Chapter 11 Production of Printing Film, PS Plate and CD-ROM

Buildings and Roads on Digital Map

As a reconnaissance survey in addition to the mapping of digital map in the map production, it is possible that it copes with of the measurement of building height with stores, preparations of the building database, the three dimensional measurement of the road network and the ground elevation of a pilot survey by the aerial photo and photometry surveying technology.

The below figure indicated the buildings displayed by blue color and roads with doubled lines displayed by the red color in the data acquisition items of digital map with a scale of 1 to 5,000.

The building data is expected to use as a base map for population survey in the census, urban planning, facility management of utilities including water supply, electricity, gas, telephone and etc., basic information to manage residential people and others.

Road data becomes an important data infrastructure for traffic planning, urban planning, disaster management planning. In the master plan of solid waste management, the evaluation for road accessibility of the garbage collection vehicle on road data is one of important items in the garbage collection planning.

Chapter 11 Production of Printing Film, PS Plate and CD-ROM

Using the digital topographic map data, printing films, PS plate and CD-Rom for digital data were produced as the final products of the Study.

Scribing method had been applied for topographic map printing for a long time. However, with the development of computer technology, since the 1990's, printing film has been produced by digital method. So, the digital method to make printing film was applied for the topographic map printing instead of the conventional method to produce original printing sheet (scribing sheet).

The following three methods are generally used for map printing at present.

1) Relief printing
2) Intaglio printing
3) Surface printing

The offset printing commonly used for topographic map printing is a kind of the surface printings. The method of surface printing is made by using the difference of surface of plate such as oleophilic and hydrophilic parts. Today, the offset printing is widely used for color printing by which high printing quality can be obtained.

11.1 Production of Printing Film

Before producing PS plate, it is necessary to make negative films of each color from the digital topographic map data. This negative film is called as "Printing film". In general, the printing film is produced using the special printer for film printing color by color. In the Study, 4 printing films for each topographic map (printing film for black, red, green and blue) were produced in Japan.

11.2 Production of PS Plate

PS plate (Pre-sensitized Aluminum Plate) is the aluminum plate with sensitive materials on its surface and widely used for printing plate for the offset printing. The sensitive material on the surface of PS Plate becomes hard by ultra violet ray used for the development processing and this part becomes oleophilic and prevents water infiltrate into this part.

On the other hand, the part without line or drawing becomes hydrophilic and the printing ink will not be pasted on this part even though the PS plate is flat. For this characteristic, PS Plate is widely used for the offset printing.

Before starting the production of PS Plate, SOB and Study Team discussed the specifications of PS Plate. The

outline of specifications of PS Plate production was as follows:

1)	Printing machine:	Lithrone－40（2 colors printing machine）
2)	Available printing area:	720mm×1,020mm
2)	Size of PS Plate:	800mm×1,030mm
3)	Thickness of PS Plate:	0.30mm
4)	Color:	4 colors
5)	Relation of printing film and PS Plate:	Shown in Figure 11.2.1 “Relation between Printing Film and PS Plate”.
6)	Punch hole of PS Plate:	SOB will make punch holes.

At the end of the 2nd year’s Study, Printing films and PS plate for one sheet of 1:5,000 scale digital topographic maps were prepared and the test print was executed using the printing machine of SOB in Bangladesh.

By the end of the 2nd year’s Study, PS plates for all 1:5,000 scale topographic map sheets were produced based on the above-mentioned specifications for the PS Plate.

11.3 Production of CD-ROM

Following digital data are stored in CD-ROM as a part of the final products of the Study:

1)	Digital topographic map data	2 sets
2)	GIS Basic data	100 sets
3)	Digital aerial photo image	1 set
4)	1:50,000 scale digital orthophoto image	1 set
5)	1:5,000 scale digital orthophoto image	1 set

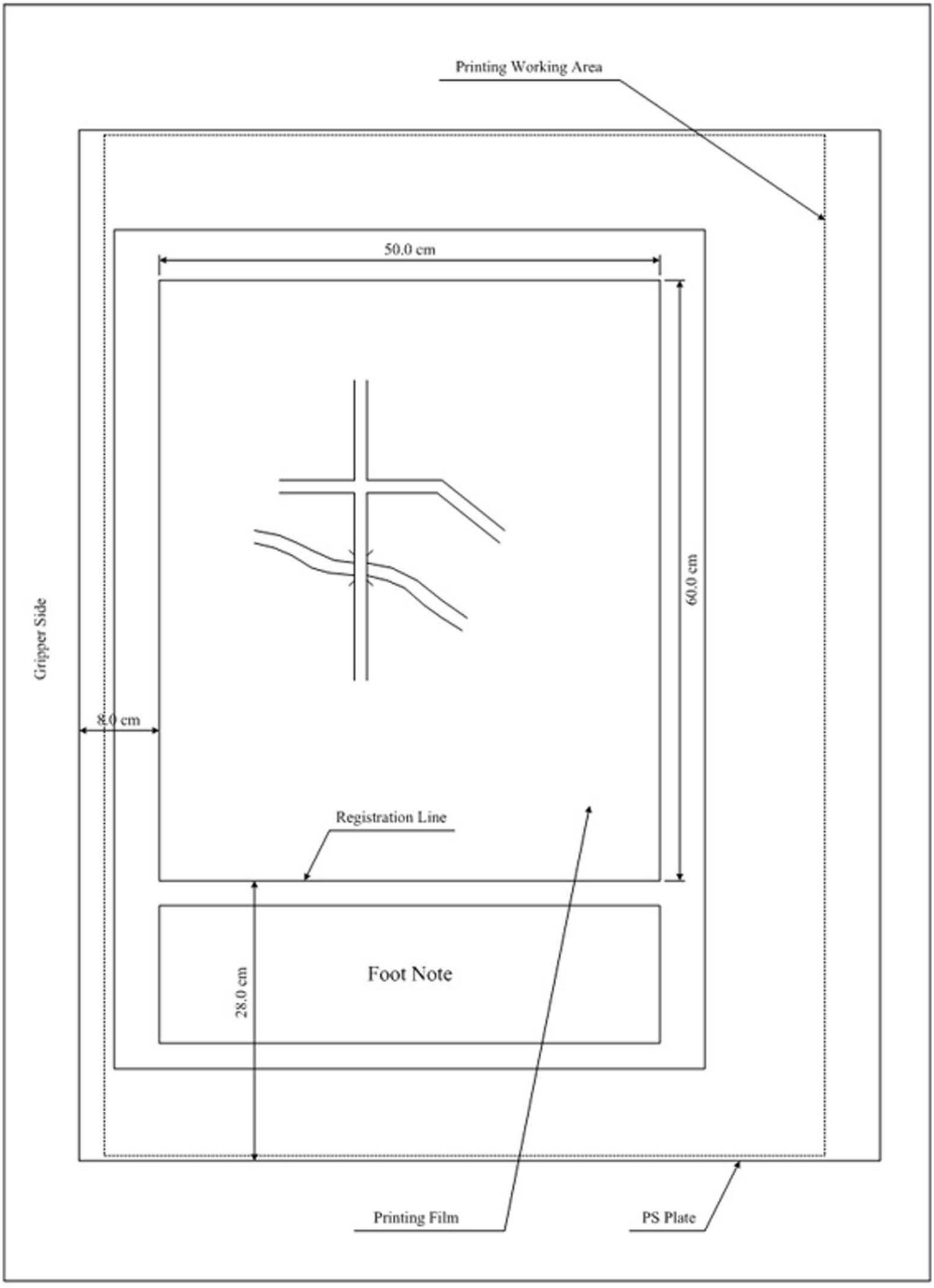
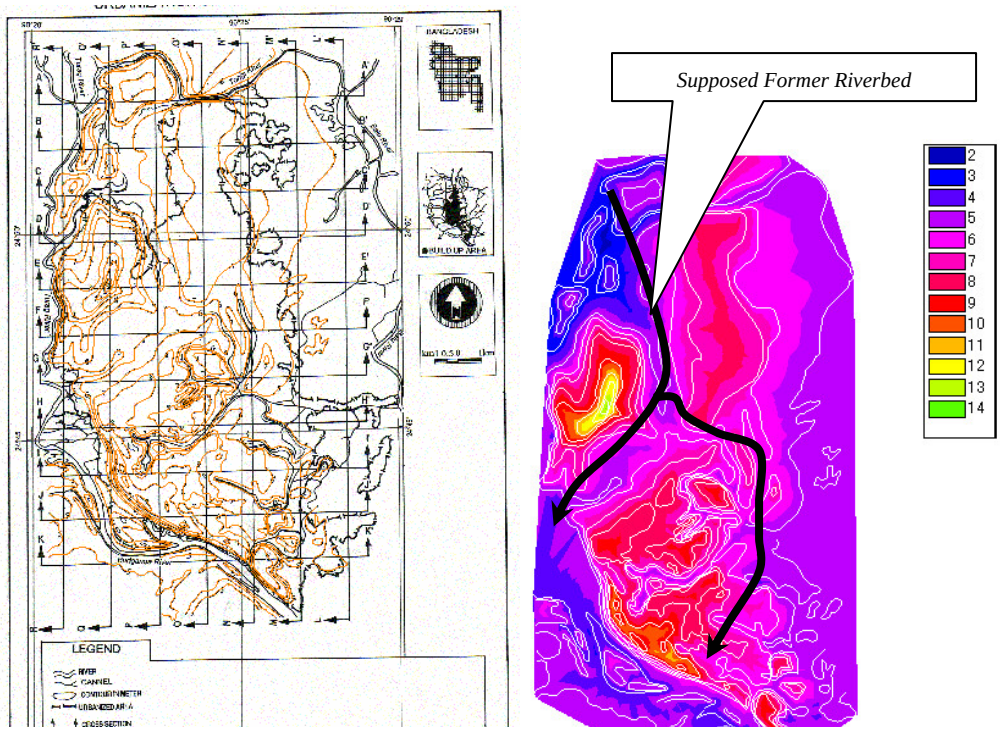


Figure 11.2.1 "Relation between Printing Film and PS Plate"

Chapter 12 Equipment Supply and Procurement of Printing Materials

Estimation of Topography and Former Riverbed in the Greater Dhaka City Area



Growth of the Dhaka city area is closely relating to the flood control and the water utilization, it is expected to develop database development of Geographic Information which is conducible for actual analysis and the future prediction by using flood condition, natural condition, social condition, regional development and so on.

Contour in the topographic map can be estimated about the grand elevation and relief so that it can expect to use and apply for data about relations among flooding and topographic surface, history of flooding and its control, estimation of the former riverbed and etc.

The Dhaka city area stands on the confluence points of rivers from Padma river, Jamuna river, Meghna river, the land form has been formed by the backwash of flood water caused by river inundation and the change of river bed. Stream gradient is extremely gentle and topography is formed by microscopic topography, natural bank and the former river bed without less relief in the whole.

The left figure shows the contour distribution of microscopic topography in the study area. Elevation is displayed from 3 m to 10 m. The right figure shows the display that is converted to grid cell of elevation (DEM) from contour in the topographic map.

Chapter 12 Equipment Supply and Procurement of Printing Materials

The JICA Bangladesh Office executed procurement and supply of equipment necessary for technology transfer at the 2nd year's Study on October 2003. Also, the Study Team executed procurement of materials necessary for the printing of topographic maps by SOB in 3rd year's Study from November to December 2003.

12.1 Selection of Equipment Necessary for Technology Transfer

On the Study, technology transfer for production of the 1:5,000 scale digital topographic maps and GIS basic data to the counterparts of SOB were planned to execute at the later half of the 2nd year's Study. For this purpose, the Study Team selected necessary equipment and software, and the JICA Bangladesh Office executed the procurement of selected equipment and software.

The necessary equipment and software were selected by the following point of view.

1) The equipment presently possessed by SOB should be use effectively as much as possible. The selection of equipment and software and necessary number of equipment and software should be decided from the viewpoint of availability of the existing equipment and software owned by SOB.

2) The equipment should be compatible to the existing equipment and software presently owned by SOB.

3) The maintenance of equipment and software condition in Bangladesh should be considered.

Considering the purpose of technology transfer and above-mentioned items, the Study team finally selected the following equipment and software for technology transfer for the 1:5,000 scale digital topographic mapping and GIS basic data production.

1)	Digital plotting system (SocetSet)	1 set
2)	Digital compilation system (Microstation)	2 sets
3)	GIS system (ArcInfo)	1 ser
4)	UPS	4 sets

The details of equipment and software procured by the Study are shown in Table 12.1.1 "Equipment of Digital Mapping System", Table 12.1.2 "Equipment of Digital Compilation System" and Table 12.1.3 "Equipment of GIS System and UPS".

Table 12.1.1 "Equipment of Digital Mapping System"

Item No.	Description	Part #	Q'ty
Software (Socet set)			
1	Core win	Win-1000-L	1
2	Core UE Win	Win-1000-UE	1
3	Stereo Win	Win-1010-L	1
4	Stereo UE Win	Wn-1010-UE	1
5	Block Win	Win-1030-L	1
6	Block UE Win	Win-1030-UE	1
7	APM Win	Win-1040-L	1
8	APM UE Win	Win-1040-UE	1
9	ATE Win	Win-1050-L	1
10	ATE UE Win	Win-1050-UE	1
11	Terrain Win	Win-1060-L	1
12	Terrain UE Win	Win-1060-UE	1
13	3D Win	Win-1070-L	1
14	3D UE Win	Win-1070-UE	1
15	True Ortho Win	Win-1080-L	1
16	True Ortho UE Win	Win-1080-UE	1
17	Ortho Mosaic Win	Win-1090-L	1
18	Ortho Mosaic UE Win	Win-1090-UE	1
19	Image Map Win	Win-1110-L	1
20	Image Map UE Win	Win-1110-UE	1
21	SPOT Win	Win-1230-L	1
22	SPOT UE Win	Win-1230-UE	1
23	Dodger Win	Win-2010-L	1
24	Dodger UE Win	Win-2010-UE	1
Hardware			
25	Work station for digital photogrammetric system Note: Pentium 4 Processor at 2.80 GHz w/8000MHz front side bus/512K L2 Cache 1 GB Dual Channel DDR SDRAM at 400 MHz (2x512M) Dell Quietkey Keyboard 19 in (18.0 in viwable) M992 CRT Monitor Additional 19 in (18.0 in viewable) M992 CRT Monitor New 128 DDr ATIRADEON 9800 Graphic Card with TV-Out and DVI 36 GB Serial ATA Hard Drive (10000RPM) 3.5 in Floppy Drive Microsoft Windows XP Home Edition Dell 2-button Scroll Mouse Integrated intel PRO 10/100 Ethernet 56K PCI Data/Fax Modem 16 Max DVD-ROM Drive Sound Blaster- Audugy 2 sound card with DVD Audio		1
26	Stereograpic Z screen non-integrated	SEBLRSVWIP1	1
27	3S Mouse	SEBLRSVWIP1	1
28	PRO600 (includes the PRODPW and PROCART items)	SEBLRSVWIP1	1
Others			
29	Data editing software Microstation J/7.1		1
30	PATB-NT for aerial triangulation		1

Table 12.1.2 "Equipment of Digital Compilation System"

Item No.	Description	Q'ty
1	**Computer Worksation for Digital Editing System**	2
	CPU :Interl Pentium 4 Processor, 2.4GHz,512/533 Front Side Bus	
	Memory: 512Mb PC1066 ECC RDRAM (2RIMMS)	
	Keyboard: Entry Level Quietkey Keyboard,PS/2	
	Graphics Card: ATI,FIRE GL E1,64MB,2VGA or 1VDA and 1DVI,(Dual monitor capable)	
	2nd monitor: 17 inch Flat Panel Monitor (17 inch vis)	
	Hard Drive: 80GB ATA-100 IDE, 1 inch(7200 rpm)	
	2nd Hard Drive: 80GB ATA-100 IDE, 1 inch (7200rpm)	
	Floppy Drive Options: 3.5 inch 1.44MB Floppy Drive	
	CD-ROM/CR Writer: 20/48 x IDE CD-ROM and 48 x/24 x /48 x CD R-W	
	Mouse: Intellimouse PS/2 (2-button, W/scroll)	
	Mouse Pad: Mouse Pad	
	Security Software: Antivirus (1 user license)	
	Operating System : Windows 2000 Professional (SP3) with Media using NTFS	
	Hardware Supports: 3yr parts with Labor	
2	**Work/Office Productivity Software**	2
	Office XP Professional	
	Word,Excel, Access, PowerPoint, OutLook Express and Other Standard tools	
	Adobe ACROBAT 5.0	
3	**CAD Software for Photogrammetric Data Editing**	2
	MicroStation /J 7.1 version	
4	**Raster and Vector Editing Software**	2
	Adobe Illustrator V 10	
	Adobe Photoshop V 7.0	
	A number of standard plug-ins and sample data inclued in the CD-ROMs	

Table 12.1.3 "Equipment of GIS System and UPS"

Item No.	Description	Q'ty
1	**Computer Worksation for GIS System**	1
	Processor: Interl Pentium 4 2.4GHz	
	Memory: 512Mb PC1066 ECC RDRAM (2RIMMS)	
	Mother board: ATX full feaatures mother board	
	RAM: 512 MB, HDD: 80 GB EIDE/AT ATAPI	
	Video Memory: Graphics Controller Built-in On Moter Board. Diskette Drive: one, 3.5 inch 1.44MB	
	Multimedia (CD-ROM Drive, Audio and Speakers: Internal Speakers and 40 x/12 x / 48 x EIDE CD WR Drive, ATAPI	
	I/O Ports: 1-Parallel, 2 PS/2 and USB Ports	
	Casing: ATX Mid Tower Casiing,	
	Key Board: Enhanced 104 Keys, PSA/2 Based	
	Monitor: 21inch NEC Color Monitor	
	Mouse & Pad: PS/2 Mouse with Pad	
	Software of Operating System: Windows 2000 Professional with License and Manual CD Media	
	Hardware Supports: 3yr parts with Labor	
2	**GIS Software**	1
	Arc/Info ArcGIS Ver 8.3 (for NT)	
3	**Security Software**	1
	Symantec Antivirus Corp ED 8.0 (5 User license)	
4	**UPS for Workstation**	4
	Model and capacity:APC Smart-UPS XL,1000V (670W),230 V	
	Runtime:3.21 hours at 41% load	
	Output&Interface: Output 2, Interface port6 DB-9 RS-232	
	Key Features: Automatic Voltage Regulator, Built-in Smartlot,Hot Batteries, Load meter, Overload indicator, Scalable runtime,Softqare an Repleacebale Batteries	
	Additioonal:Co with software, Hot swap batteries, User Manual and standard accessories	

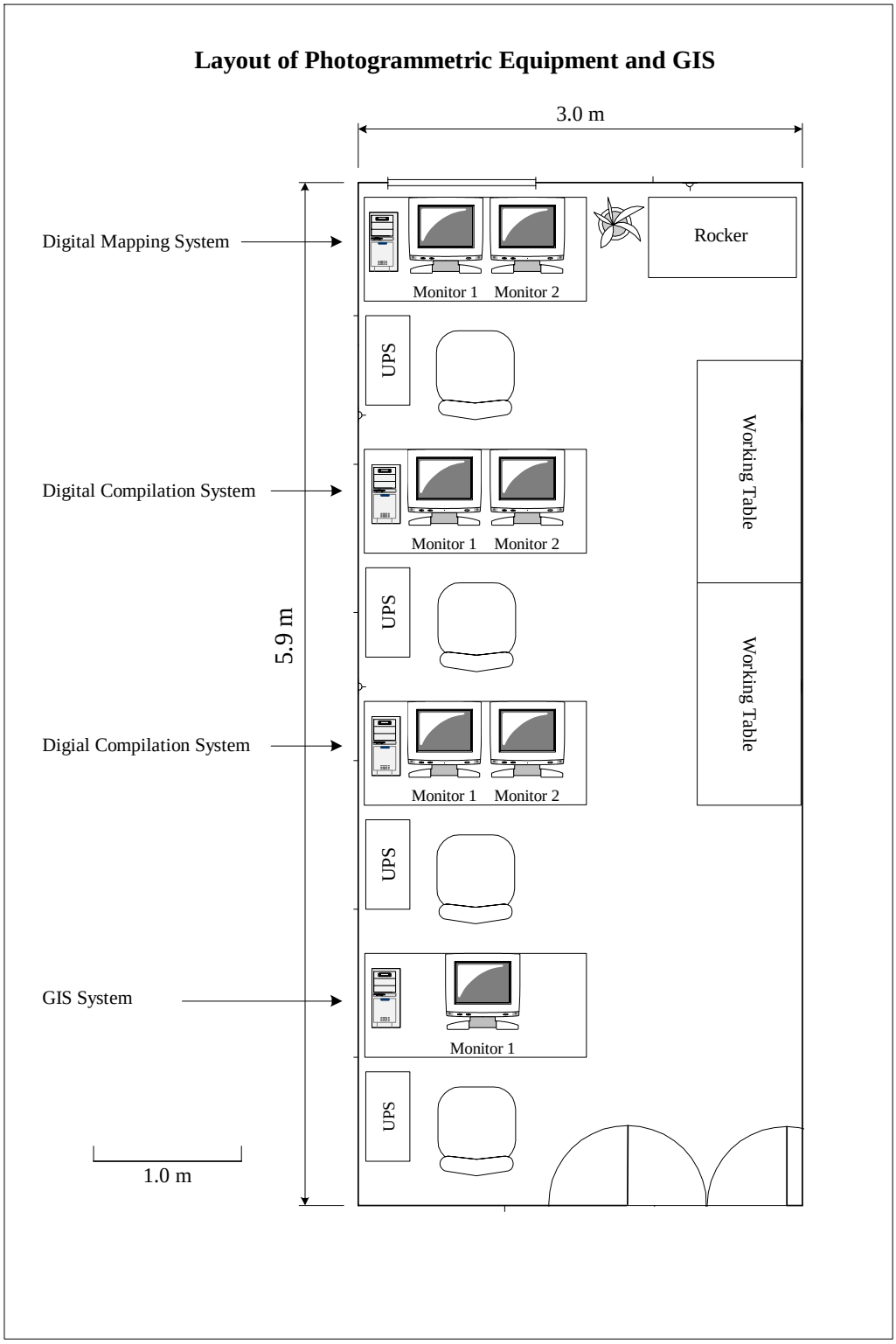


Figure 12.2.1 "Layout of Digital Mapping Room"

12.2 Installation of Equipment in SOB

SOB prepared one room of the digital mapping section for setting up the equipment necessary for technology transfer. This room already has air conditioner and enough numbers of plug outlets of electric supply to the equipment and sufficient space for installation of the equipment. SOB and the Study team agreed that the room would be used for installation of the equipment for the digital mapping system, digital compilation system and GIS system.

The Study team made a plan for layout of equipment considering the room space and location of plug outlets of electricity and size of equipments before installing the equipment in the room. The layout of equipment is shown in Figure 12.2.1 "Layout of Digital Mapping Room"

A local agent delivered the equipment and software necessary for the technology transfer to SOB in a period form the middle of November 2003 to the beginning of December 2003.

Photo 12.2.1 "Digital Mapping Room"

Photo 12.2.2 "Signboard of Digital Mapping Room"

Photo 12.2.3 "Digital Mapping Equipment"

12.3 Procurement of Printing Materials

In the Inception Report meeting, SOB requested to the Study team to provide the necessary materials for printing of the topographic maps which planned to be executed in 3rd year's Study by SOB.

The Study team was not in a position to answer for the request from SOB, because this was not mentioned in the Minute of Meeting of S/W agreed between SOB and JICA. Therefore, the Study team promised to

convey the request of SOB to the Head Office of JICA in Tokyo.

The Study team discussed with the Head Office of JICA in Tokyo concerning the request of SOB. The Head Office of JICA in Tokyo finally decided that necessary materials such as paper, ink, chemicals and so on for the printing of 1:5,000 scale topographic maps (total 122 topographic map sheets, 500 sheets each) would be procured by the Study Team in Bangladesh during the execution of 2nd year's Study, and supplied to SOB by the end of 2nd year's Study.

The volumes of printing materials were calculated as 700 sheets for each topographic map taking the necessary test printing and printing loss into consideration. The printing materials were procured at the end of November 2003 and delivered to SOB by the end of December 2003.

Photo 12.3.1 "Printing Materials (Part)"

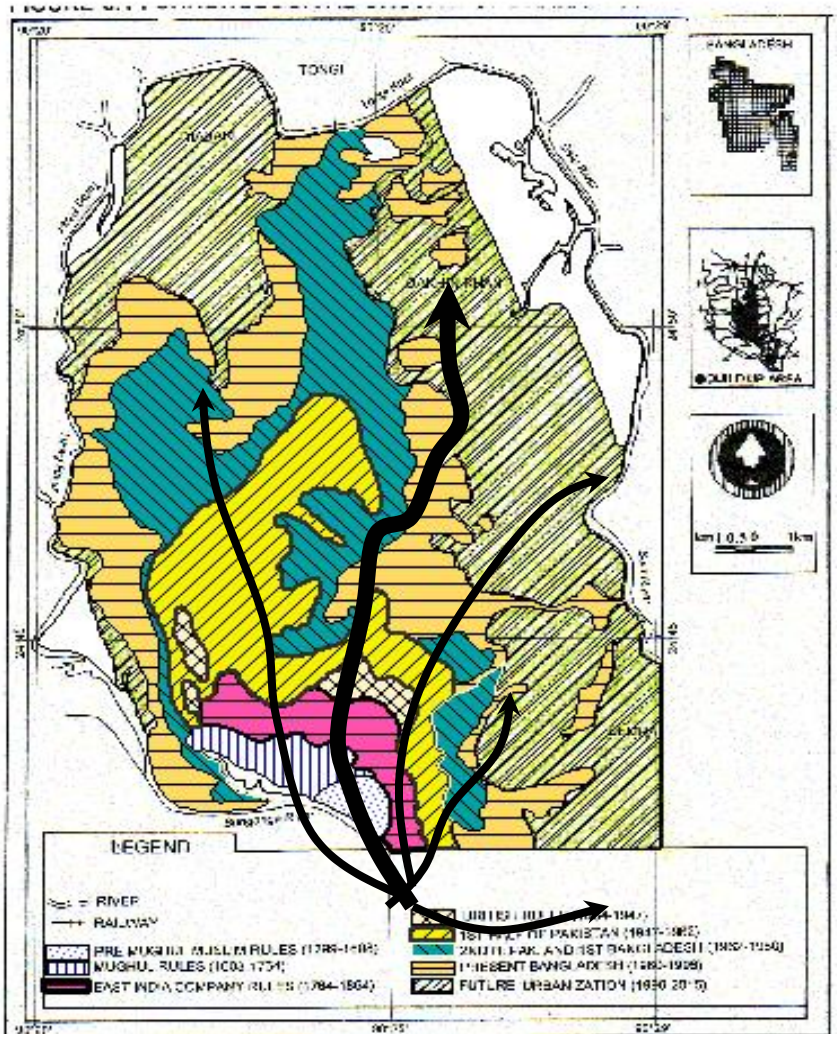
Photo 12.3.2 "Printing Materials (Paper)"

Photo 13.3.3 "Printing Materials (Part)"

Photo 13.3.4 "Printing Materials (Paper)"

Chapter 13 Technology Transfer

Transition of Urbanization in the Grater Dhaka City Area



The urbanization growth in the grater Dhaka had been spread from the OLD Dhaka located in the center at the southern part of the Dhaka to the north and to the surrounding area. The urban transition is the history of the urban planning and the figure shows a time series of results about master plan for urban planning and development in each sector in the Dhaka. In the regional planning it is important for the information infrastructure in fields relating to regional development and social infrastructure, it is also proposed to cooperate database among development agencies and to develop database of Geographic Information to support their planning.

Chapter 13 Technology Transfer

There are two methods in making digital topographic maps. One is paper map digitization and the other is digital photogrammetric mapping. SOB is using map digitization technique to make 1:50,000 scale digital topographic maps from 1:50,000 scale existing paper topographic maps.

However, SOB does not have any experience in the production of medium- to large-scale digital topographic maps by photogrammetric method.

In order to identify the exact items of technology which should be transferred to SOB for the production of 1:5,000 scale digital topographic maps, SOB's 1:50,000 scale map digitization process was compared with the process required for the photogrammetric production of medium to large scale digital topographic maps.

13.1 SOB's Digital Topographic Mapping Methods and the Technologies it Lack

SOB is in the process of digitizing existing 1:50,000 scale topographic maps using the digital compilation system introduced through the cooperation from France. Prior to the start of the transfer of technology, the Study team analyzed the digital topographic mapping method that SOB is using to digitize the topographic maps and compared that method with the digital topographic mapping method to be used in the Study, in order to identify technologies SOB needs to learn.

The flowchart of the digital topographic mapping procedure at present being implemented by SOB, prepared by the Study team from the results of a hearing from the counterparts, is shown in Figure 13.1.1 "Workflow of the Digitizing of 1:50,000 Scale Topographic Maps Implemented by SOB". The workflow of the 1:5,000 scale digital topographic mapping work in the Study is shown in Figure 13.1.2 "Workflow of 1:5,000 Scale Digital Topographic Mapping and GIS Basic Data Creation in the Study".

The results of the comparison of these workflows are as outlined below.

1) What SOB is doing is map digitizing, which is data acquisition in two dimensions, not three.

2) In map digitizing, the topographic maps as such are digitizing directly; basically, the operator do not need to sort the data to be acquired. In photogrammetric method, on the other hand, the data to be acquired has to be sorted and selected from photo images. For this reason the operator has to have knowledge of and experience in subjects such as cartography, topography and photogrammetry. Such expertise is not required of an operator engaged only in map digitizing.

3) Aerial triangulation is not being carried out.

With regard to topographic mapping by photogrammetric method, SOB has the following problems in terms

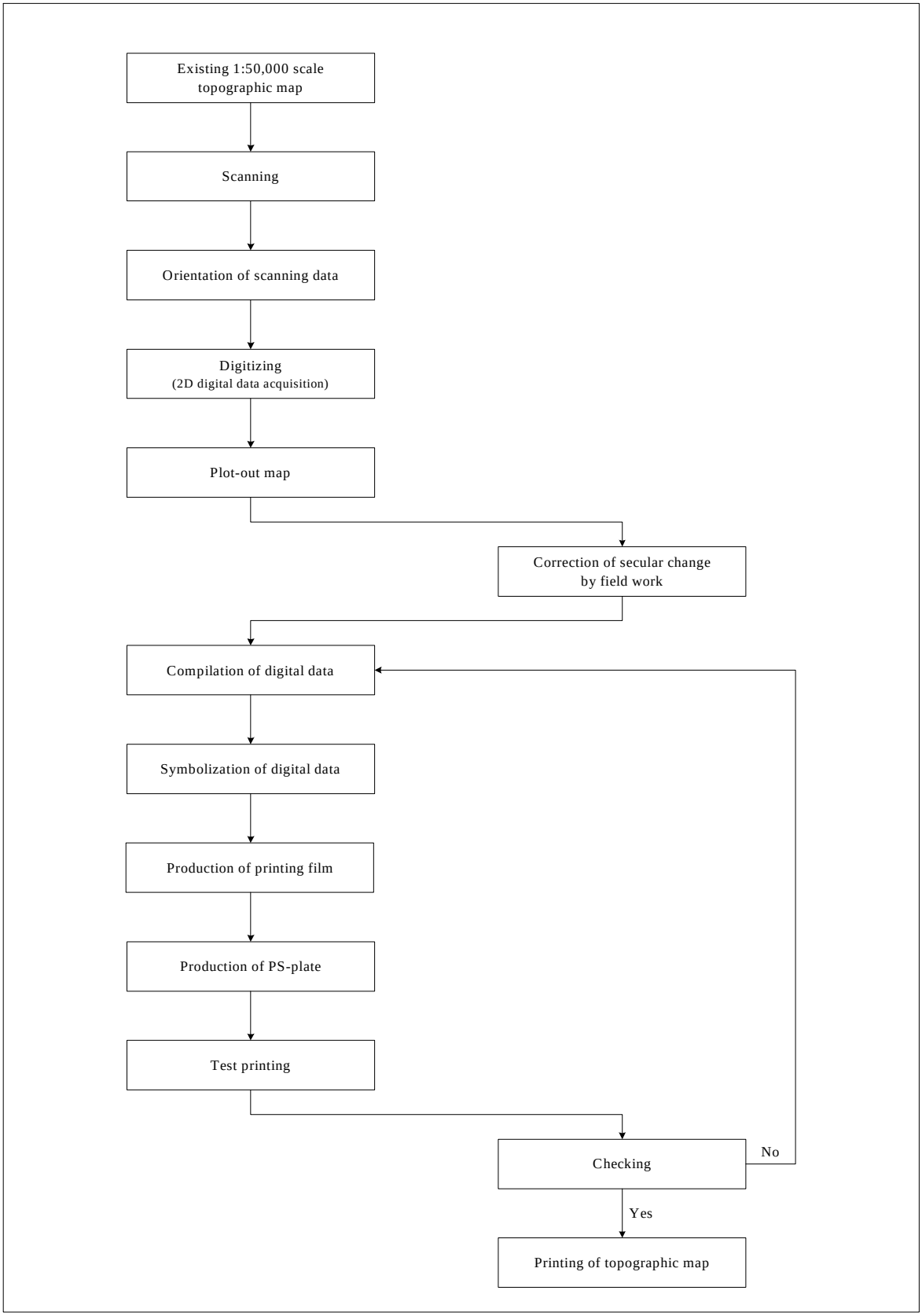


Figure 13.1.1 "Workflow of Digitizing of 1:50,000 Scale Topographic Maps Implemented by SOB

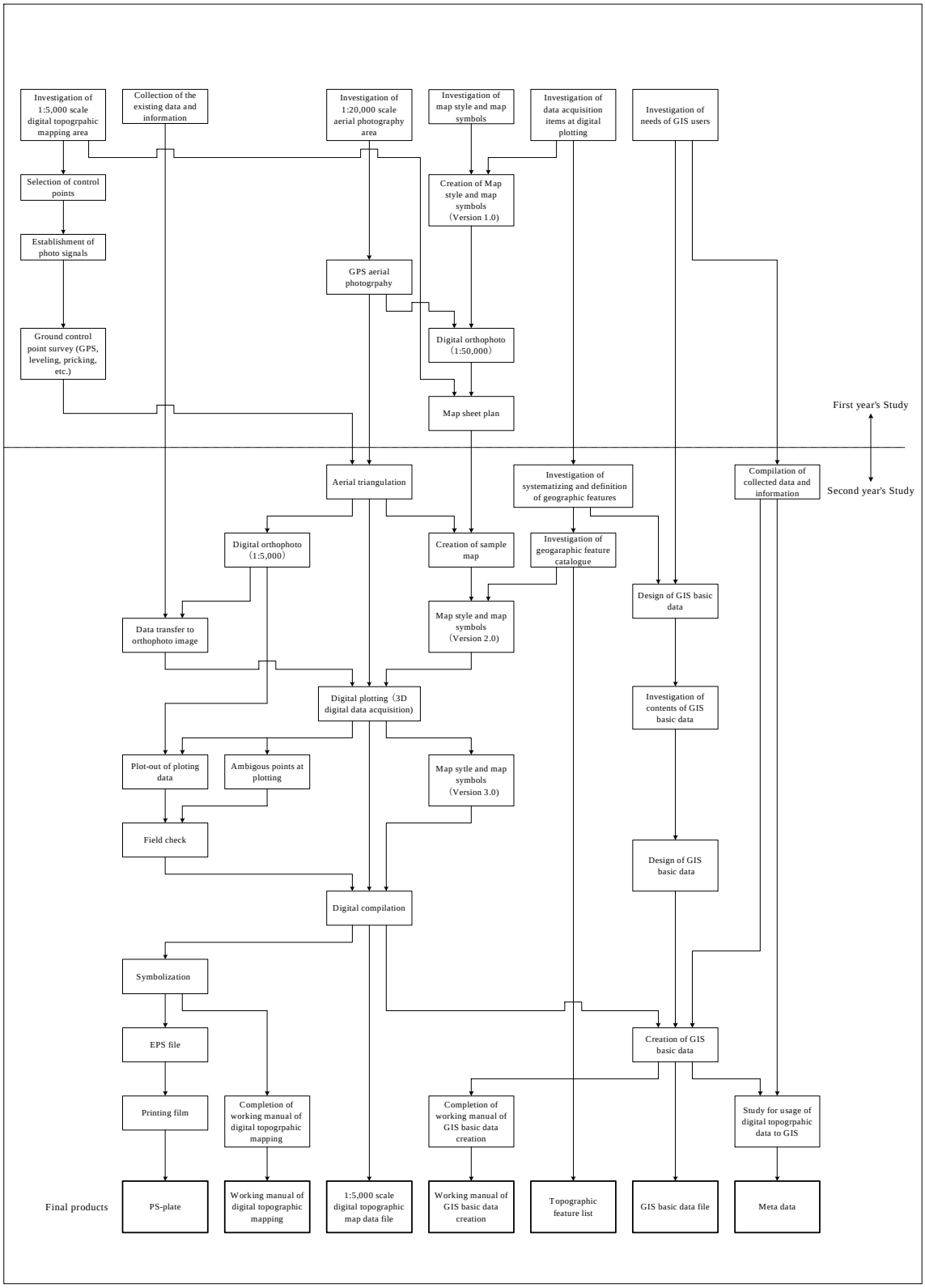


Figure 13.12 "Workflow of 1:5,000 Scale Digital Topographic Mapping and GIS Basic Data Creation in the Study

of human resources and organization:

1) SOB has little experience in creating topographic maps using analog photogrammetric method, and has few engineers experienced in creating topographic maps using an analog plotter. SOB possessed 6 analog plotters, but most of these are out of order at present; only one is usable, and that one is barely functional.

2) Some of SOB engineers have completed the training course for photogrammetry at ITC, the Netherlands, and elsewhere. But since they could not have any chance to use and test their knowledge in practical work at SOB, it is no exaggeration to say that there is almost no one with practical experience in topographic mapping by photogrammetric method.

SOB's problems in digital topographic mapping, as the Study team understood from technical discussion with the counterparts, are as follows:

1) The digital topographic mapping SOB has carried out so far has basically been map digitizing (2 dimensions data acquisition), and they have had no experience in 3 dimensions data acquisition.

2) Digital topographic mapping carried out by SOB is for the production of paper maps. Therefore, data structures of map features are not suitable for GIS. For example, in the process of digitalization, the Structuralization of features is not perfect and existing data have problem about the un-adjustment of the figure in data use to GIS.

   All these problems were caused by the shortage of understanding by SOB counterparts about the data structure and also by their miss-operations in the working. Furthermore, a problem about the quality control of the work of SOB need to be noted.

3) Since SOB has produced only small-scale topographic maps in the past, they have no understanding about the difference between medium- to large-scale topographic maps and small scale maps. For this reason they try to apply the images of the small-scale topographic maps directly to the medium to large-scale topographic maps. In short, they have no understanding of the method of concrete data acquisition by photogrammetric method and the basics of map compilation.

4) One digital plotter (SocetSet, Unix version) has been provided to SOB through the cooperation of France, but it is not being used effectively.

5) As a digital editing system, SOB is using software named GeoConcept which was introduced in French technical cooperation program. While GeoConcept has various functions ranging from map digitizing and map symbolization to GIS analysis, the software is not suitable for editing of

large-scale topographic maps.

6) GIS software that other public agencies in Bangladesh are using is mainly ArcView/ArcInfo, and most of those agencies have not introduced GeoConcept. Therefore, there is some incorrect knowledge about the compatibility of the data exchange between SOB and other organization and experiences of data exchange also are insufficient.

7) As mentioned to the above, in order to make SOB to utilize digital data produced by GeoConcept as a property, SOB must make it clear to orientate the use of GeoConcept in consideration of the easy operability to use and its merits.

In considering the transfer of digital topographic mapping technology using the digital plotters and the digital compiler under the circumstances facing SOB, the Study team determined that it would be important to pay attention to the following points in carrying out the transfer of technology:

1) SOB must become to be able to acquire data three-dimensionally for digital plotting. However, 3D data acquisition differs from 2D data acquisition in that it requires a considerably high level of proficiency, and the aptitude of the counterparts must be considered. The transfer of technology to counterparts with little aptitude or capability would be a waste of time.

2) SocetSet and Microstation possess various functions, but in the production of the digital topographic maps the minimum functions necessary for digital topographic mapping should be used. SOB counterparts should master the other functions through private study.

3) The transfer of basic technology should be carried out through the actual production of at least one sheet of the 1:5,000 scale topographic map, under the guidance of the Japanese engineers of the Study team.

4) There is an interval of about 2 months between the end of the 2nd year's Study and the start of the 3rd year's Study. During this period, SOB counterparts should produce at least one sheet of 1:5,000 scale digital topographic map through their own efforts. In the 3rd year's Study, the Study team should inspect and evaluate the digital topographic map produced by SOB counterparts in order to check their level of understanding and to implement additional technology transfer as follow-up activities.

5) It was observed that still many errors, particularly related to the geometry of features, exist in digital topographic data made by SOB. This indicate that SOB need to implement strict data management measures. Data need to be cleaned and arranged by using ArcInfo.

13.2 Preparation of Work Manuals

Since SOB has had no experience in producing medium to large scale digital topographic maps by photogrammetric method, for the purpose of carrying out the transfer of digital topographic mapping technology to SOB counterparts using the equipment and materials provided in the Study, work manual drafts as descried below were prepared in Japan following the work processes for digital plotting, compilation and GIS basic data creation used in Japan.

In drawing up the draft work manual, since actual key operations are given in detail in the manuals that come with the software provided by JICA, it was decided that the work manuals should mainly cover items not covered in the software manuals.

As SOB so far had experience only in producing small-scale topographic maps, it was necessary to make SOB counterparts understand the differences of medium- to large scale topographic maps. In order to give SOB counterparts a visual understanding of the differences in the data items to be acquired, data acquisition methods and methods of compiling acquired data, etc. for topographic maps to be produced through scaling, it was decided to use diagrams as much as possible to explain the data acquisition method and data compilation method in detail.

The draft work manuals drawn up were used as a guideline in the technology transfer to SOB counterparts, and in order to make the draft manuals easier to understand additions and corrections were made in cooperation with the counterparts, for items identified through the technology transfer. The final work manuals will be put together in group work by the Study team and the counterparts in the 3rd year's Study.

It is expected that these work manuals will be used as work guidelines when SOB produces medium to large scale topographic maps in the future, and also as reference books for training programs within SOB.

The work manuals prepared in the Study are as follows:

1) Digital plotting and compilation work manual
2) GIS basic data work manual

13.3 Technology Transfer of Digital Plotting Technology

13.3.1 Training by BAE systems engineer

BAE Systems supplied a digital plotting system through JICA's procurement of the equipment for technology transfer, and an engineer from BAE Systems set up the SocetSet at SOB, after which the engineer provided SOB staff with one week's training in SocetSet operations.

1) BAE Systems engineer
   - Ms. Thao Duong Senior Application Engineer

2) Period
   - From 15th November 2003 to 22nd November 2003

3) SOB staff who participated in the training
   - Lt. Colonel Mahmud-un-Nabi Director of Defense
   - Major Khandaker Aftab Hossain Director of Development
   - Md. Abdur Rouf Howlader Superintendent of survey
   - Md. Abul Hossain S.A.S
   - Mrs. Jahanara Sultana S.A.S
   - Mrs. Morzia Begum Draftsman grade 1
   - Md. Abu Hasan Surveyor Grade 1
   - Md. Alauddin Draftsman Grade 3
   - Ms. Nahid Sultana Computer grade 4

4) Content of training
   - Outline of digital photogrammetric mapping
   - Outline of SocetSet
   - Basic operation method

Photo 13.3.1 "Training by a BAE Systems Engineer"

Photo 13.3.2 "Participants in the Training"

13.3.2 Technology transfer of digital plotting technology by the Study team

The transfer of digital plotting technology by the Study team to SOB counterparts was carried out through the counterparts themselves producing 1:5,000 scale digital topographic maps, using the digital aerial photo image and aerial triangulation results that were the products of the 1st year's Study.

In the technology transfer, specifically, the Japanese engineers gave the counterparts instructions in the method of concrete data acquisition item by item using SocetSet, and the counterparts produced two sheets of 1:5,000 scale digital topographic maps (map sheet No. 39 and No.53).

The content of the technology transfer was as follows:

1) SOB counterparts

- Mr. Abul Hossain
- Mrs. Morzia Begum
- Mrs. Jahanara Sultana

2) Period of training

- From 1st December 2003 to 14th January 2004

3) Contents of training

- Creation of DTM
- Creation of digital mosaic
- Digital mapping

  Pro600 setup method

  Method of acquisition of house data

  Method of data acquisition of road, bridge, railway and other data

  Method of acquisition of river and other water area data

  Method of acquisition of fence, wall and other data

  Method of acquisition of vegetation and vegetation boundary data

  Method of acquisition of photogrammetric heights

  Method of acquisition of contour line

  How to use PAT-B (aerial triangulation program)

4) Digital data acquired by SOB counterparts

Topographic map data of map sheets No. 39 and No. 53 (final map sheets No. 144 and No.145)

Photo 13.3.3 “Training of Digital Plotting”

Photo 13.3.4 “Training of Digital Plotting”

Because there was a blank period of about 2 months with no fieldwork between the 2nd year’s Study and the 3rd year’s Study, the Study team made a request to SOB for SOB staff to produce by themselves one sheet of 1:5,000 scale digital topographic map covering a new area.

Through the evaluation of the 1:5,000 scale topographic map produced by SOB counterparts themselves, it was possible to check the counterparts’ level of understanding of the content of the technology transfer in the

2nd year's Study, and to implement in the 3rd year's Study a follow-up technology transfer of those parts of the technology transferred in the 2nd year's Study that were lacking or had been misunderstood.

13.4 Technology Transfer of Digital Compilation and Symbolization

The transfer of the specific technologies of digital compilation and symbolization was carried out first in Japan using the data acquired in the digital plotting work because this was easier with the data for which digital plotting was finished.

As described in the section of digital plotting, the method of technology transfer was for SOB counterparts to produce by themselves an actual 1:5,000 scale digital topographic map. When the counterparts had completed the digital plotting of map sheet No. 52 and 53 (work sheet number), the technology transfer moved on to the stage of digital compilation and symbolization in which the topographic map sheet was digitally compiled and symbolized, to produce the 1:5,000 scale digital topographic map.

The details of the technology transfer were as follows:

1) SOB counterparts

- Mr. S.M. Nasir Haider
- Ms. Nahid Sultana
- Mr. Mohammad Hossain
- Ms. Jahanara Sultana

2) Period of training

From 1st December 2003 to 27th January 2004

3) Content of training

- Digital compilation
  - Basic Microstation operating methods
  - How to create MRC and cell files
  - Field survey data inputting method
  - Tie checking method
  - MFC data checking method
  - Accuracy control method and preparation of accuracy control table
- Symbolization
  - How to create marginal information file
  - Pasting process
  - Hatching process
  - Outlining process
  - Symbolizing process

Plot file output method

Accuracy control method and preparation of accuracy control table

- Data digitally plotted and symbolized by counterparts

Topographic map data of map sheet No. 52 and No.53 (work sheet number)

Photo 13.4.1 "Training of Digital Compilation"

Photo 13.4.2 "Training of Digital Compilation"

As for digital plotting, for digital compilation and symbolization too, a request was made to SOB for SOB staff to produce by themselves one new sheet of the 1:5,000 scale topographic map during the interval period between the 2nd year's Study and the 3rd year's Study, during which there was no field survey.

The purpose of this request was, as for the digital plotting, to enable the counterparts' level of understanding of digital compilation and symbolization technologies to be evaluated, in order to determine what should be done in the 3rd year's Study in the follow-up to the technology transfer. Thus, the 1:5,000 scale digital topographic maps sheet No. 52 and No. 53 (work sheet number) were produced by SOB counterparts.

13.5 Transfer of Technology of the Creation of GIS Basic Data

As for the technology transfer about the preparation of the GIS basic data, the priority target aimed to produce the structure GIS data without any errors of figures by using GIS software, the on the job training were carried out to practice as follows:

1) GIS Structuralization of digital mapping data
2) Restructuring of the existing GeoConcept data by the cleaning of figures
3) Data exchange among system

Outline of technology transfer of GUS basic data creation was as follows:

1) Name of counterpart

- Mrs. Kaji Momotaz — Nominated by SOB
- Mr. Nizamuddin — Nominated by SOB
- Mr. Abu Hassan — Nominated by the Study team and SOB
- Mr. Ashraf Hossain — Nominated by the Study team and SOB

2) Period

・From 21st December 2003 to 1st March 2004

3) Contents of technology transfer

The GIS training concentrated to train the software operation to be able to produce GIS data without any topology errors relating to the geometries of figure data. During the training, the following were instructed to reduce many careless mistakes such as mistakes about keyboard typing, writing, meaningless operation of window operation and others not to avoid wasting time.

The operation training consists of the following themes:

■ Instruction of ArcInfo operation
- Understanding of GIS data structure and terms
- Understanding of data structure in ArcInfo
  - Data structure and errors of figure
  - Procedure for GIS data structuralization
- Basic operation of ArcInfo
  - Operation of command line corresponding to PC ArcInfo
  - Importing of digital mapping data about DXF, Shape file and other data
  - Digitizing of figure including capture and handling of image data on ArcInfo, backdrop coverage
  - Basic operation of ARCEDIT including Clean and Build operation to build topology
  - Basic operation of INFO file (editing of attribute data)
  - Basic operation of ARCPLOT including reparation of view window and map window for map print
  - Data exchange

■ Instruction of re-compilation of SOB data
- Use and utilization of GeoConcept
- Check of data structure and recompilation of data
- Data exchange

■ Instruction of production of GIS basic data

Photo 13.5.1 "Training of GIS"

Photo 13.5.2 "Preparation Work for GIS Data Creation"

Photo 13.5.3 "Test at the End of Technology Transfer"

Photo 13.5.4 "GIS Data Creation"

In the training four counterparts were divided into two groups, and the training was carried out by the following approaches: alternately the repetition operation not only in the group but also between groups and crosses check of level of understanding.

Also, the practical training was done about not only data processing of digital topographic map produced by the Study but also other themes about the followings:

1) Cleaning of figures on digital data produced by relevant organizations
2) Editing of attribute
3) Arrangement of data such as administrative code, and so on.
4) Arrangement of map for data entry for GIS data

The GIS operation is not only for software operation of GIS. It is requested that the operation of GIS needs not only the operation of mere software but also the extensive knowledge including design of database and the understanding of database, system management, data's arrangement quality control management and the working management, so the technology transfer was instructed concretely with cooperative work with counterparts in SOB.

13.6 Counterparts Training in Japan

The counterparts training in Japan was executed two times (the middle and end of 2nd year's Study). The names of counterparts participated in the training in Japan and the purpose of training were as follows:

13.6.1 The 1st counterparts training in Japan

The outline of 1st counterpart training in Japan was as follows:

1) Name of counterparts

- Ms. Jahanara Sultana — Sub-Assistant Superintendent
- Mr. Alauddin — Draftman

2) Period and location

- Period: — from 6th September 2003 to 28th September 2003
- Location: — Asia Air Survey Co., Ltd.

3) Purpose

The purpose of counterpart training in Japan at this stage is to give the fundamental information of 1:5,000 scale digital topographic mapping and GIS basic data creation to the counterparts for smooth implementation of the technology transfer in Bangladesh. For this purpose, lectures and training of the following items were executed.

- Outline of aerial triangulation
- Outline of digital mapping
- Outline of digital compilation
- Outline of GIS basic data creation
- Visiting survey and mapping organizations in Japan

Photo 13.6.1 "Training in Japan"
(at Asia Air Survey Co., Ltd.)

Photo 13.6.2 "Visiting to GSI Japan"

13.6.2 The 2nd counterpart training in Japan

The outline of the 2nd counterparts training in Japan was as follows:

1) Name of counterpart

・Brig Gen Muhammad Shafiqul Islam　　Surveyor General

2) Period and location

・Period:　　from 7th March 2004 to 24 Mach 2004

・Location:　　Asia Air Survey Co., Ltd.

3) Purpose

The purpose of the counterparts training in this stage is to confirm the contents of 1:5,000 scale of digital topographic maps created in the Study before making PS plates, and also to make understood the present situation of publishing and utilization of topographic maps and digital topographic data in Japan to the counterpart.

- Visiting to survey and mapping organizations in Japan
- Situation of utilization of topographic maps and digital data in Japan
- Situation of publishing of topographic maps and digital topographic data in Japan
- Final confirmation of 1:5,000 scale digital topographic maps

Photo 13.6.3 “Visiting to GSI Japan”

Photo 13.6.4 “Check of 1:5,000 Scale topographic Map by Surveyor General of SOB (at Asia Air Survey Co., Ltd.)”

13.7 Follow Up of Technology Transfer

The fundamental knowledge and technique of digital topographic mapping, digital compilation and symbolization and creation of GIS basic data was already transferred to the counterparts by the end of the 2nd year’s Study.

However, from the viewpoint of quality control and production management, the staff of SOB are still low level due to the reason of lacking of actual work experience in digital topographic mapping by themselves.

From now on, the staff of SOB have to executed the actual digital topographic mapping and GIS data

creation under the condition of limited time and also limited budget using the equipment and software donated by JICA effectively.

Therefore, the Study team requested the counterparts of SOB to produce the three sheets of 1:5,000 scale digital topographic maps by themselves during the period of the middle of March 2004 to the end of May 2004 by themselves.

In general, when facing the problem, the staff of SOB has a tendency to ask the members of the Study team or other persons for help and do not try to solve the problems by themselves. Frankly to say, several staff of SOB has no intension to study by themselves and they are always passive. The most important matter for the staff of SOB is to study by themselves and also to solve the problems faced by themselves from now on. Therefore, the Study team requested SOB to create the 1:5,000 scale digital topographic maps and GIS basic data by the counterparts during the absence of the member of the Study team in Bangladesh.

At the 3rd year's Study, the Study team evaluated products of the 1:5,000 scale digital topographic maps and GIS basic data created by the counterpart by themselves. Based on the evaluation, the Study team executed the additional technology transfer to rectify the misunderstanding points or lacking of understanding in the production of digital topographic mapping and GIS basic data creation were executed by the Study team to the counterpart.

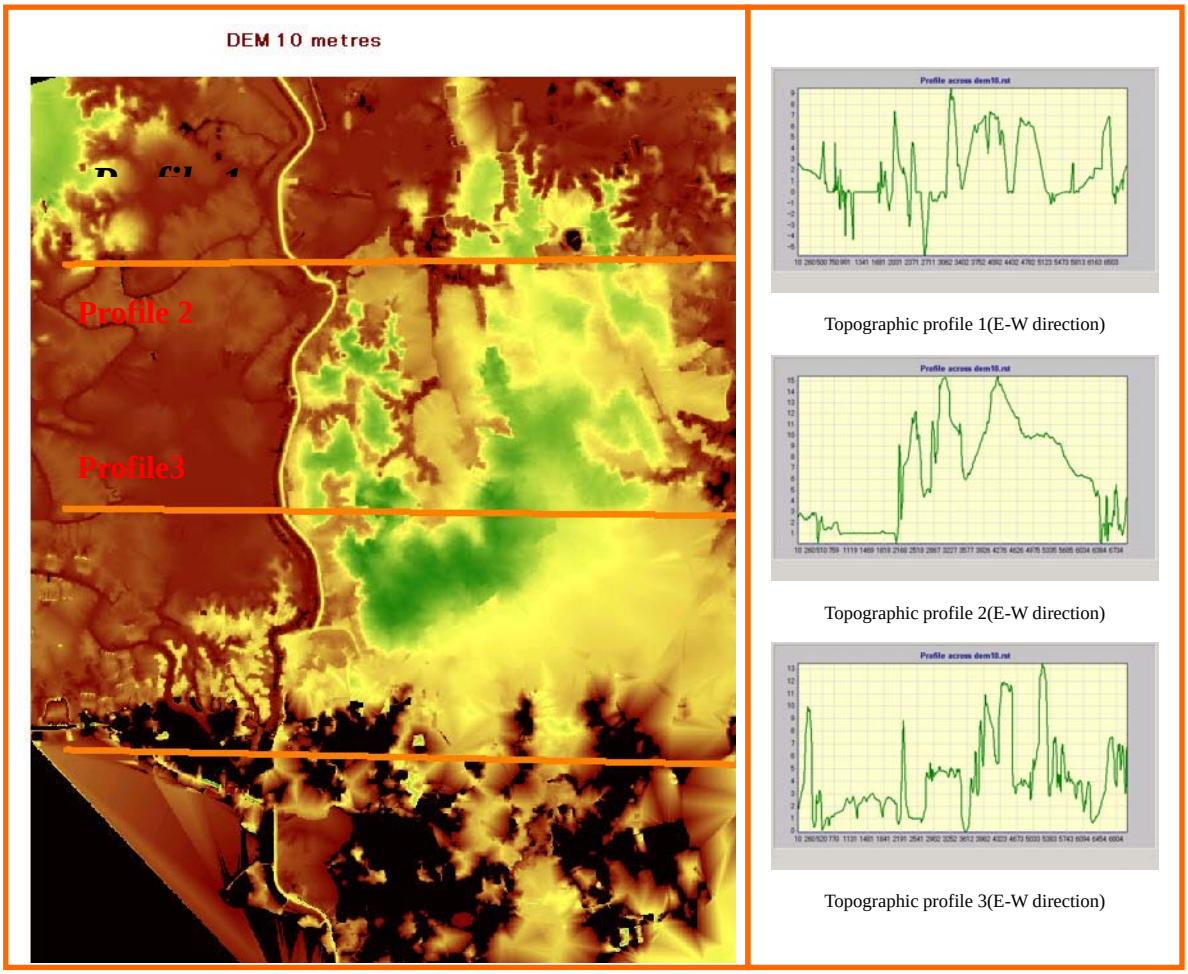
13.8 Evaluation of Counterparts

Paper test and operation test were executed at the end of 2nd year's Study and 3rd year's Study to judge and evaluation the technology transfer of digital topographic mapping and GIS basic data creation to the counterparts.

The evaluation of each counterpart was summarized and evaluation report of counterparts was submitted to the Surveyor General directly from the Study team.

Chapter 14 Seminar

DEM and Topographic Profile



Topographic profile 1(E-W direction)

Topographic profile 2(E-W direction)

Topographic profile 3(E-W direction)

The left figure was produced as a DEM, so called Digital Elevation Model, by using the contour line with the 2 meters interval in the digital map and three profiles from East to West are drawing in the DEM. The right figure shows the drawing of profiles about the cross sections on geographical features from East to West. As for Dhaka city area, a city area has been developing in the natural embankment, and that development is the history of the flooding and the flood countermeasure. It is imagined that there are situations of the reclamation of the river bed and the development of the town according to the geographical cross section in the natural condition as shown in the above.

It is expected that elevation data and profile of geographical section are utilized to the geographic information in the social infrastructure including road, water supply and sewerage, drainage, urban landscape and the flood control and so on.

Chapter 14 Seminar

At the end of the 3rd year's Study, seminar inviting the officials of authorities and organizations, personnel and so on concerning the Study was held jointly by SOB and the Study team on the end of June 2004 at Dhaka to explain the contents and the final products of the Study to them.

14.1 Objectives of the Seminar

The objectives of the seminar were:

1) To make understand the contents of the Study, workflow and significance of the Study for SOB and also vital issues of SOB to not only counterparts participating the Study but also other staffs of SOB who are not participating in the Study directly.

2) To show and explain the final results of the Study such as the 1:5,000 scale digital topographic maps and digital data and GIS basic data produced by the Study to the agencies and organizations expected to be users in Bangladesh and also to promote these final results to be used effectively by them.

3) To held the meeting between staff of SOB and other agencies and organizations in Bangladesh for exchanging the opinions and requests to SOB especially concerning the future SOB's activities.

For the above purpose, H.E. Matsushiro Horiguchi, Japanese Ambassador to Bangladesh, Mr. Kazuo Inaba, Director, Geoinformation Department, GSI, Japan and Dr. Raquib Ahmed, Professor, Department of Geography and Environmental Studies, Rajshahi University were invited as special guest and they explained the importance of basic data such as an accurate large to medium scale digital topographic maps, GIS data to solve the various kinds of problems arising in Dhaka Metropolitan Area.

14.2 Agenda of the Seminar

The Agenda of the seminar was as follows:

1) Time and date: 10:00 – 14:00, 26 July 2004, Monday
2) Venue: Ball Room, Dhaka Sheraton Hotel
   1, Minto Road, G.P.O. Box 504, Dhaka 1000
3) Agenda

09:30	Registration	
10:00	First Session	
	- Welcome address and introduction	Mr. Muhammad Shafiqul Islam Surveyor General of Bangladesh

	- Greeting address	Mr. Akio Arai Resident Representative JICA Bangladesh Office
	- Speech by Special guest	H.E. Matsushiro Horiguchi Japanese Ambassador to Bangladesh
	- Ceremony of handing over of Equipment	Mr. Akio Arai Resident Representative JICA Bangladesh Office Mr. Muhammad Shafiqul Islam Surveyor General of Bangladesh
	- Keynote address	Mr. Kazuo Inaba Director, Geoinformation Department GSI, Japan
	- Keynote address	Mr. Shahinur Hasnat Islam Assistant Surveyor General, SOB
	- Keynote address	Dr. Raquib Ahmed Professor, Department of Geography and Environmental Studies, Rajshahi University
11:30	Tea Break	
12:00	Second Session	
	- Outline of Urban Information Management for Greater Dhaka City	Mr. Khandaker Aftab Hossain Director, Development Survey (SOB)
	- Outline of digital topographic Mapping	Mr. Abdur Rouf Howlader Officer in charge 1 Cartographic Office, SOB
	- Outline of production of GIS basic data	Mr. Kazumi Suwabe GIS expert, JICA Study Team
	- Outline of the development of Thematic map from topographic map and GIS basic data	Mr. Shigeru Ono GIS expert, JICA Study Team
	- Question and answers	From the participants
	- Closing address	Mr. Muhammad Shafiqul Islam Surveyor General of Bangladesh
13:40	Prayer time/Leg Stretch Break	
14:00	Lunch	
15:00	End of Seminar	

Photo 14.2.1 "Opening Ceremony"

Photo 14.2.1 "Ceremony of Handing Over of Equipment"

(Left: Mr. Arai, Resident Representative, JICA Bangladesh Office
Center: H.E. Matsushiro Horiguchi, Japanese Ambassador to Bangladesh
Right: Brig. Gen. Muhammad Shafiqul Islam, Surveyor General of Bangladesh)

Photo 14.2.3 "Keynote Address by Dr. Raquib Ahmed, Rajshahi University"

Photo 14.2.4 "Keynote Address by Mr. Kazuo Inaba, Director, GSI, Japan"

Photo 14.2.5 "Participants to the Seminar"

Photo 14.2.6 "Participants to the Seminar"

14.3 Participants to the Seminar

Approximately 180 persons from about 80 authorities and organizations including medias were participated in this seminar. The names of authorities and organization participated in the seminar are shown in Table 14.3.1 "List of Participants to the Seminar"

Table 14.3.1 "List of Participants to the Seminar"

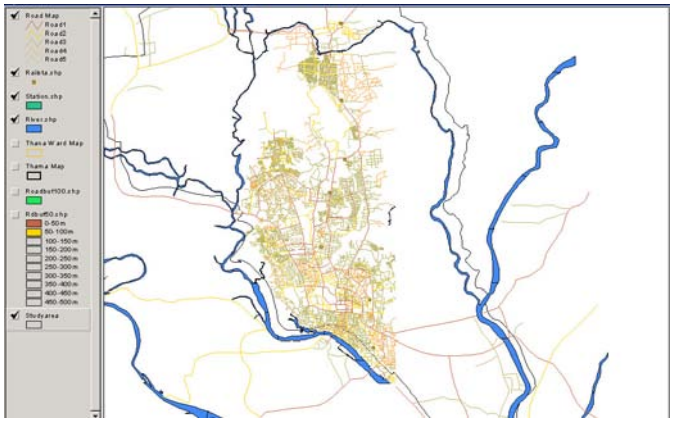
No.	Name of Organization	No.	Name of Organization
	Bangladesh Government		**University**
1	IGP, Police Head Office	1	Vice Chancellor, BUET
2	Director Engineer, AHQm E-in-C'S Branch	2	Civil Engineering Department, BUET
3	Industrial Park Investment Board, Prime Minister's Office	3	Geology Department, Dhaka University
4	Bangladesh Water Development Board, WAPDA	4	Town & Regional Planning Department, BUET
5	Chief Engineer, LGED	5	Water Resource Engineering Department, BUET
6	Chief Town Planner, DCC	6	IWFM, BUET
7	BIWTA	7	Geological Department, Dhaka University
8	SPARSO	8	Department of Geography & Environment, University of Dhaka
9	Roads & Highway Dept.	9	Geological Department, Jahangirnagar University
10	PWD Dept.	10	Department of Geography and Environment, Jahangirnagar University
11	Land Record's & Survey Dept.	11	Department of Geography and Environment, Rajshahi University
12	Bangladesh Meteorological Dept.		**Private Company**
13	Forest Dept	1	The Mappa Ltd.
14	SRDI	2	Dev. Design Const. Ltd.
15	Geological Dept.	3	Bangladesh Consultancy Ltd.
16	Bangladesh Oil, Gas & Mineral Resource Corp.	4	Tropical Homes Ltd.
17	Archeological Dept.	5	Eastern Housing Ltd.
18	Joint River Commission	6	Japadacca Pvt. Ltd.
19	Planning & Design, Power Development Board	7	Sumitomo corporation
20	Fisheries Inspection & Quality Control	8	Titas Gas Transmission & Dist. Co., Ltd.
21	T & T		**Foreign Government/International Organization**
22	Public Health Engineer Dept.	1	UNDP
23	Fire Service & Civil Defense	2	JICA
24	WARPO	3	Embassy of Japan
25	CEGIS		**Media**
26	Institute of Water Modeling	1	Daily Star
27	WASA	2	Independent
28	Bangladesh Atomic Energy Commission	3	BSS
29	Higher Secondary Education Board	4	UNB
30	Ex-Engr., DESA	5	New Nation
31	Dhaka Transport Coordination Board	6	Prothom Alo
32	Armed Force Division, Prime Minister's Office	7	Ittefaq
33	Director General, Bangladesh Rifles	8	Janakantha
34	Director Military Operation, General Staff Branch	9	Bangladesh Observer
35	Engineer Adviser, Ministry of Defense	10	Financial Express
36	Director (Hydrography) Naval Headquarter	11	New Age Metro
37	Senior Assistant Chief, Planning Cell Ministry of Defense	12	Bangladesh Today
		13	Channel I

Chapter 15 Final Products of the Study

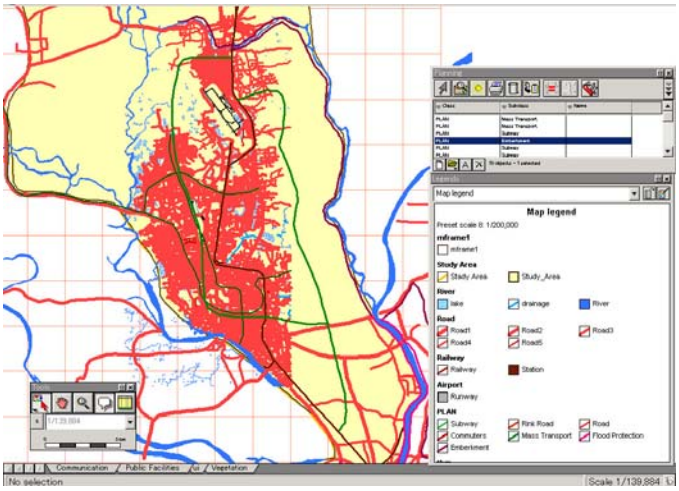
Thematic Map Relating to the Traffic Network

Road and railway are major transportations ways mainly in the Dhaka city area and road data based on the large map scale is expected to utilize for the infrastructure management. The below map was compiled to the thematic map of the traffic and the transportation about

Data were compiled about a traffic route and road information and the information on the social infrastructure that a plan is scheduled about the road network which influences a traffic infrastructure based on the topographical map, and those data were produced as a thematic map by making future plan to plot on the base map.



The present situation of traffic infrastructure in the Dhaka Metropolitan area



Future plan of social infrastructure in the Dhaka Metropolitan area Subway plan, mass transportation plan, bypass road plan, construction plan of embankment

Chapter 15 Final Products of the Study

The Study was started from the end of November 2002 and completed by the end of August 2004 and total working period was approximately 21 months. The final products produced in each year's Study are as follows:

15.1 Final Products of the 1st Year's Study

The final products of the 1st year's Study are as follows:

1) Aerial photography

- 1:20,000 scale negative film 1 set
- 1:20,000 scale positive film 1 set
- 1:20,000 scale contact print 1 set

2) Ground control point survey

- Description of control point 1 set

3) Scanning

- Scanning data of positive film 1 set

4) Report

- Inception report 20 sets

15.2 Final Products of the 2nd Year's Study

The final products of the 2nd Year's Study (Phase 1 and 2) are as follows:

1) Aerial triangulation

- Aerial triangulation results 1 set

2) 1:5,000 scale topographic map

- Printing film 1 set
- PS plate 1 set

3) Digital data

- 1:5,000 scale digital topographic data 2 sets
- 1:5,000 scale GIS basic data 100 sets
- 1:5,000 scale orthophoto data 1 set

4) Report

- Progress report	20 sets
- Interim report	20 sets
- Draft final report	
Main report	30 sets
Summary	30 sets

15.3 Final Products of the 3rd Year's Study

The final products of the 3rd year's Study are as follows:

1) Final report

- Main report	50 sets
- Summary	50 sets
- Supporting report	50 sets

2) Printing map

- 1:5,000 scale printed topographic map	500 sets (printed by SOB)