

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
THE UNITED NATIONS TRANSITIONAL ADMINISTRATION
IN EAST TIMOR (UNTAET)**

DIGITAL TOPOGRAPHIC MAP REVISION

AND DATABASE OPERATION MANUAL

FOR

THE STUDY ON URGENT ESTABLISHMENT OF

TOPOGRAPHIC MAPPING

IN EAST TIMOR

August 2000



ASIA AIR SURVEY CO., LTD. (AAS)

SSF
JR
00-147

Preface

In response to a request from the United Nations Transitional Administration in East Timor (hereinafter referred to as “UNTAET”), the Government of Japan decided to conduct “The Study on Urgent Establishment of Topographic Mapping in East Timor” and entrusted the Study to Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. WATANABE Toru of Asia Air Survey Co., Ltd. to East Timor, twice between February and September 2000.

The team held discussions with the officials concerned of UNTAET and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project in East Timor.

Finally, I wish to express my sincere appreciation to the officials concerned of the UNTAET for their close cooperation extended to the Team.

August, 2000

Kimio FUJITA

President

Japan International Cooperation Agency

Letter of Transmittal

August, 2000

Mr. Kimio FUJITA
President
Japan International Cooperation Agency

Dear Mr. Fujita

It is my great pleasure to submit herewith the Digital Topographic Map Revision and Database Operation Manual for the Study on Urgent Establishment of Topographic Mapping in East Timor.

The study team which consists of Asia Air Survey Co., Ltd. (AAS) conducted field survey in East Timor between February 2000 and March 2000, and office work such as digital topographic mapping between May 2000 and August 2000 as per the contract with the Japan International Cooperation Agency.

During the field survey in East Timor, discussion with the officials of the United Nation Transitional Administration in East Timor (UNTAET) were held. Based on the results of the discussion with UNTAET, digital topographic maps, other final results and manual were prepared.

On behalf of the study team, I would like to express my heartfelt appreciation to the United Nation Transitional Administration in East Timor and other authorities concerned for their diligent cooperation and assistance and for the heartfelt hospitality which they extended to the study team during our stay in East Timor.

I am also greatly indebted to the Japan International Cooperation Agency, the Ministry of Foreign Affairs and the Embassy of Japan in Indonesia and Australia for giving us valuable suggestion and assistance during the preparation of this report.

Yours faithfully,

Toru Watanabe
Team Leader for the Study of Urgent Establishment
on Topographic Mapping in East Timor

The Study on Urgent Establishment of Topographic Mapping in East Timor

Contents

Preface

Letter of submittal

PART 1 DIGITAL TOPOGRAPHIC MAP REVISION MANUAL	1
1. Revision of Topographic Maps	1
2. Overall Revision	3
3. Partial Revision	5
4. Revision of Horizontal Positions (Creation of Revision Originals)	6
4.1 Revised Items of Horizontal Positions	6
4.2 Method Using GPS	6
4.3 Method Using Total Station	8
4.4 Method Using Plane Table	8
4.5 Method using Measuring Tape	12
5. Revision of Contours (Creation of Revision Originals)	14
5.1 Revision Items of Contours	14
5.2 Revision of Contours by Total Station Method	14
6. Revision of Digital Data	17
6.1 Revised Items of Digital Data	17
6.2 Digital Data Revision by Digitizer	17
6.3 Digital Data Revision on Display Windows	18
PART 2 DATABASE OPERATION MANUAL	21
1. Introduction	21
2. Start ArcView	22
3. Definition for Each Buttons	25

3.1	Map Select Button	25
3.2	Return Icon	27
3.3	Area Image	28
4.	Measuring Distance and Areas	32
4.1	Measuring distance	32
4.2	Measuring area	32
5.	Hot Link	34
6.	Editing the Data	35
7.	Installing the Database	36
8.	System Requirement	37
9.	Application for Cadaser Database	38

Figures

PART 1 DIGITAL TOPOGRAPIC MAP REVISION MANUAL

Figure 1.1.1	Flow of Revision of Topographic Map
Figure 1.2.1	Aerial Photogrammetry Method
Figure 1.4.1	GPS Method
Figure 1.4.2	Total Station Method
Figure 1.4.3	Plane Table Method
Figure 1.4.4	Measuring Tape Method
Figure 1.5.1	Contour Line Revision by Total Station Method
Figure 1.6.1	Digital Data Revision by Digitizer

PART 2 DATABASE OPERATION MANUAL

Figure 2.2.1	The Main ArcView Window”
Figure 2.2.2	Menu Bar
Figure 2.2.3	Open Project Dialog Box
Figure 2.4.2	Overview of the Index Map
Figure 2.3.1	Index Map
Figure 2.3.2	Select Map Dialog Box
Figure 2.3.2	Select Dialog Box
Figure 2.3.4	Topographic Map
Figure 2.3.5	Land Use Map
Figure 2.3.6	Land Condition Map
Figure 2.3.7	Urban Facility Map
Figure 2.4.1	Measure Tool
Figure 2.4.2	Drawing Tool
Figure 2.5.1	Hot Link
Figure 2.6.1	Edits Map Data

PART 1 DIGITAL TOPOGRAPHIC MAP REVISION MANUAL

1. Revision of Digital Topographic Maps

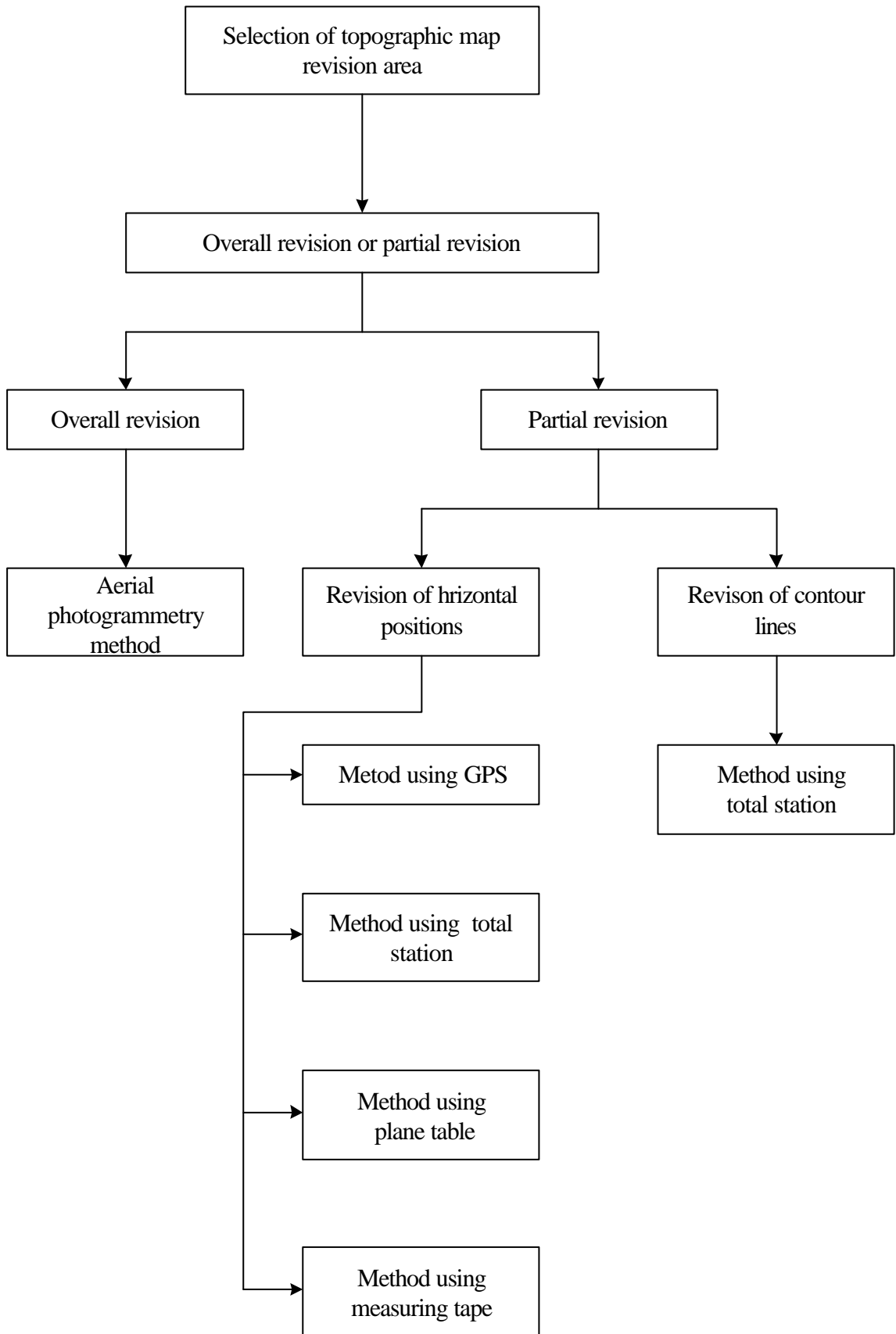
The revision of an existing digital topographic map can be made in two methods, ‘overall revision’ and ‘partial revision’. In overall revision, the entire map is newly created. If 30% or more of revision is necessary to an existing topographic map, it is generally said that time is shorter and cost is lower to newly conduct aerial photography and renew the entire map.

On the other hand, in partial revision, only a part of the existing map is revised and the part to be revised is limited. In partial revision, the existing topographic map is locally revised based on the data obtained from ground survey.

To determine which method should be adopted, overall or partial revision, it is necessary to first examine the variance in the existing topographic map and which method is shorter in time and lower in cost as well as more appropriate in technical aspects (personnel, equipment, etc.).

The procedures of revising a topographic map are shown in Figure 1.1.1 “Flow of Revision of Topographic Maps”.

Figure 1.1.1 "Flow of Revision of Topographic Maps



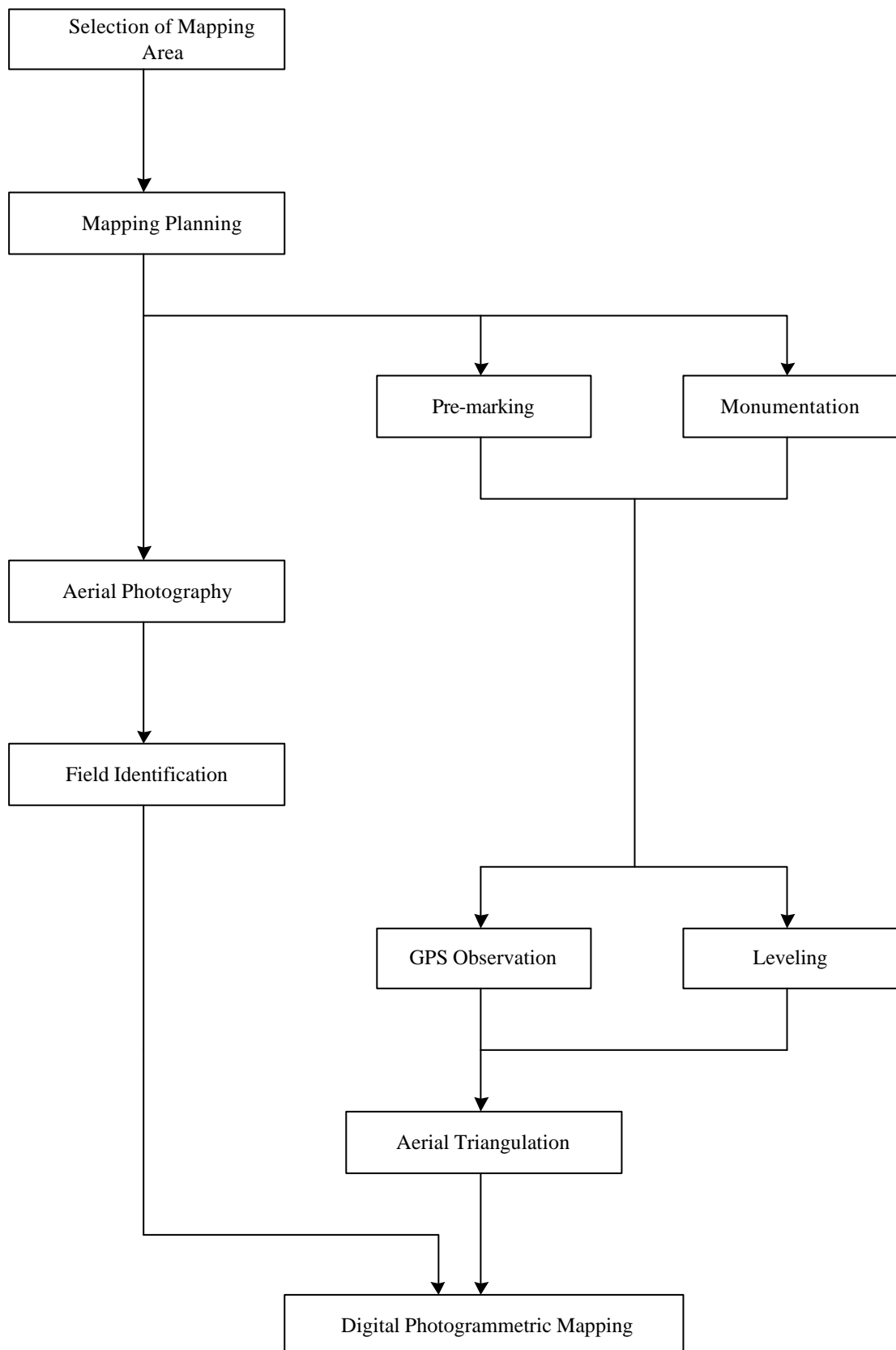
2. Overall Revision

In conducting overall revision of an existing topographic map with many secular changes, a new topographic map is created using a plotter based on the aerial photos newly obtained in aerial photography that is newly carried out. In East Timor, however, there are no equipment nor engineer necessary for aerial photography (such as aerial camera and aircraft) and for photogrammetric survey (equipment for aerial triangulation and plotter) at present. Therefore, it is a realistic way to conduct the overall revision of the topographic maps with large secular changes under technical assistance from the government of any foreign country.

It is inevitable that the information represented in any topographic map becomes older with time. Therefore, the realistic way of revising the topographic maps in East Timor would be to make a partial revision to the maps regularly based on ground survey.

The flow of overall revision (new creation) of topographic maps is shown in Table 1.2.1 “Aerial Photogrammetry Method”.

Figure 1.2.1 "Aerial Photogrammetry Method"



3. Partial Revision

In most partial revisions of large-scale topographic maps, it is general that horizontal positions are revised. Therefore, the main works of the partial revision of topographic maps based on ground survey are how to measure the horizontal positions and how to display the measured results.

On the other hand, the main works of partial revision of contour lines based on ground survey are to measure the horizontal positions and elevation values of a number of points by plane table survey or mesh survey, to deploy the data on the map, to draw new contour lines and how to display the results.

The partial revision based on ground survey is made on the following two items:

(a) Revision of Horizontal Positions

The horizontal positions of buildings and roads that have been newly constructed or removed are measured and added to or deleted from the existing topographic maps.

(b) Revision of Contour Lines

The contour lines on the earth surface that have been changed due to various construction works are revised.

4. Revision of Horizontal Positions (Creation of Revision Originals)

4.1 Revised Items of Horizontal Positions

In revision of horizontal positions, it is necessary to determine two factors; measuring shapes of planimetric features and structures and positioning those features on the existing topographic maps.

The revision of horizontal positions is mainly made in three methods. Selection of method depends upon the available equipment, ability of engineers and scope of revision.

In revision of horizontal positions, it is to note that the shapes of houses and buildings represented on the topographic maps created based on photogrammetric survey are shapes of their roofs or external walls. If the shapes of houses and buildings are measured in the field survey, therefore, it is necessary to measure the positions of their roofs. In addition, if the distances from those houses and buildings are measured, the distances from their roofs should be measured.

4.2 Method Using GPS

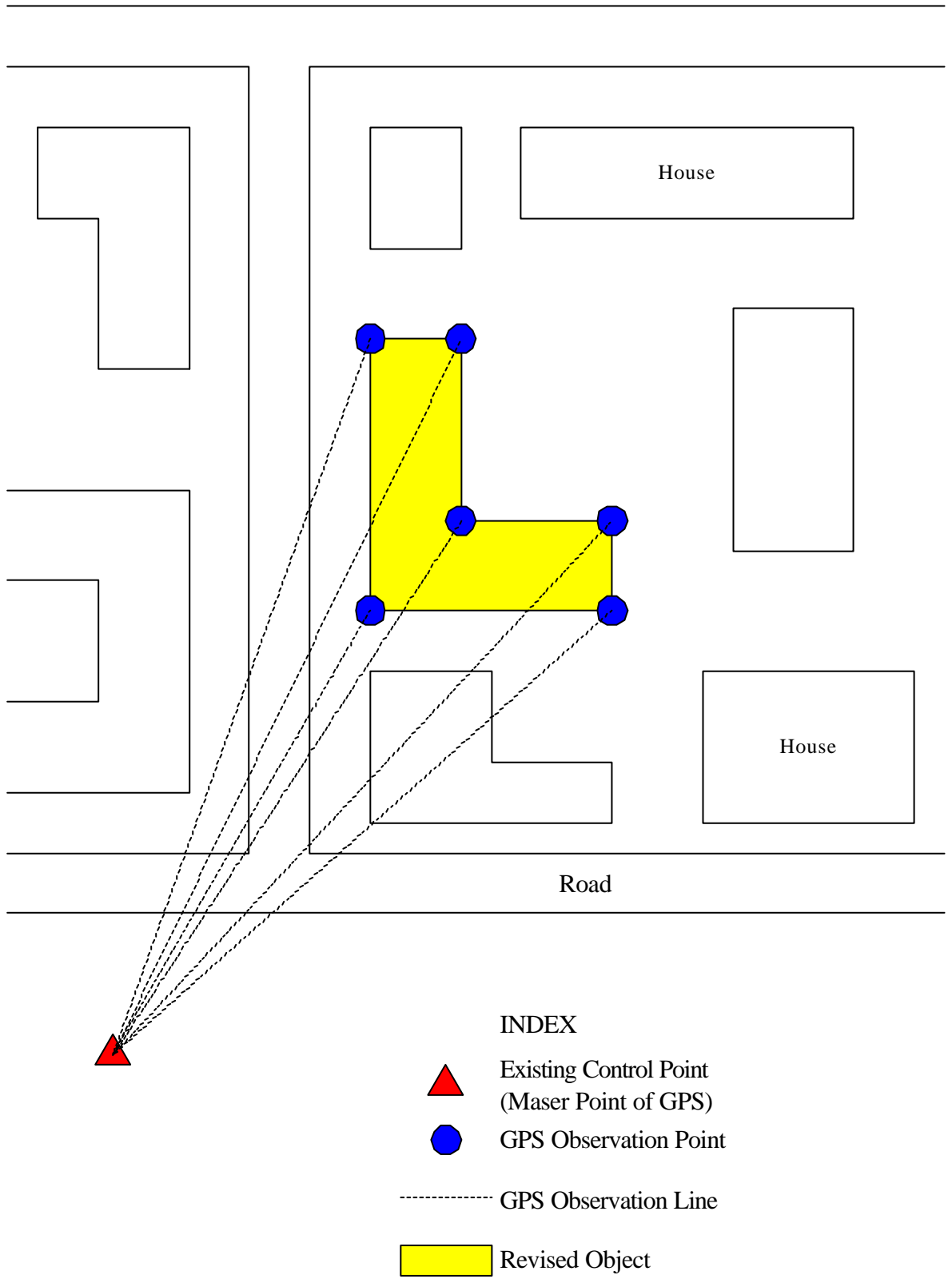
In GPS survey, the points to define the shapes of the features (edge points of a building) are measured to calculate the values of their coordinates. In this case, the points based on the calculated coordinate values are only deployed on the existing topographic map. It is not necessary to consider the positional relations between the measured features and those on the existing topographic map unless the ellipsoid or projection is used erroneously.

However, for the GPS equipment to be used in the ground survey, at least two sets of GPS equipment capable of statistic differential GPS observation should be prepared because simple type GPS models are incapable of static differential GPS observation and insufficient in accuracy. This type of survey equipment is cheaper than it has been in the past, but still expensive. In addition, the calculation process requires knowledge on calculations of GPS observed values. In East Timor at present, it is not so practical to use this type of equipment.

In East Timor, most roofs of the houses are made of corrugated tin plate. If the edges of the existing houses are measured by GPS survey, the satellite signals are reflected on the corrugated tin plate, resulting in lower positioning accuracy. Therefore, the GPS survey is not suitable depending upon the places and features.

The conceptual diagram of partial revision using GPS equipment is shown in Figure 1.4.1 “GPS Method”.

Figure 1.4.1 "GPS Method"



4.3 Method Using Total Station

The Total Station Method is a system to acquire necessary data for revision of topographic maps by installing a total station at the existing control point or the supplementary control point fixed by traversing survey and measuring the terrain and planimetric features. The total station method is performed in the processes described below. The conceptual diagram of partial revision using a total station is shown in Figure 1.4.2 “Total Station Method”.

(a) Selection of supplementary control point and nailing

A point for which the supplementary control point is required is selected in consideration of the conditions of terrain and planimetric features in the area for revision of the topographic map and a survey nail is laid at the point.

(b) Traversing survey and leveling

The supplementary control point is installed by traversing survey and leveling made using an existing control point as a given point in the area for revision of the topographic map, and the horizontal coordinates and elevation of the supplementary control point is calculated to fix the point.

(c) Measurement of planimetric features by total station

A total station is installed at the fixed supplementary control point and the horizontal positions and elevation values of any of planimetric features are measured using the angle and distance method or another method to determine the coordinate values.

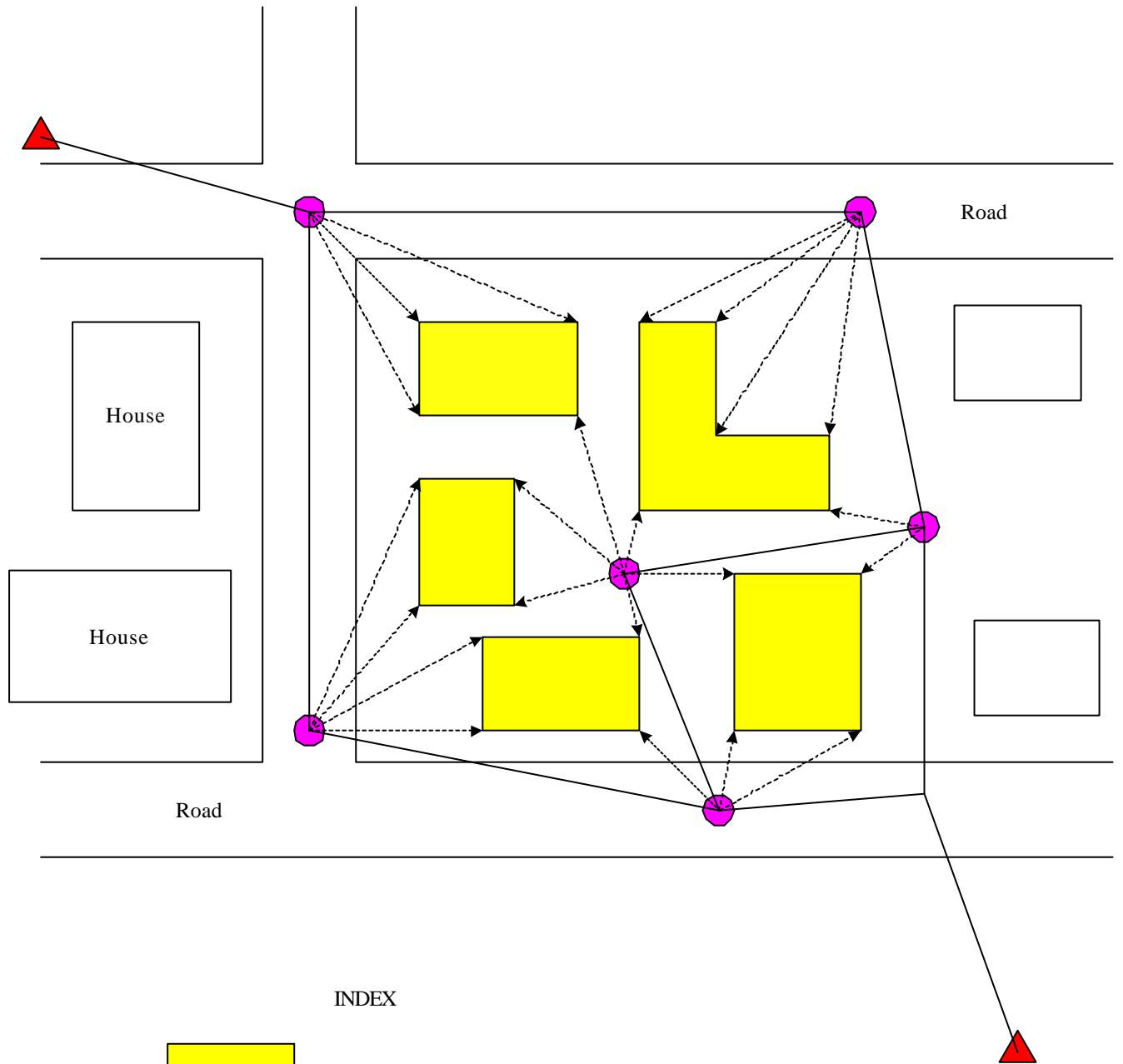
(d) Preparation of revision original

Based on the coordinate values of the planimetric features measured by the total station, the positions of the features are deployed on a 1:2,000-scale topographic map to prepare the revision original.

4.4 Method Using Plane Table

The plane table method is a system to acquire necessary data for revision of a topographic map in which the terrain and planimetric features are drawn directly on the map based on the plane table survey using an existing control point, the supplementary control point fixed by traversing survey or a point defined on the 1:2,000-scale topographic map. In the plane table method, there are two ways as described below. The conceptual diagram of partial revision using plane table is shown in Figure 1.4.3 “Plane Table Method”.

Figure 1.4.2 "Total Station Method"



INDEX



Revised Object



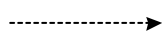
Existing Control Point



Supplementary Control Point



Traversing Line



Observation Line for Details by Total Station

Method of making plane table survey after installing the supplementary control point by traversing survey

(a) Selection of supplementary control point and nailing

A point for which the supplementary control point is deemed to be necessary is selected considering the conditions of terrain and planimetric features and a survey nail is laid at the point.

(b) Traversing survey and leveling

A supplementary control point is fixed by traversing survey and leveling in the area for revision of the topographic map using an existing control point as a given point and the horizontal coordinates and elevation value of the supplementary control point are calculated and determined.

(c) Drawing of planimetric features using plane table

A plane table is installed at the fixed supplementary control point and the planimetric features for revision on the topographic map are directly measured by the plane table survey method. Then, the planimetric features to be revised are drawn in the scale of 1:2,000.

(d) Preparation of revision original

Based on the diagram drawn by the plane table survey, the planimetric features to be revised are arranged on the 1:2,000 scale topographic map to prepare a revision original.

Method of making plane table survey using a point defined on 1:2,000 scale topographic map

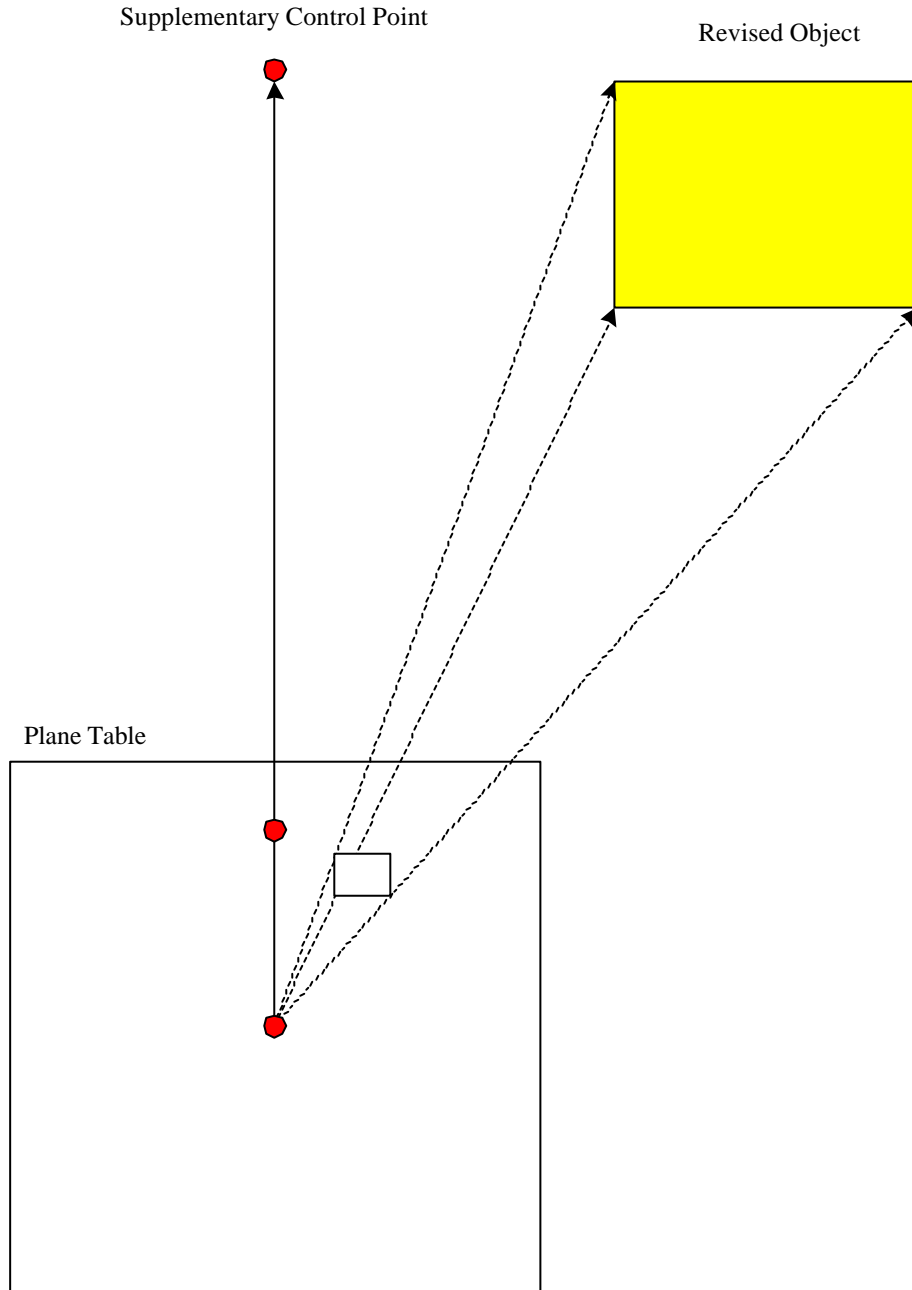
(a) Selection of a point defined on topographic map

A point to define the actual location on the 1:2,000-scale topographic map is selected within the range of revision of the topographic map.

(b) Drawing of planimetric features by plane table survey

A plane table is installed on the selected point and its direction is set in reference to the point defined on the 1:2,000-scale topographic map. After setting the direction of the plane table, the planimetric features to be revised are drawn directly by the plane table survey method.

Figure 1.4.3 "Plane Table Method"



(c) Preparation of revision original

Based on the diagram drawn by the plane table survey, the planimetric features to be revised are arranged on the 1:2,000-scale topographic map to prepare the revision original.

4.5 Method Using Measuring Tape

The method using a measuring tape is a system to acquire necessary data for revision of a topographic map in which the distance from a defined point on the 1:2,000-scale topographic map to the object to be revised on the topographic map is measured using a tape. Anybody can perform this method easily because no special equipment or technology to use such equipment is required. The measuring tape method is performed in the procedures described below. The conceptual diagram of partial revision using a measuring tape is shown in Figure 1.4.4 “Measuring Tape Method”.

(a) Selection of a point defined on topographic map

A point to define the actual location clearly on the 1:2,000-scale topographic map (a wall, intersection of a road or building) is selected within the range of revision on the topographic map.

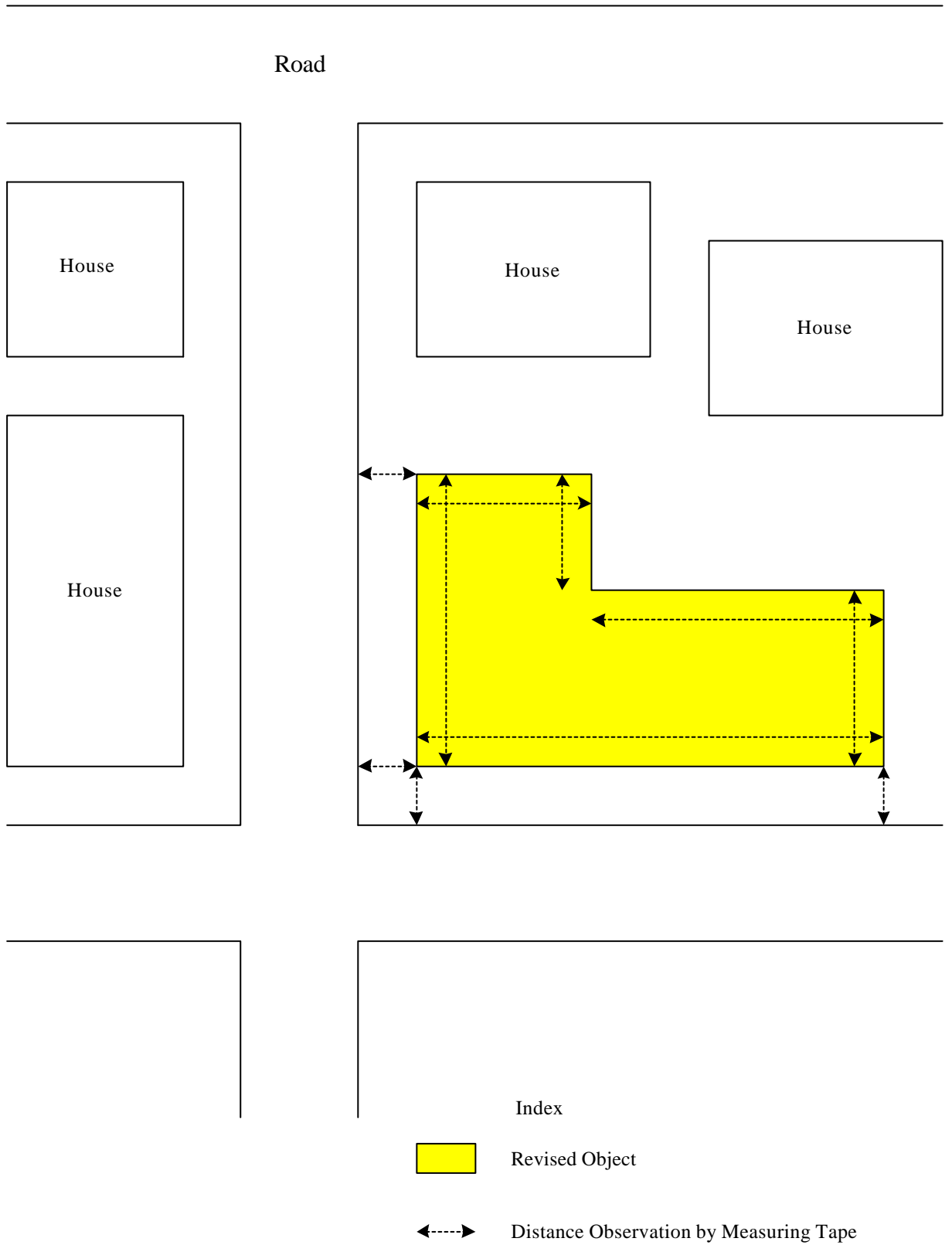
(b) Distance measurement

Various distances required to determine the distance from the selected point to the object to be revised on the topographic map, and the shape of the object are measured by a measuring tape.

(c) Preparation of revision original

Based on the measured distances, the planimetric features to be revised are depicted on the 1:2,000 scale topographic map to prepare the revision original.

Figure 1.4.4 "Measuring Tape Method"



5. Revision of Contours (Creation of Revision Originals)

5.1 Revised Items of Contours

Revision of contours is to revise the elevations of an area the terrain of which has been changed due to construction and other works. To revise the contour lines using the ground survey method, it is necessary to set a number of observation points in the area part to be revised and determine their elevation values and horizontal positions.

In general, the revision of contours can use the total station method, the mesh survey method or the plane table survey method. In the revision of contours by the plane table survey method, the survey experts are required for technical knowledge on the plane table survey. This method could not be recommended considering the conditions of survey experts in East Timor at present.

The differences between the total station method and the mesh survey method lie only in the equipment to be used and the way of distributing the observation points. The total station method can practically be performed if it is usable.

5.2 Revision of Contours by Total Station Method

In revision of contour lines by the total station method, observation points are fixed at a given density within the area part where the contour lines are to be revised. Then, the elevation values and horizontal coordinates of the points are measured and determined by the total station method in order to acquire necessary data for revision of contours. The revision of contours by the total station method is made in the procedures described below. The conceptual diagram of contour line revision using the total station method is shown in Figure 1.5.1 “Contour Line Revision by Total Station Method”.

(a) Selection of supplementary control point and nailing

If there is no existing control point in the necessary area part where the contour lines are to be revised, a point requiring a supplementary control point is selected considering the conditions of the terrain and planimetric features and a survey nail is laid at the point.

(b) Traversing survey and leveling

A supplementary control point is fixed by traversing survey and leveling using an existing control point as a given point in the area where the contour lines are to be revised and the horizontal coordinates and elevation value of the supplementary control point is calculated and determined.

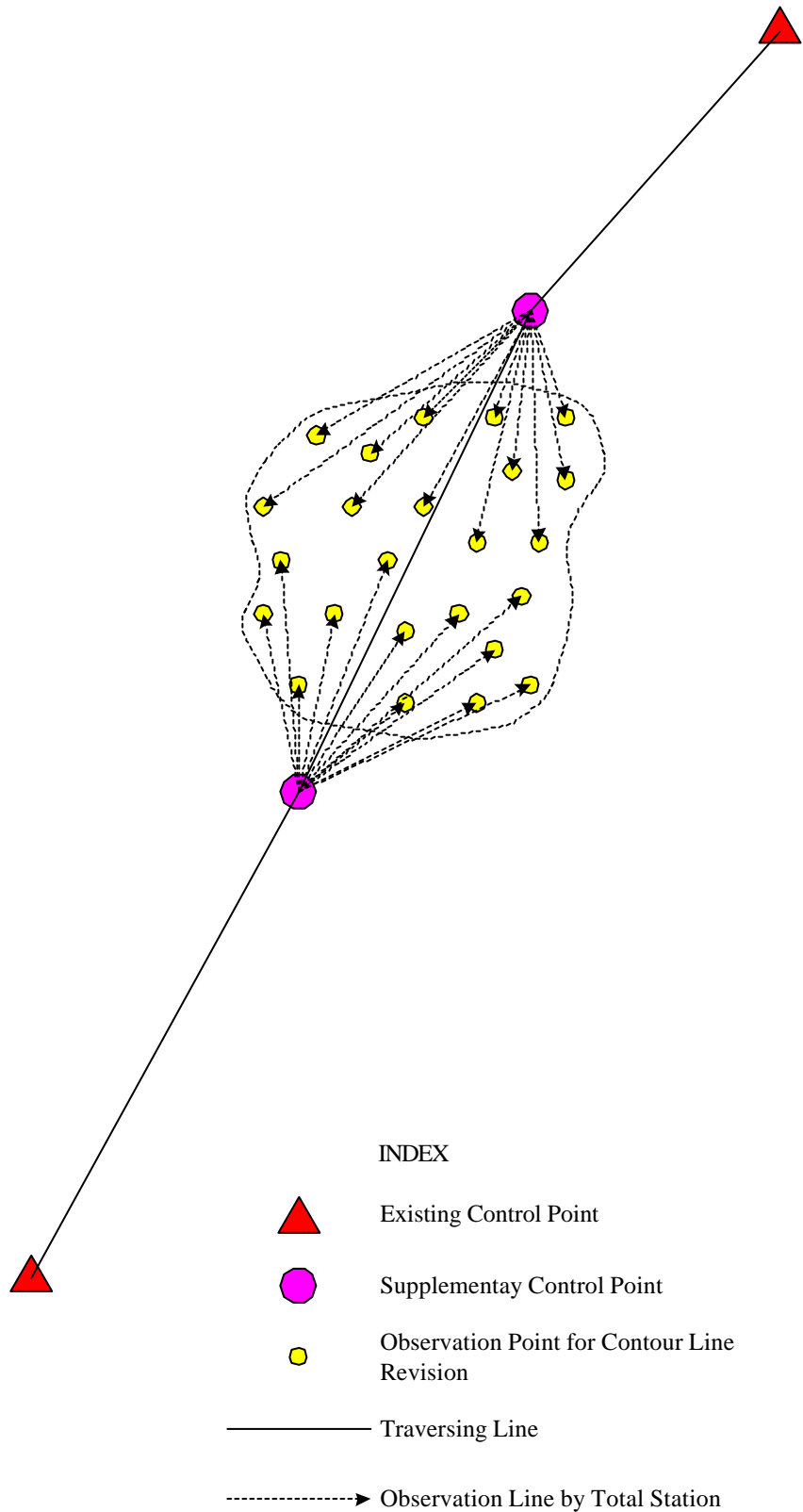
(c) Measurement of observation points

A total station is installed at a fixed supplementary control point and the azimuth is determined using another supplementary control point. Then, a mirror is installed at a point (observation point) necessary for revision of a contour line to determine the elevation value and coordinates of the point.

(d) Preparation of revision original

The observation points measured by the total station method are deployed referring to their elevation values and coordinates. Based on the elevation values of the deployed observation points, a new contour line is drawn to prepare the revision original.

Figure 1.5.1 "Contour Line Revision By Total Station Method



6. Revision of Digital Data

6.1 Revised Items of Digital Data

The prepared revision original map is converted into digital data before the existing digital topographic map is revised. In revision of the digital topographic map, the following two processes are carried out:

(a) Deletion of existing digital data

The unnecessary digital data for the area where partial revision is made is deleted.

(b) Input of digital data

The revision original map prepared by the ground survey is added to the existing digital topographic mapping data.

In general, the revision original map data is digitized. The revision of digital data of the topographic map can be performed in the following three methods:

(a) Digital data revision by digitizer

(b) Digital data revision on display window

(c) Revision by scanner

The scanner used for revision of topographic maps should be of A-0 or A-1 size and it is expensive. As this type of scanner is not available in East Timor at present, the digital data revision using the scanner is not realistic.

6.2 Digital Data Revision by Digitizer

The method of revising digital mapping data by the use of a digitizer is using a digitizer to create an original revised map and inputting the digitized map data into the computer. The concept of revising the digital data by a digitizer is shown in Figure 1.6.1 “Digital Data Revision by Digitizer”.

(a) Attaching revised original map to digitizer and measuring the coordinate values

An original revised map sheet with revised items is attached to a digitizer board. Then, the coordinate value of the same point on the original revised map sheet and that on the digital map are entered into the computer to manage the tablet or the digital map by keying in those from the keyboard.

(b) Calculations of coordinate conversion parameters and unification of coordinate systems

The coordinate conversion parameters are calculated to revise the digital map from the coordinate values obtained and to unify the coordinate systems. In calculation of coordinate conversion parameters, it is necessary to note that three points, which are not affected by secular changes, are needed within or around the revised map part.

For the coordinate conversion, two methods can be used: Helmert's transformation and Affin transformation. The former method is used for conversion in two-dimensional rotation, parallel move of the origin and scale adjustment. The latter is used for conversion to unify the conversions in enlargement, scaling and reversion with parallel move, for which Affin transformation is used in general.

(c) Deletion of digital data of revised part

The old data of the part revised shall be deleted so the new input data is not duplicated on the old data. The method of deleting the old data depends upon the software program used. Therefore, it is necessary to refer to the operation manual in practice.

(d) Digitizing revised part by digitizer

After deleting the old data of the revised part, the original revised map is digitized by using the digitizer and input the data of the revised part into the computer.

6.3 Digital Data Revision on Display Window

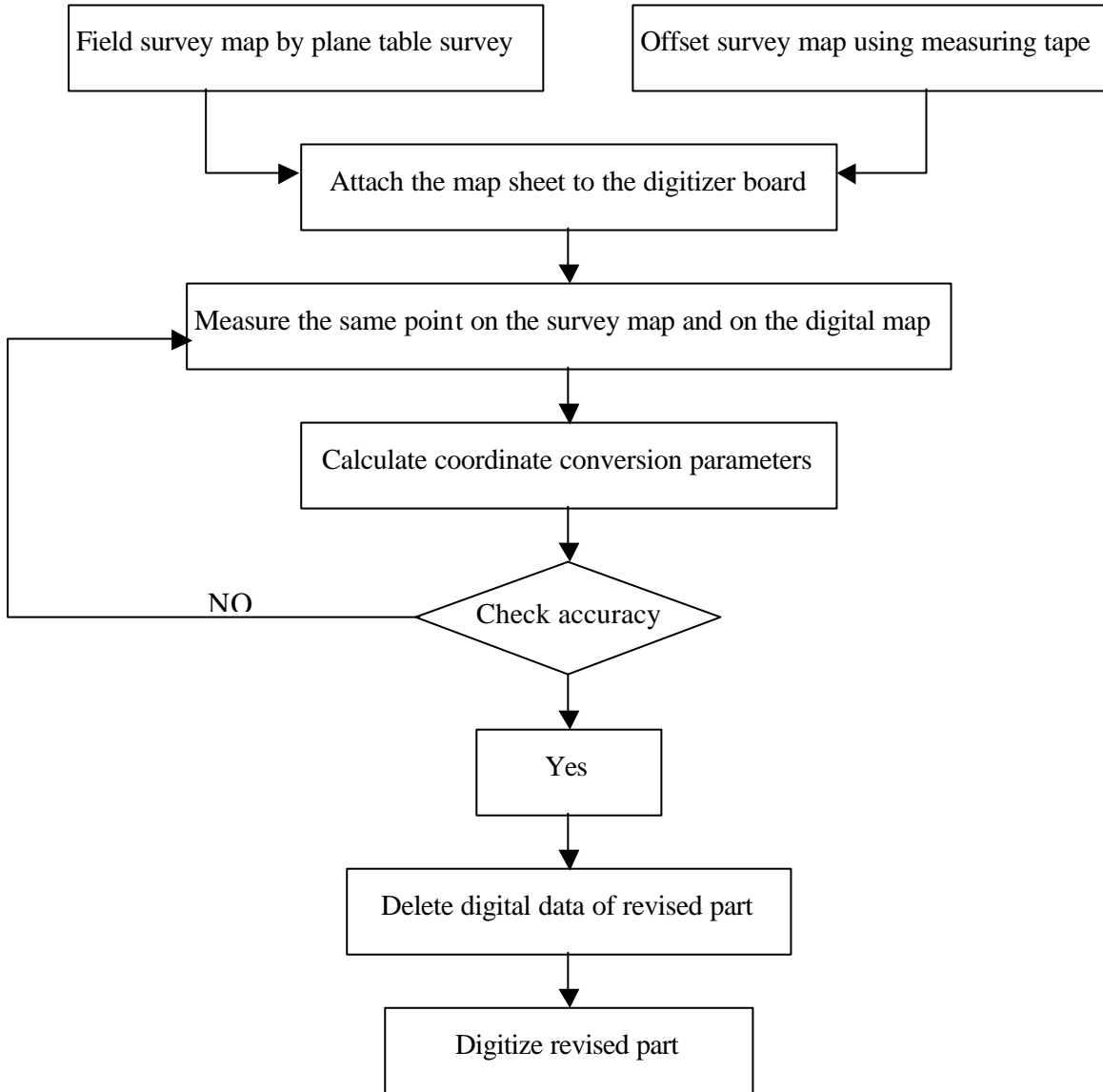
For revising the digital data on a display window, there are two methods. One is the method of reading the original revised map part as a digital image by the use of a scanner and revising the secular changes by overlaying the digital map part on the original map part to be revised. In the other method, no drawing is used, but the digital data is directly revised from the actual measured values of the revised points (mainly the values obtained by the offset survey). As there is no adequate scanner in East Timor, as described above, the latter method will be described below.

The method of revising the digital mapping data from the actual measured values is basically to enter the distance from a point with no secular change to the target point into the computer and to determine the position of the point to be revised. This means that the procedures as shown in Figure 1.3.4 "Measuring Tape Method" is reproduced by the computer.

To implement these operations, a group of editing commands should have been provided. This revision method would take much time. So it is desirable to use the method of revising the digital data by use of a digitizer.

If a software program without complete editing commands should be used, the distance on the display window could not be determined, and the planimetric features have to be entered on the window referring to their relative positions from the surrounding objects while watching the original revised map sheet. In this method, it is inevitable that the position accuracy is lower. However, this method has to be used if the available software program has limitations.

Figure 1.6.1 Digital Data Revision by Digitizer



PART 2 DATABASE OPERATION MANUAL

1. Introduction

ArcView GIS software is a computer software system that can store virtually any information found on a paper map. It is much more helpful to use stored digital map data than a traditional map.

ArcView can display a map on a computer display screen, and provide detailed information about various map features including buildings, roads and so forth. In addition, the computer can quickly search and analyse these map features and their attributes in a way that has been impossible in using paper maps.

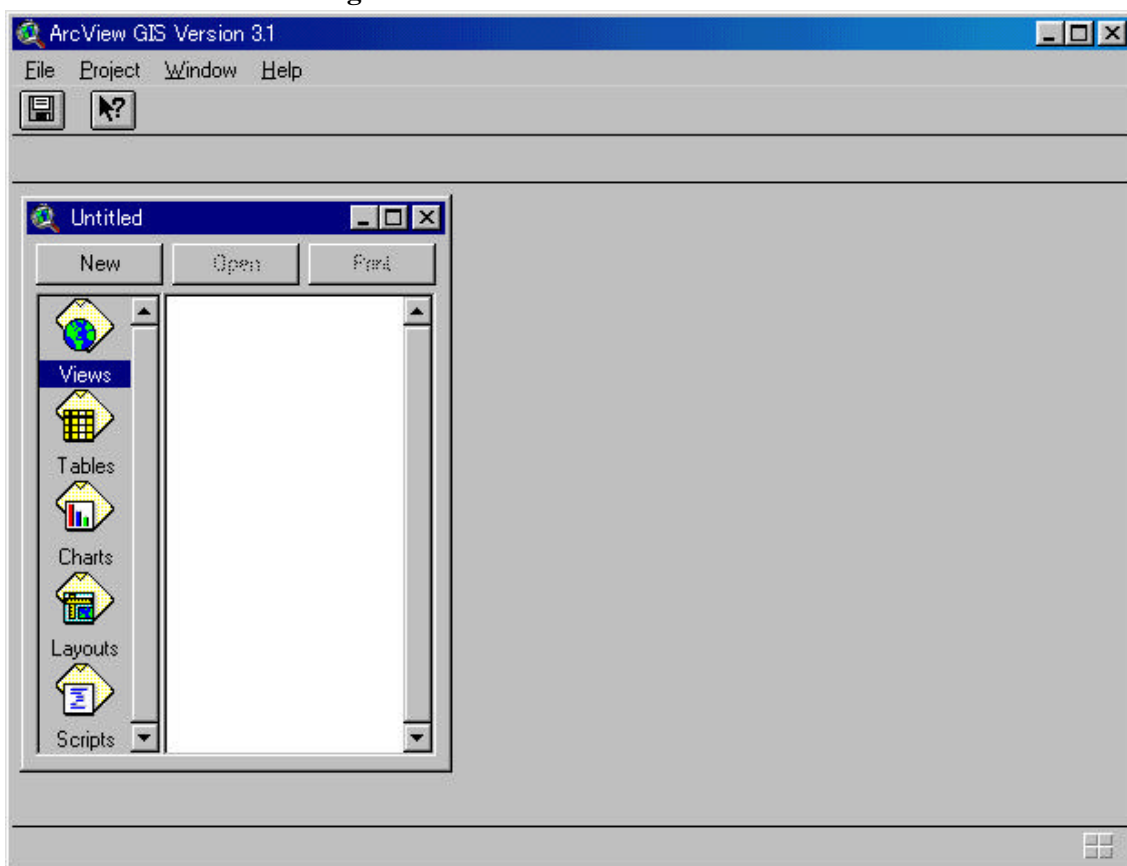
This manual offers detailed explanation of the mapping applications customised for the East Timor Project using ArcView software.

2. Start ArcView

Start ArcView. The main ArcView application window will open (Figure 2.2.1).

Two windows will appear. The larger one is entitled “ArcView GIS” and the smaller one is a project window. The title bar for this window displays the name of the current project, but in this case, it indicates “Untitled”.

Figure 2.2.1 “The Main ArcView Window”



Access to the file menu (Figure 2.2.2) and select Open Project to access to the Open Project dialog box. Then, select the “timordb.apr” project and click the OK button (Figure 2.2.3). Make sure that you are selecting “Directories C: Timor” on the right side of the window (Figure 2.2.3).

Wait a moment and the ArcView window will be enlarged, and the title of the project window will be changed from Untitled to Index Map.

Figure 2.2 “Menu Bar”

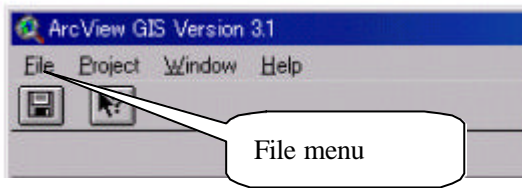
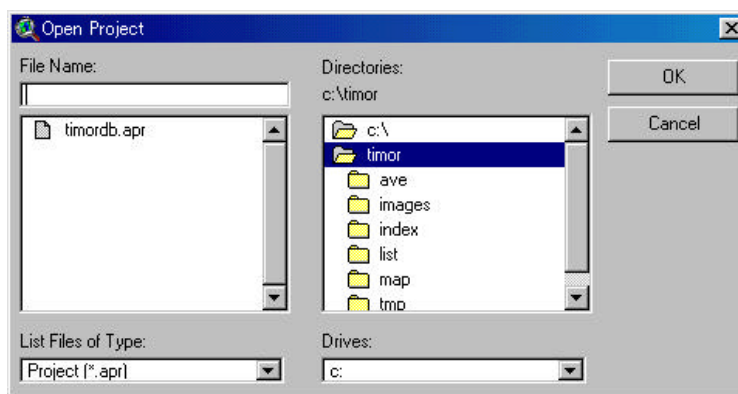
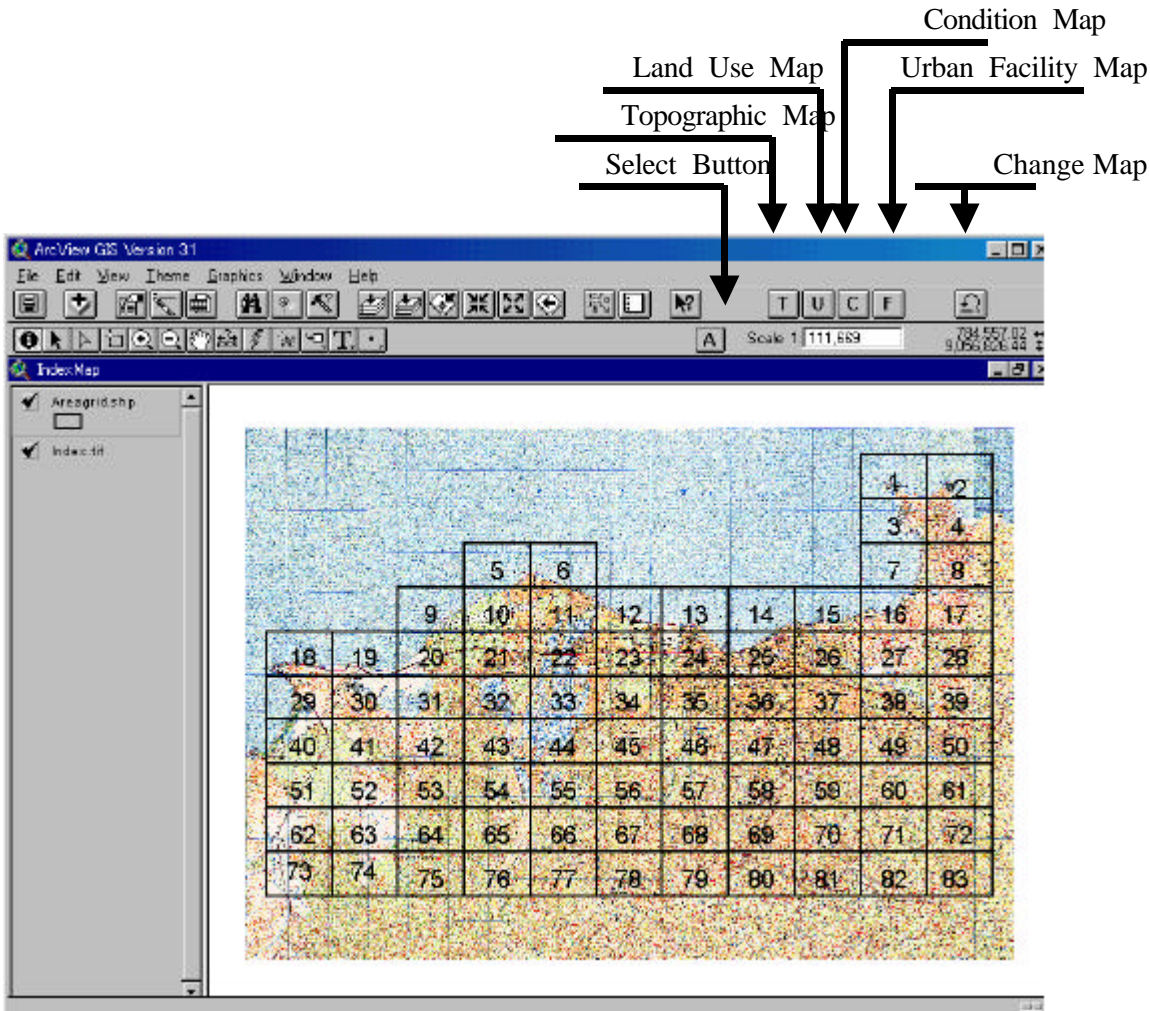


Figure 2.2.3 “Open Project Dialog Box”



The main program window will appear. On the right side of the menu bar, new buttons customised for this project are placed (Figure 2.2.4).

Figure 2.2.4 "Overview of the Index Map"



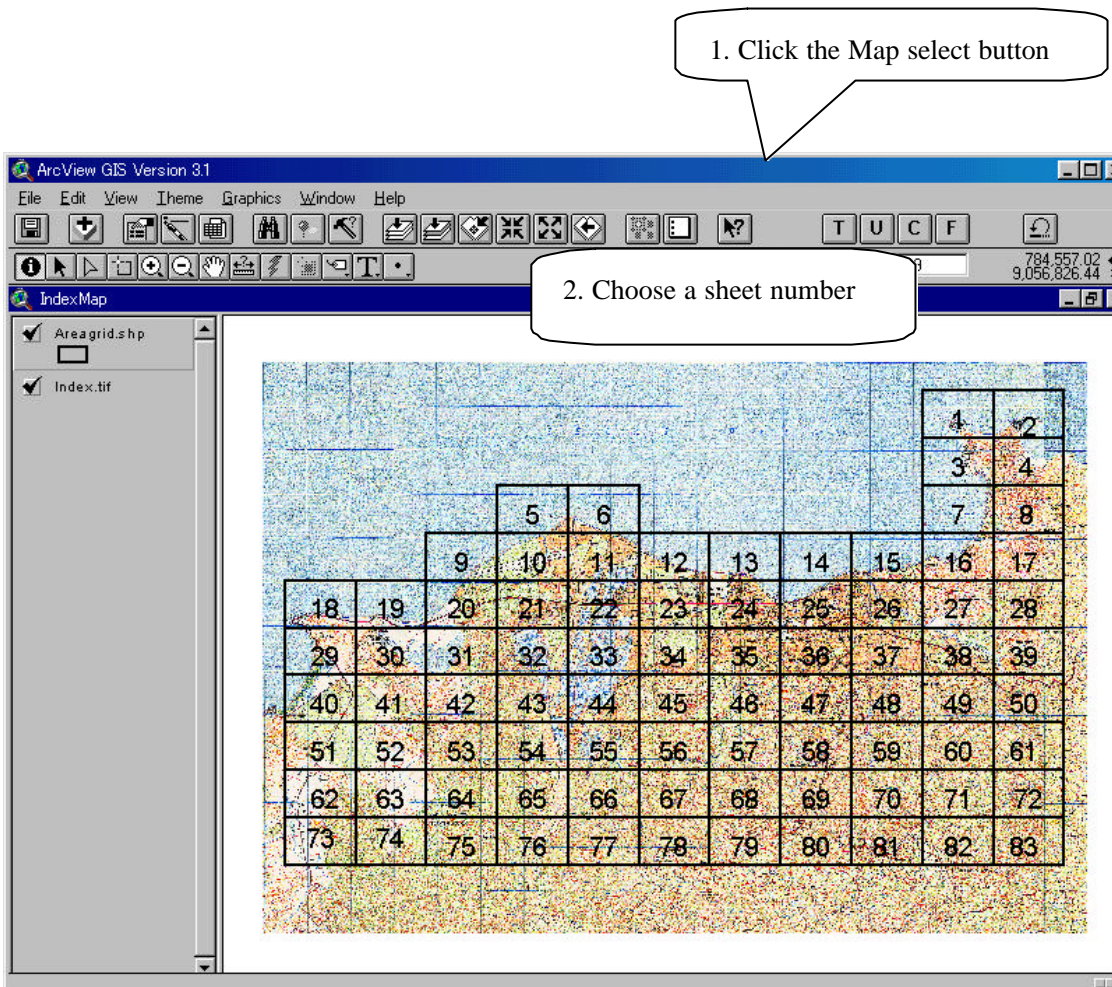
3. Definition for each buttons

3.1 Map select button



(1) Click the “Map Select” button and choose a sheet number (Figure 2.3.1).

Figure 2.3.1 “Index Map”



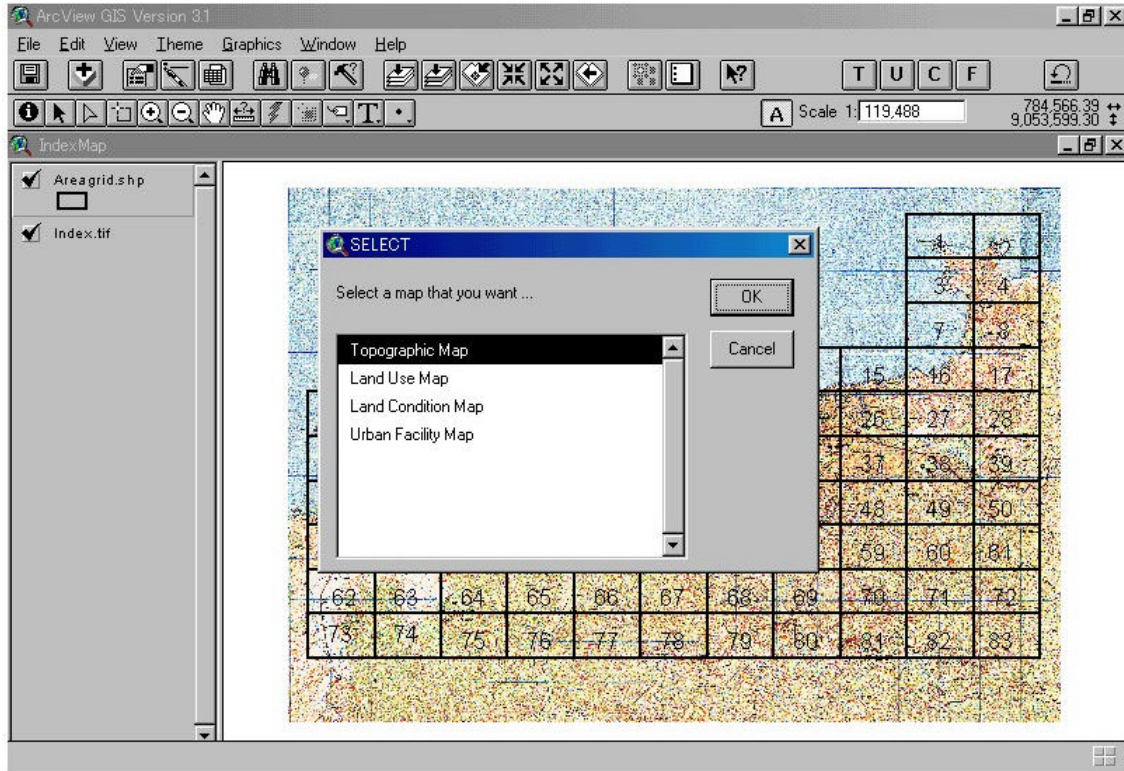
(2) Choose a map from the SELECT menu dialog box, and click the OK button (Figure 2.3.2).

You can choose a map from four different maps:

- Topographic Map
- Land Use Map
- Land Condition Map

- Urban Facility Map

Figure 2.3.2 “Select Map Dialog Box”

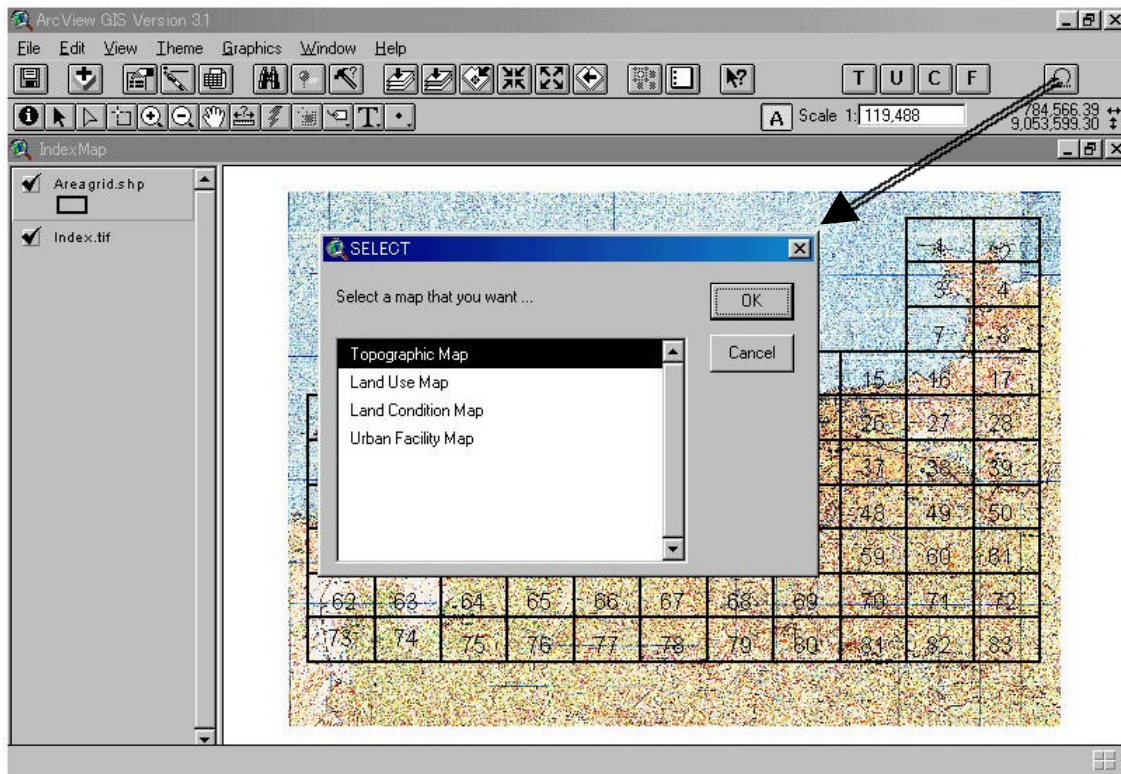


3.2 Return Icon



(1) Click the Return icon to display the selection dialog box (Figure 2.3.3).

Figure 2.3.3 “Select Dialog Box”



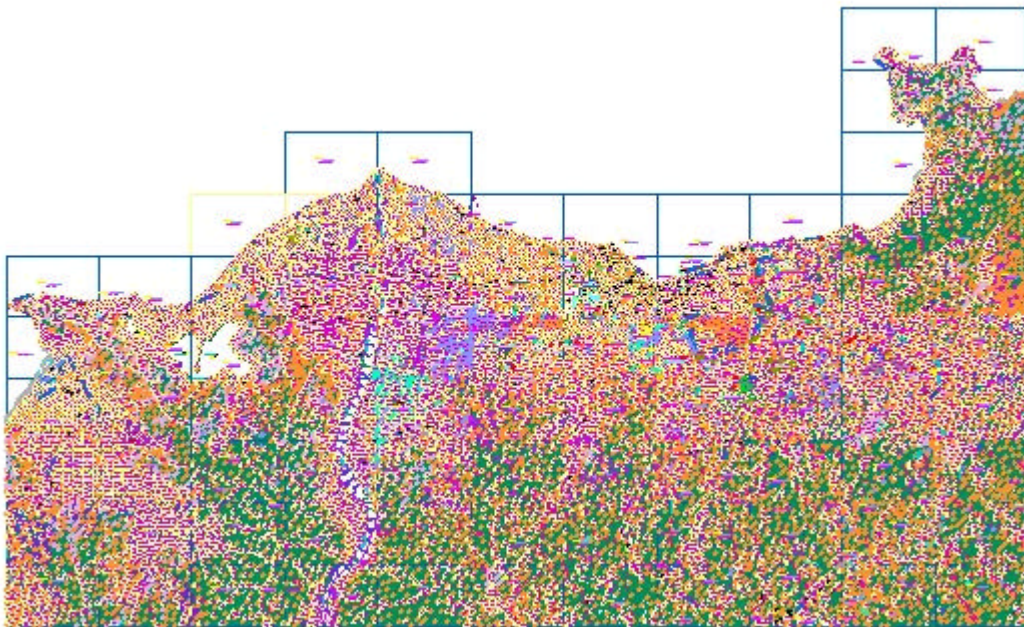
3.3 Area Image

(1) Topographic map



Click the Topographic Map button and the Topographic Map will appear so that you can view the entire area of topographic image (Figure 2.3.4).

Figure 2.3.4 “Topographic Map”

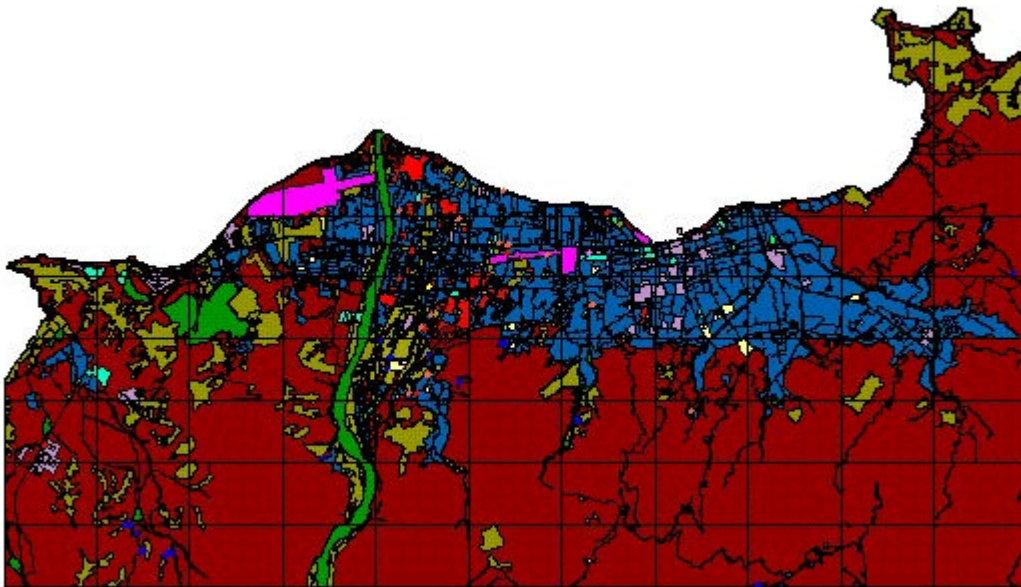


(2) Land use map



To view the entire area of land use image, click the Land Use Map button, and the Land Use Map will appear (Figure 2.3.5).

Figure 2.3.5 “Land Use Map”



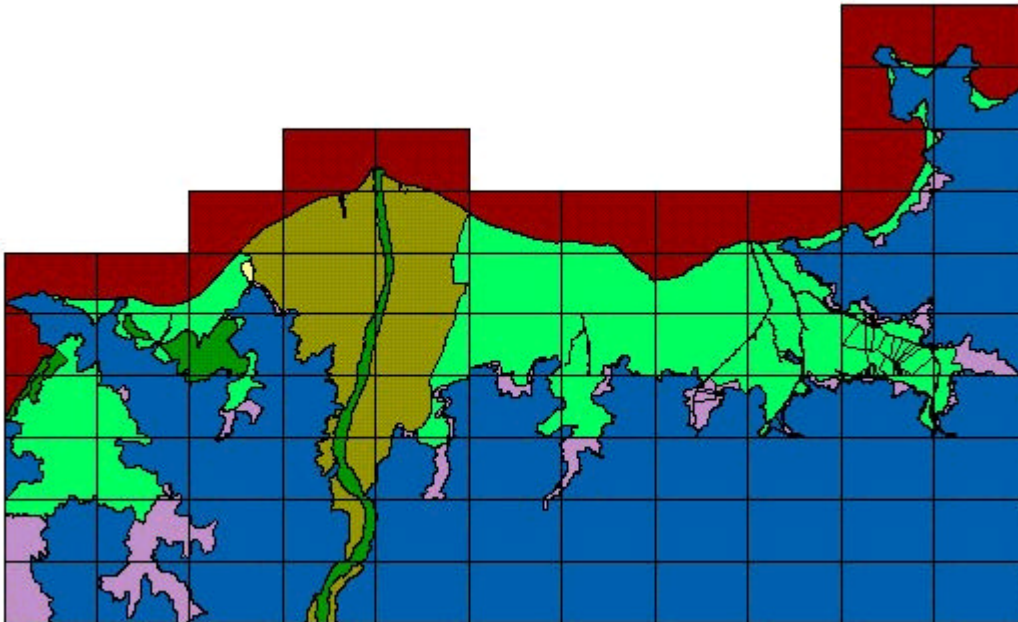
(3) Land condition map



To view the entire area of land condition image, click the Land Condition Map button.

The Land Condition Map will appear (Figure 2.3.6).

Figure 2.3.6 “Land Condition Map”



(4) Urban facility map



To view the entire area of urban facility image, click the Urban Facility Map button. The Urban Facility Map will appear (Figure 2.3.7).

Figure 2.3.7 “Urban Facility Map”



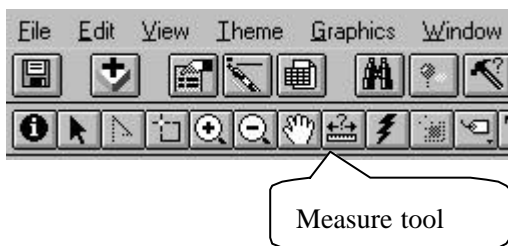
4. Measuring Distance and Areas

One of the advantages that the GIS has is that you can measure distances and areas so that the measurements are reported in real world units such as meters or kilometres.

4.1 Measuring distance

Click the Measure tool (the cursor changes to a ruler), and then click the start point that you want to measure from. Move the cursor to the end. Note that ArcView draws a line segment from one point to another in the view and reports the length of this line in the status bar (at the bottom of the ArcView window). Doubly click the mouse button to end the line. ArcView will report the measurement in km (Figure 2.4.1).

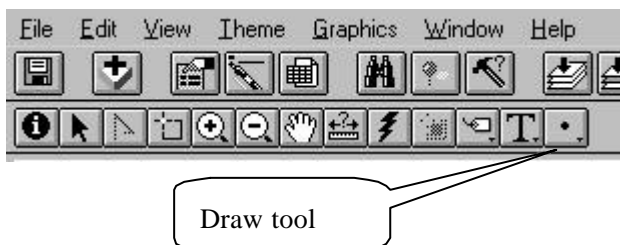
Figure 2.4.1 “Measure Tool”



4.2 Measuring area

Click the Draw tool to select the tool from the dropdown list of tools (Figure 2.4.2).

Figure 2.4.2 “Drawing Tool”



Click the mouse button and move the cursor to the next point. Continue these steps until the area that you need is covered. Doubly click the mouse button and release it. The amount will appear at

the bottom of the ArcView window.

For more information, refer to the ArcView manual.

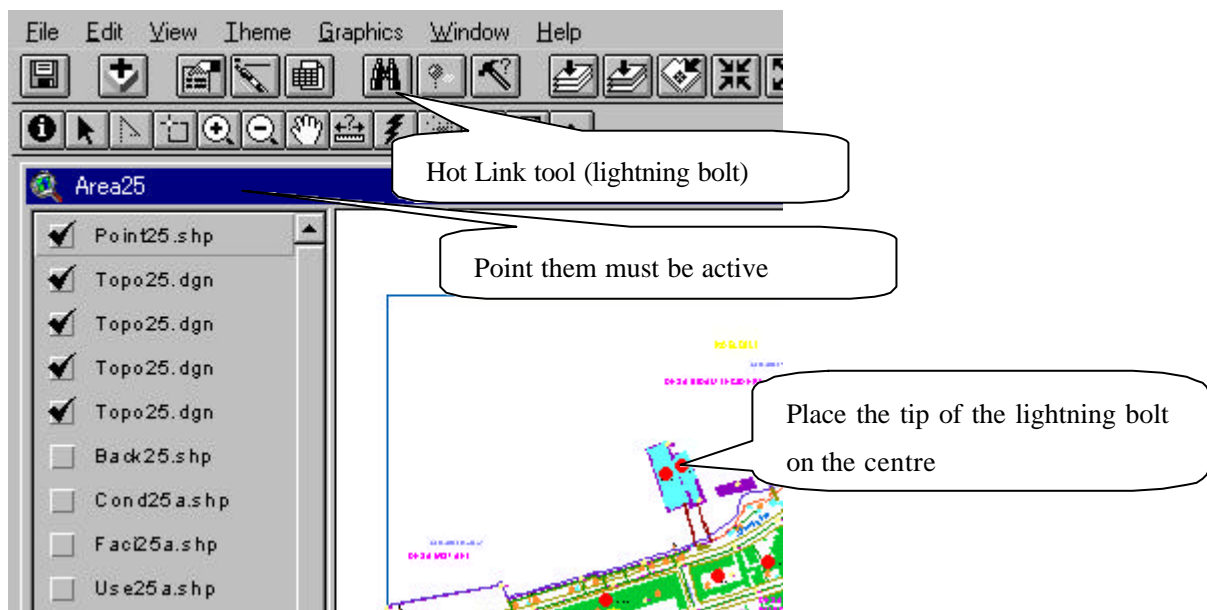
5. Hot Link

With the Arc View's hot link feature, you can link a feature on the view to a data source such as an image or text file. When you click any feature with the hot link tool, ArcView opens the linked data source.

Make sure the Point theme is active and click on the Hot Link tool. (This tool is enabled only when hot link properties have been set for the active theme.) The cursor changes to a lightning bolt as you move it over the view. Place the tip of the lightning bolt on the center of the view and click it. If the view doesn't open with the first click, move the tip of the lightning bolt closer to the center of the marker and try it again (Figure 2.5.1).

Close the view of the photograph and click on the other site. A view with a photo of the sheet will open.

Figure 2.5.1 “Hot Link”

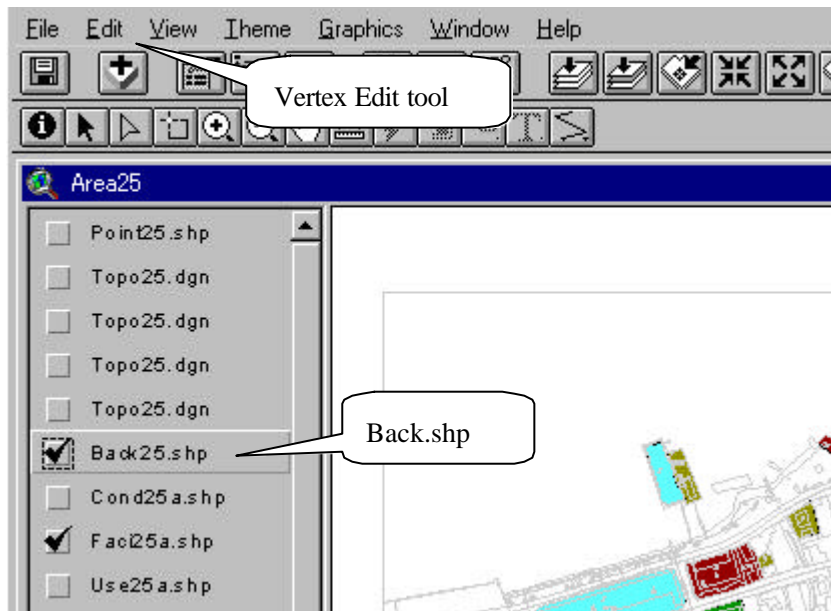


6. Editing the Data

You can create shapes from any existing features and draw new shapes using the Draw tool. You can also split and merge the shapes.

In order to edit the data, open Urban Facility Map and make Back.shp active. As the Back.shp theme is created from a shape file, the data can be edited (Figure 2.6.1). Using Vertex Edit tool, you can edit shapes by adding, deleting, and moving the shape data. (For more information, please refer to the ArcView Manual).

Figure 2.6.1 “Edits Map Data”



You can edit shapes with a mouse, but the standard version of ArcView also supports a digitizer (a tablet with a pointing device), which enables the shapes to be edited more precisely. To use the digitizer with ArcView, you need to load the ArcView Digitizer extension. For details on extensions, refer to the ArcView manual.

7. Installing the Database

Place the CD-R disc in the disc holder, and insert it into the CD-ROM drive. Setup can automatically be done and the database will automatically be installed in "c:\Timor" folder. To use this database, run the ArcView program and open the "timordb.apr" file.

8. System Requirements

- A multimedia PC, 500MHz or more
- 128MB or more RAM
- 400MB hard disk space
- CD-ROM drive
- 15-inch monitor

9. Application for Cadaster Database

It is expected to apply the products of this Study to the cadaster database, the working procedure is as shown in Table 2.9.1 “Application for Cadaster Database”. The detailed working procedures are as follows:

(a) Survey of Owned Land Boundary

After the boundary lines of land-ownership is confirmed at the site, the length of each boundary side line of the land and the length of each diagonal line will be measured using a measuring tape and/or total station. The position of each corner point of the boundary lines will be measured on a 1:1,000 scale topographic map.

The method of surveying the owned land boundary is described in Section 4.3 Method Using Total Station and in Section 4.5 Method Using Measuring Tape in PART 1.

(b) Entry of Owned Land Boundary in 1:1,000 Scale Topographic Map

The owned land boundary lines will be entered in the 1:1,000 scale topographic map (paper output map) based on the results of field survey to prepare the base map.

(c) Creation of Cadaster Database

The items to be included in the cadaster database file will be arranged and the data file format will be determined.

(d) Collection of Land-ownership Data

Based on the determined data file format, the data including the names and addresses of landowners, the areas of land and other necessary data will be collected from the existing materials and in field survey. The results will be arranged and entered in the data file.

(e) Determination of Cadaster Numbers

Based on the collected data of the above items, the cadaster number of the land lot of each landowner will be determined.

(f) Entry of Cadaster Numbers in 1:1,000 Scale Map

The determined cadaster number of the land lot of each landowner will be entered in the 1:1,000 scale topographic map to create a base map.

(g) Entry of Owned Land Boundary and Cadaster Code in Digital Topographic Map

Based on the base map created in the preceding item 9.6, the owned land boundary and the cadaster number of each land lot will be entered in the digital topographic map. The method of entry of those data is described in Section 6. Editing the Data in PART 2.

(h) Digitization of Cadaster Data File

The created cadaster data file is edited using the programs such as Excel. Should any ground photos be attached to the file, the photo images taken by a digital camera will be entered, or the photos will be entered by a scanner.

(i) Preparing of Listing Tables

Based on the created cadaster data file, a listing table will be prepared using the program such as Excel.

(j) Data Link

The 1:1,000 scale digital topographic maps data containing the owned land boundary lines and cadaster numbers, the cadaster data file and the listing table will be linked with each another using the Hot Link function of Arc View. For the method of linking the data by the Hot Link, refer to Section 5. Hot Link in PART 2 or Arc View Operation Manual.

Figure 2.9.1 "Application for Cadaster Database "

