

THE PEOPLE'S REPUBLIC OF BANGLADESH
FLOOD PLAN COORDINATION ORGANIZATION

MASTER PLAN
FOR
GREATER DHAKA PROTECTION PROJECT
(STUDY IN DHAKA METROPOLITAN AREA)
OF
BANGLADESH FLOOD ACTION PLAN NO.8A

FED 8A

DATA BOOK III
TOPOGRAPHIC SURVEY DRAWINGS

NOVEMBER 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

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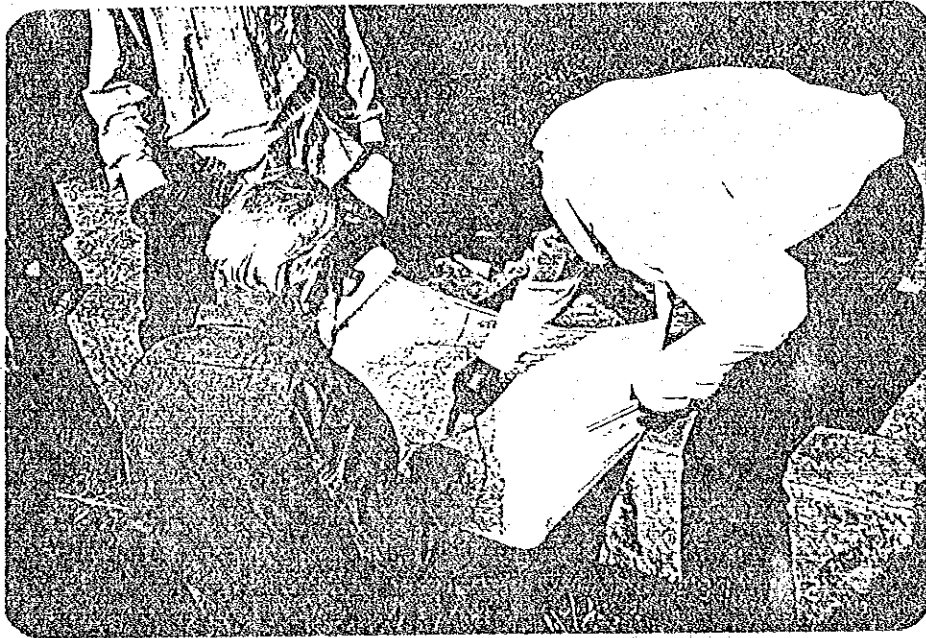
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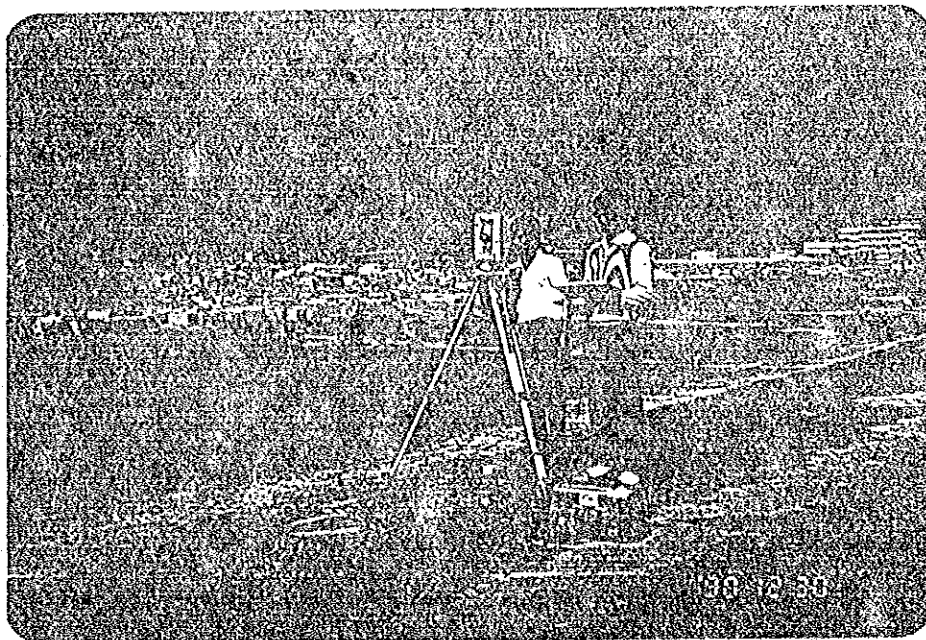
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1. SUPPORTING REPORT A



Field Reconnaissance



Topographic Survey

SUPPORTING REPORT A
GEOGRAPHY AND TOPOGRAPHY

SUPPORTING REPORT A GEOGRAPHY AND TOPOGRAPHY

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SUPPORTING REPORT A: GEOGRAPHY AND TOPOGRAPHY

1. Location and Land Form

The study area (approx. 850 km²) is situated in between lat. 23°34' N-lat. 23°59' N and long. 90°13' E-long. 90°33' E, and consists of the Greater Dhaka and part of Tongi, Savar, Keraniganj and Narayanganj (Fig. A.1).

The study area is composed of alluvial terraces and low lying areas. Dhaka city and surrounding towns are located mainly on alluvial terraces, named the Madhupur Jungale Terrace.

A rough land form map which illustrates stretches of comparatively high elevated areas and low lying areas in the study area was prepared based on the contour maps collected, accuracy of which is likely to be considerably varied (refer. Fig. A.2).

The map shows the following land form areas :

<u>Land form Area</u>	<u>Description</u>
- 1	higher than 10.0 meter (GTS)
- 2	8.0 - 10.0 meter (GTS)
- 3	6.0 - 8.0 meter (GTS)
- 4	4.0 - 6.0 meter (GTS)
- 5	2.0 - 4.0 meter (GTS)
- 6	lower than 2.0 meter (GTS)

The land form areas -1 and -2 are supposed to be safe from normal floods, but the land form area -3 seems to be marginally free from floods. Distinct low land is lying towards the north-west and east side of Dhaka city.

2. Available Topographic Map

Several kinds of topographic maps were collected from SOB, BWDB, SPARRSO and other concerned agencies through FPCO coordination. They are listed below.

<u>Scale</u>	<u>Description</u>
1. 1: 4,000	: prepared in 1986 with contour lines covering only a part of Narayanganj (Fig. A.3).
2. 1: 7,920	: prepared in 1965 - '72 with contour lines covering G. Dhaka, Keraniganj and partly Tongi and Narayanganj (Fig. A.4).
3. 1: 15,840	: prepared in 1964-'72 with contour lines covering Savar, partly Tongi and Narayanganj (Fig. A.5).
4. 1: 10,000	: prepared in 1989 partly with contour lines based on aerial photos 1983/84 covering G. Dhaka, Keraniganj, Tongi and partly Narayanganj (Fig. A.6).
5. 1: 20,000	: reduced map of the above 1 : 10,000 scale map.
6. 1: 50,000	: prepared in 1971-'89 covering the whole country with no contour lines (Fig. A.3).
7. 1: 50,000	: spot satellite image taken in February - March, 1989 covering the whole country, indexed as of Fig. A.3.

Except the spot image map, the 1/10,000 scale map is the latest available map with recent field verification. The 1/50,000 scale map (No. 6 of above) was prepared by using old air-photos, and also contour maps of scales 1/7,920 (No. 2 of above) and 1/15,840 (No. 3 of above) were prepared during the period of East Pakistan.

Accordingly, above maps are old to use for the master plan. So, the 1/50,000 scale map is required to update by the latest maps, air-photos, field verification and other available data.

3. Survey datum

Two datums, called GTS and PWD are used for elevation survey in Bangladesh. The GTS (Great Trigonometrical Survey) is the Bangladesh standard datum of levelling. The national topographic map series is prepared based on GTS. On the other hand, PWD datum is used for hydrographic survey. The relationship of both datums is ;

$$\text{PWD} = \text{GTS} + 1.509 \text{ feet}$$

In the study area and its surroundings, there are seven (7) GTS bench marks established by SOB and eight (8) BWDB bench marks based on PWD datum. The location and elevations of these control points are shown in Fig. A.7 and Table A.1 respectively.

Out of the above control points, Ramna BM (GTS bench mark), which was used in JICA previous surveys from 1987 to 1990, was selected as the basic bench mark in this leveling survey. The elevation of Ramna BM is 24.2718 ft, a value that was confirmed by check levelling survey between Mymensingh and Comilla during 1966 - 1967.

4. Supplementary Survey

4.1 General

The supplementary survey was carried out to obtain the necessary data for hydrological and hydraulic analysis, and formulation of flood mitigation and stormwater drainage plan.

The supplementary survey consists of the followings ;

- 1) For updating the existing topographic maps (1:50,000, 1:20,000)
 - Spot height survey of the whole study area
 - Spot height survey for preparation of contour lines of low lands
- 2) For preparation of longitudinal and cross sections of rivers and drainage channels
 - Longitudinal and cross sectional survey
- 3) For existing facilities
 - Levelling and structural dimension survey

4.2 Updating of Existing Topographic Map

4.2.1 Spot height survey

1) Spot height of whole study area

In order to obtain a general feature of ground elevation in the whole study area, spot levelling was conducted along the existing roads shown in Fig. A.9. This survey was carried out at intervals of 200 m along the road. At each road location spot height determined of every 250 m pitch for a symmetric cross section of 0.5 km to either side of the road (a total of 1 km).

The total number of spot heights was approx. 5,700 points. The elevation of key points were indicated on the updated 1: 50,000 scale map.

2) Spot height of low land area

Grid spot height levelling was carried out at intervals of 100 m by 200 m. These data was used to draw the 50 cm contour lines of low land areas shown in Fig. A.10. The total number of grid heights were approx. 800 points.

4.2.2 1/50,000 scale map

The existing 1: 50,000 national map was updated based on the following available data. The updated map is used as the base map of this master plan study.

- 1) Satellite coloured spot image maps taken in February - March, 1989
- 2) 1/10,000 scale SOB maps (DHAKA CITY AND SURROUNDINGS) based on aerial photos 1983/84.
- 3) 1/50,000 scale national series of coloured infra-red air-photos taken in 1983/84.
- 4) 1/50,000 scale skeleton line map (DHAKA METROPOLITAN AREA) based on 1983/84 photos, SPARRSO.

For updating the 1/50,000 map, the spot image was used for the correction of the shape of rivers, major khals and also marsh area, because it is the latest available image. The areas covered by 1/10,000 scale map, was updated using these maps. The colour infra-red air-photos were referred to correct the planimetric features.

The SPARRSO skeleton map was used to refer the names of some facilities and minor roads. These items were verified on the field during December, 1990 to January, 1991.

About 800 key spot heights were added to this 1/50,000 scale map according to the results of spot height survey.

4.2.3 1/20,000 scale map

The 1/20,000 scale map covering the Greater Dhaka and Narayanganj area of about 380 km² was prepared for the subsequent feasibility study.

Following maps were used for this preparation:

- 1) 1/20,000 scale SOB maps.
- 2) 1/10,000 scale Dhaka city map prepared by JICA study team on Storm Water Drainage System Improvement Project, October 1987.
- 3) 1/15,840 scale Water Development Map

New maps were compiled from the above three kind of existing maps were used. The low land areas were inserted the contour lines at the intervals of 50 cm according to the results of grid spot height survey and also, corrected by field verification in February, 1991.

The areas of contour drawing is about 170 km² as shown in Fig. A.10.

All existing maps used for this map preparation were paper printed, as such the conditions of sheet connection between successive maps was not so good at some portions.

4.3 Longitudinal and Cross Sectional Survey of River and Drainage Channels

Longitudinal & cross-sectional surveys of the five (5) rivers and 55 drainage channels in the study area were carried out during the period February to March, 1991. The surveyed longitudinal length and number of cross-section are summarized below :

River	Length (Km)	Nos. of Section
(1) Balu River	27.6	7
(2) Tongi Khal	14.4	3
(3) Turag River	30.0	4
(4) Karanatali River	11.2	4
(5) Haidarabad Khal	3.7	3
Total	86.9	21

Drainage Area	Nos. of Khal	Length (Km)	Nos. of Section
(1) Dhaka North West	8	26.1	35
(2) Dhaka East	17	54.8	72
(3) Narayanganj & DND	21	49.3	77
(4) Keraniganj	9	24.8	32
Total	55	155.0	216

Location of the above longitudinal and cross-sectional surveys are shown in Fig. A.11 & Fig. A.12. These drawings based on the PWD Datum were compiled as a survey data book.

4.4 Other Surveys

For the existing flood control facilities, following surveys were conducted.

- 1) Spot height survey of the existing flood-wall around DND project area in Narayanganj.
- 2) Structural demension survey of five (5) sluice gate at west bank of the Great Dhaka.

TABLE A.1 List of Existing Control Point

1. Geodetic Survey Mark (S.O.B)

Name of Geodetic Survey Point	Latitude	Longitude
Nayarhat B.T.S	23° 54' 33.997"	90° 13' 54.874"
Tongi B.T.S	23° 53' 45.43"	90° 24' 36.77"
Savar B.T.S.	23° 51' 36.48"	90° 16' 01.62"
Gulshan B.T.S	23° 47' 49.54"	90° 25' 06.49"
MET. Office	23° 46' 08.018"	90° 23, 01.207"

2. G.T.S. BM (S.O.B)

Name of B.M. (S.O.B)	Value in GTS
A/21	27.447 ft.
S.O.B	27.3810
B - 79	22.970
G - 8	20.370
Ramna B.M.	24.2718
G.B. M - 1	20.5154 /
G.B. M - 2	22.7894 /

3. BWDB BM (PWD)

Name of Gauge Station	B.M. Value in PWD	Latitude	Longitude
7.5 Demra	6.817 m	23° 44' N	90° 30' E
14.5 Nayarhat	9.316	23° 54' N	90° 14' E
42 Millbarak	6.776	23° 14.9' N	90° 25.3' E
69 Savar	8.358	24° 14.9' N	90° 11' E
299 Tongi	10.644	23° 52.8' N	90° 24.2' E
7 Pubail	7.529	23° 56.5' N	90° 29.8' E
302 Mirpur	10.451	23° 47.3' N	90° 20.3' E
71 Kalagachia	5.450	23° 34.7' N	90° 32.7' E

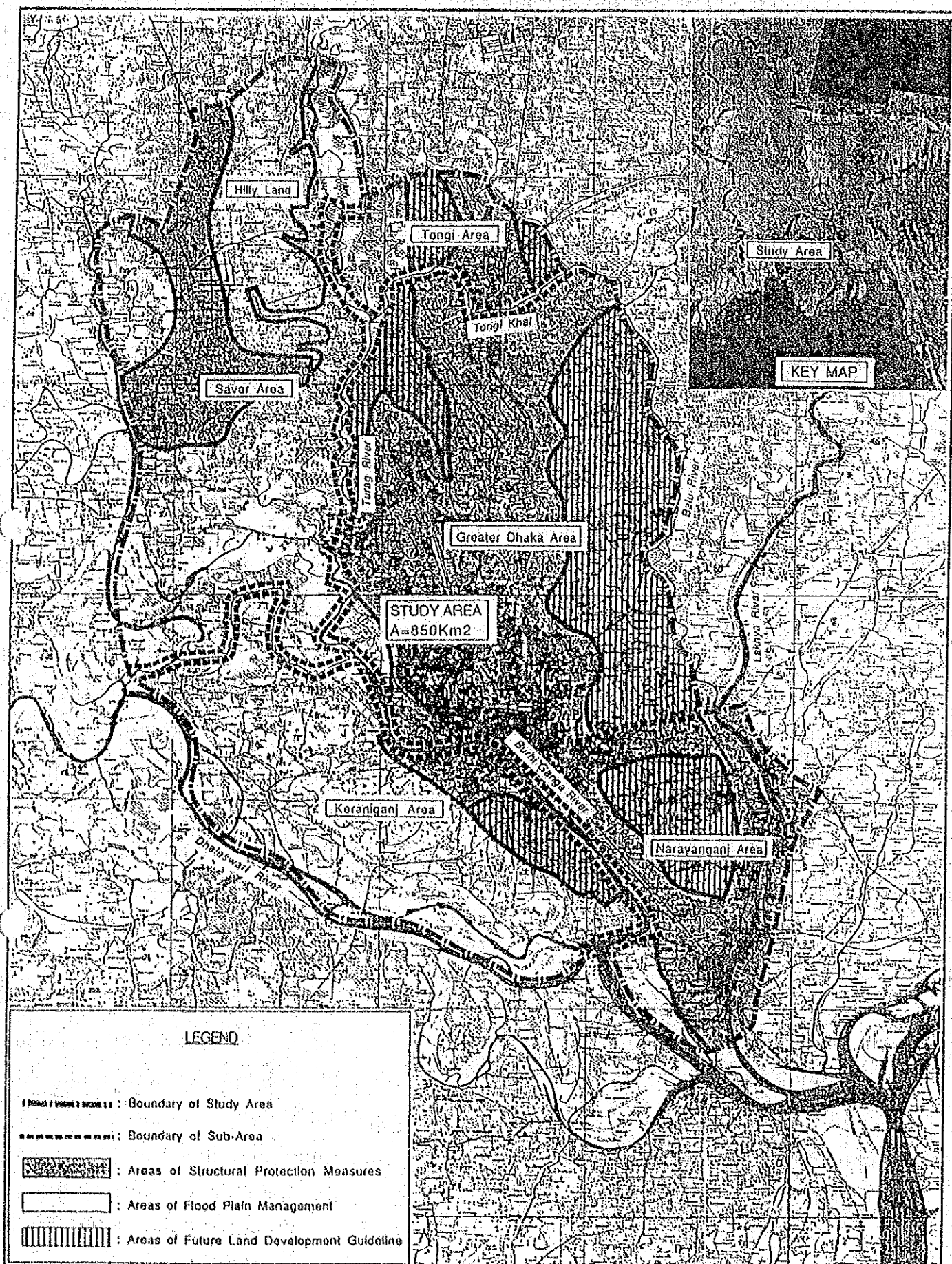
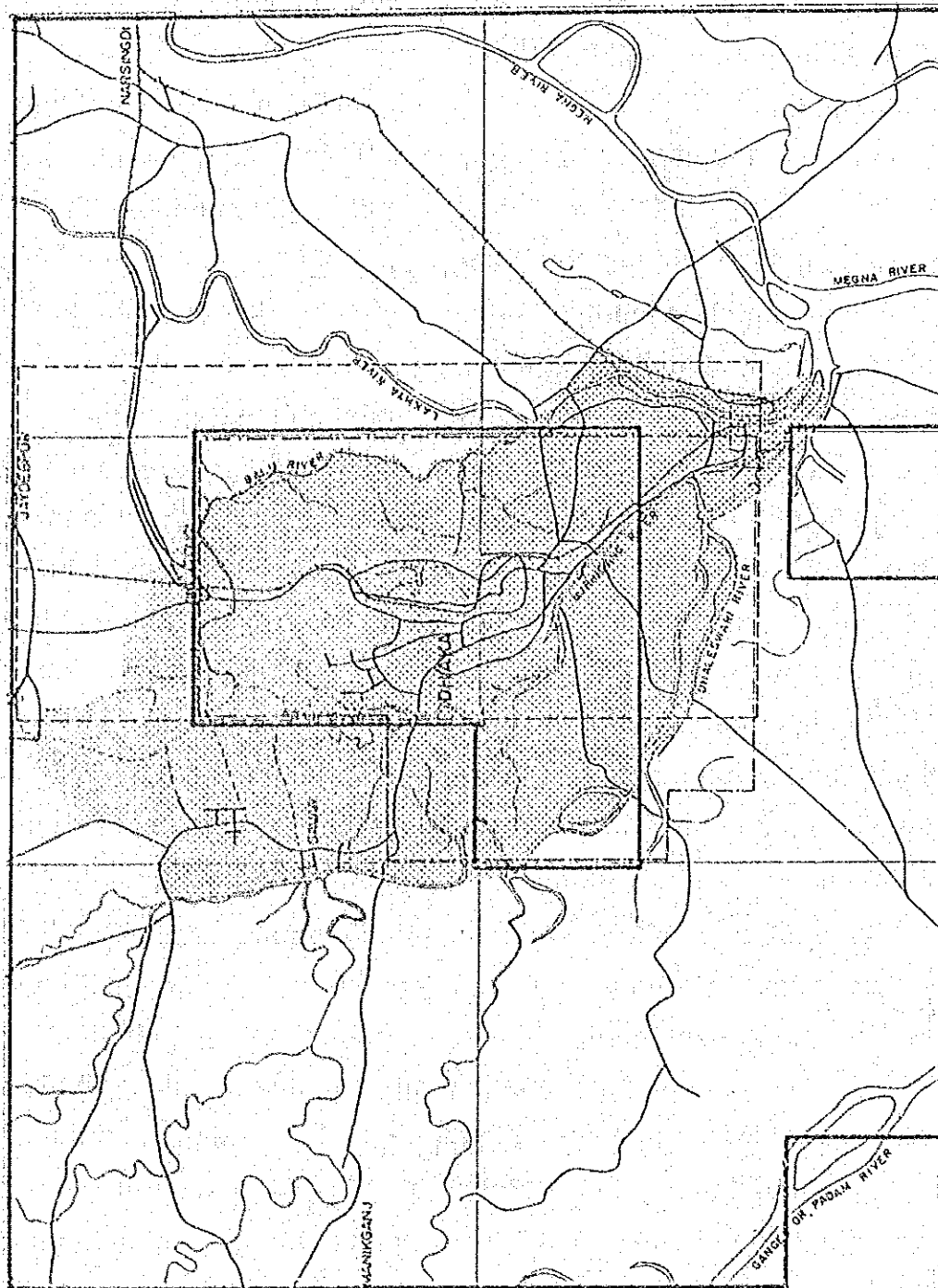


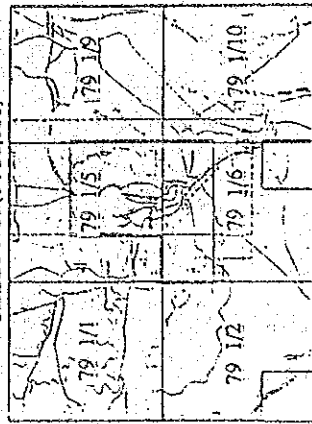
FIG. A.1

LOCATION MAP OF THE STUDY AREA

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF
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SHEET NO. (1 : 50,000)



LEGEND

SCALE (SURVEY YEAR)

- 1 : 15,840 (1964 - 1972)
- 1 : 7,920 (1965 - 1972)
- 1 : 10,000 (1989)
- 1 : 4,000 (1986)

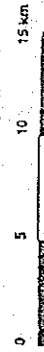


FIG. A.3 EXISTING MAP INDEX

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROPOLITAN AREA) OF
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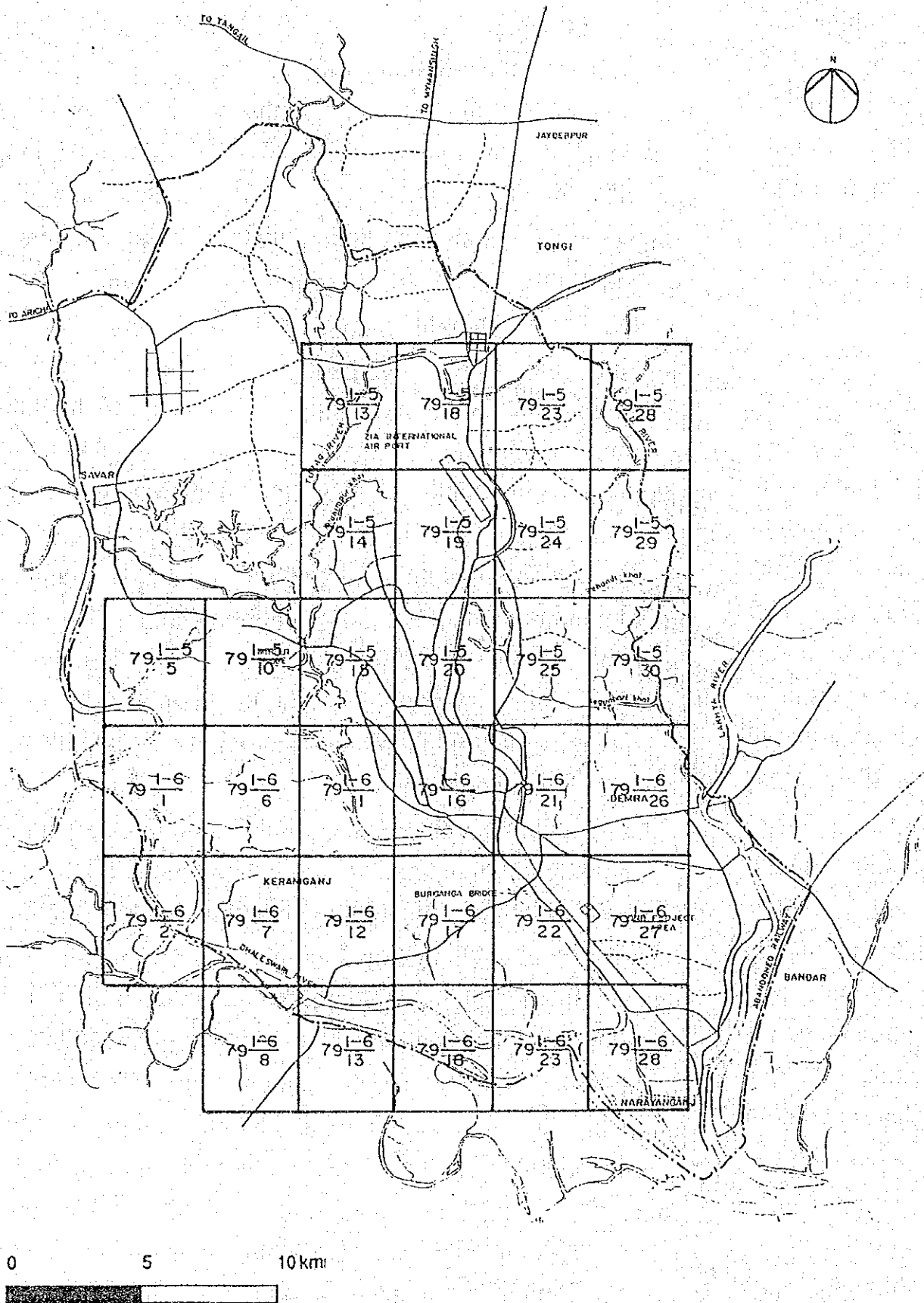


FIG. A.4

1 / 7,920 SCALE CONTOUR MAP SHEET INDEX

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF
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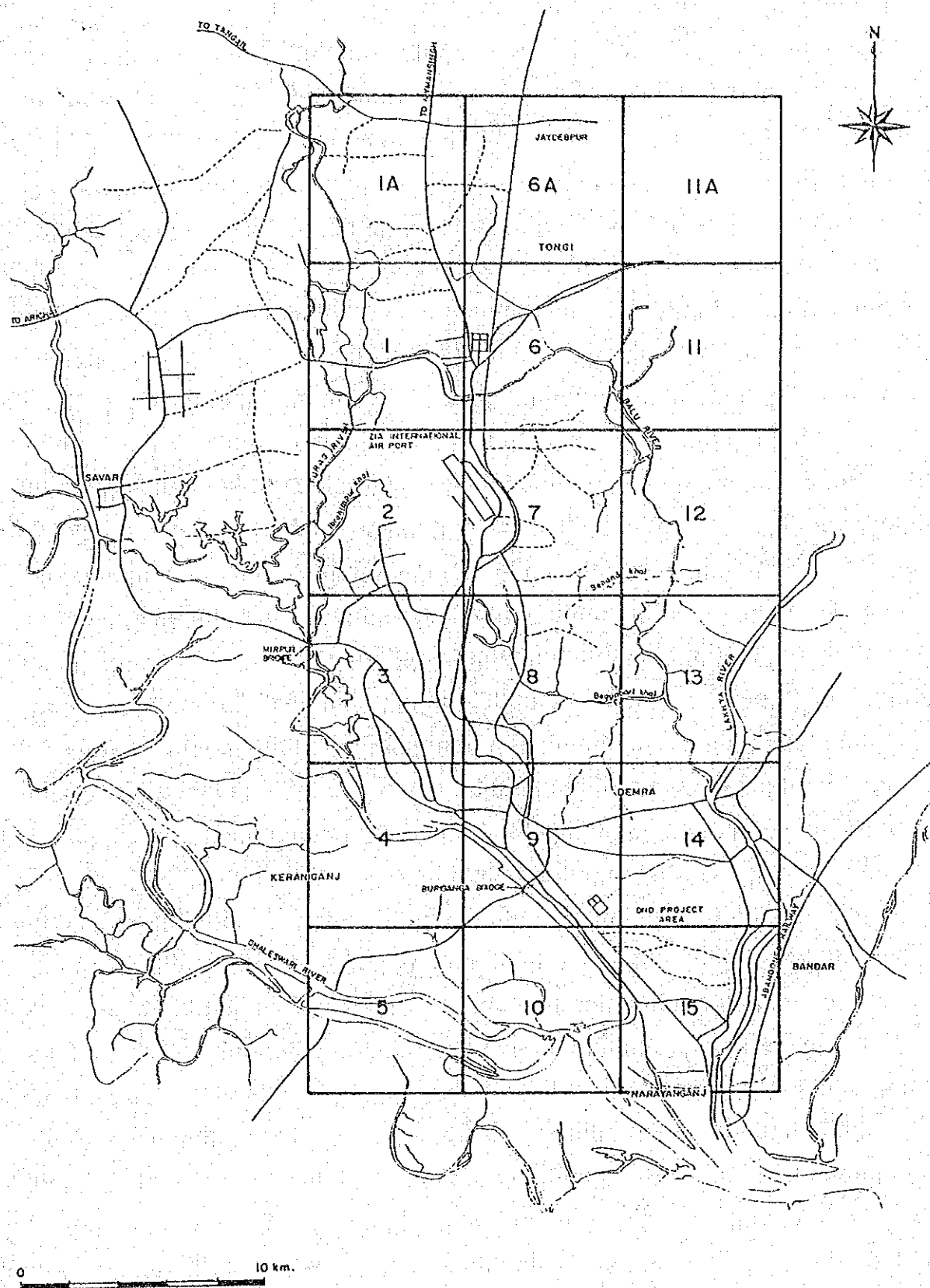


FIG. A.6

1 / 10,000 SCALE MAP SHEET INDEX

GREATER DHAKA PROTECTION PROJECT (STUDY IN DHAKA METROLOLITAN AREA) OF
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