

Numbering System of Indian SOI Topographical Sheets

PG Diploma in RS & GIS

Semester: II

PAPER: Computer Cartography (GIS: 08)

Dr. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI

STUDY OF TOPOGRAPHIC MAPS

POINTS OF DISCUSSION

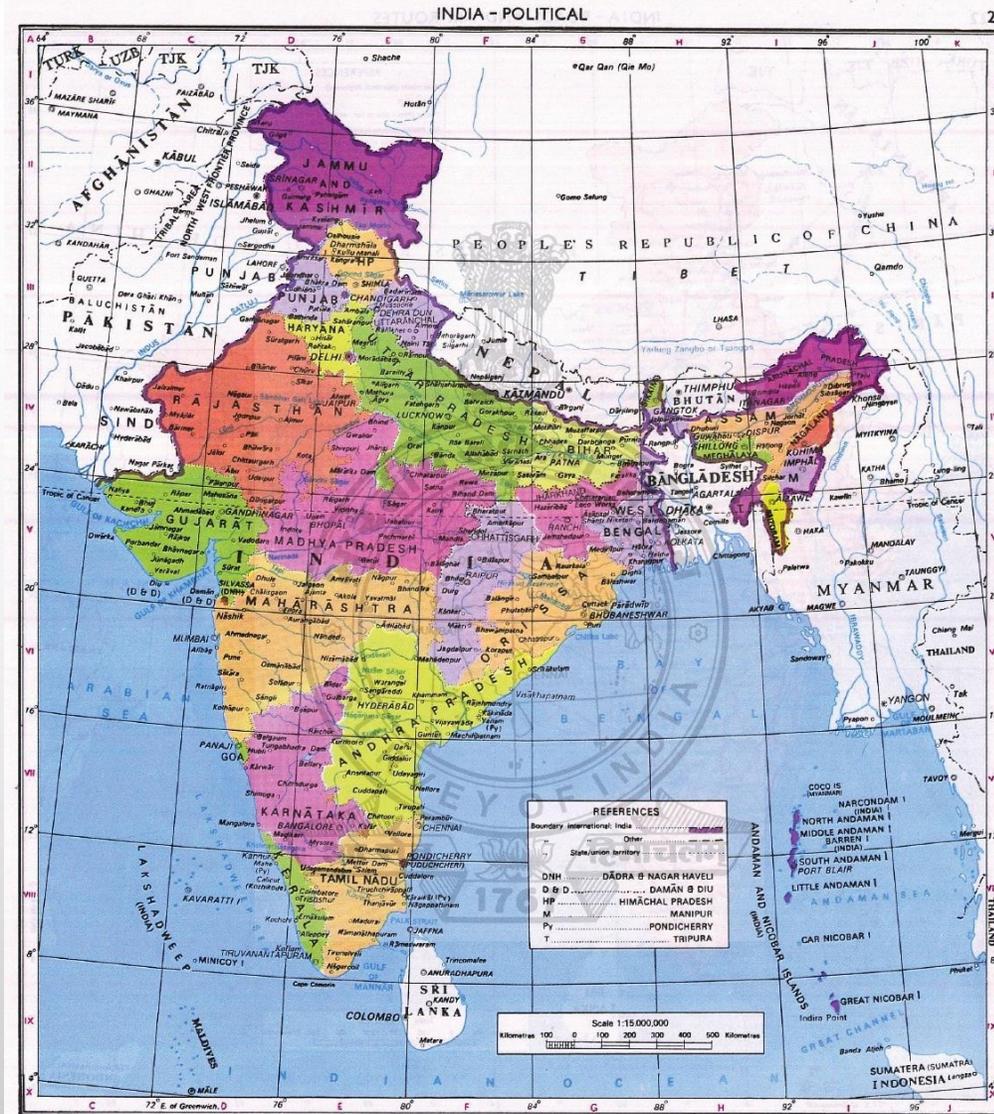
- ✓ Different type of Maps
- ✓ Who Prepares Maps
- ✓ Who uses these Maps
- ✓ Information available on Topo sheets
- ✓ Scales of Maps
- ✓ Grid system, Numbering of sheets
- ✓ How to locate sheet for a particular area
- ✓ How to know features of the area
- ✓ From Where to procure

- **Maps is visual representation of data**
- Maps are indispensable tools in study of geography.
- Various type of Maps are used for different purposes
- Depending on requirement maps are drawn on small or large scale
- Surface of earth is made up of large number of features such as mountains, plains, rivers, lakes, oceans, etc.
- These features are represented by specific symbols, signs and colours

MAP ON GLOBE



POLITICAL MAP



Projection: Lambert Conformal Conic.
TJK TURKISTAN
TURK TURKMENISTAN
UZB UZBEKISTAN

The boundary of Meghalaya shown on this map is as interpreted from the North-East Areas (Reorganisation) Act 1971, but has yet to be verified.
The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.

GOVERNMENT OF INDIA (COPYRIGHT) 2002

ROAD AND RAIL MAP

22

INDIA - ROADS AND AIR ROUTES



TOPOGRAPHICAL MAPS

- Maps which represent a symbolic or conventional picture of the physical and cultural landscape of small area on very large scale are known as Topographical maps or topo sheets.
- These maps are based on actual survey of the area.
- The scale of the maps is large enough to show the physical and cultural features in detail.
- These features are represented by specific symbols, signs and colours
- Topo sheets are available on scale of 1:250000 and 1:50000 & 1:25000

TOPOGRAPHICAL MAPS

'Topographic sheet' contain information about an area like roads, railways, settlements, canals, rivers, electric poles, contours/levels and important land marks etc. According to their usage, they are available at different scales (e.g. 1:250000, 1: 50000 and 1:25000 etc, where the former is a small scale as compared to the latter). They are made on a suitable projection for that area and contain lat-long information at the corners. Thus any point on it can be identified with its corresponding lat-long, depending upon the scale (i.e. if the scale is large, more accurate lat-long).

WHO PREPARE TOPOGRAPHICAL MAPS

'Survey of India, The National Survey and Mapping Organization of the country under the Department of Science & Technology, is the OLDEST SCIENTIFIC DEPARTMENT OF THE GOVT. OF INDIA. It was set up in 1767

In its assigned role as the nation's Principal Mapping Agency, Survey of India bears a special responsibility to ensure that the country's domain is explored and mapped suitably, provide base maps for expeditious and integrated development and ensure that all resources contribute with their full measure to the progress, prosperity and security of our country now and for generations to come.

INFORMATION ON TOPOGRAPHICAL MAPS

- Name of State and District
- Location in terms of latitude and Longitude
- Scale
- Magnetic declination
- Conventional signs
- Date of issue and revision of toposheet.
- Type of landforms such as general slope, hills, valleys etc.
- Drainage – Important rivers and tributaries , drainage pattern
- Vegetation – Type of forest and type of trees and their distribution.

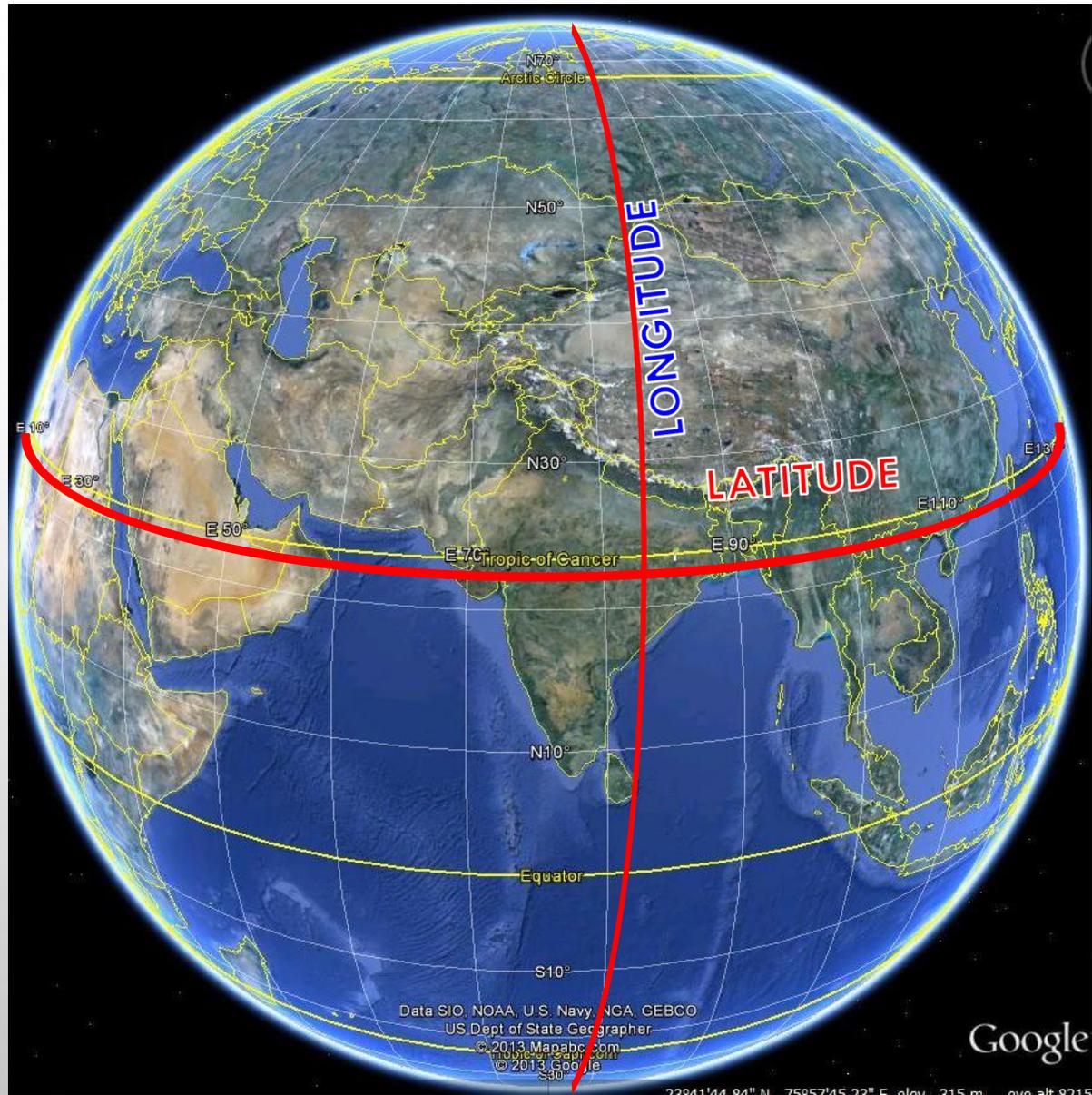
INFORMATION ON TOPOGRAPHICAL MAPS

- Forest location and area covered
- Wild life sanctuaries and area covered
- Land Use cultivated land, waste land and other uses
- Means of irrigation – Canal, wells and tanks etc
- Communication – Railway, roadways, Bridges, cart track, Telephone lines, Transmission lines, airport, seaport etc.
- Settlement – Urban centers, their sizes, rural settlement their pattern

USES OF TOPOGRAPHIC MAPS

- A student of geography studies physical and cultural landscape of area.
- A traveler or a tourist tries to find out locations and plans his tour accordingly.
- A planner/ engineer studies natural and cultural resources before planning for development project.
- A military general may require it to chalk out his strategy of defense or aggression.

LATITUDE & LONGITUDE



Characteristics of Different Scales SOI Toposheet

Number of map (ex-ample)	Name	Number of Divisions	Scale in Degrees	Scale in Inches	Scale in Centimeters	Contour interval in ft.
53	Million Sheet	136	4° latitude × 4° longitude	1 in = 16 mile	1 cm = 10 km	500
53 C	Degree or Quarter	16 (A to P)	1° latitude × 1° longitude	1 in = 4 mile	1 cm = 2.5 km	250
53 C/NE	Half Inch	4 (NE, SE, NW, SW)	30' × 30'	1 in = 2 mile	1 cm = 1.25 km	100
53 C/8	Inch	16 (1 to 16)	15' × 15'	1 in = 1 mile	1 cm = 0.5 km	50

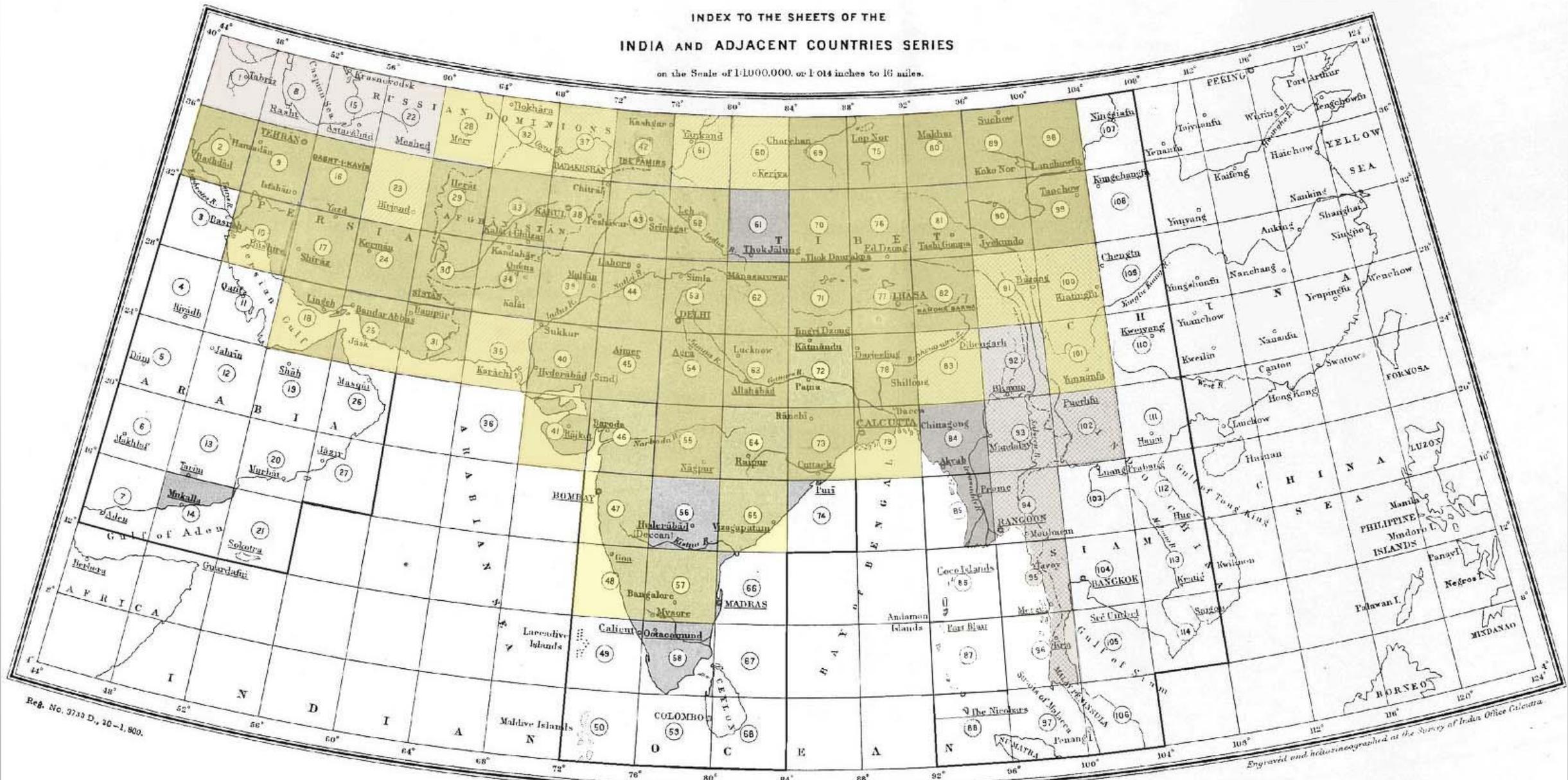
MILLION SHEET MAP

- ✓ For the purpose of an interaction series (within 40 N to 400 N latitude and 440 E to 1240 E) at the scale of 1:1,000,000 is considered as a base map and this map is called million sheet map.
- ✓ The million sheet map which scale being 1:10,00,000 (1cm to 10 km) or 1:M each covering 40 of longitude and latitude .
- ✓ The numbering of sheets in India is based on the number system of maps of india and these series bears the numbers like 1,2,3,4 ...upto 136 consisting of the segments that cover only land area.
- ✓ these 136 such sheets cover India and adjacent countries and these numbers are known as index number of the area.
- ✓ For example , sheet number 73 is consider for Jharkhand area.

TOPO SHEET GRID

INDEX TO THE SHEETS OF THE INDIA AND ADJACENT COUNTRIES SERIES

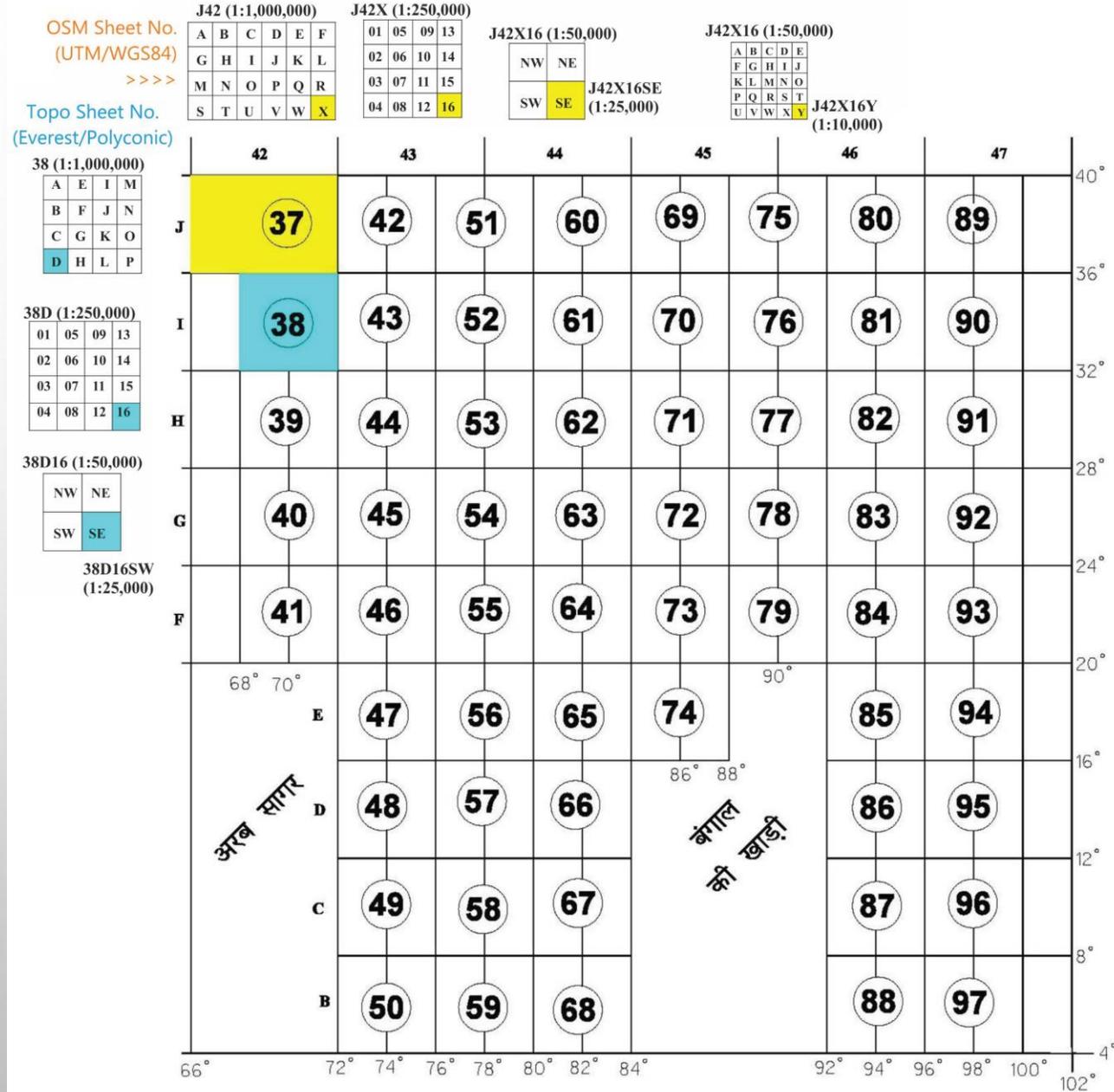
on the Scale of 1:1,000,000, or 1:104 inches to 16 miles.



Reg. No. 3733 D, 10-1, 900.

Engraved and lithographed at the Survey of India Office Calcutta.

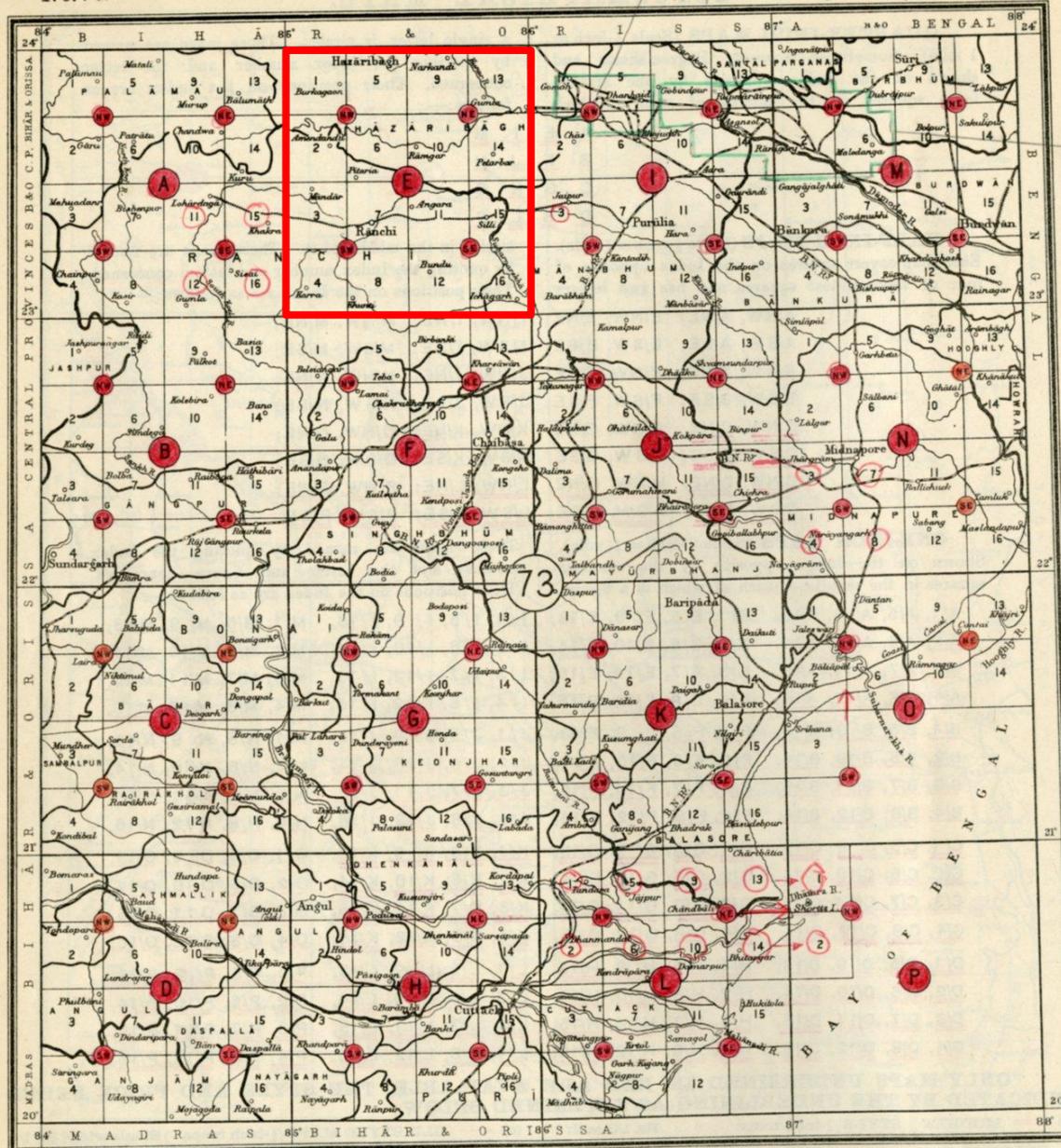
Index for conversion of Topo Sheet No. to OSM Sheet No.



TOPO SHEET GRID

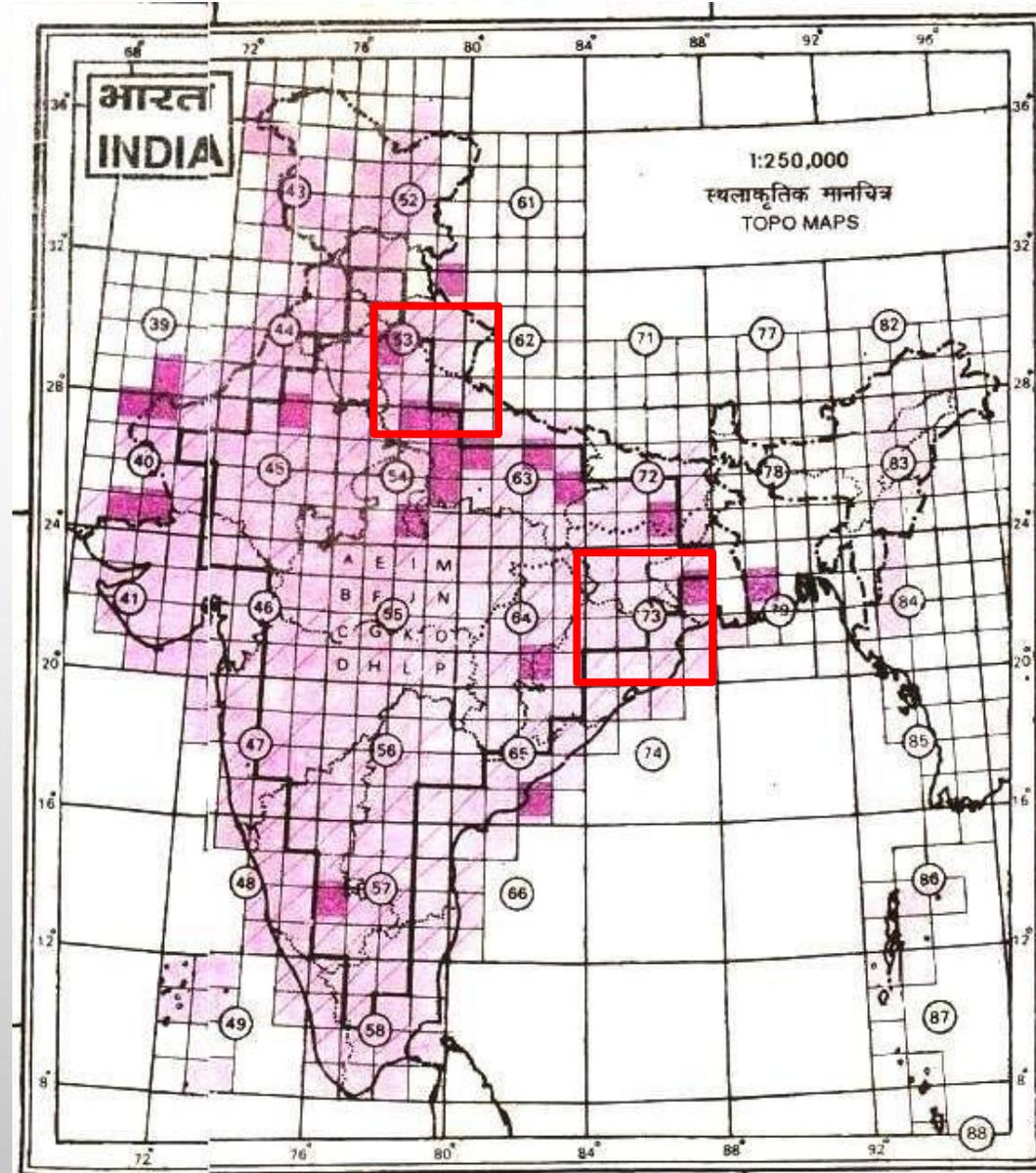
INDEX
No. 73.

see Jharia Coalfield under
India-- Parts of for 1:15,840
maps of this area



see Ranigumri
Coalfield under
India--
Parts of
for
1:15,840
maps of
this
area

TOPO SHEET GRID



TOPO SHEET GRID



TOPOGRAPHICAL MAPS SCALE 1:250000

A	E	I	M
B	F	J	N
C	G	K	O
D	H	L	P

53

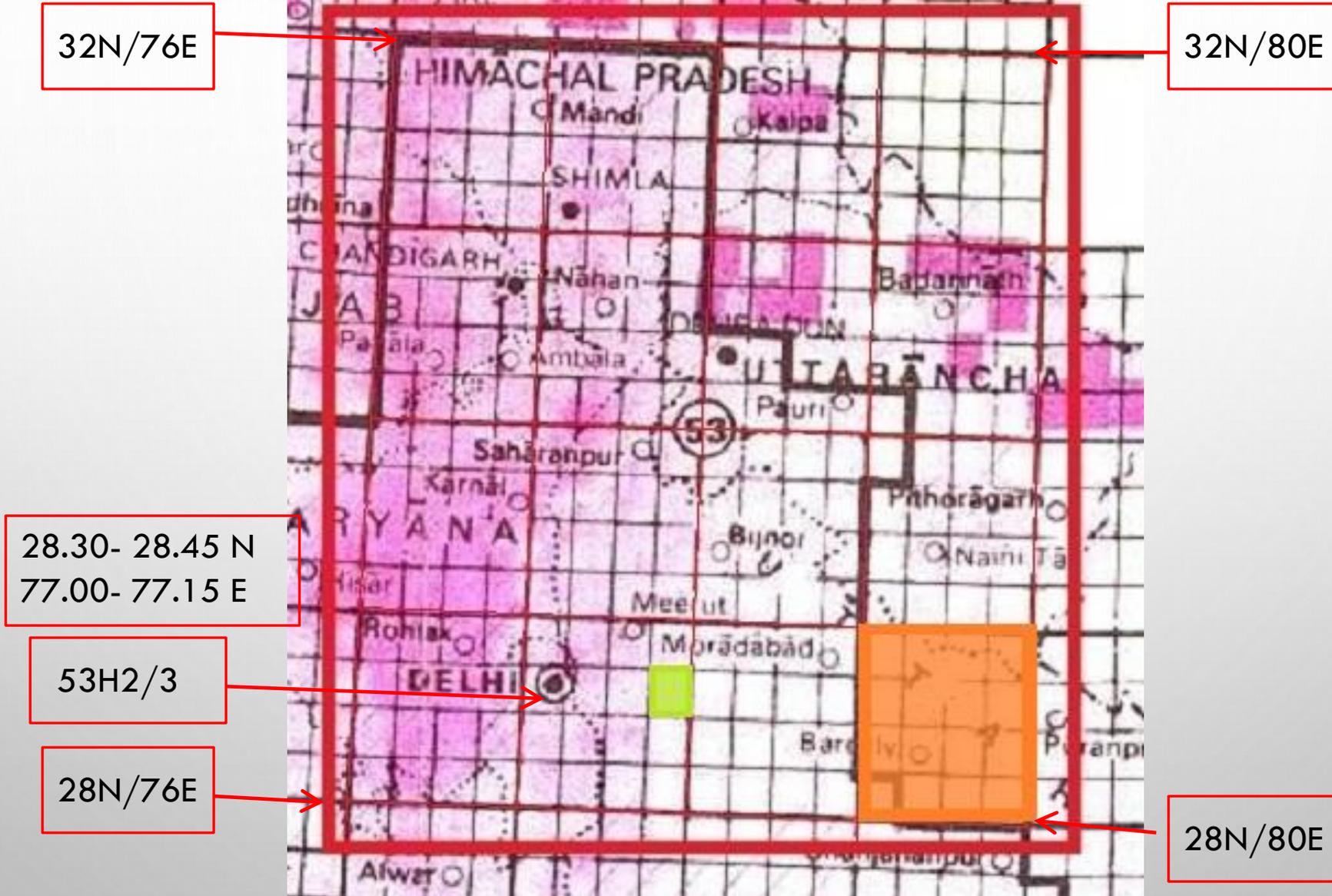
Each sheet cover area equal to 1 degree x 1 degree

TOPOGRAPHICAL MAPS SCALE 1:50000

1	5	9	13
2	6	10	14
3	7	53H	15
4	8	12	16

Each sheet cover area equal to 15 Minutes x 15 Minutes

TOPO SHEET GRID



28° N

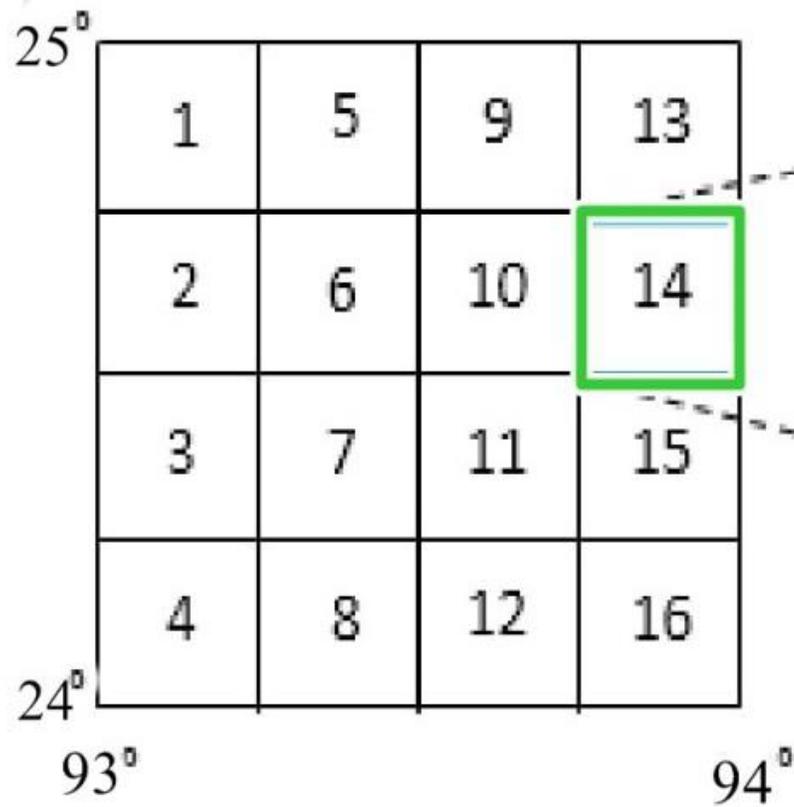
24° N

90° E

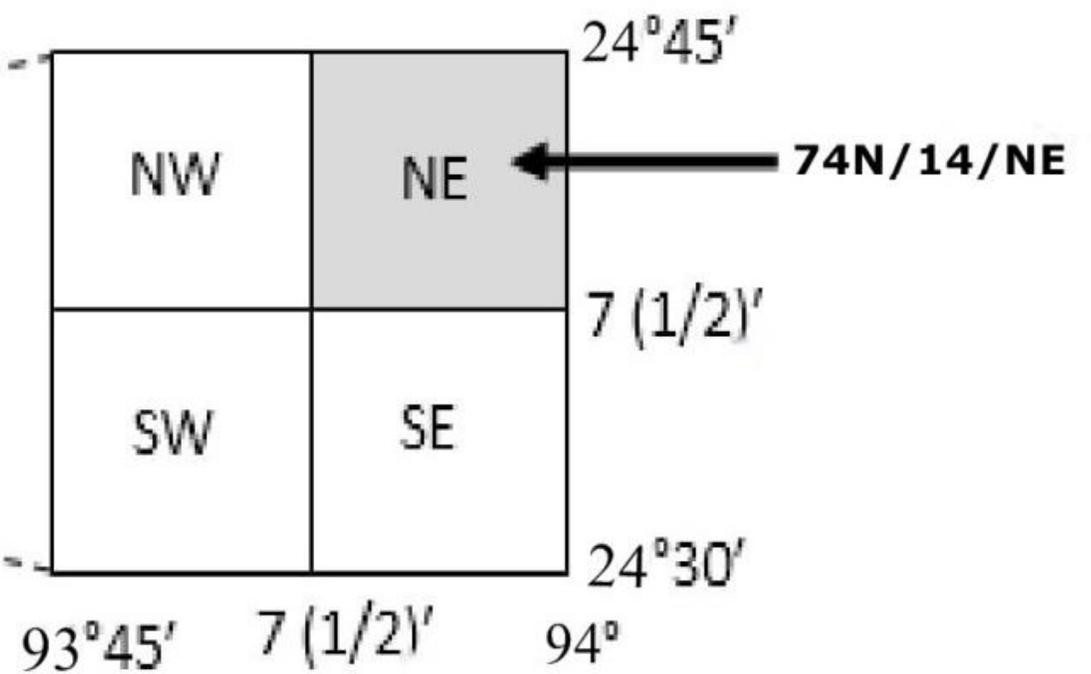
94° E

79

A Sheet of 4° x 4° (Scale: 1:1,000,000)



A Sheet of 1° x 1° (Scale : 1:250,000)



A Sheet of 7(1/2)' x 7(1/2)' (Scale : 1:25,000)

Topographical maps with scales

1" to 16 miles ↓ 1:1000,000	1" to 4 miles ↓ 1:2500,000	1" to 2 miles ↓ 1:125,000	1" to 1 miles ↓ 1:50,000	1" to ½ miles ↓ 1:25,000
---	--	---	--	--

Characteristics of Different Scales SOI Toposheet

Number of map (example)	Name	Number of Divisions	Scale in Degrees	Scale in Inches	Scale in Centimeters	Contour interval in ft.
53	Million Sheet	136	4° latitude × 4° longitude	1 in = 16 mile	1 cm = 10 km	500
53 C	Degree or Quarter	16 (A to P)	1° latitude × 1° longitude	1 in = 4 mile	1 cm = 2.5 km	250
53 C/NE	Half Inch	4 (NE, SE, NW, SW)	30' × 30'	1 in = 2 mile	1 cm = 1.25 km	100
53 C/8	Inch	16 (1 to 16)	15' × 15'	1 in = 1 mile	1 cm = 0.5 km	50

TOPO SHEET GRID

- ✓ For the purpose of an interaction series (within 40 N to 400 N latitude and 440 E to 1240 E) at the scale of 1:1,000,000 is considered as a base map and this map is called million sheet map. The million sheet map which scale being 1:10,00,000 (1 cm to 10 km) or 1:M each covering 40 of longitude and latitude. The numbering of sheets in India is based on the number system of maps of India and these series bears the numbers like 1,2,3,4 ... upto 136 consisting of the segments that cover only land area. These 136 such sheets cover India and adjacent countries and these numbers are known as index number of the area.
- ✓ For example, sheet number 79 is considered for further discussion. Its extension is from 240 N to 280 N and from 900 E to 940 E.
- ✓ The million sheet has been subdivided into 16 sections (4 row and 4 column), each of 10 latitude x 10 longitude and each part is numbered with block capital letter of English alphabet A to P. The sections start from North West directions, run column wise and end in South East direction.

- ✓ As the extension of each section is 10 latitude and 10 longitude the scale of this sheet is 1 inch to 4 miles or 1: 250,000. The numbering of one of the sheet is 79 N and its extension is from 260 N to 270 N and from 93 Degree E to 94 Degree E.
- ✓ The 10 x10 sheets are further sub divided into four parts which is known as half inch sheet , each of 30/ latitude and 30/ longitude and the scale is 1 inch to 2 miles or 1: 125,000 . these are identified with the help of cardinal direction NE, NW, SE, and SW. let us take the figure number 3. It is extended between 260 30/ N to 270 N and from 930 30/ E to 940 E .
- ✓ The 10 x10 sheets can also divided into 16 equal part or sections, numbering from 1 to 16 in a column and each of 15/ latitude and 15/ longitude. Each part will have a scale 1inch to a mile or 1:63360 or 1:50,000.

- ✓ This is also known as 30/ x 30/ (Scale 1:100,000) one inch map and this is the most common type of map produced by Survey of India . the extension of the sheet is 79 N/14 and is from 240 30/ N to 250 N and 930 15/ E to 940 E.
- ✓ The 1 inch sheet (15/ x 15/) can be divided into 4 sheets. Each of 7 (1/2)/ and are numbered as NE, NW, SE, and SW. the scale of this sheet is 1:25,000 or 1 inch to 1/2 mile. This sheets are not very much common in use.

SOME FACTS

- Circumference of Earth is 40000Kms app.
- Circumference is divided in to 360degree by imaginary lines
- When we move North –South or East West distance travelled at Equator is :
 - Distance Per Degree = 111 Km
 - Distance per Minute = 1.85 Km
 - Distance per Second = 30.83 Meter

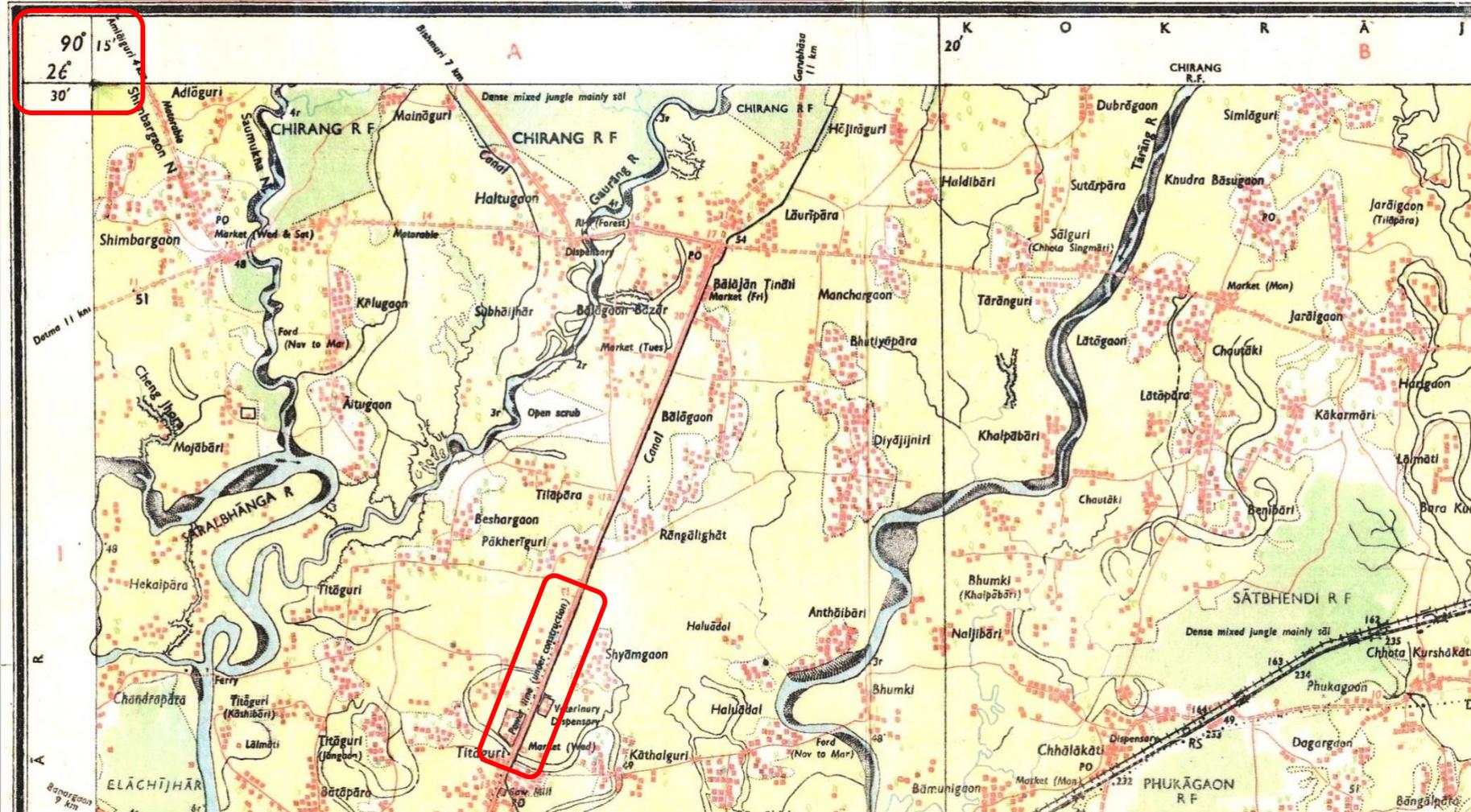
TOPO SHEET READING

GOĀLPĀRA DISTRICT.

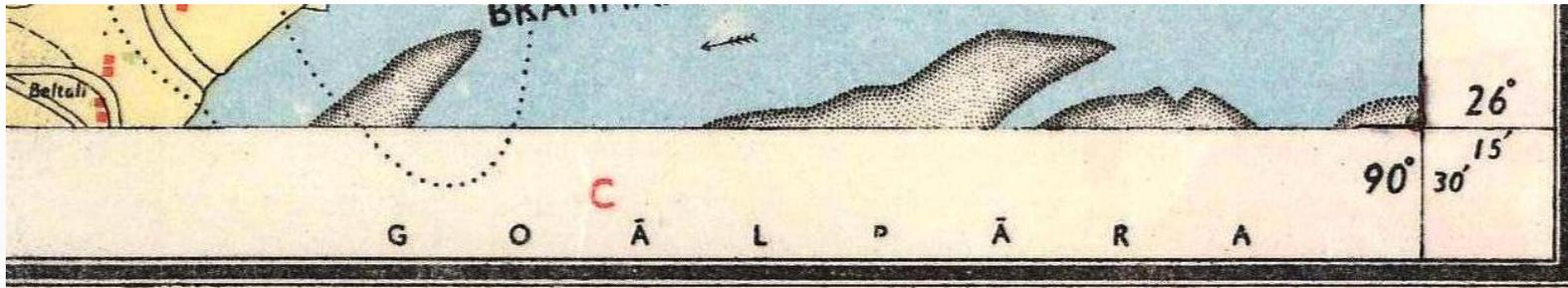
RESTRICTED

Surveyed 1969-70.

ASSAM



TOPO SHEET READING



Administrative Index



PRINTED AT THE I.O.I. (M.L.O.) PRINTING GROUP OF SURVEY OF INDIA

Towns or Villages: inhabited; deserted. Fort.				
Huts: permanent; temporary. Tower. Antiquities.				
Temple. Chhatri. Church. Mosque. Idgāh. Tomb. Graves.				
Lighthouse. Lightship. Buoys: lighted; unlighted. Anchorage.				
Mine. Vine on trellis. Grass. Scrub.				
Palms: palmyra; other. Plantain. Conifer. Bamboo. Other trees.				
Boundary, international.	-----			
" state: demarcated; undemarcated.	-----			
" district; subdivn., tahsil or taluk; forest.	-----			
Boundary pillars: surveyed; unlocated; village trijunction.				
Heights, triangulated: station, point; approximate.				
Bench-mark: geodetic; tertiary; canal.				
Post office. Telegraph office. Combined office. Police station.				
Bungalows: dak or travellers; inspection. Rest-house.				
Circuit house. Camping ground. Forest: reserved; protected.				
Spaced names: administrative; locality or tribal.				



GOVERNMENT OF INDIA COPYRIGHT, 1974.

Price: Five Rupees.

RESTRICTED

This map is NOT to be published, copied or reproduced in part or in whole either by photography or by any other means: should be kept in safe custody and handled by authorized persons only.

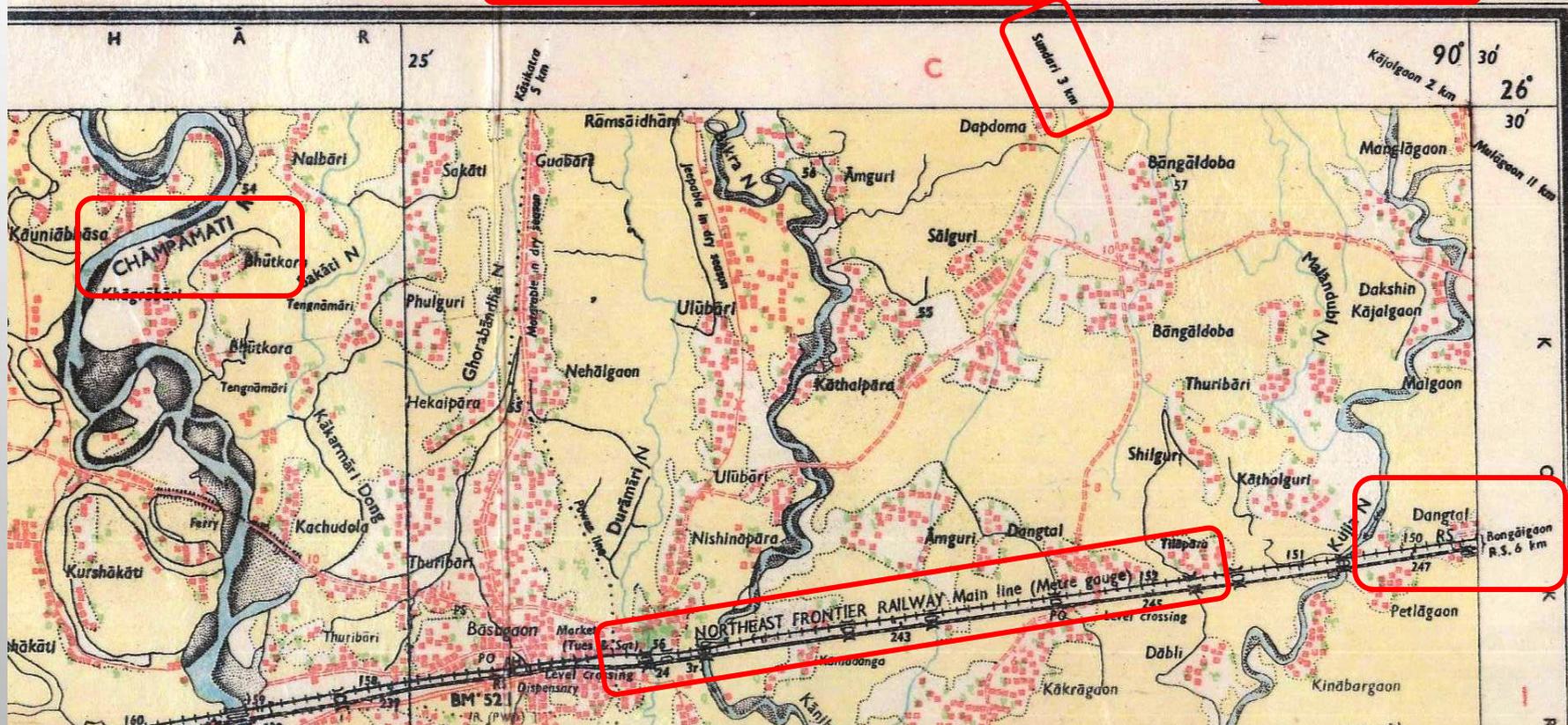
TOPO SHEET READING

FIRST EDITION

INDIA
REFER TO THIS MAP AS :- 1:50,000
SHEET 78 J/7 FIRST EDITION

Magnetic Variation from True North about $\frac{1}{2}^{\circ}$ West in 1970.
(Annual change negligible)

No. 78 $\frac{J}{7}$



TOPO SHEET READING



Published under the direction of Dr. Hari Narain, M.Sc., D.Phil., Ph.D., Surveyor General of India, 1974.



Water features are shown in blue where they generally contain water.
Cultivated areas are coloured yellow.
The exterior boundaries of areas of Reserved or Protected Forests are shown by green ribands.

Contours are approximate.
A relative height, *sr.* represents the approximate height, in metres, between the top and bottom of a steep slope.
Wooded areas are coloured green. Scattered trees and other vegetation are in green, but prominent surveyed trees are in black.

The triangulated heights and contours in this sheet have not been adjusted to the heights of the spirit-levelled bench-marks and may not be strictly in accordance with them.

The kilometre stone numbers along roads, railways and canals are shown in slant type, e.g. '5' whereas milestone numbers are shown in upright type, e.g. '5'.

The area adjoining the Brahmaputra River is liable to change owing to continual fluctuation in the course of the river and remains flooded during rainy season.

All unmetalled roads inside the Tea Gardens are motorable in dry season. Permission to use these roads is required from the Tea Garden authorities.

Boundaries of Reserved Forests have not been shown for want of information.

The alignments of the subdivision boundaries, shown on this sheet, are based on the information, supplied by the Deputy Director of Surveys, Assam, but have yet to be verified.

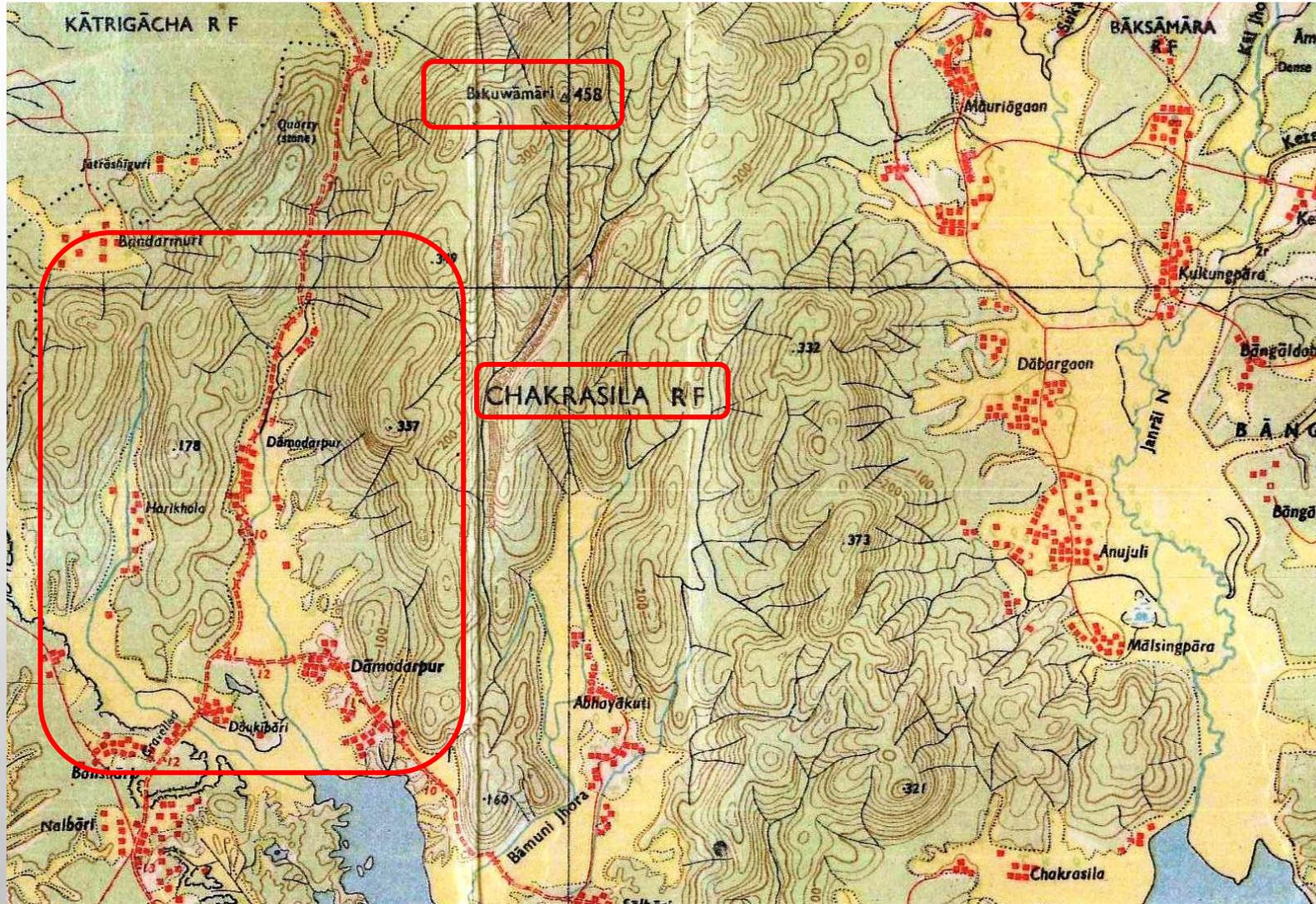
REFERENCES

NH 31 National Highway No. 31.

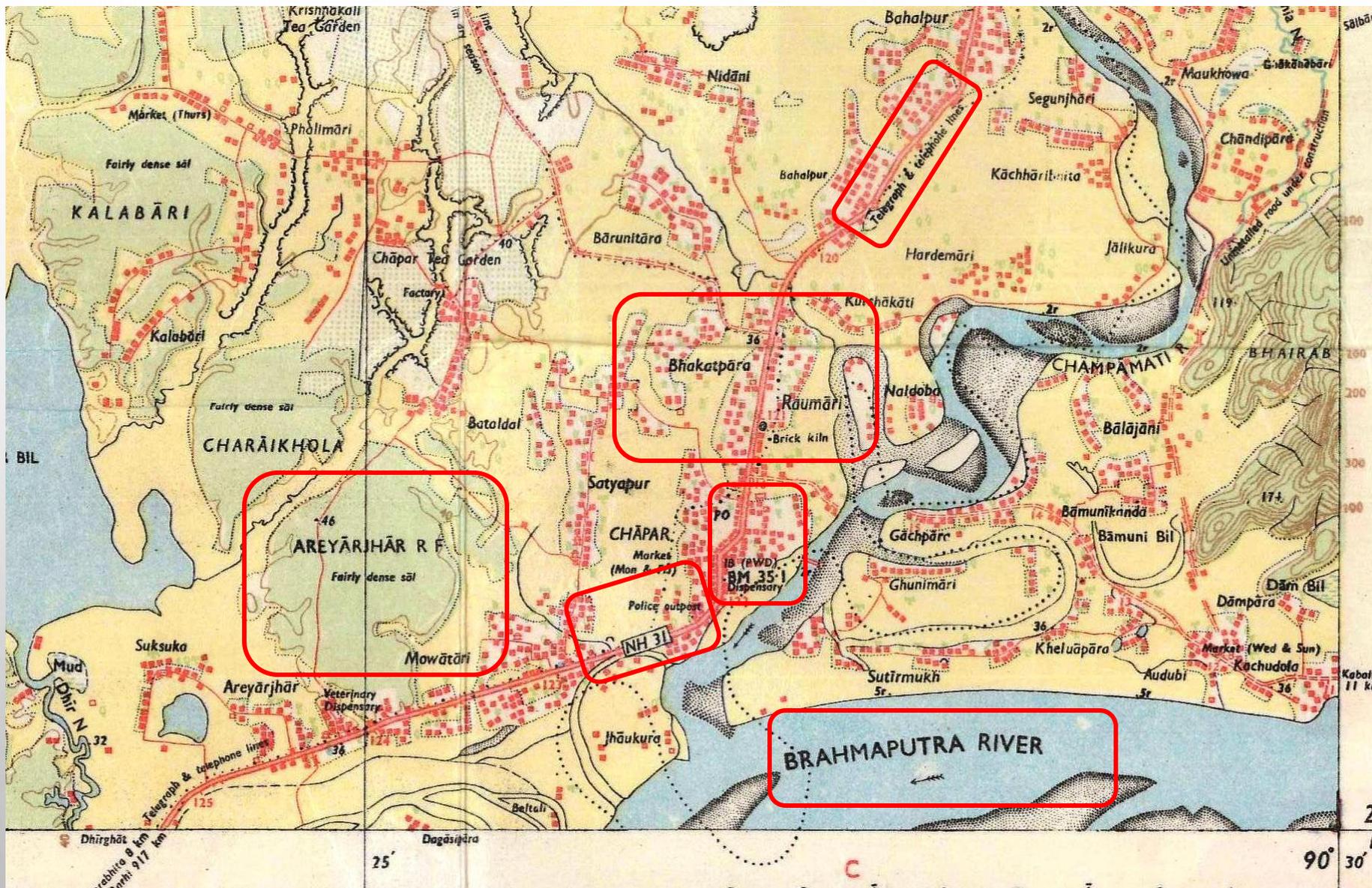
Administrative Index



TOPO SHEET READING



TOPO SHEET READING



- Topographic maps or topo sheets can be procured from [Survey of India office Hathi Badkala Estate Dehradun](#).

[Contact No 0135-2747051-56](#)

- Topographic maps are also available at Regional offices of Survey of India located in different states.
- There are two categories of toposheets
 - a. Restricted topo sheets : Covering border area or other sensitive area can be procured with the approval from respective ministry.
 - b. Unrestricted topo sheets : These sheets can be procured directly from available source.
 - c. Topo sheets are available at nominal cost of Rs. 35 to 75 only.

- ✓ NPG Group under Engineering Services is custodian of Topo sheets available in engineering and cater to requirement of all the engineering groups.
- ✓ We are having 3460 topo sheets .
- ✓ These sheets are issued on temporary basis as books are issued in library.

We have learnt that the topographical map are large scale maps prepared to show minute details of the ground. i.e. location (longitude and latitude of any location), spot height, bench marks, vegetation, land use, form of settlement, drainage patterns, transport network and communication network.

SOI Topographical Maps:

1. **Topographical Maps** : (Everest Datum and Polyconic Projection)

These maps were printed on 1:250,000; 1:50,000 and 1:25,000 scale.

On implementation of National Mapping Policy-2005 on 19 May, 2005 production of topographical maps has been replaced with Open Series Maps (OSM) and Defence Series Maps (DSM) on 1:250,000; 1:50,000 and 1:25,000 scale.

2. **Open Series Maps (OSM)**: (WGS-84 Datum and UTM Projection)

These maps are being prepared on 1:250,000; 1:50,000 and 1:25,000 scales for the use of general public for supporting development activities in the country. They do not contain grid and classified information; therefore, they are kept under Unrestricted category. Some maps sheets are also printed in Hindi and other regional languages.

3. **Defence Series Maps (DSM)** : (WGS-84 Datum and LCC Projection)

These are prepared on 1:250,000; 1:50,000 and 1:25,000 scales for the use of defence forces of India and caters to support National security requirements. They contain full features of map with grid, contours and other classified information without any dilution of accuracy; therefore, they are kept under Restricted category. Survey of India is only authorized for preparation and printing of DSM. For sale and distribution the responsibilities are assigned to ADGMS (GSGS), Ministry of Defence, DGIS Enclave, Rao Tula Ram Marg, Delhi Cantt.

Q: What is difference between normal geographic map & Topographical (Toposheet) map?

A:Topographical maps or topo sheets represent symbolic or conventional picture of the physical and cultural landscape of small area on very large scale where as normal geographic map is on small scale and sufficient features are not indicated.

Q:Who prepares topographical maps?

A: Survey of India, The National Survey and Mapping Organization of the country under the Department of Science & Technology, is assigned role as the nation's Principal Mapping Agency, Survey of India bears a special responsibility to ensure that the country's domain is explored and mapped suitably,

FREQUENTLY ASKED QUESTIONS

Q:How to know the toposheet number of a location?

A:Index map has been divided into horizontal & vertical lines (latitude & Longitude) Each segment of 4Deg x 4Deg is assigned a number, 1,2,3 etc. This is further divided in to 1Deg x 1Deg and assigned alphabet A to P. There is further subdivision of 15' x 15', These subdivision are numbered 1 to 16. If we know location in latitude & longitude term toposheet number can be located very easily otherwise we have to locate some important town near to the location indicated on Index map.

FREQUENTLY ASKED QUESTIONS

Q:Can we know the altitude of a particular location on toposheet?

A:Contours are drawn on map, we can know approximate altitude of location from contour lines.

FREQUENTLY ASKED QUESTIONS

Q: What is difference between restricted map and unrestricted map?

A: Restricted topo sheets are covering border area or other sensitive area and can be procured with the approval from respective ministry whereas unrestricted topo sheets can be procured directly from available source.

FREQUENTLY ASKED QUESTIONS

Q: From where the topo sheets can be procured?

A: These can be purchased from Survey of India Hathi Badkala Estate Dehradun Or from any regional office of Survey of India.