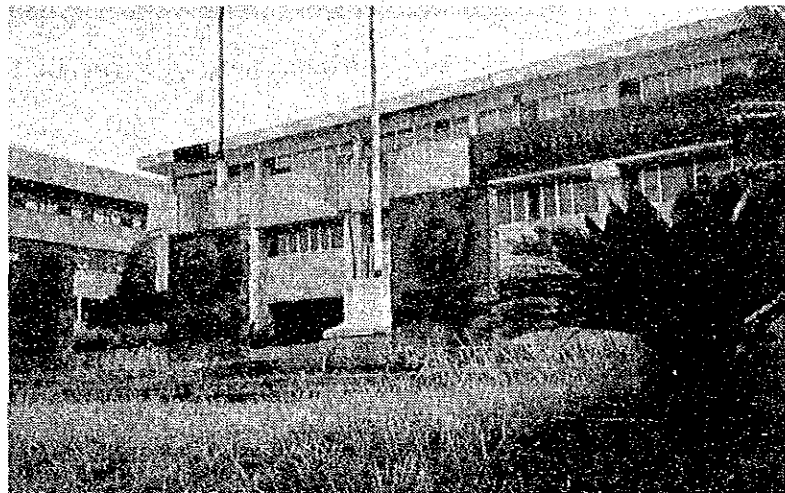


Lecture on landform classification
in the technical meeting (at BCGS)



Turnover ceremony for
the contoured map and
planimetric maps
(at DENR in October,
1987)

Department of
Environment and Natural
Resources (DENR)
(Quezon City)



National Mapping &
Resource Information
Authority (NAMRIA)
(Fort Bonifacio)

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1. Background of Project

The Metro Manila Region is the political, economic and cultural center of the Philippines. It has become overcrowded due to a drastic influx of population into the present inadequate urban infrastructures such as the road system and housing facilities. The circumstances of the Region have therefore become rapidly worse, as observed in the increase of illegally inhabited areas and the chronic inundation caused by heavy rainfalls.

The Philippine Government has been making efforts to solve the problems through the Metro Manila Commission (MMC) by formulating an urban redevelopment program, enforcing restrictions on land use and taking measures against flooding on a priority basis.

Faced with so many urban problems, in order to systematically solve them in terms of urban policy, it is first necessary to prepare a base map to correctly ascertain the existing conditions in the Metro Manila Region and its environs. However, the available maps of the metropolitan area are inadequate. These are the basic material necessary for carrying out various urban plans and so an urgent task is to prepare contoured, planimetric, land use and land condition maps which accurately express the existing conditions of the urban structure of the metropolitan area. The Philippine Government requested the Japanese Government in March 1984 for technical cooperation in mapping the Metro Manila Region.

In response to the request for technical cooperation, the Japanese Government sent a contact mission in January 1985, and a preliminary survey team in March the same year to the Philippines for discussions with the Bureau of Coast and Geodetic Survey (BCGS), the surveying organization of the Philippine Government, about the proposed technical cooperation as well as to conduct field survey and data collection. As a result, based on the Implementing Arrangement (I/A) concluded in March 1985 between the two Governments, it was decided that technical cooperation be carried out under a four-year program starting in 1985 for the establishment of a graphic information base project of the National Capital Region (NCR).

(1) Outline of the project is as follows:

Contoured map	1:10,000	1,500 km ² (57 sheets)
Planimetric map	"	1,500 km ² (")
Land use map	"	823 km ² (33 sheets)
Land condition map	"	476 km ² (16 sheets)*

* includes marine area

(2) The outline of the work which has been completed in the first and second years is as follows:

Year	Kind of Work	Quantity
First year (FY 1985)	(Field Work)	
	Ground Control Point Survey	12 points
	Leveling	300 km
	Pricking (Ground Control Points)	25 points
	" (Leveling Points)	100 points
	Field Identification (Contoured Map)	1,500 km ² (57 sheets)
	" (Land Use Map)	823 km ² (33 sheets)
	(Indoor Work)	
Aerial Triangulation	120 models	
	Stereo-plotting	1,500 km ² (57 sheets)
Second year (FY 1986)	(Field Work)	
	Field Completion (Contoured Map)	1,500 km ² (57 sheets)
	Field Identification (Land Condition Map)	429 km ² (16 sheets)
	Minor Order Leveling (")	150 km
	(Indoor Work)	
	Compilation (Contoured Map)	1,500 km ² (57 sheets)
	Preparation of Original Manuscripts of Contoured Map and Planimetric Map	1,500 km ² (57 sheets)
	Printing (5 colors) (Contoured Map)	57 sheets, 1,000 copies each
" (2 colors) (Planimetric Map)	57 sheets, 1,000 copies each	

2. Outline of Project

2-1 Outline of Third Year Work

In the 3rd year work, compilation and field completion for the land use and land condition maps were carried out, and the compilation manuscripts for the both maps were completed.

As the 3rd year field completion was the final field work, symbols and specifications including those for printing were also clarified in consideration of the fact that drafting and printing were expected to be conducted in the following 4th year.

(1) At the technical meeting with the BCGS in Manila, items which had been discussed and agreed on until the 2nd year were reconfirmed, and the classification criteria and information to be presented for the land use and land condition maps were finalized for the 3rd year compilation and field completion work.

Furthermore, symbols, the color scheme and marginal information, etc. were all discussed and agreed upon, and presented on the sample maps which had previously been prepared for detailed discussion on the 4th year drafting and printing work.

(2) Compilation manuscripts for the land use and land condition maps were prepared in order of "preparation of base map", "compilation", "field completion" and "data evaluation".

(3) As to the compilation manuscripts, 33 sheets for land use map and 16 sheets for land condition maps were completed. Text "information and usage" were drafted for both maps.

2-2 Outline of Project Area

2-2-1 Outline of Project Area

NCR and its environs are generally classified into the following five areas as shown in Fig. 2.

(1) Urban area extending from Manila to Makati, Quezon City, etc. where the commercial and business districts are mainly located.

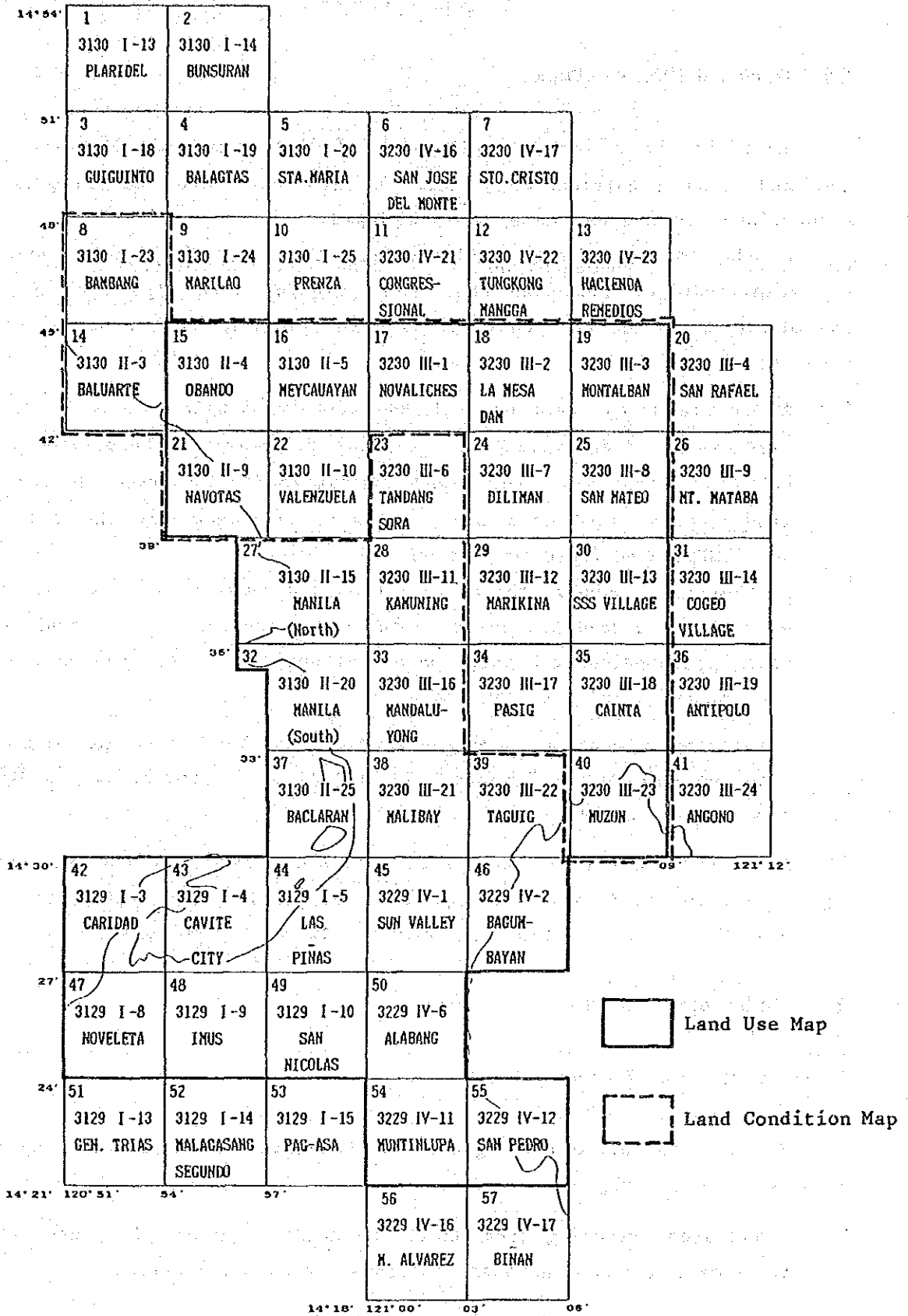


Fig. 1 Sheet Name and Number Index
(Land Use Map and Land Condition Map)

- (2) Suburban residential areas including subdivisions which surround the urban area.
- (3) Marine pond area in the coastal plain extending along the north-western and south-western coast of Manila.
- (4) Agricultural land area in the northern and southern hills and plateaus as well as in the Marikina river basin.
- (5) Forest areas in the eastern mountains.

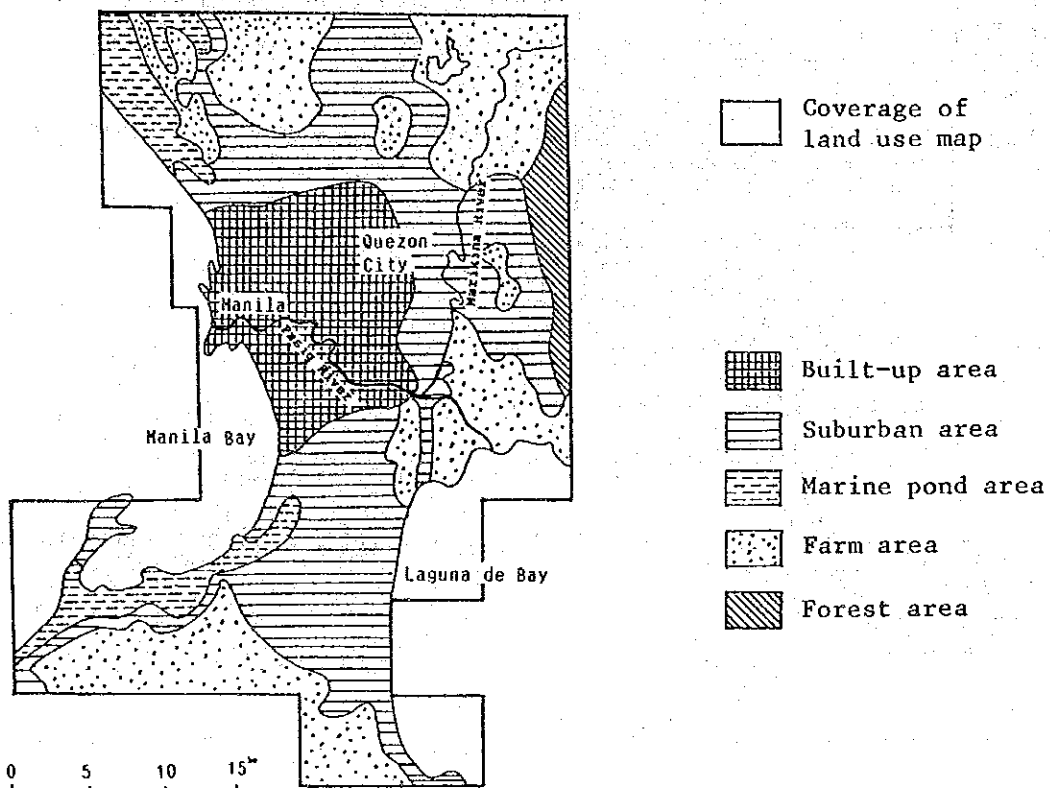


Fig. 2 Outline of Project Area

2-2-2 Characteristics of Landform

The landform of the project area is generally classified from west to east as follows:

- 1) Coastal plain along Manila Bay
- 2) Hills and plateaus in Manila and Quezon City areas
- 3) Lowland around Marikina river basin and environs of Laguna de Bay
- 4) Hill and mountain areas of the eastern part

Narrow coastal lowland extends north to south along Manila Bay.

Hills and plateaus extend north to south in Manila and Quezon City areas. Across the hill and plateau area, the ground elevation is 20 m to 30 m around Pasig river and gradually increases northward from 80 m to 100 m. South of the project area is the foot of Taal volcano, where elevation ranges from 40 m to 80 m.

The land around the Marikina river basin and the environs of Laguna de Bay are low-lying flat areas with elevation of 1 m to 20 m.

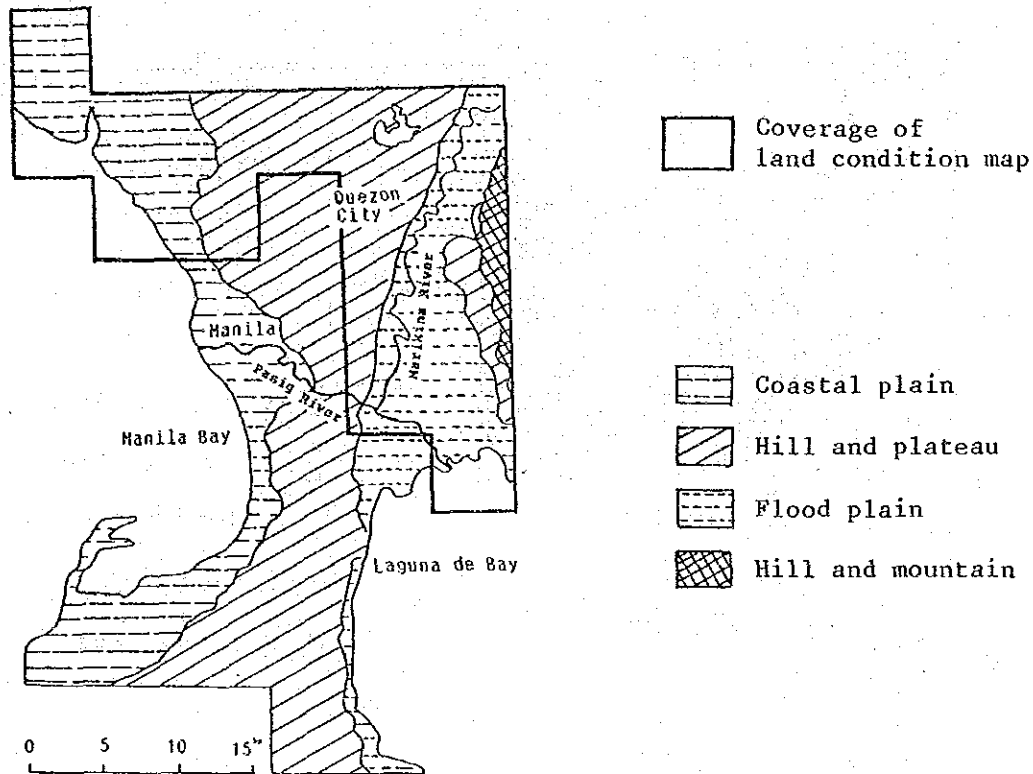


Fig. 3 Outline of Landform

The mountain area in the eastern part of the project area has an elevation of 200 m to 300 m, and the hilly western side of the mountain area is of 50 m to 100 m in elevation. In the mountains where top flats still remain, slopes become more gentle to south although there are steep slopes along the river valleys.

2-2-3 Massive Housing Development

Due to the recent drastic influx of population in NCR, the urbanized area is expanding outward to the suburban areas. Particularly, rapid housing development in the northern hilly area of Quezon City, the

low-lying area around Marikina river basin and the environs of Laguna de Bay as well as in the southern part of Cavite Province is outstanding.

2-2-4 Flood Disasters

Lowlands in Manila City and the suburban areas are suffering from frequent floods every year. It is considered on urgent to formulate a comprehensive river development plan for the Marikina river, Pasig river and other medium and small rivers flowing in Manila Bay or Laguna de Bay, and to establish overall disaster prevention measures for the recently created inland flood area caused by artificial land deformation accompanied with the expansion of the urban area.

2-3 Period of Survey Work

(Indoor Work)

Compilation

for Land Use Map	Late July - late September '87
for Land Condition Map	" - "

(Field Work)

Field Completion

for Land Use Map	October 5 - December 4 '87
for Land Condition Map	" - "

2-4 Formation of Survey Team

Field Completion

Leader	(General)	Masayoshi Takasaki	Nov. 25 - Dec. 4 '87
Deputy Leader	(Deputy General)	Tokihiko Kaminishi	Oct. 5 - Dec. 4 '87
Headquarters	(Coordinator)	Hiroshi Kimura	Oct. 5 - Dec. 4 '87
Member	(Chief Surveyor)	Keikichi Yoshida	Oct. 8 - Dec. 4 '87
"	(Surveyor)	Tomotaka Kamakura	Oct. 8 - Dec. 4 '87
"	"	Toshiyuki Harada	Oct. 8 - Dec. 4 '87
"	"	Tsutomu Moriiwa	Oct. 8 - Nov. 25 '87
"	"	Masumi Ikuno	Oct. 8 - Nov. 25 '87
"	"	Masataka Miyazaki	Oct. 8 - Nov. 25 '87

Member	"	Takeshi Toyooka	Oct. 5 - Dec. 4 '87
"	"	Shingo Niijima	Oct. 8 - Nov. 25 '87
"	"	Naoya Yunohara	Oct. 8 - Nov. 25 '87
"	(Cartographer)	Tomoyuki Nakano	Nov. 25 - Dec. 4 '87

2-5 Work Volume

2-5-1 Land Use Map

Compilation (manuscripts)	823 km ² , 33 sheets
Field completion	823 km ² , 33 sheets

2-5-2 Land Condition Map

Compilation (manuscripts)	476 km ^{2*} , 16 sheets
Field completion	423 km ² , 16 sheets

* include marine area

2-6 Survey Equipment

(Field Survey)

Auto Level	1 set
Plane Table	1 set
Soil Auger	1 set

(Indoor Work)

Contact Printer	1 set
Copying Machine (large type)	1 set
Plotting Machine	1 set

2-7 Plan and Result

Item of Work	Plan	Result	Remark
Land Use Map			
Compilation (Manuscript)	823 km ²	823 km ²	33 sheets
Field Completion	823 km ²	823 km ²	33 sheets
Land Condition Map			
Compilation (Manuscript)	476 km ²	476 km ²	16 sheets
Field Completion	429 km ²	429 km ²	16 sheets

2-8 Survey Schedule

The outline of the survey schedule of the 3rd year field work is shown in the Appendix-1.

2-9 Technical Meeting with BCGS

In this year's work, compilation manuscripts for the land use and land condition maps were prepared using base map which was prepared from the contoured map. As to the symbols and specifications that had previously been agreed between both sides in general, the categorization, definition, application and the minimum area on the map, etc. were reconfirmed and finalized after partial additions and revisions through discussions between both sides.

For detailed specifications of the drafting and printing to be carried out in the 4th year, color scheme, marginal information, etc. were finalized on the sample maps for printing.

To attain better and effective usage of the land use and land condition maps, the map information and the usage of the maps were discussed and drafted between both sides.

2-10 Undertaking of BCGS

BCGS performed close cooperation with the JICA survey team at the time of the field completion. The qualified BCGS counterparts were appointed to undertake part of the field work.

2-11 Field Supervision

During the 3rd year field work, the following advisors were dispatched by JICA to Manila for technical meetings with BCGS and supervision over the field work:

Masatoshi Nagaoka: Head of Second Geographic Div.

Geographic Dept., Geographical Survey Institute

Ministry of Construction

- 1) October 16 to 23, 1987
- 2) November 30 to December 4, 1987

Koji Mori : Staff, First Development Survey Div.,
Social Development Cooperation Dept., JICA
November 30 to December 4, 1987

3. Preparatory Work in Japan

3-1 Outline of Work

The outline of the preparatory work was as follows:

- . Preparation of criteria for the compilation of land use map and land condition map.
- . Preparation of sample map for detailed discussion on drafting and printing to be conducted in the 4th year.
- . Preparation of information and usage (draft) of the land use map and land condition map.

3-2 Criteria for Compilation and Review on Symbols and Specifications

Based on the draft symbols and specifications which had been prepared through the 2nd year, classification symbols and the color assignment for the compilation work were studied and finalized.

As for the symbols and specifications of the land use and land condition maps, a series of studies had been made to bring out more simplified and refined expressions without making any basic changes in the draft which was to be finalized in the 3rd year work.

3-3 Preparation of Sample Map for Printing

For the preparation of sample maps, typical areas presenting characteristic land usage and land conditions in the project area were selected and 2 sample sheets were prepared for each map.

For the preparation of the final sample maps, studies were made on several trial sheets, taking the following into considerations:

- (1) Color scheme which enable clear classification.
- (2) Harmonious map presentation as a whole.

3-4 Preparation of Information and Usage (Draft)

To attain better and effective usage for map users, the information and usage of the land use map and that of the land condition map were drafted.

The main contents were as follows:

- (1) Usage of Map
- (2) Process of Preparation
- (3) Outline of Area and Contents of Presentation
- (4) Criteria for Presentation

4. Compilation

4-1 Outline of Work

Compilation manuscripts for the land use and land condition maps were prepared on the basis of the survey results and reference materials, including symbols and specifications which had been acquired through the 2nd year.

4-2 Preparation of Base Map

For the compilation, scribed sheets, which had been made for the contoured map production, were employed for the preparation of base maps on which the topography and planimetric features were printed by the photo-processing method with the specified colors not so as to hinder the subsequent work. For the base map, shrinkproof polyester base (#500) sheets were employed.

4-2-1 Base Map for Land Use Map

- (1) As the land use boundary and classification symbols were to be plotted in black, and topography and the planimetric features in green and brown respectively so as not to be intermingled with the boundary lines and the classification symbols.
- (2) For the easy correction of land use boundaries and symbols to be plotted on the surface of the base map, the topography and planimetric features were printed on the back.
- (3) For the land use boundaries for vegetation, vegetation boundary lines were printed in black on the surface of base map using the vegetation boundary plates of the contoured map. These printed lines were utilized for the delineation of the land use boundary lines for vegetation.

4-2-2 Base Map of Land Condition Map

For easy correction of the landform classification, the organization and public facilities were plotted in black on the surface of base map, and the topography, planimetric features, etc. were printed in green on the back.

4-3 Compilation of Land Use Map

4-3-1 Work Flow of Compilation

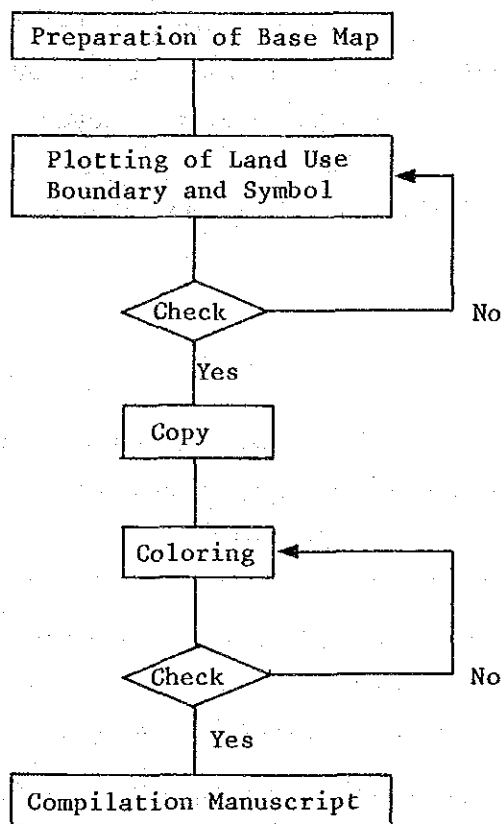


Fig. 4 Work Flow of Compilation (Land Use Map)

The compilation manuscripts of the land use maps were prepared using the base map on which the land use boundaries and land use classification symbols were plotted. The work was conducted using aerial photographs on which the results of the field identification were incorporated while being based on the symbols and specifications. Furthermore, colored copies of the manuscripts were prepared using color pencils specified for each land use classification.

4-3-2 Reference Materials for Compilation

- (1) Base Map
- (2) Contoured Map (1:10,000 map completed in the 2nd year)
- (3) Aerial Photomap made in 1986 (1:10,000)
- (4) Aerial Photographs for Field Identification (1:10,000; Results of the field identification in 1985 were incorporated)
- (5) Symbols and Specifications

4-3-3 Instruments

- (1) Rotering Pen (0.1 mm needle)
- (2) Colored Pencil: MITSUBISHI POLYCOLOR 7500 and
MITSUBISHI COLOR PENCIL 7700 (HARD TYPE)
- (3) Pencil : MITSUBISHI UNI 2H

4-3-4 Items of Compilation

- (1) Land Use Boundary and Classification Symbols
- (2) Coloring of Each Land Classification

4-3-5 Utilization of Contoured Map and Aerial Photographs

In the later part of the 1st year field identification as well as in the 2nd year work, the symbols and specifications for the land use and land condition maps were partly corrected. Therefore, some of the classificatin symbols plotted on the aerial photos used for the field identification did not correspond to those of the specifications. Furthermore, changes after aerial photography had not been corrected. Thus, in the compilation, the items to be possible to correct were compiled using the contoured map and the aerial photos, and other items to be surveyed in the field completion were marked on the manuscript copies.

- (1) Utilization of colored map

As to the contoured map, stereo-plotting were conducted on the basis of the aerial photographs taken in 1982 and the changes after aerial photography were corrected in the field completion in September 1986.

Among the classification items for which the symbols and specifications were changed after the field identification for land use map (conducted in 1985), those items already surveyed in the contoured mapping were classified on the basis of the contoured map.

(2) Utilization of aerial photographs

It is so important for the land use map to present the state of detailed land use such as small-scale housing development that correction was made for even small changes of area, unlike for the case for contoured mapping.

Aerial photomaps (1:10,000) made in 1986 by the Philippine Government were utilized for selecting the changes of features to be corrected and for plotting them on the manuscripts.

4-3-6 Details of Compilation

- (1) The vegetation boundaries printed on the surface of base map were used for plotting the land use boundaries.
- (2) Land use boundaries were plotted as follows:
 - ① Distinct land use boundary ——— solid line
 - ② Under construction, artificial deformation ----- broken line
- (3) Where land use boundary lines coincide with double line roads, alleys, railways, canals, embankments, revetments, salt beds, marine ponds, tops of landslides, walls and fences, etc., the land use boundaries were deleted.
- (4) At the toe of landslide, cut and banked up slope, land use boundary was delineated if necessary.
- (5) Only the area presented as temporary housing on the contoured map was presented as temporary housing area.
- (6) Land use boundaries in the generalized area were delineated by tracing method, using aerial photomaps (1986).

- (7) Land use boundaries in the built-up area was delineated following the outline of building presented on the base map as much as possible.
- (8) Narrow foot-path and water way running between marine ponds distributed in the coastal low land were included in the marine pond area.
- (9) In the compounds of parks or shoals, facilities with different usage were classified according to each usage.
- (10) Double line road was not colored.

4-3-7 Adjoining

Continuity between each adjoining sheet was made directly on the original compilation manuscripts in principle.

4-3-8 Coloring

From the compilation manuscripts on which the land use boundries and classification symbols were completely plotted, copies (Delimina SSP) were prepared and colored in pencil, in accordance with the specified color assignment.

4-3-9 Inspection

Before preparing the above-mentioned copies, the compilation manuscripts were checked and corrected on the overlaid papers (White Uniper #150) through the collation with the aerial photos used for field identification and the contoured map.

4-4 Compilation of Land Condition Map

4-4-1 Work Flow of Compilation

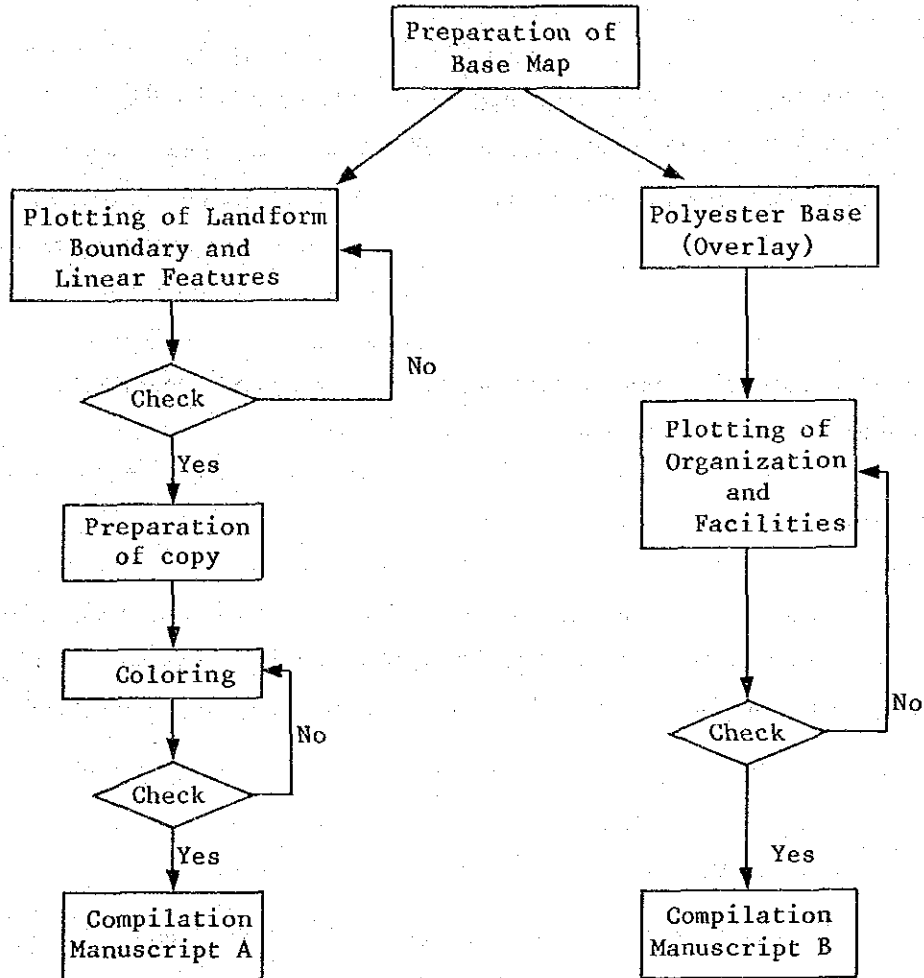


Fig. 5 Work Flow of Compilation (Land Condition Map)

Compilation of the land condition map was made using the following process:

Compilation manuscripts A were prepared presenting landform boundaries, linear features and landform classification symbols based on the aerial photos on which results of photo interpretation were incorporated, as well as in accordance with the symbols and specifications.

With regard to the organizations and facilities, for the compilation manuscripts B, items common to those of the contoured map were selected and plotted on polyester base overlays.

Also, landform classification manuscripts were prepared using copies of compilation manuscripts A onto which colors and symbols were presented according to the landform classification specifications.

4-4-2 Reference Materials for Compilation

- (1) Base map
- (2) Contoured map (1:10,000 map completed in the 2nd year)
- (3) Aerial photographs used for photo interpretation
- (4) Aerial photographs taken in 1966 to 1968
- (5) Results of the field identification
- (6) Data collected in the field survey
- (7) Symbols and Specifications

4-4-3 Instruments

- (1) Mirror stereoscope
- (2) Rotering pen (needle 0.1 mm)
- (3) Colored pencil: MITSUBISHI POLYCOLOR 7500
- (4) White ink

4-4-4 Compilation Items

- (1) Landform classification boundaries and symbols
- (2) Coloring according to the landform classification
- (3) Selection of organization and facilities

4-4-5 Utilization of Old and New Aerial Photographs

Owing to the artificial land deformation accompanied by the recent drastic urban development in the Metro Manila Region, the natural landform has been diminishing in the project area.

As the landform classification aims basically to identify the original landform, efforts were exerted to identify the original landform

by referring to as many older aerial photos as possible and further, to determine the existing landform including the artificially deformed landform by a comparative study of new and old aerial photos as much accurately as possible.

The old aerial photos (1:15,000) taken about 20 years ago (1966 to 1968) were very effectively used for identifying the landform before artificial deformation.

4-4-6 Details of Compilation

- (1) Linear features such as main roads, railways, the shoreline and revetments, etc. were given priority in plotting. In case these features coincide with landform boundary, the latter was omitted.
- (2) Based on results of the 2nd year field identification, landform boundaries classified on the aerial photographs were delineated on the base map according to the symbols and specifications.
- (3) The landform classification being made mainly based on photo interpretation, include the two landform boundaries; the boundaries which are clearly presented by the line connecting critical points, and the indistinct boundaries classifying landform such as microrelief in gentle slope and lowland.
Landform units clearly identified by photo interpretation were bounded in block lines, while indistinct landform units were bounded in broken line.
- (4) Uncertain or questionable boundaries were selected as items to be confirmed in the field completion.
- (5) With regard to organizations and facilities, items in common with those of the contoured map (1:10,000) were selected from the contoured map.
- (6) Main roads were delineated, for discussion with BCGS, on the planimetric map (1:10,000) according to the symbols and specifications.
- (7) The compilation items for the marine area were selected as follows:
 - ① Bathymetric line (1 m interval)
 - ② Tidal flat (mud)
 - ③ Bar

4-4-7 Adjoining

Adjoining was made so as not to make any omission.

4-4-8 Coloring

Copies were prepared from the compilation manuscripts on which landform boundaries and classification symbols had completely been plotted, and colored in ink and colored pencil according to the color assignment.

4-4-9 Inspection

Inspection was conducted to check for errors or omissions of the landform boundaries and symbols when compared against the aerial photos used for interpretation and the contoured map.

5. Field Completion

5-1 Outline of Work

The field completion was carried out for the clarification of questionable matters brought out in the compilation of manuscripts as well as for the confirmation of classification items which might be revised according to change of classification criteria.

Final technical discussions with BCGS regarding the completion of the land use and land condition maps, including confirmation of the contents of information and usage (draft), were also conducted in Manila.

5-2 Preparatory Work in Japan

- (1) A plan of the field completion was set up in view of the nature of the work, difficulty of work, the work period and subsequent work, etc. The survey team was organized mainly with the members who had participated in the past field survey.
- (2) Uncertain items found in the course of compilation work as well as items to be confirmed in the field were marked.
- (3) Changes in the large-scale land use, the artificial deformation due to housing development, etc. were marked by referring to aerial photomaps made in 1986.
- (4) For the final confirmation for the color scheme and detailed specifications related to drafting and printing to be conducted in the 4th year, sample maps for printing were prepared as reference materials for discussion between two sides.

5-3 Preparation of Field Work

For the preparation of field work, four members from headquarters (Kaminishi, Kimura, Yoshida and Toyooka) arrived at Manila October 5, 1987. The team visited the Japanese Embassy, the JICA Office and BCGS for preliminary arrangements. At the same time, the team made arrangements for accommodations, field work, the take-over of survey equipment and materials and the hiring of vehicles and laborers.

(1) Headquarters and accommodations

Headquarters and accommodations were set up at the following address:

MANILA MANOR HOTEL

1660, J. Bocobo St., Malate

Manila, Philippines

Tel.: 573055 to 58

The hotel is located nearly in the center of the survey area and convenient for transportation to the survey area, for the offices concerned as well as for the assembly of the BCGS counterparts.

(2) Communications

Telephone and telex were used for business communications between Tokyo - Manila. Communications in the survey area were made by public telephone.

(3) ID cards

ID cards were issued to all of the survey team members same as for the last year and these cards were carried always by the members during the survey period.

5-4 Outline of Field Work

(1) At the technical discussions on the contents of work, the work schedule, work method, group formation, etc., agreement and confirmation of BCGS were obtained on the field completion for land use and land condition maps, as well as on the assignment of counterparts.

(2) During the field survey, the headquarters members mainly carried out technical discussions as well as confirmation and coordination of the work progress. The field party was in charge of the field work, data collection, etc.

(3) Each field party consisted of the team members, the counterparts, and laborers with one vehicle.

(4) During the survey period, the turn-over ceremony for the contoured map and planimetric map completed in the 2nd year was held. The ceremony was attended by the technical advisor and the Deputy Leader of the survey team.

5-5 Field Completion of Land Use Map

5-5-1 Outline

With regard to uncertain items and other items related to the suitability of classification, changes of the classification criteria, etc., confirmation and supplementation were made in the field and the results were incorporated on the compilation manuscripts and the colored manuscripts.

In addition, detailed discussions were conducted with BCGS on revision of the symbols and specifications, items related to the drafting and printing, confirmation of the information and usage (draft), etc.

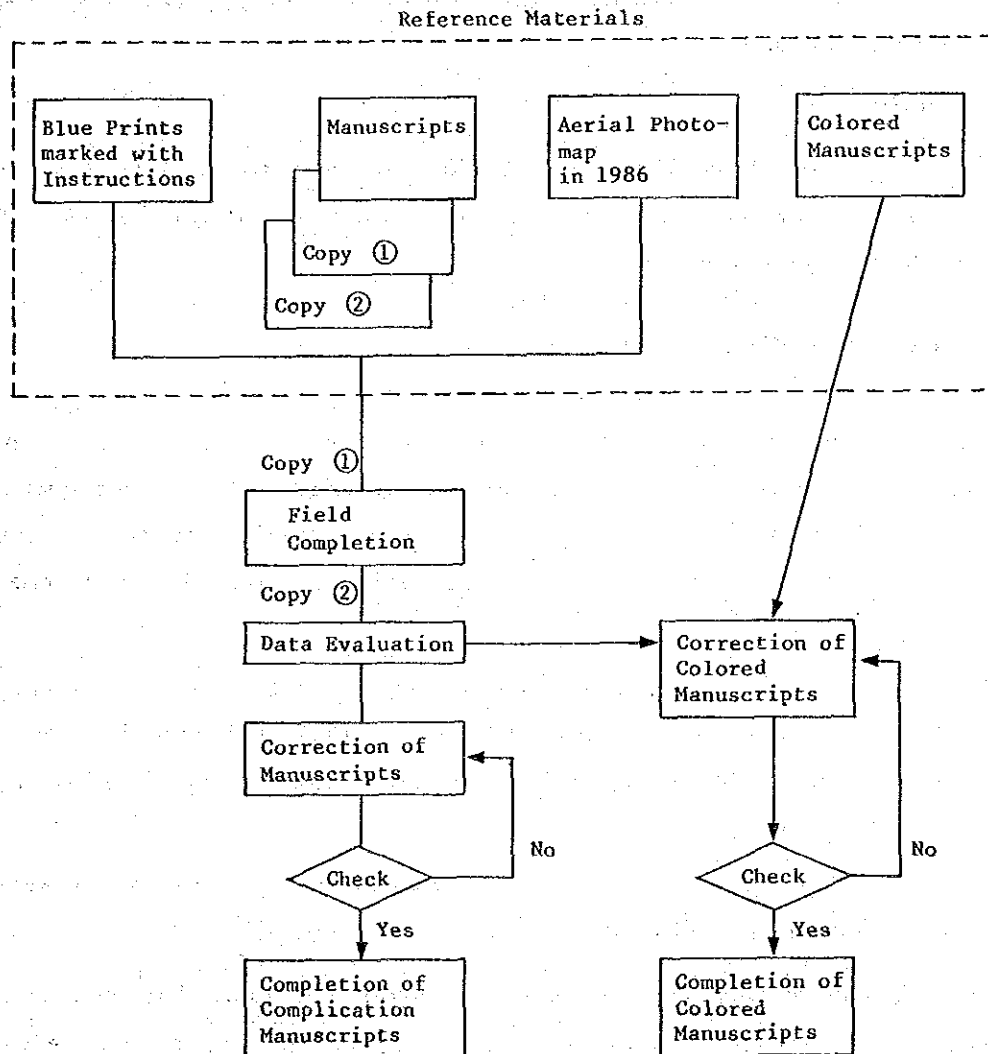


Fig. 6 Work Flow of Field Completion (Land Use Map)

5-5-2 Reference Materials

Reference materials prepared for the field completion were as follows:

- (1) Compilation manuscripts: Polyester base original (2 colors: contour line in green, others in brown)
- (2) Copies of the manuscripts (colored) : Delmina SSP
- (3) Copies of the manuscripts (for the field work): Delimina SSP
- (4) Copies of the manuscripts (for the evaluation): Delimina SSP
- (5) Blue prints marked with instructions
- (6) Aerial photos used for the field identification
- (7) Aerial photomap made in 1986
- (8) Sample map for printing
- (9) Symbols and specifications
- (10) Information and Usage (draft)

5-5-3 Changes in Land Use Classification

Changes or additions relating to the classification in the 1st, 2nd and 3rd year were listed as follows:

(1) Changes in the 1st year

Item	Temporary Classification for Field Identification	Classification after Field Classification
Temporary Housing	Temporary Housing	Residential
Hotel, Motel	Commercial	Business
Theater, Cinema	Commercial	Park and Recreation
Exhibition Hall	Commercial	Education and Culture
Billiards, Casino, Cockpit	Commercial	Park and Recreation
TV/Radio station	Business	Business
Telephone exchange	Business	Business
Sports center	---	Park and Recreation
Memorial park	Park and Recreation	Religious and Cemetery
Abattoir	Utility	Transportation
Dumping area	Open Space	Utility
Gasoline station	Commercial	Transportation
Agricultural warehouse	Transportation	Agro-Industrial
Animal food factory	Large-scale Industry	Agro-Industrial
Pasture, Ranch	Crop Land	Grass Land
Plantation	Plantation	Categorized in 6 items

- Note: 1. "Utility" was replaced with "Service" in the 2nd year.
 2. Item "Billiards" was classified into "Sports and Athletics" in the 3rd year.

(2) Additions in the 2nd year

- 1) Classification "Mixed Business-Commercial" was added.
- 2) Category "Mixed" shall be limited to the three(3)- or more storey buildings.

(3) Addition and changes in the 3rd year

- 1) Classification "Mixed Business-Residential" was added.
- 2) Changes of classification

Items	Classification at Field Completion	Final Classification
Slaughterhouse	Transportation	Service
TV/Radio/Telephone station	Business	Service
Newspaper establishment	Business	Service

5-5-4 Criteria for Classification

However, considering that this land use map will be used as a base map for the future urban planning, emphasis was placed on clarifying the existing states of individual usage or mixed usage of buildings in the built-up area.

Further, as the survey items became more in detail owing to additional specifications for presenting minimum area for the convenience of map user, classification of the mixed category was made according to the following chart:

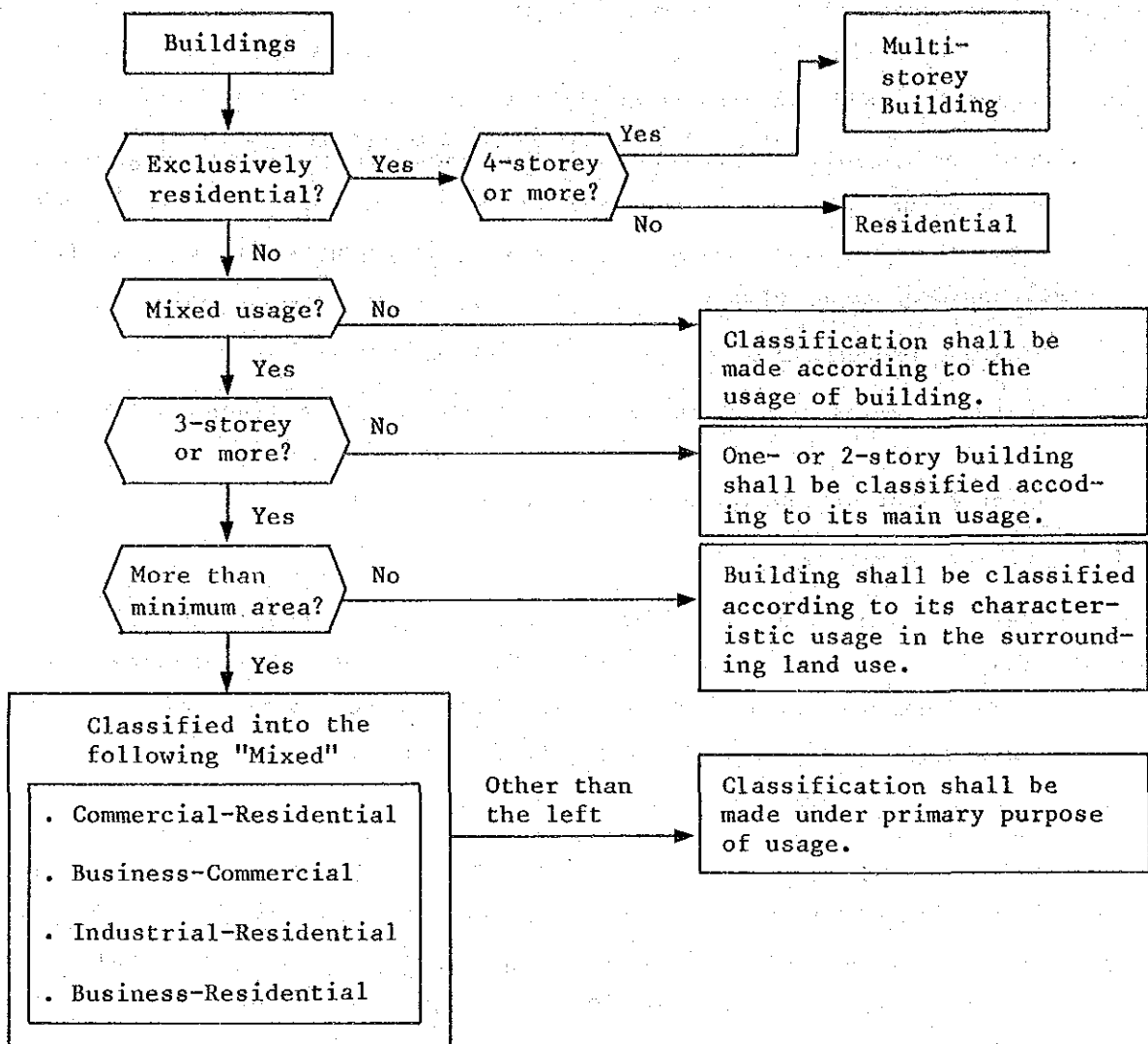


Fig. 7 Classification Chart for Mixed Category