

SURVEY OF INDIA



HANDBOOK OF TOPOGRAPHY

CHAPTER XI

GEOGRAPHICAL MAPS

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INDEX TO CHAPTER XI

<u>Para No.</u>	<u>Topic</u>	<u>Page No.</u>
SECTION I		
1	History of Geographical mapping in survey of India:	3
2	Definition of Geographical map:	4
3	Proposed series of Geographical maps:	4
4	Brief description of each Geographical map:	6
5	Sources of Data for compilation and reference:	8
6	Compilation of Geographical maps:	9
6.1	Conventional	9
6.1.1	Selection of Material and Preparation of Key Plan:	10
6.1.2	Compilation Chart: -	11
6.1.3	Rough Compilation (R.C.):	11
6.1.4	Selection of Detail at R.C. Stage	11
6.1.5	Mosaics	11
6.1.6	Fair mapping	12
6.2	Digital method of compilation:	12
6.2.1	Digital Geographical data base (DGDB):	13
6.2.2	Creation of DGDB	14
6.2.3.1	Factors influencing generalization:-	15
6.2.4	methods of generalization:	16
6.2.5	Broad Directive for Generalization	16
6.3	Exaggeration	17
7	Contents of Geodata base:	18
8	Geographical names:	25
8.2	Errors in geographical names :	25
8.3	Standardization:	25
8.4	National Gazetteers	28
8.5	Name beyond a single sovereignty:-	28
8.6	Vernacular Names:-	28
8.7	Density of Names: -	29
8.8	Descriptive Remarks	29
8.10	Spelling and Alignment of Names:-	30
8.11	List of important locality names	31
8.12	Foot-notes, Symbol Tables and Other Marginal Items:	32
8.13	Spelling and Alignment of Names:	32
9.	Adjustment of Edges:	32
10.	Boundaries	32

11 Political Tints and Boundary Ribands:	34
12 Digitization	36
12.2 Data Model Structure for Geographical mapping:	36
12.3 Cell and Font Library for various categories of Geographical maps:	36
13. Hill shading:	36
13.1 Status of DEM Data and creation of hill shade	37
14. Patterning	37
15. GIS	37
15.1 Selection of attributes for GIS:	37
15. Examination	38
20. Sheet File	39
22. History Sheet	40
23. Responsibility for compilation	41
24. Maintenance and reissues	41

SECTION II

1. International Map of the World (IMW)	42
2. ICAO Maps	61
3. State Map series	61
4. Specification for the 1:2,500,000 Map of India and adjacent countries	65
5. Political map of India	74
6. Physical map of India	78
7. Map of India and adjacent countries	83
8 Road map of India	86
9 Railway map of India	92
10 Map of great Himalaya and surrounding areas	97
11 World Map	104
12 Plastic Relief Maps:	105

SECTION I
Preface to present edition

During last two decades there has been a major change in concept and technique of map making. Conventional mapping technique has already been superseded by digital technology. There have been major changes in specifications too. For our topographical maps new policies have been framed that transformed our topographical maps from Polyconic to UTM projection and from Everest to WGS 84 datum. With this, available edition of Chapter VI and Chapter XI dealing with Topographical and Geographical maps respectively, in conventional method, have become obsolete. On the other hand, if we consider the user segment, there is a change in taste. A group of customer demand soft copy maps, there is a group showing interest in GIS ready data to suit their need. Changes in Printing Technology also compel redesigning of maps (size) that must be compatible for the new printing press. It is also to note that maps published by Survey of India are basic tools to meet academic and administrative requirement. In view of this, we may have to analyze the requirement of the available set of Geographical map series a fresh and future requirement to be assessed. If we try to concentrate on these issues there is need to re- write chapters with new set of rules and guidelines.

With this objective, a committee has been constituted for the revision of Chapter XI. Committee has analyzed the various aspects and drafted Chapter XI, touching all the important points. Certain issues pointed out by the committee were also circulated amongst the Directorates, and their suggestions/comments have been incorporated at proper places.

It is also to note that this new Chapter XI cannot be considered as an independent document/ guide for Geographical mapping. New edition of Chapter VI being prepared, incorporating new guidelines on topographical mapping in digital environment, need to be referred along with chapter XI wherever necessary.

1. History of Geographical mapping in survey of India:

At an International Conference held in London in 1909, it was decided to prepare International Map of the World (IMW) to standard specifications. Each member nation possessing suitable cartographic establishment was required to prepare and publish, in consultation with adjoining countries, sheets covering certain territories in accordance with its geographic position. This was the first step for Survey of India to expand its domain in to geographical mapping. In survey of India, drawing of IMW maps started as per the standard guidelines. Further, in 1937, Colonel J.D. Campbell, then D.M.P., produced Departmental Paper No. 16 on Map Policy. As a result of this, certain firm decisions on future mapping policy were arrived at. For various reasons, the chief being the advent of World War II little was done to implement these decisions. As a result, the main object of his Paper-that of establishing a settled Map Policy for continuous application over a long period (10 years as suggested)-has never been achieved. Departmental Paper No. 17, published in 1947, laid down the general Survey and Mapping Policy in the post-war and post-partition era. This paper chiefly deal with the topographical survey and mapping aspect and from it evolves the necessary organisation to give effect to this policy. This paper also made an estimated time period of 8 years to complete the Geographical mapping task out of which 2 years were to be spared for completion of immediate essential requirements for ICAO.

During 1938, there was a major policy decision, where it was decided that, in future all maps of 1:2m and smaller were to be in Lambert's Conical Orthomorphic projection. Till then all our Geographical Maps were on Modified Secant Conical Projection. This was a major decision in change of concept, on which DMP commented,

“If we are to recompile and redraw all these series it will involve a long interim period, to cover which we must have some up- to- date Geographical maps on at least 2 scales, one for a wall map and one for a desk map: these would then be maintained to their proper edition interval until superseded by the new compilations on the Lambert Projection of other wall and desk maps. Alternatively, we could modify the 1938 decision and the adoption of the Lambert Conical Orthomorphic Projection could be made applicable only to maps on scales of and between 1:2M and 150-mile. The President, Geodetic and Research Branch has been consulted, and agrees that below 150-mile scale the errors of the graphical scale will be so small as to be no

practical source of embarrassment. At some future date, when all our Geographical Maps above the scale of 150-mile to an inch are available on the Lambert Projection, the question of recompilation maps on scales smaller than 150-mile to 1-inch can be reconsidered”.

It was a valuable comment and therefore decision for compilation of all maps on LCC projection were taken up only when **Geographical Maps** above the scale of 150-mile to an inch were available on the Lambert Conformal Conic Projection. Till to date the decision prevails and most of the Geographical maps drawn on LCC projection.

Departmental publication Part I dealing with map projection was made available and have the complete projection data for each category of topographical and Geographical map. Till recently, Part I was referred as an important tool for Projection parameters but after introduction of digital method, Part I has been sidelined since software’s cater all that it is available in Part I.

2. Definition of Geographical map: The distinction between a Geographical Map and a Topographical Map may be expressed thus:

A Geographical Map is one that is on such a small scale that the features shown on the map are suitably generalised and the map is intended to give a picture of the country as a whole, and not a strict representation of its individual features.

The Survey of India classes all maps on scales smaller than 1:250,000 (or 1 inch to 4 miles) as Geographical Maps.

A Topographical Map, on the other hand, is one on a sufficiently large scale to enable the individual features shown on the map to be identified on the ground by their shapes and positions.

3. Proposed series of Geographical maps:

(a) Series maps covering India

- 1:1m International map of the world (IMW)
- 1:1m World aeronautical chart (ICAO)
- 1:1m and 1:1/2 M State map series

(b) Other geographical maps:

- Road map of India on 1:3.5m/1:2m@
 - Railway map of India on 1:3.5m
 - Physical map of India on 1:4m
 - Political map of India on 1:4m
 - Map of India and adjacent countries 1:8M **
 - World map on 1:30m
- (c) Plastic relief maps:
- India Physical at scale 1:15M
 - India Political at scale 1:15M
 - Relief maps of selected states 1:1.5M
- (d) Map covering particular area only:-
- 1:2,500,000 Maps of Great Himalaya and Surrounding Regions.

3.1 All the above categories of maps to be made available in both Hard copy and Soft copy.

3.2 Specially customised maps can be generated and sold as per the requirement of indenters.

3.3 Need based GIS can be created for Indenters as per their requirement

@Present road map prepared in 1:2.5 m scale is too big and is a mosaic of four pieces. To avoid mosaicing, it is proposed that scale to be reduced to 1:3.5m so that it is a single piece and handy. However, by this, smaller settlements and unclassified roads will be lost. Therefore, it is proposed that the whole country can be suitably divided into three-four parts and road maps can be prepared for each part on scale 1:2m separately. This will accommodate more road information with better clarity. Design and lay-out of these part maps are to be decided by NGDC.

*** As per the existing chapter XI, India and adjacent country series were published on 1:2.5M 1:8M, 1:12M and 1:16M. In the present scenario, publication of maps in four different scales is redundant and therefore 1:8M to be continued with and 1:2.5 M, 12M and 16M to be dropped.*

4. Brief description of each Geographical map:

4.1 1:1,000,000 the International Map of the World (IMW) or Carte Internationale du Monde (CIM):- CIM series maps are prepared by compilation from the of 1:250,000 topo maps and retains major topographical features. These maps are published as per the international guidelines on the lay-out of $6^{\circ} \times 4^{\circ}$ and serve as the basic input documents for compilation of other small scale geographical maps.

4.2 1:1,000,000 Worlds Aeronautical Charts-ICAO: - Preparation of ICAO maps are International commitment and are published at various scale as per the Guidelines of International civil aviation organisation. These maps/charts help civil aviation and IAF

4.3 1:1,000,000 and 1:500,000 State Maps: - The intention is to cover the whole of India by the minimum number of State Maps possible by resorting to convenient grouping of states. Earlier practice was to publish all state maps in 1:1m scale but after creation of few new states, maps were also published in 1:500,000 scale for selective states.

4.4 1:3,500,000/1:2,000,000 Road Map of India: - Aim is to provide road information for the whole country. Subject to the limitations of the scale, all motorable roads and connected information (in India) are shown. It includes an inset map showing air routes. Till to date, road map published in 1:2.5m is a mosaic of four pieces and is too big in size

Therefore new road map as envisaged in 1:3.5M scale will be smaller and single piece depicting all major roads; Express highways, National highways and State highways. Further, entire country to be suitably divided in- to 3-4 parts and each part to be covered in scale 1:2M depicting important roads and settlements that can be depicted within the available space.

Lay-out to be designed by NGDC, Dehradun

4.5 1:3,500,000 Railway Map of India: - It is designed to show the railway systems in India and is published biennially (in two editions, English and Hindi) with corrections supplied by the Railway Board. Zonal railways are shown in contrasting colours and States are given distinctive colour tints. The positions of the various coalfields are shown in dark grey. It includes an inset map showing air routes also.

4.6 1:4,000,000 Political and Physical Map of India: - These form our small scale wall maps. Physical map give main emphasis to drainage system and relief of country, whereas Political map depicts states and union territories with contrasting colours.

4.7 1, 8,000,000 Map of India and Adjacent Countries: - It is a general map with emphasis on physical features. Hills are portrayed by stump shading.

4.8 1:2,500,000 Map of Great Himalaya and Surrounding Regions: - It is a layered map in 2 sections, covers the Himalaya and Central Asia and shows information of interest to mountaineers and explorers. Previously this map was titled “Highlands of Tibet and Surrounding Regions”.

4.9 1:30m World map: Though there is no mention about the publication of world map in existing chapter, there are world maps published on scale 1:40m and 1:20m. Digital version of world map on 1:40m prepared by NGDC is also available. After comparison of 1:40m and 1:20m it is found that most of the design aspects are similar except that, the map in 1:40 m does not contain insets like; northern & Southern polar region and also the world air and sea navigational routes. Therefore, future edition of world map should be done in an intermediate scale of 1:30m. This will contain all the insets as existing in 1:20m.

4.10 Plastic relief maps: Decorative wall maps in very small scale printed on plastic surface with Three Dimensional modelling on following scale.

- India Physical at scale 1:15M
- India Political at scale 1:15M
- Relief maps of selected states 1:1.5M

4.11 Edition Interval:

The normal edition interval for the various maps will be as follows:-

- | | | | | |
|-------|--|----|----|----------|
| (i) | 1:2,500,000 Road | .. | .. | 2 years |
| (ii) | 1:3,500,000 Railway Map | .. | .. | 2 years |
| (iii) | 1:2,500,000 Map of Great Himalaya
and Surrounding Regions | | | 10 years |

(iv) All other Geographical Maps 5 years

The above intervals do not mean that the maps are automatically re-issued at these stated intervals, but indicate that the organisation is available to reissue the maps at these intervals if changes demand it.

5. Sources of Data for compilation and reference:

Geographical maps are compiled maps and dependant on secondary data source. Topographical series on various scale prepared by Survey of India are the basic input. Beside that, data need to be taken from external sources for the regions falling outside Indian territories. Earlier, materials listed below were referred for compilation but situation at present is different, since we can use Internet to gather information on foreign countries. However, one should verify the authenticity of internet sites while taking disputed elements like; International boundaries, Name of countries/sites etc to avoid any embarrassment.

The officer responsible for the compilation of a Geographical Map should consult all relevant maps and books available. The following are some of the important publications that are being referred at the time of compilation:

- (1) The Geographical Journal.
- (2) The Himalayan Journal.
- (3) Statesman's Year Book.
- (4) Military Route Books, Military Reports and Gazetteers, available with the Director Military Survey.
- (5) Books of travel and exploration in Trans frontier areas.
- (6) Aeronautical Information Circular No. 11/68 or its latest equivalent for list of aerodromes in India.
- (7) Marine and Admiralty Charts.
- (8) Gazetteer of India.
- (9) Maps published by foreign countries available in No. 1 D.O(presently NPG) or in Director of Military Survey Library.
- (10) Latest World Atlases.
- (11) Latest Census Reports.
- (12) Maps published by local governments.
- (13) Departmental Railway and Road Maps for classification of lines of communication though not for alignment or location.

- (14) Indexes to Surveys and Exploration in the Himalaya and Central Asia.
- (15) Geography and Geology of the Himalaya by Burrard and Hayden.
- (16) Gazetteer of Chinese place names based on V.K. Ting Atlas compiled by United States Board on Geographical Names, 1944.
- (17) P.C.G.N. Lists for Trans frontier areas.
- (18) Imperial Gazetteer of India.
- (19) Constitution of the Indian Republic.
- (20) Chinese Postal Guide.
- (21) Inland Mission Map of China.
- (22) Particulars of the Radio Network in India from A.I.R., Delhi.
- (23) Motor Guide Books and Road Books.
- (24) Glossary of words in various Indian and Asiatic languages used on Survey of India maps, 1st Edition 1940, published by Survey of India.
- (25) Any other publication considered to be authentic.

6. Compilation of Geographical maps: Whether it is Analogue method or Digital method, basic principles of compilation remain unchanged. Present day requirement is extensive use of digital method for compilation of geographical maps. Still, few steps rigidly followed in Analogue (conventional) method have been described below to understand gravity of the old process. This gives insight to the old cumbersome job, and today's digital compilers can learn fundamentals out of this.

6.1 Conventional

The following is summary of the general procedure for preparation of a Geographical Map:-

- (i) Obtaining Surveyor General's orders.
- (ii)(a) Selection of material and preparation of a Key Plan.
- (b) Preparation of a Compilation Chart.
- (iii)(a) Collection of material and Rough Compilation.
- (b) Merging of components (Mosaicing).
- (iv) (a) Fair drawing.
- (b) Preparation of Colour pattern
- (v) Plate Making and Final Printing.

6.1.1 Selection of Material and Preparation of Key Plan: -

(a) The compilation of Geographical Maps cannot be done according to any hard and fast rules. Everything depends on the purpose for which the map is prepared, the quality of the data/material available and the affect desired. Therefore, as far as compilation is concerned, this para deals with basic principles, rather than rules. There can not be rigid guidelines for the compilation of Geographical maps like what we have for our topographical series. The compiling officer must exercise his own judgement in deciding what data/material he will use, how he will use it, what detail he will show and what he will omit.

(b) Material for any Geographical Map is generally selected from the map/maps on the next larger scale; thus for 1: M mapping the relative importance of the material to be used is:-

- (i) Digital Topographical Database on scale 1:250,000 and 1:50000.
- (ii) Modern Extra-departmental Maps.
- (iii) Old Departmental Maps.
- (iv) Any other maps.

(c) The first essential, therefore, is to select the data/material on which the map under compilation is to be based. The selected material is then indexed in a fresh design file (chart,) on some scale called Key Plan, (e.g., 1:2M, 1:6M, 1:15M indexes, etc.) of a convenient size. This will prevent the overlooking of any data/material already available or expected shortly. At this stage a clear ruling should be obtained from the Administrative Officer as to what data/material for inclusion can be expected in the near future. If it is not likely to come in before that stage, it should be ignored and left for a future edition.

(d) The relative values of the data available should be carefully considered and the limits of the material selected for each area accurately marked on the Key Plan. Title of the document, seasons and scales of survey and dates of publication are also to be marked on key-plan.

(e) Mention should be made of reference books and maps to be consulted. The edition foot-note pertaining to the map under compilation should be entered at the south-west corner of the Key Plan.

6.1.2 Compilation Chart: -

- (a) The hard and soft copy of the compiled scale should be sent for scrutiny and entry of additional information to
 - (i) State GDCs whose areas fall in the map and
 - (ii) The Director General of Military Survey, Army H.Q., New Delhi, in the case of sheets containing frontier and Trans frontier areas.
- (b) The information received should be examined independently and approved by Administrative officer.
- (c) The Compilation Chart should be kept in the Sheet file.

6.1.3 Rough Compilation (R.C.): -

- (a) The first step is to collect all the large scale data/material mentioned in the Compilation Chart and bring it all to a common projection/ datum and scale
- (b) A list of unwanted details should be prepared and these details should be filtered out from the data.
- (c) Necessary generalization/sampling should be done at this stage.
- (d) If there already exists an edition of the map under preparation, data of this edition can be utilized for areas in which no later surveys exist. If such areas are small, it will be found better to do recompilation from the larger scale material.
- (e) Data without shade, tints and boundary riband should be used for this compilation.
- (f) Where contours are required for the map under preparation, e.g., layered maps with shade, contour data should also be obtained.

6.1.4 Selection of Detail at R.C. Stage: - Guiding principles should be laid down for the persons employed in the compilation work keeping in view the specifications of the map in hand, and precise instructions as to what sites, communications, boundaries, streams, contours, bridges, ferries, aerodromes, antiquities, should be kept. Generally about 30% more items are taken up for final compilation.

6.1.5 Mosaics: - At rough compilation stage, generally information are collected from various sources (maps), each may vary in term of projection and scale. It is therefore necessary to bring them to a unified projection base

on a uniform scale. This entire process of generating a projection surface and pasting component pieces together is called mosaicing. Mosaic piece of map thus achieved is the main source or input for fair mapping. Old edition of chapter VI can be referred for detail rules and regulation of mosaicing process.

6.1.6 Fair mapping: In conventional method of mapping, there are two methods; (a) Paper drawing method and (b) Negative scribing method

- (a) **Paper drawing method:** In this method Blue prints are obtained from mosaic sheet (by photography and printing process). Separate originals are drawn for each colour, Name plates are prepared by type setting or pasting method, colour guides are prepared. Finally, all originals are combined together by photographic process and offset printing to achieve multicolour map. Chapter VI can be referred for the complete process.
- (b) Negative scribing method is superior to paper drawing method. In this process, drawing is done with the help of needles on plastic coated sheets. By this process we eliminate the costly photographic process. Quality wise this is superior to paper drawing method. Chapter vi and scribing manual can be referred for detail process.

6.2 Digital method of compilation:

After closure of conventional mapping (paper drawing and scribing technique) and switching on to new technology in digital environment, Geographical-mapping process has taken a new shape.

Following Geographical maps in Digital environment (dgn. format) have already been processed by NGDC but none is freshly compiled. These maps were prepared, taking the available hard copy maps as a source material and without changing basic style of maps.

- Road map of India 1:2.5m
- Railway map of India 1:3.5m
- Railway map of India 1:10m
- India and adjacent countries 1:4m
- India and adjacent countries 1:2.5m
- World map 1:40m
- Physical map of India 1:4m

- International map of the world (few sheets) 1:1m
- Motoring map of India

Set of above series available in digital format (mostly in dgn format) can be up- dated at regular interval and modified data can be used for publication of latest geographical map in each scale.

Then question arises ---- what the need of fresh compilation is?

Chapter XI that is being prepared must narrate the entire compilation process in detail so that it can fulfil our mapping requirement and also useful as training-aid for **Freshers** entering to Survey of India, to understand compilation process in detail.

6.2.1 Digital Geographical data base (DGDB):

Conventional method of compilation described in para 6.1 is most cumbersome exercise. One has to struggle to trace selected elements from various component sheets. There are lots of confusion in selection and tracing of features. Finally, joining component sheets on a projection platform to make it a single unit is also a difficult job.

Digital compilation has made our job easier. Creation of DGDB is similar to that of conventional compilation chart but is quite flexible in operation. In conventional technique, separate compilation is done for all categories of Geographical maps. Source materials also differ for each Geographical map. However, DGDB once created can be used for all.

But, before creation of DGDB we must have a planned approach as what is our lowest goal and what is highest. Here it means --what are the possible amount of features that are planned to be mapped in the largest possible scale and smallest possible scale with the help of DGDB.

Though, Definition of Geographical map has drawn a cut- up line on scale (maps smaller than 1:2, 50,000 are termed as Geographical map) but DGDB should not be restricted to it. It is envisaged that smallest unit of DGDB should be on a degree- sheet lay-out but contain less features than that of degree sheet. This must provide Basic platform for all categories of Thematic map, Geographical map and Atlases. Government and private publishers can also share this Base to generate their own product.

6.2.2 Creation of DGDB

(a) Digital Topographical Database on 1:50,000 is available for the entire country that can be used as basic input for creation of Digital Geographical Data Base (DGDB)

(b) DTDB component sheets on scale 1:50,000 on UTM projection & WGS84 datum to be merged together for each Degree square.

(c) Features required for Geodatabase to be selected and rest of the unwanted layers to be deleted at this stage (Refer para----, page---to--- for contents of geodata base)

(d) Working unit to be changed to make this on scale 1:2,50,000

(e) Since, DTDB is available on both **dgn** as well as **mdb** format. In case of dgn data is used, it should be converted to **mdb** format with the help of Conversion S/W.

(f) Linear features and Polygon features to be generalized by deleting close vertices to make it smooth.

(g) **Degree sheet- wise database is thus available on UTM Projection and WGS84 Datum in mdb format.**

(h) Further, it can be transformed to LCC Projection with the help of Arcinfo S/W

Generalized Digital Geographical Data base achieved as above is a basic source from which all Geographical maps can be generated.

6.2.3 Generalization and exaggeration: It is impossible even on the largest scale maps to show all the features in the terrain at exact size and shape on the map to the map scale. Process of generalization helps selection- off and simplification- off the features which appear on the map. It is carried out to aid legibility of a map, and should always be executed with reference to map- scale and purpose of the map. The process of symbolization can itself be called as a form of generalization.

6.2.3.1 Factors influencing generalization:-

(a)Scale:-If we look at the maps on scale 1:10,000, 1:100,000 and 1:1,000,000 we find that there is progressive simplification as the scale decreases. At scale 1:10,000 separate houses and the full street pattern can be shown in a town, where as on scale 1:100,000 same towns are shown by out line only with Main Street in a simplified form. The representation of town on 1:1,000,000 might be confined to a point symbol such as a geometric figure. Many details may have to be omitted as the map of the same area is prepared on the reduced scale.

The smaller the scale, the greater the degree of generalization, as it is impossible to represent features at small scale with same details as they can be shown on larger scales. The representation must be simplified in order to keep a legible image.

(b)Purpose of Map:-Different types of maps are prepared for various users. Features represented on the map should be selected to fulfill the purpose of the map. Say on a land use, map on 1:25,000 scale it would be necessary to show the agricultural field pattern in considerable details. But on a standard topo map of the same area and on the same scale much less information on agricultural pattern would be required.

Selection of features representation on the map depends on the purpose of the map.

Scale and purpose of the map are closely related.

Scales should be chosen to suit the intended purpose of the map. The necessary information must be shown on the map in a legible way. If the degree of generalization is such that information can not be shown in sufficient details at the chosen scale than the scale too small to suit the purpose of map should be enlarged.

When the scale of map is fixed due to some constraints it is necessary to reconsider the specification of contents and necessarily level of generalization.

6.2.4 There are three different methods of generalization:

(a) Selection: -The purpose of Map is the main factor in determining the selection of details, which have to be represented – it is absolutely essential that the map contains all the information relevant to its purpose. Conversely it is pointless to include details which are not relevant to the purpose.

(b) Simplification: -It means structural generalization. Features which are too small or too complex to be shown in full details must be simplified to avoid loss of legibility or over crowding the map. Map scale is the main factor in this factor.

(c) Omission: - In order to preserve the legibility and clarity of the map certain features may be omitted even though they may in fact to be a specified for inclusion. Scale is again an important factor here. The nature of terrain is also a critical consideration.

It will be noticed that there is a close relationship between all the three aspects of generalization and in practice it is difficult to consider each in isolation from the other.

6.2.5 Broad Directive for Generalization:- Generalization is a very subjective operation. Given a map sample at a particular scale and asked to re-draw it for reproduction at a smaller scale introducing the necessary degree of generalization, twenty different draftsmen will produce twenty results of map. It would be difficult to judge which the best solution has, though it would be clear that some results are better than the other.

It being a subjective operation it is difficult to give a set of rule of generalization. Broad rules are directives which can be more or less being universally applied for generalization are given below:

(a) Observe the map purpose at all times:-This is one of the basic rules for map designer and generalization has to be done keeping in view. All maps intended to fulfill certain purpose and the selection of details must be in consistent with the map purposes even any simplification due to a scale should meet the requirement of the map user.

(b) Maintain the essential character of the area:-The map should aim to give faithful representation of the area regardless of scale of map.

Simplification increases with the reduction of the scale. In spite of simplification, visual impression of the character of the area should be preserved.

(c)Be consistent in treatment: It is essential to preserve the same degree of generalization over the map as a whole. When a series of map are involved it is more difficult. There is a stronger tendency to over simplify area with high density of details and reverse is true of areas of scarce details where the temptation is to under generalization.

This may lead to an impression that both areas have similar amount of details. Thus misleading impression of terrain is created.

If a person actually performing the generalization is familiar with the area it will be more difficult to simplify its representation, *the reverse is also true* i.e., if a person is totally ignorant of the character of the area the simplification is easier. But this does not mean that generalization should be done by the person who has no knowledge of the area. The person who has the knowledge of the area may take more time to sort out the relevant details but the resultant generalization is much more liable to give a representation consistent with the actual nature of the terrain.

6.3Exaggeration: Exaggeration can be considered as a particular type of generalization. It is a technique of enlarging the representation of features on the map with respect to what would be their dimension at the scale of the map. Exaggeration of the map is carried out to add legibility or it may be applied to the emphasis to particular feature. The amount of exaggeration is directly related to the actual size of the features and the map scale and as a general rule the amount of exaggeration increase as the scale decreases. The concept of exaggeration though quite simple creates quite a few problems concerned with preserving true shape and position in the exaggerated symbol. Exaggerated symbol occupy more space on the map than it does on the terrain.

To preserve correct position the exaggerated symbol should be placed with its centre or axis over true position of the features and where feature stands in isolation this presents no problem.

Where the placement of details over centre or axis is not possible the only solution is to simplify the path of the line i.e., to smooth it out thus we can

see exaggeration in fact generates the simplification. The example is of winding roads in the mountains.

The other problem faced is when the adjacent are exaggerated and exaggeration of these symbols to overlap each other solution to this problem is to move some of the features in favour of the other. To achieve consistent map product it is customary to standardize the procedure as far as possible.

In the case of topographical maps where accuracy is of prime importance, this problem is of more severe. In this case normally point symbol is displaced by line symbol but certain point symbol i.e., triangulation and control points must appear at their correct position and should not be displaced.

Displacement does affect the accuracy of the positioning of the features on map, however relative accuracy is maintained. The features are always maintained in correct position relative to each other even though absolute accuracy can not be preserved.

7Contents of Geodata base: The Geographical Database developed from DTDB must have the following features:

7.1 Settlements:(a) Selection of sites always requires careful consideration because the emphasis shifts according to the purpose of the map, e.g., on a Political Map administrative status is the primary consideration and on a Railway Map junction stations gain importance. In general, subject to the limitations of the scale and purpose of the map, the following sites should appear:-

- (i) Headquarters of all administrative partitions of status not below that of a tahsil.
- (ii) Places of military, industrial, historical and archaeological importance.
- (iii) Places of importance to travellers and tourists, and places mentioned in books of reference.
- (iv) Sites of aerodromes.
- (v) Important waterfalls, dams, canal headworks, etc.

(b) Other things being equal, places with bigger population and Rest Houses should be given preference.

(c) Subject to limitations of scale, capitals of countries and headquarters of states should be shown as surveyed, slightly exaggerated, if necessary, when the site is not large enough to be shown to scale. Other towns may also be shown, as surveyed, if the scale permits.

(d) In selecting railway station sites, their relative importance should not be judged only on the score of population of the villages after which they are named. It may happen sometimes that a railway station, as such, is quite important while the village after which it is named is of little size or non-existent.

(e) In frontier and Trans-frontier areas, especially where no large scale maps exist, it is important to show along main routes as many named sites as the scale permits. Important halting places or camping grounds should also be shown; where they have no local names, the remark "Camping Ground" or its abbreviation CG should be entered against them.

7.2 Railways:- Three classes of railways are normally shown on 1: M maps:-

- (i) Broad gauge, single or double.
- (ii) Metre gauge, single or double.
- (iii) Other gauges.

On the 1:2½M to 1:4½M scale maps, only two symbols are used, one for gauges wider than metre and the other for metre and narrower gauges. On smaller scale maps, only one symbol for railways will be used. Where the scale permits of showing railway stations, these should be indicated by small blocks on the correct side of the line. On maps on scales larger than the 1:2½M important railway bridges and tunnels should be shown.

Ropeways, tramlines and mineral lines should not be shown unless important, and then only on 1:M scale maps.

There are special rules for the 1:3½ million Railway Map *see* its specifications.

7.3 Roads and Passes:-

(a) For purposes of Geographical Maps roads are classified into three categories:-

- i) Express highways
- (ii) National Highways

- (iii) State Highways.
- (iv) Metalled, surfaced or gravelled.
- (v) Un-metalled
- (vi) Track/Path.

(b) Category (iv) roads are generally all-weather-motorable.

Category (vii) roads are motorable in fair weather only. Tracks/Paths are not motorable and include jeepable-tracks, cart-tracks, pack-tracks and foot-paths. When selecting roads from Topo Maps, an all-weather-route should be preferred to a fair-weather-route, even though the latter is shown as of higher importance on the Topo Maps.

The latest situation at any stage may be ascertained from the Union Ministry of Transport and Communications (Transport Wing).

(c) In trans-frontier and mountainous areas, non-motorable main trade routes are shown by track symbol.

(d) Where a road or track follows the bed of a stream, it should be drawn clear of the stream.

(e) Important passes should be entered with names and heights if available. On all Geographical Maps symbol for a pass will be the same as for 1:M IMW sheets, viz., a small bridge symbol to be printed in black.

7.4 Bridges, Ferries and Fords: - These will be shown only on 1:M scale maps and even on this scale only important ones will be shown. These items become particularly important in mountainous and uninhabited areas where no other methods of crossing exist.

7.5 Ocean Steamer Routes: - These should be shown by the proper symbol, in short lengths radiating from ports (or in full height across the sea/ocean as considered suitable to the map in hand) with destinations. All distances across the ocean should be given in terms of nautical miles rounded off to the nearest multiple of ten. The ***Nautical or Sea Mile* is the length of one minute arc of latitude at the mean sea-level.

***The length of this mile varies in different latitudes from about 1861 metres (or 6107 feet) at the poles to about 1842 metres (or 6045 feet) at the Equator and its mean accepted value is 1853 metres (or 6080 feet) = 1 admiralty knot = 1.15 statute miles = 10 cables = 1000 fathoms (each fathom being about 1/80th longer than the common fathom, which is about 1.83 metres or 6 feet). The Geographical Mile which is also the length of one minute of latitude is thus identical with the Nautical Mile.*

7.6 River Steamer Routes: - These will be shown only on 1:M scale maps. The words “Steamer service” should be entered along the symbol, or in the case of narrow rivers, along the river itself.

7.7 Submarine Telegraph Cables :- These should be shown by dotted lines in short lengths radiating from the terminal points (or in full across the sea/ocean as considered suitable for the map in hand) with the entry “Submarine cable” with destination. They will not be shown on maps on scales smaller than 1:2½M.

7.8 Boundaries:-

(a) The following boundaries are generally shown on Geographical Maps:-
In India:-

- (i) External boundaries in India.
- (ii) Boundaries of States and Union Territories.
- (iii) Boundaries of districts and partitions of equivalent status.

Outside India:-

- (iv) International boundaries.
- (v) Major partitions of foreign countries.
- (vi) Sub-Divisional, Tahsil and Taluk boundaries

(b) Boundary enclosing an area or enclave of less than 4mm (or 10/60 inch) in its larger dimension on the scale of publication should be omitted. If such area contains a town of sufficient importance to appear on the map, the name of the district or state to which it belongs may be typed in brackets (in the style of type used for administrative names) below the name of the town.

(c) Boundary pillars are not shown on Geographical Maps.

(d) Boundary symbols along rivers and streams should shown.

(e) Political lines, such as the “Inner Line” in Assam and U.P., will not be shown on Geographical Maps.

7.9 Water Features: - The following should be shown where scale permits:-

(i) Rivers and important streams. Single-line Rivers and streams should be graduated in thickness from the sources. Adjoining sheets should be consulted for graduation of streams which have their source outside the sheet. They should change to double line when the surveyed width reaches about 1mm on scale of publication. As a general rule, once a stream changes to double-line it should continue to remain so. Small streams should seldom be shown by two lines. The courses of rivers and streams which have not

been accurately surveyed should be shown by broken lines. More feeder streams should be shown in hilly areas than in plain areas.

(ii) Important canal systems, important reservoirs (for dams, *see* para 56), locks, sluices and waterfalls (with height); lakes and important tanks (with embankments drawn heavy); springs and wells in dry desert and frontier areas, as applicable to the scale. .

7.10 Coastal Features :- The coast-line which should coincide with the high water line should be shown by a thick continuous line; the low water line, where there is room to show it, should be indicated by a fairly heavy dotted line except below sand or rock symbol, when it should be omitted. Subject to the limitations of the scale of the map, details in the foreshore, such as sand, mud, marsh, etc., should be shown by the proper symbols. The symbols for “marsh without vegetation” and “marsh with vegetation” will be the same as for 1:M IMW Series, viz., bars for the former and bars with reed symbol for the latter.

7.11 Miscellaneous: -Subject to limitation of the scale, the following are shown:-

- (i) Important dams. The symbol for a dam will be the same as for 1:M IMW Sheets, viz., a black bar.
- (ii) Telegraph and telephone lines in Tran frontier areas only and to the nearest important place if continued into India; also post offices and telegraph offices.
- (iii) Important pipe-line and power lines with descriptive remark, especially in Trans frontier areas.
- (iv) Aerodromes will not be shown in areas prohibited to civil-aircraft.

Information to be taken from the Director General of Military Survey, Army HQ. as to which military aerodromes, if any, are to be shown, and to indicate the prohibited areas.

The Director General of Civil Aviation in India maintains lists of aerodromes in India available for civil use. In this connection reference should be made to the Aeronautical Information Circular No. 11/68 or its latest equivalent for list of aerodromes in India.

The categories of aerodromes to be shown on all Geographical Maps and the symbols for them will be the same as for 1:M IMW Sheets, viz.

- (a) International aerodrome: - by a small aeroplane symbol with its nose pointing northwards, enclosed within a circle; to be printed in black.
- (b) Other aerodrome: - by the above mentioned symbol less the circle.
- (v) Mines with their product entered against the symbol if important.
- (vi) Large areas of tea, coffee, rubber, etc., with descriptive lettering Tea Garden, Coffee Estate, Rubber Estate, etc., spaced across the area.
- (vii) Forts should only be shown, when important, by the conventional symbol.
- (viii) Query marks along unreliable details or names in frontier and Tran frontier areas. If the alignment of a road, track or path is doubtful the interrogation symbol, viz., “?”, may be entered against it at intervals. Doubtful names and sites will be shown as laid down in T.H.B. Chapter VI, Appendix E.

Note: - Items (ii), (iii), (v) and (vi) will be shown only on scales 1:2.5M or larger.

7.12 Heights:-

(a) heights should always refer to the ground level, a difference of 2 metres (or 5 feet) or less being negligible, and should be chosen with discretion to mark the dominant features of the country, such as the highest peak or the terminal point of a range, a junction of rivers, prominent isolated peaks, a plateau, a lake, an important town, the crossing of a watershed or a river by a railway or an important route, etc.

As a rule the heights should agree with the basic material but Topo Maps are the final authority.

(b) On 1: M, where possible, the highest and the lowest points in any sheet should always be shown.

(c) A height dot is required only when there may be doubt as to the exact spot referred to.

(d) Heights will normally be entered to the nearest metre. In high mountains and in areas compiled from unreliable material, clinometric heights should be rounded off to the nearest 5 metres and hypsometric and aneroid heights to the nearest 50 metres.

7.13 Hypsometric Tints: Contour lines are useful for engineering and topographical maps for depiction of relief of terrain more accurately. In small scale geographical maps hypsometric tints are applied for this purpose. In this technique, terrain is divided into zones and specific contour lines are retained according to height zones. Each zone bounded by successive principal contour shall have one **distinct tint** called Hypsometric tint.

7.14 Bathymetric Contours and Sea-Depths: - These should be taken from the Admiralty Charts Published by the Naval Hydrographic Office and not shown in too much detail. Depths should be given in metres and not in fathoms. Selected depths should be entered without dots. Bathymetric contours and sea-depths will be inked up in black on the Rough Compilation.

7.15 Ornamentation: - The only ornamentation to be shown is marshes, sand hills and flat sand in desert areas, sand in river beds, sand in dry lakes and tanks, submerged sand and details in the foreshore

7.16 Altitude Scale: - Its purpose is to illustrate the contour intervals (as Geographical Maps do not usually have one uniform contour interval) and colours of the various layers employed the map.

The perimeter of the Altitude Scale and land contours below the SNOW LINE will be printed in brown. The lines indicating SEA-LEVEL and bathymetric contours will be printed in blue. The line indicating SNOW LINE and the contours above this line will be printed in the special blue used for contours in glaciated regions. Contour values go in the same colours as the lines they pertain to.

IF the map contains any land below SEA-LEVEL; it should be indicated in the Altitude Scale.

A foot-note should be entered below the Altitude Scale stating “Contours are approximate and at vertical intervals as above”. In such cases the contour interval note, if any, in the standardised foot-notes should be omitted.

9 Geographical names:

8.1 Introduction: A geographical or Toponym is a name by which a particular physical feature or a populated place is known. The name may be simple such as **Madras** or **Manila** or compound name such as **Mount Abu**. Normally a compound name consists of two parts (sometimes more than two parts) and one of the parts may be generic and the other specific.

The generic part indicates the type of feature and the specific part is the identifying part which identifies the feature - the example is **Mount Everest**, here the **mount** is generic part and the **Everest** is specific identifying a particular Hill.

Some times the apparent generic may be misleading as in the case of Mount Abu which refers to a city and not the particular hill.

8.2 Errors in geographical names:

- (i) The name itself may be wrong.
- (ii) The spelling of the name may be wrong.
- (iii) The name and the spelling are correct but the application may be wrong.

Name can be descriptive. Example being: **Table Mountain** or **Crater lakes**. Name may be record of animal life for example: **Bear Mountain**, **Deer Park**, Name may be humorous or whimsical or may have historical significance which perpetrates the memories of early settlers or notable happenings such as battles are smaller incidence.

8.3 Standardization:

A geographical name constitutes of one of the required elements of identification in administrative and legal documents dealing with the boundaries or region jurisdiction. The writing of a geographical name on maps and other documents has been difficult due to certain confusion and was an obstacle to smooth progress and understanding in economic social, and scientific activities, both at national and international levels. Such

confusion can however be avoided. Some examples of the problem faced are –

- (i) Places have different names and different languages.
- (ii) Places have different spellings in different languages.
- (iii) Different methods of transliteration from one alphabet to another may lead to different names.
- (iv) Different methods of transcribing ideographic language to alphabetic languages.
- (v) Different method of rendering names from unwritten languages.
- (vi) The exact extent of named geographical features.
- (vii) Variation in meanings of common geographical terms: Creek may refer to an inlet from the sea or to a small stream far from the sea.

In the first meeting of the international geographical union held in 1873 a resolution was passed that international usage of maps should be based on the national standardization. Similar resolution was passed in other international organization. Some of the countries have begun standardizing geographical names but until all the countries standardize geographical names international standardization cannot properly start.

The object of international standardization is to facilitate international exchange of goods, services and to develop cooperation in economic, scientific and among other activities.

8.3.1 Domestic (National) Standardization: - United Nations Conference on Standardization of geographical names held in Geneva in 1967 are recommended that as a first step in international standardization of geographical names each country should have national geographical names authority which should formulate the policy for standardization of the geographical names within the country. It should publish and distribute the names both nationally and internationally.

The name authority should define, formulate and adopt the guiding principles and practices that it will apply for the standardization of geographical names. In the principles and practice should cover the following

- (i) Factors taken into account while considering the name proposals:

- (a) Current local usage
 - (b) Historical background
 - (c) Treatment in multi-lingual areas and un-written language.
 - (d) Avoidance of repetition of names.
 - (e) Avoidance of more than one name for same feature.
 - (f) Classification of the precise extent of each individual geographical name.
 - (g) Elimination of objectionable names.
- (ii) Based upon the field investigations and with the help of surveyors, cartographer, geographers, and linguists the national name authority should prepare an inventory of the national geographical names. Before standardization of the name the following information should be collected.
- (a) Written and spoken form of the name and its meaning according to local inhabitants. The local spoken form of the name should be written in phonetic notation approved by the national name authority.
 - (b) Spelling in cadastral documents and land registers.
 - (c) Spelling on modern and old maps and in other historical source\documents.
 - (d) Spellings in census reports, and gazetteers.
 - (e) Spelling used by other local administrative and technical services.

The character extent and the position of the feature named should be determined and recorded as accurately as possible. The meaning of the generic term used locally should be clearly defined.

Persons responsible for the collection of names should have adequate training to recognize and deal with the linguistic problem, geographical phenomena and terminology that they are likely to encounter. However, while standardizing the names the following should as far as possible be avoided.

- (i) Unnecessary changing of name should be avoided.
- (ii) The naming of the features after living persons should be discouraged.
- (iii) The different names to different section of the feature should be avoided.

- (iv) Combination of words in different language should be avoided.
- (v) Double naming of features should be avoided.
- (vi) National authority on geographical names should be consulted on proposed names of new features.

In the case of multi lingual areas where more than one languages exists the national name authority should determine the geographical names in each of the official languages and other languages as appropriate.

8.4 National Gazetteers: The UN recommended that each National Name Authority should and continually revises appropriate gazetteers of all the standardized geographical names. Each gazetteer should include a minimum of such information as is necessary for the proper location and identification of the named features. In particular national gazetteers should have the following information:-

- (i) Kind of feature to which the name applies/ pertains
- (ii) Precise description of location and extent of the features, including the point position reference if possible of each named feature.
- (iii) Parts of natural features should be additionally defined by reference to the whole and names of the extended feature should be defined as necessary to their constituent parts.
- (iv) Information should be added on administrative or regional areas.
- (v) All the officially standardized names for a feature.

8.5 Name beyond a single sovereignty:-

Some features extend across the frontiers of two or more nations and may have more than one name. In such cases the geographical names authority of the nation's concerned attempt to reach agreement on these conflicting names and their application.

8.6 Vernacular Names:-

(a)As a general rule, the English word for any Topographical feature (such as pass or river) should be used on Geographical Maps. But in cases where the vernacular word for any particular feature has become generally or historically associated with the name of the feature, the vernacular term

should be retained. Obvious tautology should, however, be avoided. Thus we have: -

- (i) Karakoram Pass, Mana Pass, Paiwar Kotal, Shipki La, Bum La; but not Shipki Pass or Shipki La Pass.
- (ii) Oxus Rive, Mekong River, Amu Darya, Hari Rud; but not Amu River or Amu Darya River.
- (b) The following are exceptions to the general rule :-
 - (i) For the word “Lake”, preference will be given to the vernacular equivalent, where it has already come into general use. Thus we have Lop Nor, Koko Nor, Pangong Tso, but Wular Lake, Manasarowar Lake
 - (ii) For names of buildings for which there is no exact English equivalent, the vernacular term should be retained. Thus we have Gompa or Kyaung rather than Monastery; Ziarat rather than Shrine, Qila, Garhi or Dzong rather than Fort.

8.7 Density of Names: - Names are not entered at the Rough Compilation stage. They are entered later on the Guide for Outline and Name Original-or Pattern. The number of towns and village sites should generally follow the density of population and it should be remembered that too thick a density of names tends to confuse detail and make the map difficult to read. It is better to have a few rather than too many names. Also *see* para 48.

8.8 Descriptive Remarks: - (i) The words “unexplored” or “unsurveyed” should be entered where appropriate. The former should be entered when the area referred to is blank.

(ii) In frontier and transfrontier areas, names of important halting places and camping grounds, if known, should be shown; otherwise the abbreviation ‘CG’ should be entered against them.

8.9 Names: - (a) The sizes and cases of types, mentioned in Type Table for Topo Maps for various items may be varied to suit the purpose and nature of the map in hand. But all sites should be named, except when specifically provided, otherwise, in the specifications of a map.

(b) (i) Names of capitals of countries and state (or province) headquarters (including summer headquarters) should generally be in upper case.

(ii) Names of headquarters of districts and *tahsils* should generally be in upper case.

- (iii) Names of places of military, commercial and historical importance may go in one size larger than their population justifies.
- (iv) Prominent type should not be used on the evidence of census report only. These sometimes group a wide heavily populated area under one place name which is not otherwise important.
- (v) Administrative spaced names of status lower than that of district are not entered.
- (vi) Names of important localities, estates, hill ranges, peaks, passes, rivers, glaciers, canals, lakes, waterfalls, islands, gulfs, and other sea and coastal features may be entered subject to limitation of the scale. Particular care should be taken to include names which cover areas so wide that they have not been found suitable for inclusion on Topographical Maps, e.g., Chota Nagpur, Sunderbans, Indian Ocean, etc. A list of locality names suitable for inclusion on Geographical Maps on different scales is given in Appendix V of this Chapter.
- (vii) Important tribal names may be entered. They should always be in the singular.
- (viii) For spaced names, the rules laid down in Chapter VI, Sec. IV, should be followed. These names should be as nearly horizontal as possible and should always be easy to read from the centre of the south margin. Names should not be so widely spaced as to be difficult to read; it is better that a name should be clearly legible across the centre of an area than that it should extend over the whole length. When letters are substituted for names of small administrative areas, the same style of type as for the full name should be used. When such abbreviations are explained in foot-note it is not necessary

8.10 Spelling and Alignment of Names:-

(a) The spelling of geographical names should follow the rules laid down in Chapter VI, and the spelling and accenting adopted should be identical in all maps published by the department.

(b) In all Geographical Maps, names, which are entered horizontally, should be parallel to the latitude lines. This procedure should be followed even when the edges of the map are rectangular and do not conform to spherical limits.

8.11 List of important locality names: Localities names are to be printed
On the maps as per the chart below:

Locality	Maps on which to appear	
	Largest Scale	Smallest Scale
ARAKAN COAST	1:M	1:2,500,000
AVADH	“	1:8,000,000
BAGHELKHAND	“	“
BARI DOAB	“	“
BALTISTAS	“	“
BUNDELKHAND	“	“
CHAJ DOAB	“	1:2,500,000
CHHATTISGARH	“	1:4,000,000
CHOTA NAGPUR	“	1:8,000,000
COROMANDEL COAST	“	“
DECCAN	1:2,500,000	1:12,000,000
DERAJAT	1:M	1:8,000,000
DUARS	“	1:4,000,000
GREAT INDIAN DESERT	1:2,500,000	1:12,000,000
HUNDESH	1:M	1:8,000,000
KARNATAKA	1:2,500,000	1:12,000,000
KATHIAWAR	1:M	1:8,000,000
KONKAN	“	“
KUMAUN	“	“
MAKEAN	“	“
MALABAE COAST	“	“
MALWA (Punjab)	“	1:2,500,000
MANJHA	“	1:M
NORTHERN CIRCARS	“	1:12,000,000
RECHNA DOAB	“	1:2,500,000
ROHILEHAND	“	1:8,000,000
SIND SAGAR DOAB	“	“
SUNDARBANS	“	“
TENASSERIM COAST	“	1:2,500,000
THAL DESERT	“	1:M
TIRAH	“	1:2,500,000
TIRHUT	“	“
TOBA	“	“
TRIANGLE	“	1:8,000,000

8.12 Foot-notes, Symbol Tables and Other Marginal Items: -

- (a) Headings, foot-notes, symbol tables, references and other marginal items will appear in border file.
- (b) For maps forming parts of a series, e.g., 1:M IMW, etc., separate engraved prints of several individual items like standardised foot-notes, symbol tables, etc., are available in Eastern Printing Group Kolkata. These should be obtained and used.
- (c) For maps to be engraved afresh, marginal items will not generally be engraved but will be incorporated at the negative state.

8.13 Spelling and Alignment of Names:-

- (a) The spelling of geographical names should follow the rules laid down in Chapter VI, and the spelling and accenting adopted should be identical in all maps published by the department.
- (b) In all Geographical Maps, names which are entered horizontally should be parallel to the latitude lines. This procedure should be followed even when the edges of the map are rectangular and do not conform to spherical limits

9. Adjustment of Edges: - Particular care should be taken to adjust the edges of the sheets with Adjoining sheets, if any, each edge being initialled by the section officer.

10. Boundaries:-

- (a) Geographical Maps are generally concerned with the following boundaries:-
 - (i) International.
 - (ii) Inter-State in India and boundaries of major partitions of foreign countries.
 - (iii) District.

The Ministry of External Affairs is responsible for supplying the necessary information regarding the external boundary of India, the international boundaries and the internal boundaries of foreign countries, and should be consulted. The inter-state and district boundaries in India are the responsibility of Regional Directors concerned.

On some maps item (iii) is omitted and on some others both (ii) and (iii) are omitted; see specifications of individual maps.

(b) External boundary of India:-

(i) If the external boundary of India falls in the mapped area on a sheet, the boundary must be shown correctly as regards symbol and alignment.

(ii) **For all maps, in which the external boundary of India falls a boundary report must be prepared by Boundary verification wing of International Boundary Directorate SGO.** If the boundary is already approved by Ministry of External Affairs, Government of India, on a map of equal or larger scale, the delineation of the boundary should be scrutinised at proof stage by International Boundary Directorate SGO against the approved alignment, amended as and where necessary and certified as correct. The report should be approved by International Boundary Directorate SGO. If however, the boundary or any part of it, is not already approved, as stated above or if the boundary approved earlier has been changed due to resurveys, etc. Boundary verification Wing of International Boundary Directorate should be consulted, at proof stage, the boundary against the largest scale map/maps available, consult all available documents concerning the boundary and point out and explain any of the discrepancies which may be found. This report, with International Boundary Directorate recommendations and two proof copies of the map with boundary ribbands entered should be submitted to the Ministry of External Affairs for approval of the boundary shown. Allowance should be made for the necessary proofs in the Publication Instructions. One proof will be recorded in the Ministry of External Affairs and the other, duly endorsed by the verifying authority, in International Boundary Directorate SGO

(iii) All maps which contain any part of the external boundary of India or any other international boundary (in the main map or the insets) should be treated as secret, unless or until, the boundary as shown on them is approved by the Ministry of External Affairs.

(iv) In the case of a State Map, if the correct alignment of the external boundary of India falling in it is not already available with the Directorate concerned, it will be obtained from International Boundary Directorate SGO.

(v) Indian territory is defined in the First Schedule of the Constitution of India.

(vi) The statement regarding the boundary, in the History Sheet, must always be most carefully prepared. It should contain all the salient

- points though not in the same detail as for Topo Maps. Any differences with the previous edition should always be mentioned.
- (vii) GDC should not correspond about the external boundary of India with Local Governments until they have obtained the views of the International Boundary Directorate SGO, who alone will normally make any reference that may be necessary to the Ministry of External Affairs.
- (viii) Boundary pillars will not be shown on Geographical Maps.
- (c) Other international boundaries:-
- (i) Their alignments may be taken from the best source that may be available, but preferably from authoritative maps on same or larger scale published by the countries concerned.
 - (ii) As in the case of the external boundary of India, a boundary report will be prepared by International Boundary Directorate and approval of the Ministry of External Affairs obtained, where necessary, before final printing.

11 Political Tints and Boundary Ribands: - For entry of political tints boundary ribands on individual maps, see specifications of the map or series concerned. The essential in this regard are

Political Tints:-

- (i) *When political tints are entered, states will carry distinctive and contrasting colour tints.*
- (ii) *All Centrally Administered Union Territories will carry the same colour tint unless they are contiguous.*
- (iii) *Foreign countries will not be coloured.*

(b) *Boundary Ribands:-*

- (i) When boundary ribands are entered, the external boundary of India will carry (on the Indian side) a purple riband. Other international boundaries will be shown without ribands.
- (ii) Where a state boundary is shown by the un demarcated symbol, a broken colour riband will be used. The broken riband will have each space (or break) the length of one bar and a cross of the symbol and each bar of colour will be twice the length of the space. In the symbol for district boundary, which does not indicate whether the boundary is demarcated or not, the colour riband will be continuous and not broken unless the boundary is purely conjectural and very roughly defined.

- (iii) When single or double ribands are necessary along a boundary in the bed of a river, or along a stream shown by a single line, it is permissible to enter a riband on each bank in the case of a double riband and on either bank in the case of a single riband, if the character of the river would be obscured by placing the riband or ribands along the boundary symbol.
- (iv) Boundary ribands should be compared against adjacent sheets to ensure that boundary ribands along rivers are in agreement.
- (v) In the standardised footnote symbol tables, colour ribands should be printed along only such boundary symbols as appear in the body and only one specimen of each class of boundary should be illustrated.

Chart for Political Tint

Name of the States / Adjacent Countries	Colour Riband	Proposed Colour Percentage For Riband				Proposed Colour Percentage For Area Fill (Adm.Index)			
		Cyan	Magenta	Yellow	Colour No.	Cyan	Magenta	Yellow	Colour No.
Andaman & Nicobar Islands, Arunachal Pradesh, Chandigarh, Dadra & Nagar Haveli, Delhi, Goa, Daman & Diu, Lakshadweep, Mizoram, Pondicherry	Pink	---	30%	---	224	---	15%	---	64
Andhra Pradesh, Bihar, Gujrat, Meghalaya, Punjab, Burma, Uttaranchal	Burnt Sienna	20%	30%	60%	225	6%	10%	20%	65
Haryana, Karnataka, Madhya Pradesh, Nagaland, China	Bluish Purple	30%	25%	---	226	12%	10%	---	66
Himachal Pradesh, Chattisgarh Bangladesh	Jaba Red	---	60%	30%	227	---	20%	10%	67
Jammu & Kashmir, Kerala, Orissa, Rajasthan, Assam, Nepal	Indigo	40%	20%	40%	228	14%	8%	14%	68
Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal, Sri Lanka, USSR	Reddish Purple	20%	40%	---	229	6%	15%	---	69

Manipur, Tripura, Jharkhand	Golden Yellow	---	10%	40%	230	---	6%	20%	70
Sikkim, Bhutan	Primrose Yellow	---	---	60%	231	---	---	20%	71
India	Orange	---	30%	40%	232	---	15%	20%	72
Afganistan	Light Blue	60%	10%	10%	233	30%	4%	4%	73
Pakistan	Green Viridian	60%	---	30%	234	20%	---	10%	74

12 Digitization: Digital Geographical data base(DGDB) is proposed to be created from DTDB. Therefore fresh Digitisation is not required for the regions that are inside Indian Territory. However, for certain categories of map covering foreign land, we may have to be dependant on maps of those regions available in NPG or to be borrowed from other sources. These maps are to be freshly digitized in specific format and merged with adjacent DTDB for creation of DGDB. There is no need to specially write digitization procedure for this part. Personnel working in this set up must Refer chapter VI new version or SOP for detail procedure of Digitisation.

12.2 Data Model Structure for Geographical mapping: Data model structure designed by NGDC to be referred.

12.3 Cell and Font Library for various categories of Geographical maps: Cell and Font Library designed by NGDC to be referred.

13. Hill shading: Few categories of Geographical maps use hill shading technique for depiction of relief features such as; state maps and Himalayan maps. In future, this technique may be extended to few other categories also, because Hill shading enhances visual perception of map and a map looks more beautiful.

Hill shading can be created using GEOMEDIA (Grid), MICROSTATION V8(Geopack) or ArcInfo (3D Analyst).

13.1 Status of DEM Data and creation of hill shade: 1:50,000 sheets of the entire country have been converted to DEM with 10 metre resolution. For a specific Geographical map, hill shade can be created with these DEM. However, DEM prepared from 1: 50,000 sheets are too heavy in size and we may face technical problem in processing the data for hill shading of bigger areas. In view of this, it is suggested to take the DGDB with 100m contour interval for the creation of hill shade of Geographical maps.

Following process to be adopted to generate hill shade:

- (i) 2D Dgn data to be checked for its correctness and proper height tagging.
- (ii) To be converted to 3D.
- (iii) 3D conversion to be checked under isometric view and any mistake in height tagging to be corrected
- (iv) TIN to be generated and relief profile to be examined.
- (v) DEM/Hill shade can be created by relevant command.

14. Patterning: Cell and font library created by NGDC for all Geographical maps are to be used for patterning. Chapter VI new edition may be consulted for Method of patterning.

15. GIS: Conventional maps have some limitations; amount of information that can be depicted on a map surface is directly proportional to the map scale. On the other hand, digital database can accommodate vast amount of details. Going further, GIS has made mapping work much more flexible when comes to loading of data on a map surface is concerned. It is the ultimate technology in mapping where qualitative, quantitative and text information pertaining to features can be tagged /attached with each feature in the form of attributes. This technology has crossed all barriers in terms of storage, presentation and publication of spatial information.

15.1 Selection of attributes for GIS: Digital database consist of Point, Line and Polygon and text. All features both tangible and non-tangible can be grouped in to these categories. Further, when it comes to application of map —Attributes may vary. Attributes are considered purely on basis of Subject. Indenter has to supply the attribute information as per their requirement.

Based on data supplied by indenters, attribute table can be designed and linked to spatial data base. This can be further used for different types of analysis and also varieties of maps can be published in the desired fashion.

15. Examination: It is a very important part for every mapping process. Executive officer responsible for mapping section has to have a much planned approach to maintain the accuracy by proper examination at various levels.

15.1 Examination during compilation and generalisation: DGDB is prepared from certified OSM data base; therefore correctness of data can not be doubted. However, there is a chance of omitting important features at the time of selection of features and its generalisation. At this stage, concerned section officer must visualise the importance of feature in broader sense; taking in to consideration scale, topography, culture, administrative requirement etc.

15.2 Correctness of Data: Since data is borrowed from large scale DTDB and generalised to suitable scale at very-very small scale, there is chance to commit mistake by the operator at the time of selection and generalisation. Examiner should broadly verify the following:

- (i) Correctness of shape of International and state boundaries.
- (ii) Placement/relative position of important features close to international boundaries, there should not be any ambiguity that may lead to contradiction.
- (iii) To verify that international boundaries are in correct relationship with graticule lines at all cross sections.
- (iv) Geographical names have been properly placed and spelled correctly.
- (v) All major features are taken.
- (vi) No objectionable name or feature exist for the areas outside Indian territories.

15.3 Examination from Cartographic angle:

- (i) All the marginal or peripheral items like Title of map, Legend, Scale etc are as per the mock-up and correct in positioning.
- (ii) Graticule values are correct. Square no. if printed is in regular Fashion.
- (iii) Geographical names are correct both in placement and size.
- (iv) Symbols and colour are as per the specification and cell library.
- (v) Finally, map should be compared with the existing edition to check any gross discrepancy.

16. Price Note: - All maps, including the “Restricted” ones, and departmental charts, tables, etc., must carry a price note. The form of the note and the price of each map will be as laid down by Northern Printing Group from time to time depending upon the cost incurred in the Reproduction Office from plate-making onwards. Cost of proving and cost incurred in digitisation are not included in fixing the price.

17. Copyright Note: - Every departmental map, chart, etc., will carry the Government of India copyright note. For its latest form, see “Border Specimen for Open Series Maps.”

18. Grid and Georef: - None of our Geographical Maps is gridded. The Director of Military Survey maintains his own special gridded Military Series on 1:500,000 scale for the use of Defence Services. He also maintains maps on 1:1,000,000 scale with Geographical Reference System (Georef for short) sur-printed on our World Aeronautical Charts (ICAO) and IMW Sheets (both layered and unlayered).

19. Imprints :- (a) the date of edition to be given on a Geographical Map should be

- (i) For maps that are digitised/compiled digitally, year of sending digital data for creation of CYMK films.
 - (ii) For maps that are engraved, the year in which the chromo prints is received in the reproduction office.
- (b) For other imprints, the rules given in Chapter I should be followed.

20. Sheet File: - Every map should have a separate file, the title of which will be the number of the sheet or name of the map. This file should be opened as soon as the proposal to take up the first or a new edition of the map is made. Sheet files, one for each map, are maintained. A new folder should be started for each edition. Individual digitizing sections, dealing with different maps, may open their own Sheet Files, if necessary, but the same should be tagged on to the main folder concerned when the particular edition is published.

21. Colours: - The colours in which the various items are to appear on different Geographical Maps are given in the detailed specifications of each map.

22. History Sheet :- (a) A History Sheet should be prepared for every departmental map and this should be brought up to date for each successive edition. One copy should be filed in the GDC in which the map is drawn, one in the NGDC and one sent to the Director of Military Survey, Army H.Q. If a map is drawn in NGDC, then only two copies are required. Soft copy of the History Sheet should be prepared.

(b) For general guidance, some of the headings under which information should be given in the History Sheet are listed below:-

- (i) Number and date of the Surveyor General's sanction authorising taking up of the reissue or 1st edition of the map.
- (ii) Scope of corrections in the case of reissues.
- (iii) Compilation material used in the case of new maps. A copy of the Compilation Chart should be enclosed. Any information accepted from other sources.
- (iv) Triangulation and Levelling Pamphlets consulted and departures from the same in respect of heights.
- (v) Boundaries.
- (vi) Adjustment of edges.
- (vii) Names and their spelling. Any changes to I.G. names should be listed.
- (viii) Roads and railways, particularly those taken from sources other than the basic material.
- (ix) Comparison with the previous edition.
- (x) Departures from normal rules and practice, and authority for the same.
- (xi) Methods employed in D.O. and Reproduction Office.
- (xii) Responsibility.

(c) It often happens that new information and changes to existing information come in, and are incorporated, as the fair drawing progresses or sometimes even at proof stage. Care should be taken to record them in the History Sheet.

The preparation and publication of Geographical Maps are often spread over longer periods than Topo Maps. It is therefore, essential that the compiling officer should keep up running notes for preparation of the History Sheets. Decisions, verbal or written taken from day to day, should be recorded in these notes. Without the help of these notes, it becomes nearly impossible to

write a worthwhile History Sheet. The information given should be brief and concise, but where procedure departs from the normal it should be full and complete.

(d) The statement regarding boundaries must always be most carefully prepared. It need not be made as elaborate as in the case of Topo Maps, but salient points must always be brought out. The sources from which the alignments have been accepted should be mentioned. Regarding the external boundary of India and other international boundaries, the results of the boundary report should be summed up. Attention must also be drawn to any important changes as compared with the previous edition.

23. Responsibility for compilation: In old set up of Survey of India, State maps were compiled by respective Directorates, ICAO charts were prepared by D. Survey (Air) and rest of the maps were drawn by No 1 DO(DMP). Similarly, in the present set up responsibility for state map and ICAO charts are unchanged, other geographical maps to be prepared by NGDC.

24. Maintenance and reissues

24.1 Office Copies: - Data of all Geographical Maps, except 1:M State Maps, are maintained in NGDC, Data of State Maps are maintained by State GDCs.

In addition, the State GDCs submit list of corrections for the Road Map of India to reach NGDC by 15th May annually.

24.2 Archival of Superseded Editions: - When a new edition of a Map is published, the data of the superseded edition be Archived in NGDC and GIS & RS. Data of 1:M State Maps will remain with the Circle Office concerned.

24.3 Incorporation of New Surveys :- (a) Geographical Maps cover such large areas that they are very much more difficult to keep up-to-date than Topo Maps.

(b) Updated Data available on various scales should be used for updating existing Geographical Maps.

SECTION II

This section contain in brief the detailed specification, responsibility of compilation of each Geographical map

1. International Map of the World (IMW)

1.1 General

(a)(i)At an International Conference held in London in 1909, it was decided to prepare an International Map of the World (IMW) to standard specifications. The style and symbols for this map laid down in that conference were subsequently revised and extended in the 1913 and 1928 Conferences.

(ii) Each member nation possessing a suitable cartographic establishment was required to prepare and publish, in consultation with adjoining countries, sheets covering certain territories in accordance with its geographical position. But during World War II, and for some years after it, all production and maintenance of this Series was generally held in abeyance. In India, however, we continued to maintain the sheets for which programme was approved by the Government of India in 1938 and responsibility was assumed in consultation with the War Office, London.

The partition of India in 1947 materially altered this position. The U.N.E.S. Council, in their Conference at Bonn in 1962, have finalised the principle regarding allocation of sheets among member nations.

(iii) For the list of resolutions passed at the 1909, 1913 and 1928 Conferences and symbols laid down therein, see Central Bureau Reports of those years.

(b) (i)On July 23, 1953, the functions and assets of the Central Bureau (Carte Internationale du Monde Au Millionieme, Ordnance Survey Office, Chessington Survey, England) which looked after the Series, were transferred to the United Nations Economic and Social Council (U.N.E.S.C.), Cartographic Office, Department of Social Affairs, United Nations, New York. In 1955 and 1958, U.N. Regional Cartographic Conferences for Asia and the Far East were held at Mussoorie and Tokyo, respectively. Inter-alia certain matters concerning this Series were also discussed in these conferences.

(iii) The resolutions passed at the Mussoorie Conference may be seen in Vol. I of the Proceedings of the Conference published by the U.N.O. Gist of these resolutions is :-

- (1) It is essential to maintain both the 1:1,000,000 IMW and ICAO Series.
- (2) One basic compilation can be used for both.
- (3) Recommended that certain amount of flexibility in the specifications of IMW should be allowed to the producing countries.
- (4) Recommended that the Secretary General may appoint an Advisory Committee of Experts to finalise the specifications for IMW.
- (5) Recommended that in the case of border line sheets, the countries concerned may mutually decide as to which country should take up their publication. The general principle in this regard should be that the country with the largest land territory in a sheet should take up the publication, other country/countries supplying the necessary material for its/their territories. In case of disagreement, the good offices of the Cartographic Office should be sought.

(iv) The resolutions passed at the Tokyo Conference may be seen in Document No. E/Conf. 25/L.89, dated 01.11.1958 issued by the U.N. Gist of the resolutions pertaining to the IMW Series is as follows :-

If necessary, any projection comparable to the Modified Polyconic may be used for IMW Sheets. Adoption of ICAO Lambert Projection is recommended as an alternative between 80° North and 80° South latitudes. Similarly, if necessary, the sheet limits could also be as for ICAO World Aeronautical Charts, but the present sheet numbering and reference system should be retained.

Another Conference-U.N. Technical Conference on the International Map of the World on Millionth Scale was held at Bonn (West Germany) in 1962. It approved of several major changes in the specifications of the map. The resolutions passed at the conference are published in U.N. Document No. General E/Conf. 40/6, dated 21 August, 1962.

- (c) The series is published in two editions, layered and unlayered, the former as international commitment and the latter to replace the India and Adjacent Countries Series.

- (d) Until the Delhi Survey Conference in 1937, we also maintained the India and Adjacent Countries Series on the same scale (viz. 1:1,000,000). Though this series has now been abandoned, it is necessary to make mention of it, as its Lay-out and Numbering form the basis for the Lay-out of all Topographical Series maintained by the Survey of India. Each sheet covers 4° of Latitude and 4° of Longitude and is numbered in vertical columns 1, 2, 3, etc. Each of those sheets is then divided into degree sheets (1/4-inch sheets on F.P.S. System/1:250,000 sheets, on the C.G.S. or metric system) which are lettered in vertical columns, A to P, which are further subdivided into 1-inch sheets on the F.P.S. system/1:50,000 sheets on C.G.S. or metric system and numbered in vertical columns, 1, 2, 3, 4, etc., to 16, see Chapter I.

1.2. Purpose: - The objective is two-fold:-

- (a) To provide, by means of a general purpose map, a document which enables a comprehensive study of the world to be made for pre-investment survey and economic development planning and also to satisfy the diverse needs of specialists in many sciences.
- (b) To provide a base map from which sets of thematic maps can be prepared (e.g., population, soil, geology, vegetation, resources, administrative limits, statistical evaluation). These maps constitute a basic tool for efficiently carrying out surveys and analysis.

1.3. Uniformity :-It is desirable that uniform specifications be adopted for use on the International Map of the World on Millionth Scale (IMW), especially as regards plates showing features (hydrography, culture, relief), which form the basis on which to prepare, at minimum cost, all topical maps and in the first instance the World Aeronautical Chart.

1.4. Projection:-

(a) Basic properties of Projection envisaged at the beginning mentioned that the projection for IMW should fulfil the following conditions:-

- (i) The meridians should be straight lines.
- (ii) The parallels should be arcs of circles of which the centres lie on the prolongation of the central meridian.

(b) Modified polyconic projection with the meridians as straight lines satisfy these two conditions and hence used for IMW compilation. Values of

Polyconic projection are given in Auxiliary Tables Part I, Eighth Edition, and Map 68.

(c) Later, due to some disadvantages in modified polyconic projection, decision was taken to adopt Lambert Conformal Conic Projection. The coordinates of the Lambert Conformal Conic Projection are shown in the U.N. Document mentioned in para 4 (b) (iv) of Section I and also in a book titled 'World Aeronautical Charts Projection Tables, Lambert Conformal Conic Projection, 1948, published by Aeronautical Chart Service, Washington, 25, D.C. It is available in G&RB.

(d) **Use of UTM Projection(suggested)**: Since each sheet of IMW map exactly fits within a UTM zone and all our OSM sheets are also drawn on UTM projection only, fresh compilation of IMW to be taken up on UTM projection and WGS84 datum. However, present United Nation guidelines need to be verified.

1.5. Sheet Lay out :- (a) each sheet of the map shall cover, as a rule, an area 4° in latitude by 6° in longitude. The limiting meridians of the sheets shall be at successive intervals of 6° reckoning from the International meridian, and the limiting parallels reckoning from the Equator, shall be at successive intervals of 4° .

(b) Provided that the above sheet limits are retained in general, it shall however be permissible to extend a sheet in longitude when necessary to provide complete land cover. Minor extensions through the neat line and border of the limiting parallels are permissible in exceptional cases.

(c) Exceptionally, in the case of islands, coastal and boundary areas, sheet lines may be adjusted in both latitude and longitude to provide the most convenient complete cover. These sheets may require a special projection to fit the circumstances.

(d) Sheets of the IMW, if published on the sheet lines of the World Aeronautical Chart – ICAO 1:1,000,000- may use the rectangular format of corresponding sheets of the latter map, omitting on the top and right side overlaps which extend the represented area beyond the standard ICAO sheet limits.

1.6. Size of Map: - No sheet (including blank spaces all round) shall exceed 100 centimetres by 80 centimetres (or about 39.4 inches by 31.5 inches).

1.7. Sheet Reference System (or Numbering):-

(a) Each sheet shall bear a sheet reference indication the area covered by the sheet.

(b) The sheet reference system comprises a series of zones, parallel belts of 4° of latitude in width extending from the Equator on each side to 88° latitude and sectors of zones.

Successive zones, extending from the Equator on each side to 88° latitude are given letters A to V; polar areas are lettered Z. Each zone is divided into sectors 6° in width and the sectors are numbered 1 to 60 starting from longitude 180° E (or W) of Greenwich and increasing in an easterly direction.

(c) Each sheet shall bear a descriptive reference symbol composed of the zone letter and the sector number corresponding to its location preceded by the letter N if the sheet is in the Northern Hemisphere or S in the Southern Hemisphere, thus NG-43. A combination of two or more sheets in the same zone will be indicated thus: NP-7/8.

(d) Sheets not conforming to regular sheet lines will be indicated by the use of an asterisk (*) after the numeral, thus NL-21*. Where the sheet falls in the recognised zone but is bounded by meridians not conforming to this sector, the limiting meridians west to east may be indicated in brackets following the reference symbol, this NC-43* ($71^{\circ} 30'$ - 78°). A sheet containing portions of zones and sectors should be identified by the zone letters and sector numbers concerned in the following forms, thus:

(i) 4 Partial sheets: NE/NF-26/27*.

(ii) 2 Partial sheets: NB/NC-44*.

1.8. Style of Map: - There will be only one edition i.e. Layered without boundary ribands and hill shade.

1.9. Representation of Relief:-

(a) *General:* - The relief shall be shown by contours with contour values in metres. The relief of underwater features in sea and inland waters shall be shown by bathymetric lines and depths in metres where the information is available.

In order to emphasize the relief, the map shall also carry a series of colour tints to depict successive ranges of altitudes bounded by the principal contours as defined in paragraph (b) below, supplemented where necessary by graphic means (e.g., rocks, hachure's). Tints will also be used to depict successive ranges of depth.

(b) *Contour intervals*: - Contours shall be drawn at vertical intervals reckoning from mean sea level. The 100, 200, 500, 1000, 1500, 2000, 2500, 3000, 4000, 5000, 6000, 7000 and 8000 metre contours, called principal contours, must be shown wherever practicable because they are required as the limits of hypsometric tints. When a sheet has already been published using a contour interval different from the above, the existing intervals may be retained provided that when the sheet is extensively revised for any reason the contours shall be recompiled at the above intervals.

At any altitude, auxiliary contours may be added, but they shall be at regular vertical intervals of 10, 20, 50 or 100 metres.

(c) *Contours*: - Principal and auxiliary contours shall each be shown by continuous lines; principal contours will be shown by thick lines and auxiliary contours by fine lines. Contours and their values shall be printed in brown, except those that fall in glaciers and permanent snow, which will be printed in blue. Whenever the course of contours cannot be plotted with reasonable certainty, they shall be shown by broken lines.

(d) *Elevations*: - The elevations of selected points shall be shown by a triangle or a dot with height in metres. The heights of the mean levels of the surfaces of lakes above mean sea level should also be given. All such data shall be printed in black in upright type. As a rule, the height should agree with those on the maps used as basic material.

(e) *Bathymetric Data*: - Bathymetric contours and their values and depths in metres shall be shown in blue in seas and inland waters. Their representation shall follow the same rules as those which govern contours on land. For bathymetric values in seas, the datum should be that used for the nautical charts of the area concerned. In inland waters, the datum should be the mean sea level, but may be the mean surface level of the lake. The latest information available from the International Hydrographic Bureau should be consulted. Values of depths below sea level will be shown in upright type; those which are based on any other datum will be shown in sloping type.

Principal sea and lake bed contours shall be drawn at depths of 100, 200, 500 and 1000 metres, and then at 1000-metre intervals. Auxiliary sea and lake bed contours may be added as necessary between 0 and 100 metres at the same regular vertical intervals (10, 20 or 50 metres) as on land.

Bathymetric relief will be supplemented by soundings, particularly at great depths. In the open sea the position of the sounding will not be indicated by a dot.

(f) *Hypsometric Tints*: - The hypsometric tints shall be shown in accordance with the scale given below. Each zone bounded by two

successive principal contours shall have one distinct tint of the scale. Sheets which temporarily carry a contour interval different from the specified intervals may temporarily retain their existing hypsometric tints.

Tints shall not be used for areas of permanent snow, on glaciers, on lakes or on double-line Rivers. They will be carried over marshes, sand and mud not on foreshore. Marsh, mud and sand on foreshore will carry the first sea layer.

The new specification of colour tints as agreed and given in para 3 of the United Nations Report for 1965 on the International Map of the World on the millionth scale, is incorporated in sub-para (h) below.

(g) Bathymetric Tints: - Sea and lakes shall be given a blue wash darkening with depth as defined in the scale given in the next sub-para.

Lakes (if bathymetric contours are not shown in them) and double-line rivers will have a monastral blue single ruling over the solid blue wash of the first sea layer as for the second sea area, lakes and double-line rivers.

On the unlayered edition, sea areas, lakes and double-line rivers will have only the first depth tint, i.e., monastral blue solid.

(h) Scale of Hypsometric and Bathymetric Tints :-

Tint Chart for IMW Map

		Metres
White		8000
Violet single ruling		7000
Violet cross ruling		6000
Violet solid		5000
2nd orange solid	}	4000
2nd orange cross ruling		3000
2nd orange single ruling		2500
Over 1st orange solid		2000
1st orange solid		1500
Yellow solid		1000
Yellow single ruling		500
Green single ruling		200
Green solid		100
		0 Sea level
Blue solid		100
2nd blue single ruling	}	200
2nd blue cross ruling		500
2nd blue solid		1000
Over 1st blue solid		2000
3rd blue single ruling		3000
Over 2nd blue solid		4000
3rd blue solid over 2nd blue solid		5000
		6000

Contour values are : shown by figures.

(i) *Parts not completely surveyed:* - In parts not completely surveyed, the relief may be shown by the elements indicated in sub-paras (a) and (c) above.

The map thus established shall be marked 'Provisional Edition'.
The table of reliability will show the means which are used.

1.10. Boundary Ribands: These will be entered only on the unlayered editions as follows:-

- (i) External Boundary of India: Purple riband 2.0 mm wide on India side only.
- (ii) State Boundaries in India: Two orange ribands, each 1.0 mm wide.
- (iii) District Boundaries in India: One orange riband, 1.0 mm wide.

No other boundaries will be coloured.

For placing the ribands along streams, boundaries, etc., rules applicable to Topo Maps will be followed.

1.11. Colours and Details to be Shown :- (a) as per the new technology printing is done using four basic colours i.e CYMK. There is no limitation of colors to be used. However the following auxiliary colours may be used:-

3 blues (monastral) for washes and layers in water areas.
Yellow solid for built-up areas.

(b) *Blue*:- Hydrographic features and their names shall be in blue (electric). Monastral blue will be used for all washes and tints.

- (i) *Rivers and streams* shall be selected to give a correct impression of the drainage. River of width less than about 1000 metres will be drawn single line. Streams less than 15 km long will usually be omitted.

A distinction will be made between perennial streams and those which are sometimes dry. Wherever possible a special sign shall show those reaches of a river which can carry ordinary canal traffic.

The U.N.O. symbol tables do not lay down any symbol for “unsurveyed streams”. They will be shown by dotted lines. The symbol should, however, occur in the reference table only when this feature appears in the body of the map.

Non-perennial beds will be shown by the new symbol laid down by the U.N.O., i.e., broken lines.

- (ii) *Wells and springs* :- These will be shown in desert areas only.

- (iii) *Rapids and falls* will be shown when they are a hindrance to navigation or a possible source of power or where they are very well-known.
- (iv) *Steamer routes* will include motor launch service. They will be shown on internal water-ways only. Ocean steamer routes will not be shown.
- (v) *Canals* :- Only those shown by double-lines on Topo Maps will be included; symbols as laid down in the U.N.O. table.
Tunnels :- Only those more than ½ kilometre in length will be shown.
- (vi) *Lakes and reservoirs* :- As a guide, a non-perennial lake of at least 10 sq km, or a lake of at least 3 sq km of which ¼ area is perennial, or a completely perennial lake of 2 sq km will be shown.
- (iii) *Marsh*. :- Marsh with vegetation and marsh without vegetation will be shown by appropriate symbols.
- (iv) *Coast-line* :- Definite and approximate portions of shoreline will be shown by appropriate symbols. Where an inlet reaches a width of 8 km, the deep blue inland water tint will be shaded off to the light sea tint. The shoreline symbol will be carried up each side of the inlet to this point.

Actual shapes of rocky headlands, etc., should be carefully shown.

- (v) *Tidal arrows* and arrows showing direction of flow will be shown.
- (vi) *Water-pipe lines* :- Only those which are 30 km or more in length will be shown.
- (vii) *Miscellaneous* :- The following will also be shown in appropriate symbols for printing in blue.

Bathymetric contours and their values, sea depths, coral reefs, sand on foreshore, glacier and snow contours, salt lakes and limits of navigation along rivers.

(b) *Red printing* :- The following will be printed in red :-

- (i) Edition legend in the north margin.
- (ii) *Roads and road designations* :- The international specifications allow for five classes of roads, viz., (1) dual or divided highway, (2) primary road, (3) secondary road, (4) other roads, and (5) trail or track. But in view of the

conditions prevalent in our area of responsibility, following classes will be shown.

- 1st Class - Expressways.
- 2nd Class - National Highways.
- 3rd Class - State Highways.
- 4th Class - Other metalled and surfaced roads.
- 5th Class - Unmetalled roads and, in sparsely inhabited or desert areas when there are no road with definite formation, fair whether motorable cart-tracks.
- 6th Class - Tracks and paths. These will be shown only in areas where country carts or pack animals (elephants, camels and mules and porters are the only means of transport. Tracks which are fit for only porters will be shown only where there are no other means of transport and where they are of sufficient importance to justify their being shown at all.

The route may be identified by the appropriate national state number of letter designation as prevails, i.e., National Highway numbers and remark 'Grand Trunk Road' along roads concerned will be entered.

In the database the Roads will be continued but while patterning Road will be broken for all un-bridged crossings at double-line streams. Where there is a permanent bridge over a double-line stream or railway, this will be inserted. Bridges over single-line streams will not be shown but the road will be drawn right across the stream. Road bridges will be printed in red.

Roads will be shown over yellow tinted built-up areas but will be broken while patterning for the inner black circle symbol.

(iv) *Ferries* along roads will be shown by the appropriate symbols.

(v) *Tunnels* :- Only those over ½ km in length will be shown, the symbol being slightly exaggerated where necessary.

(d) *Black* :- The following will be printed in black :-

(i) *Boundaries* :- Three classes of boundaries will be shown:-

(a) International, by the new symbol laid down by U.N.O.

(b) State in India and, if available, boundary of equivalent status in foreign country; symbol as for Topo Maps.

(c) District in India and, if available, boundary of equivalent status in a foreign country; symbol as for Topo Maps.

Small enclaves less than 25 sq. kilometres may normally be omitted.

International boundaries as shown shall agree with the plans and documents attached to the diplomatic instruments which concern them. Their positions shall be approved by the appropriate ministries or other authorities of the countries concerned.

Those international boundaries which are not properly defined or are still in dispute shall be clearly differentiated. The symbols laid down by the U.N.O. shall be used. In addition, suitable remark shall be written alongside.

The external boundary of India will be shown by the first of the symbols laid down in the U.N.O. specifications, i.e., a series of crosses, alignment being according to our own official interpretation.

(ii) Railways: - Subject to the limitations of the scale, all railway lines and stations shall be shown. The station symbol will be placed on the correct side of the railway line. All the railway stations entered will be named, except when it is otherwise obvious as to what the name is.

The U.N.O. specifications lay down that railways shall be shown by the U.N.O. conventional signs but in countries where many gauges are in use, a wider signification, which should be explained in legend, may be given in the signs. The following four classes will, therefore, be shown:-

Broad gauge, double-line, and symbol same as U.N.O. symbol for 2 or more tracks.

Broad gauge, single-line, symbol same as above with single sleeper ticks.

Metre gauge double-lines symbol same as U.N.O. symbol for single tracks.

Other gauges symbol same as U.N.O. symbol for narrow gauge, with the gauge type along the symbol.

Railways under construction will be taken from any reliable information and shown by the appropriate symbols.

Electrified portions will be indicated, where possible by the word 'Electrified' entered alongside the symbol.

Important tramways will be shown by the symbol for 'other gauges' with the remark 'Tramway' entered alongside.

Tunnels: - Only those over 2 km in length will be shown.

Bridges: - Bridges over single-line streams and canals will not be shown. In all other cases they will be shown, e.g., a railway over a road or a double-line stream.

Ferries: - All railway ferries over double-line river will be shown by appropriate symbol.

(iii) *Town and village sites*: - These will be entered only for those places which are to be named on the map. The towns shall be divided into five classes. Wherever possible they shall be shown true to scale. The built-up areas shall be shown by yellow solid wash with the outermost limit in fine black line and will not be broken up into blocks. Roads and railways will be carried over the yellow wash but broken for the circle symbols for sites.

The relative administrative importance shall be shown by difference of symbol.

1st order - Capitals of countries; site by double circle, the inner one solid.

2nd order - Headquarters of states in India and, if known, headquarters of equivalent partitions in foreign countries; site by a double circle.

3rd order - Headquarters of districts in India and, if known, headquarters of equivalent partitions in foreign countries; site by a single circle with a dot at its centre.

4th order - Headquarters of *tahsils* or sub-divisions of districts in India and, if known, headquarters of equivalent partitions in foreign countries; site by a single circle.

5th order - Other towns and villages site by a single circle but smaller than 4th order.

Their relative importance on other grounds will be shown by difference of lettering. The following 7 sizes are prescribed in T.N.R.F. (Times New Roman Face) Type:-

1st size -	Capitals of countries	14 R/U
2nd size -	Headquarters of States and Union territories In India and, if known, headquarters of Equivalent partitions in foreign countries	12 R U/L
3rd size-	Towns with population over 10,00,00014 R U/L
4th size-	“ “ “ “ 5,00,00012 R U/L
5th size-	“ “ “ “ 1,00,00010 R U/L
6th size-	“ “ “ “ 25,0008 R U/L
7th size-	“ “ “ below 25,0007 R U/L

Notes :- The fonts used for names of District Headquarters will be one size larger than the population justifies but size 14 R U/L will not be exceeded.

Names of districts should be spaced in the body. If district boundaries in any foreign country are not shown then the province name (and failing that the country name) will be spaced instead.

The entry of these spaced administrative names in the body and borders will be governed by the same rules as apply to spaced *tahsil* names on Topo Maps, vide T.H.B. Chapter VI, The lettering and symbols employed will be explained in the marginal symbol tables. Where portions of several countries appear on the same sheet, the principle adopted for each country shall be explained in the tables of special foot-notes.

(iv) *Mountain, hill and peak names* :- All important, hill and peak names will be entered. All named peaks must have their heights also.

(v) *Dams* :- A dam shall be shown by the appropriate symbol in black, and the rest of the reservoir in blue.

(vi) *Passes* :- All passes along the external boundary of India mentioned in the description of the boundary and important passes elsewhere will be shown, even though there may be no road or track shown across them. Where possible their heights will also be entered.

(vii) *Telegraph and Telephone lines* :- Telegraph lines and Post and Telegraph Offices should be shown only in transfrontier areas. Important

Telephone lines will also be shown in the above areas by the symbol for Telegraph line with the descriptive remark 'Telephone line' entered alongside.

The symbol for Telegraph line will be the same as on Topo Maps.

(viii) *Submarine Cables* :- These will be shown by fine continuous lines in short lengths radiating from the terminal points with the entry 'Submarine Cable' (with date, if available) and destinations.

The alignments of these will be taken from "Berne Telegraph Atlas of the World" obtainable from the Director General of Posts and Telegraphs.

(ix) *Pipe-line* :- Only those which are 30 km or more in length will be shown.

(x) *Power lines* :- Only major power lines will be shown, i.e., those from power stations to major distributing stations. They will be confined to overhead lines only.

(xi) *Mines* :- All important mines will be shown and may often be grouped under one symbol. The name of the substance mined should be entered.

(xii) *Forts* :- Only those of historical interest or important as landmarks will be shown.

(xiii) *Lighthouses* :- Subject to security restrictions, all will be shown.

(xiv) *Wireless Stations* :- Subject to security restrictions, stations which are Topographically prominent will be shown.

(xv) *Oil Fields and Gas fields* :- They will be shown by appropriate symbols.

(xvi) *Ruins* :- They will be entered if famous. If the ruin is a single building, it will only be shown if it is very well-known and at some distance from a site.

(xvii) *Caravan halting places* :- They will be shown along definite and well-known routes in sparsely inhabited areas only.

(xviii) *Mission, Mosque, Temple, etc.* :- These and other structures, that constitute important landmarks and have cultural and human significance, will be shown by conventional symbols. They will rarely be shown inside heavily populated areas.

(xix) *Aerial ropeways* :- They will be shown only when they are an important means of transport and not less than 30 km in length.

(xx) *Anchorage* :- Only those anchorages, which are used for trade and not for shelter, and which are not less than 6 km from the port, will be shown.

(xxi) *Triangulation Stations* :- All geodetic triangulation stations and in frontier and transfrontier areas selected stations of minor triangulation will be shown.

(xxii) *Heights* :- See para 9 (d).

(xxiii) *Query marks* :- They will be entered along doubtful details and names in transfrontier areas. The mark should then be explained in the References.

(xxiv) *Sand* :- Sand dunes and flat sand, other than what is mentioned in para 11 (b) (xi) above under 'Blue Printing', should be shown.

(xxv) *Aerodromes* :- The U.N.O. specifications provide for two symbols, one for international aerodromes and the second for other aerodromes. The same should be followed.

1.12. Lettering :- (a) The lettering shall be in varieties of the Latin characters.

(b) Names referring to hydrography and routes of communications shall be in sloping characters. All other names shall normally be in upright characters.

(c) Choice of actual styles and sizes of lettering to be used is left to the discretion of the country which reproduces the map.

(d) Names of water features shall be in blue, road designations in red, and all other names in black.

1.13. Marginal Information :- (a) Each sheet shall bear the heading 'INTERNATIONAL MAP OF THE WORLD 1:1,000,000' in English under it the same heading in French, namely 'CARTE INTERNATIONALE DU MONDE AU 1:1,000,000'.

(b) Each sheet shall, in addition, bear the name of the city or the most important geographical feature that best identifies the area covered by the sheet. If two national territories have nearly equal coverage on the sheet, it shall be permissible to name the principal cities of both countries. When more than two countries are represented on the same sheet, preference should be given to the principal geographical feature of the region.

The actual names of sheets should be taken from the Index to IMW Sheets forming Appendix 'A' appearing at the end of this Appendix.

(c) Each sheet shall show :-

(i) The edition foot-note.

(ii) Dates of previous editions.

(iii) Names of publishing agency, i.e., Surveyor General's imprint and the year under it.

(iv) The edition number in the general publication note or in the margin of the map, i.e., the edition legend in the north margin above the sheet number with date as '1979 EDITION'.

- (v) Altitude Scale (vide para 63).
- (d) The projection used shall be indicated in the margin of each sheet. On each sheet shall be printed a reference explaining the conventional signs used in that sheet. The reference shall be in the language of the country which publishes the sheet, and in at least one of the official languages* of the United Nations. We shall thus give reference tables in English and French as hitherto.
- (e) Each sheet shall show a small index diagram, giving the sheet references of the contiguous sheets. An index to sheets of "India and Adjacent Countries Series" will also be added.
- (f) Each sheet shall also have an 'Administrative Index' which will show :-
- (i) International boundaries.
 - (ii) State boundaries in India.
 - (iii) Province boundaries in foreign countries if shown in the body of the sheet.
 - (iv) Country and State/Province names.
- District boundaries will NOT be shown in this index.
- (g) A 'Reliability Index'. This index will indicate the principal sources of information from which the map is compiled.

For sheets falling wholly outside the Restricted Line, the index will be omitted altogether, For sheets that fall partly outside the Restricted Line, no information will be given for the area outside.

- (h) Scales of kilometres, English miles and nautical miles shall be drawn on each sheet.
- (i) On each sheet shall be printed an index showing 'Lines of Equal Magnetic Variation'.
- (j) Colour printing tabs shall be printed on each sheet.

Annexure 'D' shows the correct positions for all the marginal informations.

1.14. Degree lines and Borders :- (a) Each degree line shall be drawn across the sheet. The meridians and parallels which form the limits of the sheet reference system shall be emphasized.

(b) The parallels and meridians shall be numbered in the ordinary way, the former from 0° at the Equator to 90° north or south and the latter from 0° at the International Meridian (i.e., Greenwich) to 180° east or west.

Note :- The additional values (Parallel + 90° & Meridian + 180°), now being entered in blue in the N. and E. margins, will no longer be given.

(c) For convenience of reference, the side Borders of each sheet may be provided with small letters (a, b, c, etc.), from top to bottom. There shall be one such letter for each strip of half degree of latitude.

Similarly, vertical strips each of half degree of longitude, may have as reference Roman numerals (I, II, III, etc.), from left to right, one to each strip, in upper and lower Borders.

1.15. Spelling, Transliteration and Transcription Names :-

As far as possible, the following principles shall be followed :-

(a) Countries producing IMW sheets of their own territory shall use geographical names standardised by their own national names authority.

(b) Countries producing IMW sheets covering or including territory of another country shall use in such territory the names standardised by that other country. If the writing systems of the countries are the same, the map-producing country shall use the names without modification. Names standardised in non-Roman writing shall be converted into Roman letters by systems agreed upon by the country standardising the names and the country or countries producing or collaborating in producing the IMW sheets.

(c) Names of international features shall be in accordance with the usage of the producing country.

(d) Other names, such as conventional, alternative, former or variant names may be added in parentheses at the discretion of the producing country.

(e) The above general principles may be supplemented in accordance with decisions that may be taken by the Economic and Social Council or by appropriate bodies set up by the Council on the question of standardisation of geographical names.

(f) When the producing country considers it necessary, it may give in the margin (i) a glossary of the principal generic terms occurring on the sheet; particularly when they are abbreviated, with a translation into one of the official languages of the United Nations, (ii) an indication of the pronunciation of names either in the official language of the producing country, or by means of the system of the International Phonetic Association.

1.16. Responsibility for Publication of Sheets :-

(a) Each sheet shall normally be published by the country whose territory it covers.

(b) When a sheet covers portions of more than one country, it shall normally be produced by the country covering the largest area in the sheet,

subject to agreement by the other countries, which would then provide the material necessary to cover their own territories.

All countries concerned should keep the Cartographic Section of the United Nations informed of all such agreements.

(c) If a country has not got sufficient cartographic facilities, it is desirable that individual agreement should be reached by that country with a country which has sufficient cartographic facilities to produce the map.

(d) All countries responsible for producing the map are urged to preserve the reproduction material required for producing each of the colours of the most recent edition.

(e) The country concerned may publish a special edition or editions showing one or several colour plates of certain map sheets plus additional plates as required to portray various types of information. Such editions should show the imprint 'Special Edition' (for instance : Special Edition – Base Map, Special Edition –Base Map without hypsometric tints).

(f) The purchasing price of each sheet shall be fixed by the agency responsible for publication and may be printed on the sheet. Distribution between agencies responsible for publication shall normally be ensured through bilateral agreement.

(g) A country which is about to undertake the preparation of a sheet shall inform the Cartographic Section of the United Nations of its intention, in order that the latter may make it known to other countries and the cartographic establishments

(h) Survey of India will publish all sheets containing portion of India. Adjoining countries may be consulted for border sheets, where necessary.

1.17. Conventional Signs and Border Specimen :- (a) For certain features the U.N.O. have laid down the conventional signs. Other features are to be shown by symbols chosen by us.

(b) The conventional signs laid down by the U.N.O. are intended to be used as a guide and are not, therefore, dimensioned. We may use the sizes of symbols and thicknesses of lines as considered suitable by us.

(c) In the legend of conventional signs covering roads, railways and inhabited places, it is desirable to indicate which items are only partially represented.

(d) A 'Border Specimen' incorporating U.N. specifications and additional symbols to be used (available in NPG, geographical mapping section).

2. ICAO Maps

Under mentioned maps/ charts are prepared as per the International Civil association guidelines:

- (i) 1:1,000,000 World Aeronautical Charts, covering the whole of India.
- (ii) 1:250,000 Approach Charts (Instrument/Visual. These
- (iii) 1:30,000 to 1:50,000 Landing Charts.) pertain to
- (iv) 1:10,000 to 1:15,000 Obstructions Charts. Individual aerodromes in India.

In addition the following are envisaged :-

- (v) 1:250,000 Aeronautical Charts.
- (vi) 1:500,000 Aeronautical Charts.
- (vii) 1:1,000,000 to 1:3,000,000 Aeronautical Route Charts.
- (viii) 1:2,000,000 to 1:5,000,000 Aeronautical Plotting Charts.
- (ix) Radio Facility Charts, scale not laid down.
- (x) 1:5,000,000 to 1:10,000,000 World Aeronautical Planning Charts.

These maps are part of aviation cartography and Complete know-how of ICAO maps are available with Director Survey Air, New Delhi and are responsible for compilation of all ICAO maps and charts as listed above.

3. State Map series

3.1. General :- The intention is to provide and maintain suitably economical quasi-wall maps for administrative use and for use by the general public. The first publication will be in English, to be followed by Hindi editions, as practicable.

3.2. Lay-out :- The lay-out will be decided for each individual State Map by the Regional Circle Director concerned for the states falling in his maintenance area. As far as possible the lay-out should be designed so as to enable the map to be printed on a single sheet, resorting to 'insets', if necessary. The aim is to cover the whole of India by the fewest number of

State Maps possible by resorting to convenient groupings of states as listed in next para.

3.3. Responsibility:-

As per the existing practice state maps are prepared on 1: 1M scale by respective directorates. During last 4-5 years, after creation of new states, few states maps have also been published on 1:1/2 M scale. Taking this as an example, it is proposed that state maps for smaller states to be prepared on 1:1/2M either independently or combinedly (in case of very small states). This proposal for publication in larger scale is taken with the aim that publication in larger scale will accommodate important elements such as small settlements that may be required by administrator/planner which otherwise might have been left out due to paucity of space.

Following state maps are proposed to be published and responsibility for publication is mentioned against each:

Andhra Pradesh	1: 1M --- APGDC
Arunanchal Pradesh	1:1/2M--M&A GDC
Assam -Nagaland-Meghalaya	1:1M ---A&NGDC
Bihar	1: 1M---BGDC
Chhatishgarh	1: 1M---CGDC
Gujarat & Daman & Diu	1: 1M--GGDC
Haryana -Delhi	1: 1/2M--HGDC
Himachal Pradesh	1: 1/2M--Himachal GDC
Jharkhand	1: 1M-- JGDC
Jammu & Kashmir	1: 1M-- J&K GDC
Karnataka	1: 1M--Karnataka GDC
Kerala & Lakshadweep	1: 1/2M---K&L GDC
Madhya Pradesh	1: 1M--MP GDC
Maharashtra & Goa	1: 1M---M&G GDC
Orissa	1: 1M--OGDC
Punjab, Haryana & Chandigarh	1: 1/2M --PH&C GDC
Rajasthan	1: 1M--RGDC
Tamilnadu - Pondichery	1: 1M--T&P GDC
Tripura-Manipur-MiZoram	1:1/2M--TMM GDC
Uttarakhand	1: 1/2M-- UK GDC
Uttar Pradesh	1: 1M--UP GDC
West Bengal & Sikkim	1: 1M--WB GDC

Note :- Adnaman & Nicobar Islands may either be fitted in as an inset in any of the neighbouring State Maps or may be printed as a separate State Map. The same names will appear in the legend in the Refer-to-box as in the heading.

3.3 Projection: All these maps are to be prepared on LCC projection and WGS84 datum. Every state will have its own origin and set of standard parallels. Projection parameters are to be supplied by NGDC, Deherdun.

3.3. Edition Numbering: - All editions will be numbered serially from the first edition onwards, except where the format and area of a map are changed. In that case the new map will be numbered as first edition.

3.4. Depiction of Detail: - As for International Map of the World excluding contours and layers but with the following additions:-

- (i) Hill shading according to the latest order.
- (ii) Buff tint within the states shown in the map heading. Areas outside the states will have no tint.
- (iii) District boundaries (where not already shown).
- (vi) Sub-division/*Tahsil* boundaries, if specially asked for by the State authorities, and if the necessary information is provided by them.

3.5. Suggested Method:-

- a. The map will be prepared from the Digital Geographical Database.
- b. Entry of district boundaries (and also *tahsil* boundaries, if specially ordered). District boundaries in foreign countries will be shown as available, but printing of the maps will not be held up for want of up to date information about the political set-up in any foreign country.
- c. Blocking up of administrative spaced names within the State areas.
- d. Blocking up of names of sea areas if shown open.
- e. Entry of boxes for names of state, district and *tahsil* (only where *tahsil* boundaries are shown) headquarters in the tinted area. These boxes shall be cleared of all detail and tints.

- (f) (i) The Refer-to-box for these maps will take one of the following forms. All lettering on scale of publication, will be 14 R (Gill or Universe Face) as illustrated in the specimens.
- (ii) In cases where the name/names in the Refer-to-box is/are too long to be conveniently accommodated, it/these may be entered in slightly smaller type or even in two lines. A reasonable space should be left between the end of the name and edition number.
- (iii) All state names, appearing in the map heading, will be entered in the Refer-to-box and arranged in alphabetical order.
- (iv) The word INDIA/Hkkjr will be entered above/below the Refer-to-box in the north/south margin as illustrated in the 1st/3rd specimen above.

(g) The external boundary of India will be shown in accordance with the latest orders on the subject.

(h) Roads, railway and other detail as well as lettering [except as mentioned in sub-para (a) above] will be in the same style as on the 1:M IMW Series.

(i) The detail outside the state/states proper should be thinned out considerably leaving only the main detail. The district boundaries in these areas need not be entered unless they already appear on the prints from the negatives/engraved plates of the IMW sheets. /Also see sub-para (a) (ii) above.

3.6. Publication :- Sheets will be published in the following colours :-

Black .. All outline detail and names except those mentioned below.

Red .. Roads and tracks, square reference letters and figures, edition legend in the North margin, International sheet numbers and limits in the Index to 1:250,000 sheets and Index to States.

Blue . . Coast-line, streams, steamer routes, lakes, glaciers, sea areas, names of water features, sea depths and fathom lines.

Grey .. Shade.

Political Ribands and Tints :-

Ribands :- External boundary of India 2.0 mm purple riband on India side only.

State boundary: Colour appropriate to the state (according to rules applicable to OSM Maps), width 1.5 mm to be applied on the side of the state. In case of a map of more than one state, two ribands each of the appropriate colour on the common boundary of two states.

District boundary : The same colour as for the state boundary riband, width 1.0 mm applied centrally.

Tahsil boundary: The same colour as for the state boundary riband, width 0.5 mm.

Tints : Buff solid in the body and indexes for the state/states appearing in the map heading. The area outside the state/states will have no colour tint.

4. Specification for the 1:2,500,000 Map of India and adjacent countries

4.1.General :- (a) Purpose of this map is to provide government offices, schools and the public with a large size wall map of India. It is the largest scale single map covering the whole of India.

(a) The following items will appear on the main map :-

(i) International boundaries.

*(ii) State boundaries in India and, if available, boundaries of equivalent partitions in foreign countries.

*(iii) District boundaries in India and, if available, boundaries of equivalent partitions in Nepal, Burma, Bhutan, Sri Lanka, Pakistan and Bangladesh.

(iv) Capitals of countries.

*(v) Headquarters of States in India, if available, headquarters of equivalent partitions in foreign countries.

- *(vi) Headquarters of districts in India and, if available, headquarters of equivalent partitions in Nepal, Burma, Bhutan, Sri Lanka, Pakistan and Bangladesh.
- (vii) Important non-administrative towns.
- (viii) Railways.
- (ix) Selected roads.
- (x) Aerodromes.
- (xi) Main river systems.
- (xii) Lighthouses.
- (xiii) Bathymetric contours.
- (xiv) Heights above mean sea level.
- (xv) Mountain, range and hill names.
- (xvi) Hill features by stump shading.
- (xvii) Political tints and boundary ribands.

- (c) The following inset maps will be included:-
- (i) Map showing places of tourist importance.
 - (ii) Map showing air routes.
 - (iii) Orographical features.
 - (iv) India and surrounding countries.

4.2. Title of Map :- INDIA AND ADJACENT COUNTRIES.

4.3. Scale :- The main map will be on scale 1:2,500,000. All inset maps will be on scale 1:15,000,000 except item (iv) mentioned in para 1 (c) above. It will be on scale 1:30,000,000.

4.4. Lay-out and Size :- The map will be on the same lay-out as the 40-Mile Wall Map, 1962 edition, viz. :-

- NW corner – About 59° E. and $37^{\circ} 41'$ N.
- NE corner – About $105^{\circ} 31'$ E. and $37^{\circ} 30'$ N.
- SE corner – About $100^{\circ} 10'$ E. and $4^{\circ} 20'$ N.
- SW corner – About $64^{\circ} 15'$ E. and $4^{\circ} 25'$ N.

It will be printed in four sections.

The size of the map, when the 4 sections are combined and mounted, will be approximately 160 cm by 175 cm (or 63 inches by 69 inches).

4.5 Projection :- Lambert Conformal Conic and datum WGS84.

Longitude of Origin 80 00 00
Latitude of Origin 24 00 00

4.6. Style of Map :- It will be in the same style as the 40-Mile Map, 1972 edition, i.e., in colours with boundary ribands and contrasting and distinctive tints for states. Hill features will be shown by Hill shading.

4.7. Colours :- The main map will be printed in the following colours :-

- (i) *Outline* in black, blue (electric) and red.
- (ii) *Washes* :- Water areas will be given blue (monastral) solid wash.
- (iii) *Hill Shade* in brown.
- (iv) *Polictical tints* :- States and Centrally Administered as on the current 1:4,000,000 Political Map of India.
- (v) *Boundary ribands* :-

External Boundary of India . . . Purple solid, 2.0 mm (or 5/60")
on India side only.

State Boundaries in India . . . Orange solid single riband 1.5 mm (or
3/60").

District Boundaries in India . . . Orange solid, single riband 0.5
mm (or 1/60").

4.8. Borders, Graticules and their Values :-

- (a) Borders will be printed in black.
- (b) Graticules and their values will appear in transparent mauve.
- (c) Graticules will be shown at 10 interval with ticks in the border at 15 minutes interval.
- (d) All degree values will be shown in the border, and at the interval of 8 degrees in the body of the map. The graticules will be broken to accommodate these values.

4.9. Details to be Shown :-

(a) *Blue* :-

- (i) *All hydrographic features and their names* will be in blue. All line detail and names will be in electric blue mixed with monastral in proportion of 2 to 1. Sea areas, double-line rivers

and lakes will be tinted in light monastral blue (solid) without layers.

- (ii) *Main canals and rivers*, including those forming administrative boundaries, will be shown.

The general intention will be to show streams 2.5 cm (or one inch) and longer on paper. The minimum and maximum type founts for river names will be 6R U/L and 10 R/U.

- (iii) *Lakes* big enough to be shown with washes will be entered. In India all such lakes will be named. Outside India only the better known ones will be named. Names of lakes will be typed in upper and lower case (Roman type).

- (iv) *Bathymetric contours and their values* :- The following bathymetric contours will be shown :-
200, 500, 1000 and 3000 metres.

Some sea depths will also be entered. They will be in metres and without dots.

- (v) *Glaciers*.

- (vi) *Important reservoirs and their names* :- But dams will be shown in black. See Section III, para 58.

- (vii) *Ocean steamer routes* :- They shall be shown by the proper symbol across the sea/ocean with destinations and distances in nautical miles.

- (viii) *Relevant symbols* in the symbol table.

- (ix) *Coral blanks* same as for 1:M IMW sheets.

- (x) *Dry beds of lakes and double-line streams* will be shown by blue stipple.

(b) *Black* :-

- (i) *International, state and district boundaries* , vide para 1(b) above. Symbols will be the same as for topo maps but enlarged 1½ times. District boundaries will, however, be shown by

dotted lines. Internal boundaries in India will always be shown, but those in foreign countries will be shown only if available. The printing or reissue of the map shall not, however, be held up for want of up to date information about the political set-up in any foreign country.

(ii) *Railways.*

(a) Subject to the limitations of the scale, all railways in India, except disused ones and those under construction, will be shown. Their alignments will be as on the basic material (i.e., 1:M sheets, etc.). The current 3½ Million Railway Map will be consulted and any additional lines, shown on it, should be incorporated. The alignments of these additional lines may be charted with the help of Office Copies and larger scale Departmental maps and failing that with the help of the Railway Map or the current All-India Railway Time Table. The action taken should be explained in the History Sheet.

(b) Only two categories will be shown, viz.,

- (i) Gauges wider than metre.
- (ii) Metre and narrow gauges.

Topo symbols enlarged 1½ times, will be used for categories (i) and (ii) respectively.

(b) On the 1:2.5 Million map, railway station sites, as such, may be shown by hut symbol in black, placed on correct side of the railway line, as provided hereunder :-

1. If the town and R.S. sites have the same name and are indistinguishable on the scale, the more important of the two should be shown.
2. If the town and station sites have the same name and are materially apart on paper and for any reason it is decided to name the R.S. in preference to the town site, the R.S. site should be shown by the hut symbol.
3. In every case the correct relevant name will be placed against the site symbol used.
4. Normally every site shown is named but in exceptional cases like Belonia near Tripura-Bangladesh border, where the railway station site falls in Bangladesh and town site in Tripura and both have the same name, both the sites should be shown by

their respective symbols but only the more important of the two should be named, in this case the town site.

5. Terminal railway stations should always be shown. Symbol and name should be decided in the light of items 1 and 2 above.

(c) In foreign countries, only selected railway lines will be entered.

(d) If there are two lines or gauges running side by side, only the broader one will be shown.

(iii) *Towns, names and sites* :- The relative importance of towns will be shown by different sizes of lettering and circles as follows :-

1st size :- Capital of a country; name in upper case and site by double circle, the inner one solid.

2nd size :- State headquarters in India and, if known, headquarters of equivalent partitions in Iran, Afghanistan, Pakistan, U.S.S.R., China, Thailand, Indonesia, Bangladesh, Bhutan and Burma; name in upper case and site by double circle. Also see note under para 1 (b).

3rd size :- All district headquarters in India and Nepal and, if known, headquarters of equivalent partitions in other countries; name in upper case, site by single circle. Also see note under para 1 (b).

Note :- (1) If the name of the district in India differs from the name of its headquarters, the former will be shown, within brackets, below or alongside the latter in 6 R/U.

(2) An enclave will be indicated by the initial letter or a pair of letters of the district name typed in the body of the map and explained in a separate Reference List or foot-note.

4th size :- Other towns, including industrial towns like Chittaranjan Loco Works; name in upper-lower case and site by single circle but smaller than 3rd size.

5th size :- Halting places; name in upper-lower case and site by a black dot.

(iv) *Spaced administrative names* :- The following names will be spaced in the areas concerned on the main map :-

- (1) Names of countries including that of India.
- (2) Names of states and centrally administered territories in India, provinces in Pakistan and equivalent partitions in Iran, Afghanistan, U.S.S.R., China, Bhutan, Burma, Thailand and Indonesia, if known.

(v) *Heights* :- Trigonometrical heights will be printed in Roman type and others in Italic type. They will be entered to the nearest metre. Position of a primary triangulation station only will be shown by a triangle; in all other cases the position will be shown by a dot. The dot may, however, be omitted if the position is otherwise clearly indicated. Heights above 7500 metres will be typed in larger type than those below.

Normally, heights should be accepted from the basic material but the latest Topo Maps are the final authority.

(vi) *Mountain and hill names* :- The major mountain ranges such as Great Himalaya, Karakoram, Hindu Kush, Kunlum Mountains, Vindhya Range, Western Ghats, etc., will be spaced out once and printed in large Roman type in upper case. Names of minor ranges like Shiwalik Range, Nallamala Hills, Sulaiman Range, etc., will also be in Roman type upper case but smaller and spaced out to a lesser extent.

Names of peaks will be in Roman type but without spacing, those of well-known ones like Mt. Everest, Kamet, Kanchenjunga, etc., in upper case and those of lesser known ones like Anai Mudi, Doda Betta, etc., in upper-lower case.

All peaks whose names are shown on the map must have their heights also entered.

(vii) *Locality names*:- Names of important localities in India and foreign countries will be entered. See Appendix V which shows locality names suitable for inclusion on Geographical Maps on different scales.

In Pakistan, until we are certain that old administrative or locality names, such as Baluchistan, Sind, etc., have been eliminated in all publications by that country, they should be retained on our maps as locality names.

- (viii) *Miscellaneous names* :- Names of passes, islands, capes and any other items not mentioned under any other colour will also go in black.
- (ix) *Marginal items* :- Except edition legend in north margin, scales, foot-notes, imprints, etc., will be printed in black as usual.
- (x) *Passes* :- Subject to the limitation of the scale, all passes along the external boundary of India, mentioned in the description of the boundary will be shown across them. Other important passes will also be shown. Whenever possible, their heights will also be entered. For symbol, see Section III
- (xi) *Dams* :- For symbol, see Section III
- (xii) *Aerodromes* :- In India, those which are controlled by the Director General of Civil Aviation and, subject to the approval of Director, Military Survey those controlled by the Indian Air Force will be shown. For symbol, see Section III,

(c) *Red Printing* :- The following items will be printed in red :-

- (i) *Roads* :- They will be divided into 6 categories :-

1st Class :- Expressways

2nd Class :- National Highways Existing National Highways in India, symbol 1.2 mm thick firm line. Missing links will be joined up by the most convenient routes in appropriate symbols. Grand Trunk Road to be named in black.

3rd Class :- State Highways

4th Class :- Other all weather motorable roads, symbol 0.9 mm thick firm line. Thus category will include most of the remaining 1st Importance roads and selected 2nd Importance roads.

5th Class :- Fair weather motorable roads including motorable cart-tracks. These will be shown in sparsely inhabited or desert

areas where there are no metalled roads over a large area, symbol 0.45 mm thick firm line.

6th Class :- Tracks, Symbol, pecked line 0.25 mm thick. This symbol will be used for tracks fit for pack animals, porters or jeeps only. In foreign countries only main trade routes will be shown.

Notes :- (a) The use of 5th and 6th classes will be limited to important routes and used sparingly.

(b) Density of roads in foreign countries will be thinned down and 1st, 2nd and 3rd Class symbol will not apply to them.

(c) Bridges, as such, will not be shown. Roads will be broken for unbridged crossings, and streams and canals at bridged crossings. Causeways will be treated as bridged crossings and ferries as unbridged.

(ii) *Lighthouses.*

(iii) *Submarine Cables:* - They will be shown by dotted lines right across the sea/ocean with the remark 'Submarine Cable' with destination.

(iv) Edition legend in north margin.

(d) *Brown printing:* - Hill shade.

4.10. Conventional Signs: - For Symbols and lettering Cell file and font file prepared by NGDC should be used.

4.11 Compilation:-

The map will be compiled from the Geographical Database available

The inset maps will be based on Survey of India School Atlas maps except item

.

5. Political map of India

Scale 1:4,000,000

5.1. General :- The purpose of this map is to provide a map showing political divisions in the Republic of India. It will show :-

- (i) International, state and district boundaries with their headquarters.
- (ii) The main river systems.
- (iii) Principal railways.
- (iv) Main roads.

Hill features will not be shown.

Foreign countries will be shown in skeleton only.

5.2. Title of Map :- POLITICAL MAP OF INDIA.

5.3. Scale :- The map will be on 1:4,000,000 scale after compilation from the Geographical Database or 1:2,500,000 Map of India and Adjacent Countries.

5.4 Lay-out and Size :-

The body of the map will thus be limited as follows :-

- On the north and east .As on the 1:5,500,000 Map
- On the south Great Nicobar Island
- On the west About 4 to 5 cm west of Karachi.

The printed matter will then measure about 91 cm by 82 cm (or 36"X32").

5.5. Projection :- Lambert Conformal Conic and datum WGS84.

Longitude of Origin 80 00 00

Latitude of Origin 24 00 00

5.6. Colours :- The map will be printed in the following colours :-

- (c) *Outline* :- The outline will be printed in black, blue (electric) and red.

- (ii) *Washes* :- Water areas will be given blue (monastral) solid wash.
- (iii) *Political tints* :- States and Centrally Administered Territories in India will have distinctive and contrasting tints.
- (iv) *Boundary ribands* :-

External Boundary of India. . Purple solid, 2.0 mm (or 5/60") on India side only.

Note :- No other boundaries will be coloured.

5.7. Borders, Graticules and their Values :- They will all be printed in black with square letters and figures in red. Graticules will be drawn at 4⁰ interval.

5.8. Detail to be Shown :-

(a) *Blue printing* :-

- (i) *All hydrographic features*, including coast-line and reservoirs, and their names will be printed in blue (electric). Sea areas, double-line rivers and lakes will have monastral blue solid wash.
- (ii) Only the main rivers and those which form parts of administrative boundaries will be shown.
- (iii) Important lakes and reservoirs will be shown. Some of them may be named.
- (iv) Relevant symbols in symbol table.

(b) *Black printing* :-

(i) *Boundaries* :-

International boundaries: - The symbol on scale of publication will be the same as for Topo Maps but enlarged one and a half times.

State and district boundaries in India: - The symbol for state boundary on scale of publication will be the same as for Topo Maps but enlarged one and a half times. District boundaries will be shown by dotted lines.

In foreign countries internal boundaries will not be shown.

- (ii) *Principal railways* :- (by Topo symbol enlarged 1½ times).
- (iii) *Towns, names and sites* :- Sites will be shown for the following places and they will be named on the map. The relative

importance of towns will be shown by different sizes or lettering and circles. The following are prescribed:-

1st size :- Capitals of countries; name in upper case and site by double circle, the inner one solid (type 16 I/U).

2nd size :- Headquarters of states and centrally administered territories in India and, if known, provincial headquarters in Bangladesh, Bhutan, Burma, China, Pakistan and Sri Lanka; name in upper case; site by double circle (type 12 I/U).

3rd size :- Headquarters of all districts in India, and a selected few in Nepal, Pakistan, Burma, Sri Lanka, and Bangladesh; name in upper-lower case and site by single circle (type 12I/U-L).

If the name of a district in India differs from the name of its headquarters, the former will be shown, within brackets, below or alongside the latter in 6 R/U.

All enclaves will be indicated by numbers in the body and their administrative connections explained in a separate Reference List.

4th size :- Names of other important and/or industrial towns like Chittaranjan Loco Works, etc., site by single circle, smaller than 3rd size (type 8 I/U-L).

(iv) *Names of important railway stations and junctions* :- Sites by a black hut symbol. But use of this symbol will be subject to the provisions mentioned in the specifications for India and Adjacent countries.

(v) *Spaced names* :- Names of countries, including that of India and State/Province names in India/Pakistan will be spaced in the areas concerned. Locality and hill names will not be entered.

(vi) *Miscellaneous* :- Heights and passes need not be entered. Island names may, however, be entered. Important dams and their names will be shown. For symbol, see Section III,

(vii) *Marginal items* :- Except edition legend in north margin, border, graticules, headings, scales, foot-notes and imprints, etc., will be printed in black as usual.

(c) *Red printing* :-

- (i) *Square reference letters and figures.*
- (ii) *Main roads* :- The selection will include all existing Expressways, National Highways, State Highways and a few other roads. There will be two symbols, one for all weather motorable roads (0.6 mm thick firm line) and the other for fair weather motorable roads (0.25 mm thick firm line).
- (iii) *Edition legend in north margin.*
- (iv) *Relevant symbols in the symbol table.*

5.9. Conventional Signs :- For Symbols and fonts Cell library and font library prepared by NGDC should be used.

5. 10. Basic Material :- The 1:4,000,000 map will be based either on the 1:2,500,000 Wall Map, or fresh compilation from Geographical database or from 1:M, etc., maps. It should be kept in view that a Physical Edition has also to be printed, vide App. IX.

6. Physical map of India

Scale 1:4,000,000

6.1. General: - The purpose of this map is to provide government offices and the public with a map of India showing the main physical features of the country by a system of layers. It will show (i) the main river systems, (ii) hill features by a system of altitude tints, (iii) heights above mean sea level, (iv) depths, bathymetrical contours and sea tints, (v) important towns, (vi) international boundaries and State boundaries in India and (vii) main communications both road and rail.

6.2. Title of Map: - **PHYSICAL MAP OF INDIA.**

6.3. Scale: - The map will be issued on 1:4,000,000 scale after compilation from the 1:2,500,000 Map of India and Adjacent Countries.

6.4. Lay-out and Size: - The 1:4,000,000 maps will not be on the same lay-out as the 1:4,000,000 Political Map.

6.5. Projection :- Lambert Conformal Conic and datum WGS84.

Longitude of Origin 80 00 00

Latitude of Origin 24 00 00

False easting

6.6. Colours :- The map will be printed in the following colours :-

(i) *Outline* :- The outline will be printed in black, blue (electric) and red.

(i) *Contours* :- Brown for contours over land and blue (monastral) for those above the snow lines.

(ii) *Water areas* :- Two shades of blue.

(iii) *Hypsometric tints in land areas*:- Green, yellow, orange and brown.

(v) *Boundary ribands* :- There will be no boundary ribands in this map. An Index to Countries will, however, be added.

6.7. Borders, Graticules and their Values :- As on the 1:4,000,000 Political Map.

6.8. Detail to be Shown :-

(a) *Blue* :-

- (i) Hydrographic features and their names will be in blue. All line detail including names will be in electric blue. Washes and layer tints in sea areas will be in monastral blue.

The main river systems and that stream which form the boundaries of states will be shown.

The physical edition will show more streams than the political edition. The general intention will be to show streams 2 cm and longer on scale of publication.

- (ii) Important lakes and reservoirs, big enough to be shown with blue wash, will be entered. The names of all such lakes in India will be entered. Outside India only the better known ones will be named.

(iii) Double-line Rivers, lakes and reservoirs will have a monastral blue single ruling over the solid blue wash of the first sea layer as for the second sea layer.

- (iv) Bathymetric contours and their values will be printed in electric blue. Some sea depths in metric will also be shown but without dots.

(v) Contours above the snow line in monastral blue.

(vi) Relevant symbols in the symbol table.

(vii) The following items in the /Altitude Scale will also be printed in blue :-

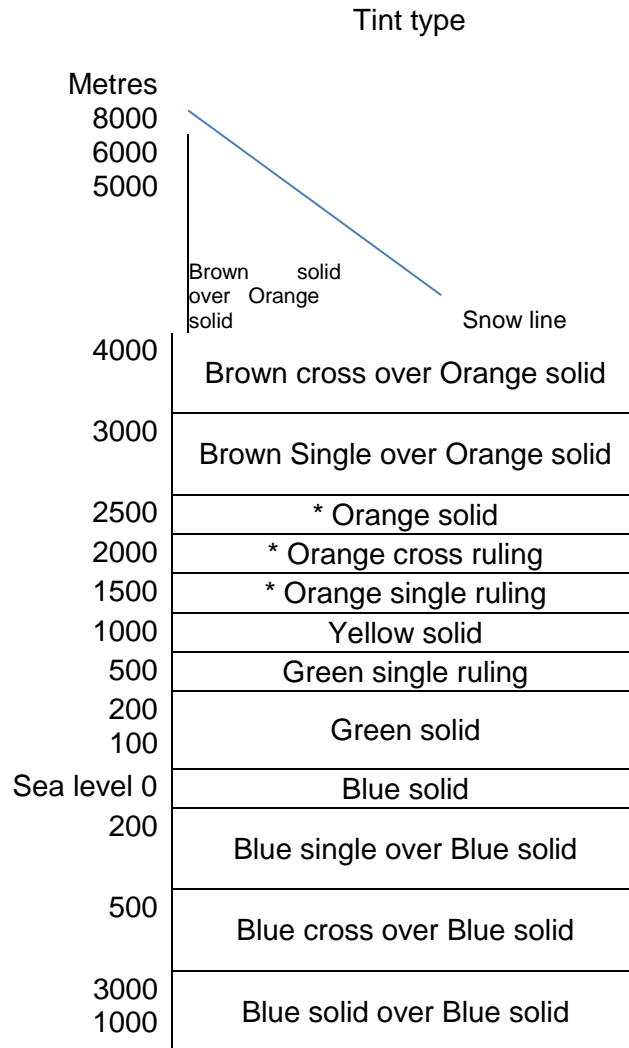
- (1) Lines representing the snow line, contours above snow line, sea level and the bathymetric contours below sea level.
- (2) Figures pertaining to the above lines.
- (3) Remarks "Sea level" and "Snow line".

(b) *Brown* :- The following items will be printed in brown:-

- (i) Land contours (except those above snow line) and their values in the body of the map and in the Altitude Scale.
- (ii) Heading and outer limits of the Altitude Scale.

(iii) Relevant hypsometric tints.

For contour intervals, hypsometric tints and layers in sea areas see table below :-



- NOTE: - Hypsometric tints will not be used above the line of permanent snow, on glaciers or on lakes and double-line Rivers. They will be carried over marshes, mud and sand not on foreshore. Marshes, mud and sand on foreshore will carry the 1st sea layer.

2. NOTE:-Equivalent colour code in CYMK for each category of solid tint will be provided by NGDC

(c) *Orange, Yellow and Green:* - The relevant hypsometric tints, vide table above.

(d) *Black* :- The following items will be printed in black :-

(i) *International boundaries and state boundaries in India*, symbols as on the 1:4,000,000 Political Map.

(ii) *Principal railways*, symbol as on the 1:4,000,000 Political Map.

(iii) *Towns, sites and names* :- The relative importance of towns will be shown by different sizes of lettering and circles. The following sizes are prescribed :-

1st size :- Capitals of countries; name in upper case and site by double circle, the inner one solid.

2nd size :- Headquarters of states in India and, if available, provincial headquarters in Pakistan, Burma, Sri Lanka and China; name in upper case, site by double circle.

3rd size :- All other towns selected for entry; name in upper-lower case and site by small black circles (types 12 and 8 italics, upper-lower according to importance). The map will show fewer town names than the 1:4,000,000 Political Map.

(iv) *Names of important railway stations and junctions*; site by a black hut symbol. But use of this symbol will be subject to the provisions mentioned in the specifications for 1:2,500,000 Wall Map, para 9(b) (ii)(c).

(v) *Spaced administrative names* :- Names of countries, including that of India and State names in India will be spaced in the areas concerned. An Index to Countries will be added, vide para 6 (v).

(vi) *Heights* :- Triangulated heights will be shown in upright type and others in sloping type. The positions of all heights will be indicated by a dot if not otherwise clearly indicated. Heights should be freely entered. They should be correct to the nearest metre. Certain heights will fall in areas where the depth of

hypsometric tinting may obscure the numerals. In such cases the tinting and contours may be cleared from the numerals.

(vii) *Mountain range and hill names* :- The major mountain range names such as Great Himalaya, Karakoram, Hindu Kush, Kunlum Mountains, Vindhya Range, Western Ghats, etc., will be spaced out once and printed in large upright type, upper case.

The minor ranges, like Shiwalik Range, Nallamala Hills, Sulaiman Range, etc., will also be spaced but to a lesser degree and printed in smaller upright type, upper case.

Names of peaks will also be in Roman type but without spacing, those of well-known ones like Mt. Everest, Kamet, Kachenjunga, etc., in upper case and those of lesser known ones like Anai Mudi, Doda Betta, etc., in upper and lower case.

All peaks whose names are shown on the map must have their heights entered.

(viii) *Locality names* :- Names of important localities will be entered. See Appendix V.

(ix) *Miscellaneous names* :- Names of passes, islands, capes, etc., and any other items not mentioned under any other colour will also go in black.

(x) *Marginal items* :- Except edition legend in north margin, border, graticule, heading, scales, foot-notes, imprints, etc., will be printed in black as usual.

(e) *Red* :-

- (i) Square reference letters and figures.
- (ii) Main roads as on the 1:4,000,000 Political Map.
- (iii) Edition legend in north margin.
- (iv) Relevant symbols in the symbol table.

6.9. Conventional Signs :- For Symbols and fonts Cell library and font library prepared by NGDC should be used.

7. Map of India and adjacent countries

1:8,000,000

7.1. General :- The purpose of this map is to bridge the gap between the 1:4,000,000 wall map and 1:12,000,000 desk map. It will be issued as a general map with hills shown by hill shading. It will show the following :-

- (i) International boundaries.
- (ii) State boundaries in India.
- (iii) Principal railways.
- (iv) Principal roads.
- (v) Main river systems.
- (vi) Lighthouses (subject to security restrictions).
- (vii) Hill features by stump shading.
- (iii) Bathymetric contours.
- (iv) Important towns.
- (v) Boundary ribands.
- (vi) Important dams.

7.2. Title :- INDIA AND ADJACENT COUNTRIES.

7.3. Scale :- 1:8,000,000.

7.4. Lay-out and Size :- Longitude 56° and 112° about the north edge and Latitudes approximately 0° and 38° . The size of the printed matter will be about 63 cm by 58 cm (or about 25" by 23").

7.5. Projection :- Lambert Conformal Conic and datum WGS84.

Longitude of Origin 80 00 00

Latitude of Origin 24 00 00

7.6. Colours :- The map will be printed in the following colours :-

- (i) *Outline* in black, blue (electric) and red.
- (ii) *Hill shading* in bluish grey or brown.
- (iii) *Water areas* will have blue wash (monastral).
- (v) *Boundary ribands* :-

External Boundary of India: Purple solid, 1 mm (or 2/60") thick on India side only.

No other boundaries will be coloured.

7.7. Detail to be Shown :-

(a) *Blue* :- Hydrographic features and their names will be in blue. All line detail including names will be in electric blue and washes in monastral blue.

Only the main rivers and canals and those rivers which form the boundary of states will be shown.

The following bathymetric contours will be shown :-
200, 500, 1000 and 3000 metres.

Sea areas, lakes and double-line rivers will have light blue (monastral) wash without layers.

(b) *Black* :- The following items will be printed in black :-

(i) *International boundaries and state boundaries in India* :-The symbols will be the same as for topo maps.

In foreign countries internal boundaries will not be shown.

(ii) *Principal railways* :- The symbol on scale of publication will be symbol No. 66 (for reduction by one-third size) of Conventional Sings Table for Topo Maps. All gauges will be shown alike. Railway station sites will be shown by a hut symbol subject to the provisions mentioned in the specifications for the 1:2,500,000 Wall Map.

Main railways will be entered in foreign countries also.

(iii) *Towns, names and sites* :- The relative importance of towns will be shown by sizes of lettering and symbols. The following are prescribed :-

1st size :- Capitals of countries; name in upper case and site by double circle, the inner one solid.

*2nd size :- State Headquarters in India and , if known, headquarters of equivalent partitions in foreign countries; name in upper case, site by single circle.

3rd size :- Other towns; name in upper-lower case and site by single circle, smaller than 2nd size. Type size may be varied according to importance and space available.

In foreign countries fewer names will be shown.

(iv) *Spaced administrative names* :- The following names will be spaced in the areas concerned :-

(a) Names of countries, including that of India.

* (b) Names of states in India and, if known, names of equivalent partitions in foreign countries.

Note :- If space does not permit the typing of a spaced states name (in India) in the body of the map, its abbreviation will be entered in the body and explained in a foot-note or Reference List.

(v) *Heights* :- Trigonometrical heights will be printed in upright type and others in sloping type. Positions of all heights will be shown by a dot, if not otherwise clearly indicated. The heights will be entered correct to the nearest metre.

(vi) *Mountain range and hill names* :- See sub-para b (vi) of para 9 of Appendix VII.

(vii) *Locality, etc., names* :- Names of important localities, in India and foreign countries, islands, passes, etc., will be entered. See List of Locality Names given in Appendix V.

(viii) *Important dams and their names.*

(ix) *Important passes.*

(x) *Border, marginal items* :- Except edition legend in north margin, heading, graticule, scales, foot-notes, imprints, etc., will be printed in black as usual.

(c) *Red printing* :-

(i) *Main Roads*.-There will be two symbols, 0.6 mm and 0.25 mm thick firm lines, on scale of publication, the former for main roads comprising National Highways in India and the latter for other roads in India and roads in foreign countries.

In India the selection will include all existing Expressways, National Highways and a few State Highways. In foreign countries the density of roads will be thinned down.

(ii) *Square reference letters and figures.*

(iii) *Edition legend in north margin.*

- (iv) *Lighthouses* (subject to security restrictions).
- (v) Relevant symbols in the symbol table.

7.8. Conventional Signs :- For Symbols and fonts Cell library and font library prepared by NGDC should be used.

8 Road map of India 1:3,500,000 and 2,000,000

8.1. General: - The purpose of this map is to provide, tourists, government offices, schools and the general public with a largest scale possible showing all motorable roads in the whole of India. Till to date this map is published on 1:2,500,000. The map on this scale is printed in 2 sections (mosaic of four pieces) and all territorial possessions of Indian Union are shown in their proper positions.

It will show the following :-

- (i) International boundaries.
- (ii) State boundaries within India,
- (iii) Motorable roads.
- (iv) Railways.
- (v) Steamer routes.
- (vi) Main river systems and canals.
- (vii) Towns.
- (viii) Boundary ribands.
- (ix) Light buff background for India.
- (x) Blue wash for water areas.

An inset map showing air routes operated by Air India and Indian Airlines are also included.

New road map as envisaged in 1:3.5M scale will be smaller and single piece depicting all major roads; Express highways, National highways and State highways. Further, entire country to be suitably divided in- to 3-4 parts and each part to be covered in scale 1:2M depicting important roads and settlements that can be depicted within the available space. Lay out for 3.5m map will be same as 1:2.5m and will maintain all the specifications. However, to maintain clarity of map, road and settlement density to be reduced proportionally

As regarding the part maps in 1:2m, Lay-out to be designed by NGDC, Dehradun. These part maps will also be developed on Lcc projection with the same origin. An inset with India map will be added to each part map at suitable place to depict the position of part map. As regarding the specification of part map, it will carry all the information as that of main road map at 1:3.5 m. beside that, road information to be densified.

8.2. Title of Map :- ROAD MAP OF INDIA.

8.3. Lay-out and Size :- It will be bounded approximately by Longitudes 67^0 and 98^0 (along north edge) and Latitudes 7^0 and 37^0 . The size of the printed matter, when the two sections are joined, will be approximately 117 cm by 142 cm (46" by 56"). The eastern and western extremities of Indian territory will extend slightly into the borders.

8.4. Projection :- Lambert Conformal Conic and datum WGS84.

Longitude of Origin 80 00 00

Latitude of Origin 24 00 00

8.5. Colours :-

Outline in black, blue, red, orange, brown and purple.

Washes .- Blue (monastral) in water areas.

Hill shade in grey.

Boundary ribands .-

External Boundary of India . . . Purple solid, 2.0 mm (or 5/60")
thick on India side only.

Political tints.- There will be no political tints. But India area will have light buff background.

8.6. Borders, Graticules and their Values :- They will all be printed in black. Graticules will be shown at 2^0 intervals and may be broken for lettering where necessary.

8.7. Detail to be Shown :-

(a) *Blue* .- The following items will be shown in blue :-

(i) All hydrographical features and their names.

- (ii) Main rivers and canals and those rivers which form administrative boundaries.
 - (iii) Lakes and reservoirs big enough to be shown with washes. In India, as far as possible, they will all be named. Outside India only a few of the better known ones will be named.
 - (iv) Glaciers.
 - (v) Ocean steamer routes with destinations and distances in nautical miles. The symbol will be shown across the sea/ocean and not in short radiating lengths.
 - (vi) Sand in dry/non-perennial river beds and lakes.
 - (vii) Letter 'P' indication availability of petrol.
 - (viii) Marsh symbol.
 - (ix) Relevant symbols in the symbol table.
- (b) *Black* .-
- (i) International boundaries and state boundaries in India; symbols same as for Topo Maps but enlarged one and a half times.
 - (ii) *Railway*.-
 - i. Subject to the limitations of the scale all railways in India, except disused ones and those under construction, will be shown. Their alignments will be as on the basic material (i.e., 1:M). The current 3½ Million Railway Map will be consulted and any additional lines, shown on it should be incorporated. The alignment of these additional lines may be charted with the help of Office copies of larger scale Departmental Maps and failing that with the help of the Railway Map and/or the current /All India Railway Time Table but such approximate alignments should be corrected in the next reissue. The action taken should be explained in the History Sheet.

In foreign countries only selected railway will be shown.

- (ii) Only two categories will be shown viz., broad gauge by 0.3 mm thick firm line and other gauges by 0.2 mm thick firm line on scale of publication.

If there are two lines or gauges running side by side, only the broader one will be shown.

- (iii) *Towns, sites and names*.-
 - (a) *Selection of sites* .- First preference will be given to the under mentioned sites appearing in the current edition of the Regional Tourist Maps published for Dept. of Tourism, Ministry of Transport and Communications :-

- Meaning places with Western style hotels.
 - “ “ “ board and lodging.
 - △ “ “ “ lodging only.
- Tourist Centres.
Industrial towns.

Next preference will be given to district headquarters, road junctions and sites whose names appear in bigger type on the 1:M basic material and are connected by road.

As regards symbols for sites, the following will be employed :-

- for places where board and lodging are available.
- △ for places where only lodging is available.
- for other sites.

Board and lodging information about the sites selected, should be given according to the best information available.

(b) *Names* .-

1st size :- Name of capitals of countries will be typed in upper case.

2nd size :- Names of capitals of states/provinces will also be typed in upper case.

3rd and 4th size :- Names of other towns will be typed in upper-lower case; size to vary according to importance. Antiquities will be typed in Old English type.

Names of Tourist Centres will have deep yellow solid rectangles as background, the bounding lines of this rectangle will be in purple. Such names will be obtained from the Ministry of Transport and Communications, Tourist Division, New Delhi.

(c) *Spaced names* .- The following names will be spaced across the areas concerned :-

Names of countries, including that of India.

“ “ States in India.

“ “ Provinces in Pakistan.

- (iv) *Distance dots*.- Places between which the distances are shown on the map will be indicated by black dots. In the case of a site the dot will be placed centrally in the site symbol and at other places the dot will be placed on the road.
- (v) *Miscellaneous* .- The following will also be entered :-
- (1) Names of railway zones.
 - (2) Names and heights (in metres) of a few major peaks.
 - (3) Main passes and their names.
 - (4) Important dams.
- (vi) *Graticules* .- Graticule lines and their values will be shown at 2⁰ intervals.
- (vii) *Heading, scales, references, foot-notes and imprints*.- as usual.
- (viii) Table of distances.- A table showing distance by road between important cities will be printed on the map as an inset in the Bay of Bengal area.

(c) *Red* .-

(d) *Roads*- Roads will be classified into 5 categories, viz.-

Expressways

National Highways.

State Highways.

First and second importance all weather motorable, others.

first and second importance motorable in dry season, others.

1st category will be printed in red, 2nd and 3rd categories in orange, 4th and 5th categories in brown.

Expressways and National Highways will be drawn by thick firm lines; width as for roads on scale of publication for Topo. Maps. Numbers will be entered in red within red boxes, squares (for one figure) and rectangles (for two or more figures). The boxes should be drawn parallel to the graticule lines.

Roads of first and second importance, all weather motorable, will be drawn by thick firm lines; width as for roads of second importance on the scale of publication for Topo. Maps. First and second importance roads, motorable in dry season, will be drawn by 0.25 mm thick firm line.

Other roads, all weather motorable, will be drawn by thick firm lines; width as for roads of third importance on scale of publication for Topo. Maps. Other roads, motorable in dry season, will be drawn by 0.10 mm thick firm line.

Road information to be collected by NGDC from the relevant sources of all states. The new Road Map will be based on that information. Any area remaining uncovered will be completed from the existing Road Map annual corrections, supplied by Regional Circles, and departmental records, maps, etc.

Alignments of National Highways should be obtained from the Ministry of Transport and Communications, Department of Transport (Roads Wing), New Delhi. Only completed National Highways will be shown by the National Highway symbol. The proposed or under construction portions will be shown by one of the other two symbols as appropriate.

- (ii) Points, where delay may occur to motorists, will be shown by dots of the same colour as of the road. The road should be broken on either side of the dot.
- (iii) All figures indication distances in kilometres along roads will be printed in the same colour as of the road, the places concerned being marked by black dots.
- (iv) Other items to go in red are square letters and figures, edition legend in north margin and relevant symbols in the References.
- (v) Abbreviation '*PS*' for police station will be typed in Italics at selected places along roads. It is presumed that all selected sites will have police stations. So *PS* need not be typed against sites.
- (d) *Orange*.- Roads of 1st and 2nd importance and their distances.
- (e) *Dark brown*.- Other roads with their distances.
- (f) *Grey*.- Hill shade.

8.8. Inset map :- Map of India showing roads and air routes on scale 1:15M appearing in the Survey of India School Atlas will be printed as an inset in this map after deleting all the roads and bringing it up to date. The following items will be shown in the inset map :-

- (i) Air routes operated by Air India and Indian Airlines.
- (ii) Cities connected by these air routes.

8.9. Symbols and Lettering :- For Symbols and fonts Cell library and font library prepared by NGDC should be used.

8.10. Compilation :- Compiled from Geographical database. Roads from the 1:M set of maps on which road information received from state Executive Engineers and Regional Circles is consolidated. For portions uncovered by these, the current Road Map will form the basic material.

9 Railway map of India 1:3,500,000

9.1. General :- The purpose of this map is to provide the Railway Board, other government offices, schools and the general public with a map showing boldly, railways in India, on a single sheet of paper. 1:3,500,000 is the largest scale possible to accommodate India on a single sheet of paper.

The following will be shown on it :-

- (i) International boundaries.
- (ii) State boundaries in India.
- (iii) Headquarters of countries, states in India and provinces in Pakistan.
- (iv) Railway Out Agencies and the roads leading to them from rail heads. No other roads will be shown.
- (v) Railways and as many railway stations as possible.
- (vi) Main rivers.
- (vii) Coalfields.
- (viii) Railway ferries.
- (ix) Political tints for states in India.
- (x) An inset map showing the air routes operated by Air India and Indian Airlines and important roads will be included.

9.2. Title of Map :- RAILWAY MAP OF INDIA.

9.3. Scale :- 1:3,500,000.

9.4. Lay-out and Size :- The map will be bounded approximately by Longitudes $5\frac{1}{2}^{\circ}$ and $36\frac{1}{2}^{\circ}$ and Latitudes 67° and 98° (along north edge).

The printed matter will measure about 108 cm by 85 cm (or 42".5 by 33".5).

9.5 Projection :- Lambert Conformal Conic

Datum WGS84.

Longitude of Origin 80 00 00

Latitude of Origin 24 00 00

9.6. Style of Map :- The railway zones will be printed in contrasting colours and state areas will have distinctive colour tints as per current edition. There will be no boundary ribands and no blue wash in water areas.

Hill features will not be shown.

A few copies without tints in states will also be printed, if asked for by the Railway Board.

9.7. Colours :- The map will be printed in following colours :-

- (i) *Outline* including railways, in black, blue, red green, brown and purple.
- (ii) *Political tints*.- States and centrally administered territories in India will have distinctive tints as on the 1:4,000,000 Political Map of India.
- (iii) *Coalfields* in grey.

9.8. Detail to be Shown@ :-

(a) *Blue* .-

- (i) All hydrographic features and names pertaining to them.
- (ii) Main rivers and canals and those rivers which form administrative boundaries.
- (i) *Rivers, Lakes and Canals*.-Only main rivers will be shown. Lakes and canals will to be shown except Manasarower Lake, Rakas Lake and Wular Lake.
- (ii) Eastern Railway.

(b) *Red* -

- (i) Square letters and figures in the border.
- (ii) Edition legend in north margin.
- (iii) North-Eastern Railway.
- (iv) Southern Railway.
- (v) Names of zonal junction stations.

(c) *Green* .-

- (i) Northeast Frontier Railway.
- (ii) South-Eastern Railway.
- (iii) Western Railway.

(d) *Brown*.-

- (i) Central Railway.

(e) *Purple*.-

- (i) Northern Railway.
- (ii) South-Central Railway.

(f) *Black* .-

- (i) International boundaries and state boundaries in India.
- (ii) Railways in foreign countries. Their gauges will, however, be shown by the same symbols as for Indian railways.
- (iii) Non-governmental railways in India.
- (iii) All lettering except as mentioned under blue and red printings.
- (v) Roads leading from rail heads to Out Agencies.
- (vi) *Graticules*.- Graticules their values will be shown at 2⁰ interval. To improve legibility of names, graticule lines may be broken for lettering where necessary.
- (vii) *Ferries*.- Railway ferry services should be shown as on the current edition. This information will, of course, be brought up to date in consultation with the Railway Board.
- (viii) *Peak names and heights*. - Heights (in metres) and names of a few selected peaks may be entered in the Himalayan region.

(g) *Grey*.-

- Coalfields*.- The areas of coalfields will be tinted in grey. Their names will go in black.

@ Presently NGDC is maintaining Digital Railway map of India and all concerned information on this is available. All the new zones that

have come in to existence and their respective colours(not mentioned above) are to be supplemented at appropriate places by verifying records available with them.

9.9 Sites :-

- (i) Sites will be selected in the following order :-
 - Capitals of countries.
 - State headquarters in India and province headquarters in Pakistan.
 - Railway Junctions.
 - „ terminals.
 - Out Agencies.
 - Other railway stations. As many as possible of these should be shown.
- (ii) Towns not connected by rail will not be shown except for capitals of countries, state headquarters in India, province headquarters in Pakistan and towns with Railway out Agencies.
- (iii) All sites including those of railway station will be shown by one symbol, viz., a small circle. The railway station sites will be printed in the colour of the railway to which they belong. Other sites including those of Out Agencies will be printed in black.
- (iv) Relative importance of sites will be shown by various sizes of type for their names:-

1st size: - Capitals of countries, in upper case.

2nd size: - State headquarters in India and province headquarters in Pakistan, in upper case.

3rd size: - Junction stations, four or more lines, in upper case.

4th size: - Junction stations, three lines, in upper case.

5th size: - Other railway stations and Out Agencies in upper-lower case.

- (v) Except as mentioned in (iv) above, administrative headquarters, industrial towns, tourist centres, etc., as such, will not be emphasized.
- (vi) Names of zonal junctions will be printed in red but the sizes of type for them will be governed by the criterion laid down in (iv) above.

9.10. Spaced Names: - Names of countries including that of India, states in India and provinces in Pakistan (in addition to the country name Pakistan) will be spaced in the areas concerned. Besides, the ocean, sea, bay and gulf names will be spaced.

9.11. Railways: - All railways appearing on the current edition, in India, Pakistan, Burma, Sri Lanka and Bangladesh, plus corrections up to date, will be shown. Railway stations and their names will, however, be thinned down in foreign countries.

9.12. Out Agencies: - As far as possible, all Out Agencies and roads leading to them from rail heads should be incorporated. Information in this regard should be obtained from the Railway Board.

9.13. Spelling of Names: - All railway and railway station names will be correctly spelt as on other Survey of India maps.

Names in foreign countries should be spelt according to the maps published by those countries. Failing that they should be spelt according to the best information available. The action taken should always be explained in the History Sheet.

The word 'Junction' in connection with railway station names should be omitted.

9.14. Inset Map :- Map of India showing Roads and Air routes on scale 1:15M appearing in the Survey of India School Atlas will be printed after bringing it up to date in the Bay of Bengal area.

The following will be printed on this map :-

- (i) Air routes operated by Air India and Indian Airlines.
- (ii) Main roads (National Highways) and a few other roads connecting them.
- (iii) Important cities connected by air routes and roads.

9.15. Symbols and Lettering: - For Symbols and fonts Cell library and font library prepared by NGDC should be used.

10 Map of great Himalaya and surrounding areas 1:2,500,000

10.1.General :- The purpose of this map is to provide a layered map, covering Himalayan Region and Central Asia and showing information of interest to mountaineers and explorers. It will be printed in two sheets to be treated as one composite map. Previously the map was titled “Highlands of Tibet and Surrounding Regions”. It will show the following :-

- (i) International boundaries.
- (ii) Headquarters of countries, states/provinces and districts, important non-administrative towns, and places of interest to mountaineers.
- (iii) Railways.
- (iv) Roads and tracks.
- (v) Aerodromes.
- (vi) River systems and lakes.
- (vii) Heights.
- (viii) Mountain range and hill names.
- (ix) Locality and tribal names.
- (x) Hill features by contours and layers.
- (xi) Blue wash for water areas.

10.2. Title :- GREAT HIMALAYA AND SURROUNDING REGIONS.

10.3. Scale :- 1:2,500,000.

10.4. Lay-out and Size :- The map will be rectangular in shape and cover the same area as the 1943 edition, i.e., approximately Latitude 44° at NW. corner and 26° at middle of the southern limit. Longitude $66^{\circ} 40'$ at NW, corner, 105° at NE. corner, $69^{\circ} 30'$ at SW. corner and $101^{\circ} 40'$ at SE. corner.

When the two sections are joined up, the printed matter will measure about 134 cm by 97 cm (or 53” by 38”).

10.5 Projection :- Lambert Conformal Conic
Datum WGS84.
Longitude of Origin 80 00 00
Latitude of Origin 24 00 00
False easting

10.6. Style of Map :- It will be on the same style as the 1943 edition, i.e., in colours with contours and layer tints. The heights and contours will be in metres. .

10.7. Colours :-

Outline.- The outline and lettering will be in black and blue.

Washes.- Water area will be given a blue wash.

Contours.- Contours, their values, and Altitude Scale will be in brown.

Hypsometric tints.- In green, yellow, ochre, orange, light sienna, dark sienna and red.

10.8. Detail to be Shown :-

(a) *Blue :-*

- (i) Main glaciers and Marshes. }
- (ii) Wash in water areas of double-line } monastral blue
Rivers and lakes.
- (iii) Other hydrographic features in electric blue.

This map will show more streams than a political map on the same scale would do. The general intention is to include streams same scale would do. The general intention is to include streams 2 cm and longer on scale of publication.

Lakes, big enough to be shown with blue wash, will be entered. A majority of them will be named. A few canals will also be shown.

Names of all hydrographic features will be printed in blue.

Important springs and wells in frontier and transfrontier sparsely populated areas may be shown.

Snow line will not be shown in the body of the map or the Altitude Scale. All contours, including those across permanent snow, will be in brown.

(b) *Brown.-*

- (i) *Contours.-* They will be shown by fine lines at a uniform interval of 500 metres, see para 9. Contours across permanent snow areas will also be printed in brown. They will not be shown across glaciers.
- (ii) Contour values in body and borders.
- (iii) *Altitude Scale.-* All lettering and lines pertaining to it will be printed in brown. But the foot-note, regarding contour interval,

i.e., “Contours are approximate and at vertical interval as above”, will be printed in black.

(c) *Black* :-

**(i) Boundaries*.- International boundaries and state boundaries in India and, if known, boundaries of equivalent partitions in foreign countries.

Symbols same as for Topo Maps, but enlarged 1½ times.

(ii) Towns, sites and names.- The relative importance of towns will be shown by different sizes of lettering and circles.

(ii) Principal railways :- Railway station site will be shown by a small hut symbol subject to the provisions mentioned in the specifications for 1:2,500,000 Wall Map. All gauges will be shown alike. In foreign countries still fewer lines will be shown

(iii) Towns, names and sites :- The relative importance of towns will be shown by different sizes of lettering and circles.

1st size: - Capitals of countries; name in upper case and site by double circle, the inner one solid.

*2nd size: - State headquarters in India and , if known, headquarters of equivalent partitions in foreign countries; name in upper case and site by double circle.

*3rd size: - District headquarters in India and, if known, headquarters of equivalent partitions in foreign countries; name in upper case and site by single circle.

4th size: - Other towns and villages;; name in upper-lower case and site by a single circle but smaller than 3rd size.

5th size: - Halting places; name in upper-lower case and site by a black dot.

Names of places of archaeological interest will be typed in old English type.

(iii) Spaced names.- Only important locality and tribal names and names of mountains, hills, ranges, etc., will be spaced in the

body. Administrative connections and names will be shown separately in an index, see para 10(a).

- (iv) *Railways*.- All railways in India and foreign countries, except those under construction or proposed, will be shown. All gauges will be represented by one symbol, viz., a thin line with sleeper bars, as on the 1943 edition.

On the 1943 edition, railway station sites and town sites are shown by the same symbol. But in certain situations it has been found essential to differentiate between the two. Necessary provision is, therefore, being made as under:-

A railway station, as such, may be shown in the new map by a hut symbol, in black, placed on correct side of the railway line as provided in the specifications of the 1:2,500,000 Wall Map.

If there are two gauges running side by side only one will be shown.

Railway names will also be entered.

- (v) *Heights*.- Heights will be in metres and entered liberally. Trigonometrical heights should be shown in Roman Type and approximate ones in Italics. The height dot along a boundary should be drawn distinctly heavier than the boundary symbol dot.

- (vi) *Peaks*.- All well-known peaks should be named.

- (vii) *Roads*.- Roads will be shown under two categories, viz.,

(a) Motorable roads and (b) tracks.

Category (a) will include both 'all-weather' and 'fair-weather' roads. In plain areas only selected roads will be shown. An 'all-weather' route will be preferred to a route involving 'fair-weather' roads. In hill areas, as far as possible, all roads will be shown. Category (b) will include all main trade routes.

The symbols will be firm lines of different thickness as on the 1943 edition.

- (viii) *Graticules*.- Graticule lines and their values will be shown at 2⁰ interval with 10' dicing along the edges as on the 1943 edition. To improve legibility of names, graticule may be broken for lettering where necessary.

- (ix) *Miscellaneous items*.-

(i) *Passes*.- All passes mentioned in the description of the external boundary of India and important passes at other places should be shown. A pass for which neither height nor

name is known should not be shown unless a track is shown across it.

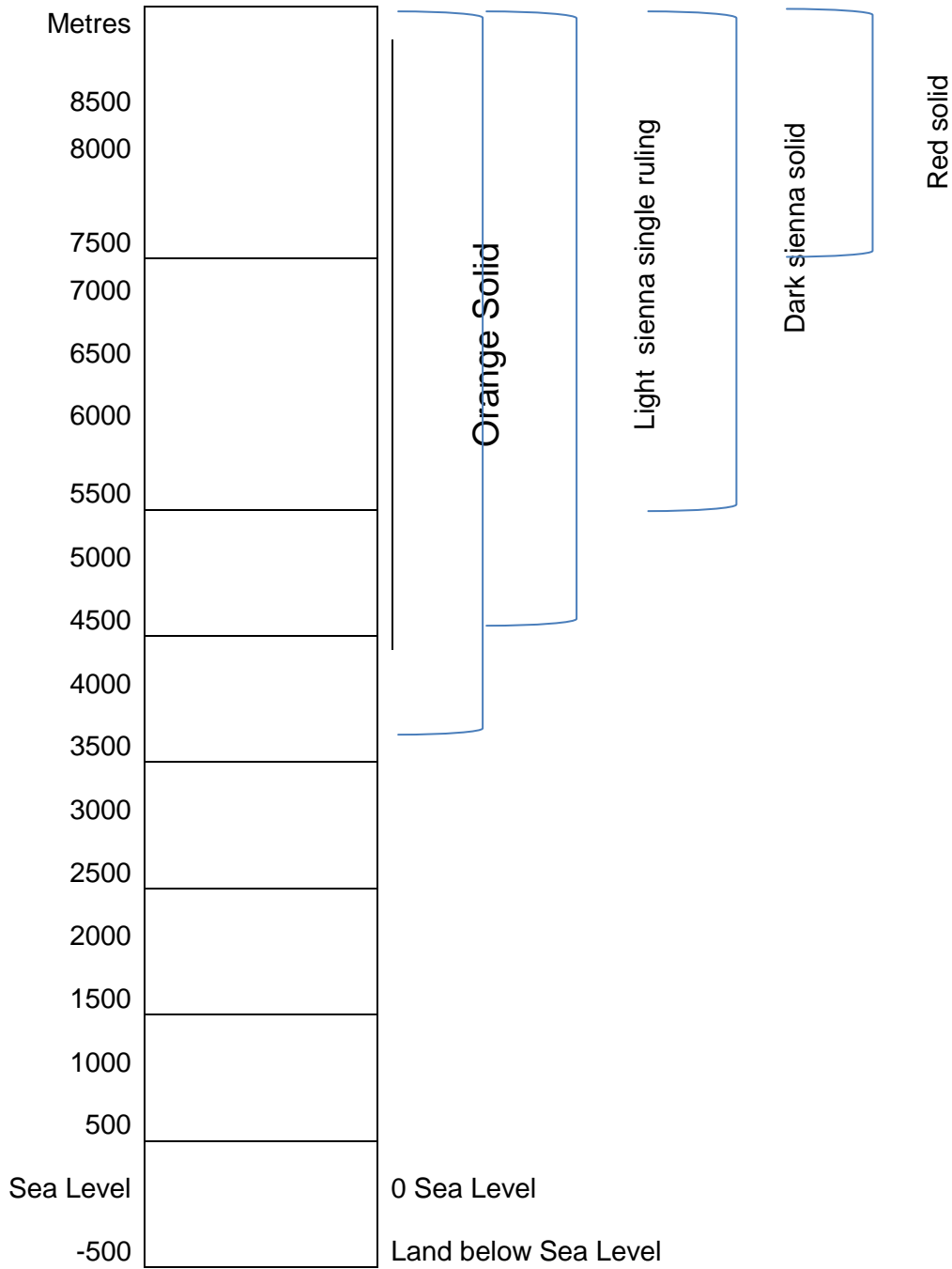
- (ii) Important telegraph and telephone lines in frontier and trans-frontier area will be shown.
- (iii) *Aerodromes*.- All will be shown. But advice should be sought from the Director Military Survey, if any, should be omitted for security reasons. For symbol see Section III, para 58 (iv).
- (iv) Destinations of selected railways and roads should be entered in the borders. Distances will be in kilometres.
- (v) Square letters and figures will be entered in the borders.
- (vi) Dry beds of double-line Rivers and lakes will have black stipple.
- (vii) Foot-note regarding contour interval below the Altitude Scale.
- (viii) Heading, foot-notes, scales, imprints, legends, etc., as usual.

10.9.Hypsometric Tints.-

For contour intervals and hypsometric tints see table below :-

HYPSONETRIC TINTS

For contour intervals and hypsometric tints see table below :



NOTE:-Equivalent colour code in CYMK for each category of solid tint will be provided by NGDC

Both in the body of the map and the Altitude Scale, contours will be shown at 500 metres interval, but the layers will be as shown above. The following foot-note will appear below the Altitude Scale.

Contours are approximate and at vertical interval as above.

Hypsometric tints will not be used over glaciers and water areas, in lakes and double-line Rivers, but will be carried over dry beds and marshes. .

10.10. Indexes: -The following indexes will be shown:-

(a) *Index to Countries.* - It will be a skeleton map of the area, covered by the main map, and on scale 1:25,000,000 designed to illustrate the political divisions. It will show:-

- (i) International boundaries.
- (ii) State boundaries in India and, if known, boundaries of equivalent status in foreign countries.
- (iii) Country names.
- (iv) State names in India and, if known, names of equivalent status in foreign countries.
The latter may be entered even if their boundaries are not shown.
- (v) Lakes, if shown, will have blue wash.
- (vi) Countries will have contrasting colour tints.

These may be selected from the tint used for hill layers.

- (vii) All detail and lettering will be in black.
- (viii) Graticules and their values will be shown at 4⁰ interval.

(b) *Index to Mountain Ranges.*- This will be a skeleton map of the area covered by the map designed to illustrate the lay-out of mountain ranges. It will be in two colours and show the following :-

- (i) Graticule frame (with lines and values at 4⁰ interval) in black.

- (ii) Mountain ranges by firm or pecked black lines according as the alignment is well or ill defined.
- (iii) Range names (in black) spaced along their respective alignments.
- (iv) Main rivers, their names and a few lakes in blue.
- (v) Blue wash in the lakes.

(c) *Index to main water-partings.*- This will be a skeleton map of the area covered by the map designed to illustrate the main water-partings and basins. It will be in two colours and show the following :-

- (i) Graticule frame (with lines and values at 4⁰ interval) in black.
- (ii) Basin limits by firm black lines.
- (iii) Basin names spaced in the area concerned, in black.
- (iv) Important peaks and their heights (in metres) and names in black.
- (v) Important rivers (without names) after which the basins are named in blue.

(d) *Relative Reliability Index.*

10.11. Basic Material:- It should be based on the latest and best material available, according to normal rules and practice.

10.12 Symbols and Lettering: - For Symbols and fonts Cell library and Font library prepared by NGDC should be used.

11 World Map

Though World map in 1:40m and 1:20m were prepared in 1DO DMP earlier but is not listed in Chapter XI. A copy of world map published in 1:40m, prepared by digital method in NGDC was also traced out. After comparison of 1:40m and 1:20m it is found that most of the design aspects are similar except that, the map in 1:40 m does not contain insets like; northern & Southern polar region and also the world air and sea navigational routes. Therefore, it is proposed that preparation of world map should be done in an intermediate scale of 1:30m. This will contain all the insets as existing in 1:40m and will be handy.

(a) Projection of main map: Molewide projection.

- (b) Contents and specification are same as 1:40 million world map.
- (c) Method of compilation:
 - (i) No fresh compilation required.
 - (ii) Existing Digital data to be used for publication.
 - (iii) All insets existing in 1:20m to be digitized and incorporated in 1:30 m

12 Plastic Relief Maps:

Plastic relief maps are decorative maps mostly used as wall hanging in offices and drawing rooms. Since plastic relief map looks like three dimensional miniature of earth surface, it increases the aesthetic value that attracts the viewer. There is no basic difference between a plastic relief map and paper map except that the elevation profile is added to it. All other specification like projection, colour scheme remains same as that of Physical and Political map of India.

Presently, NPG is processing and printing three types of plastic relief maps by available technology:

- **India Physical at scale 1:15M**
- **India Political at scale 1:15M**
- **Relief maps(physical) of selected states 1:1.5M (proposed)**

12.1 Specification of India Physical at scale 1:15M: This map will be processed basically taking Physical map of India as base map and will carry the following information.

- (i) International and state boundaries.
- (ii) Major rivers
- (iii) Major road and rail network
- (iii) All state capitals, major cities, important tourist locations.
- (iv) Major locality names, mountain and river names.
- (v) Tint plate of physical map of India to be used for the layering purpose.

12.1.1 Processing: (i) Details contained in physical map of India to be reduced proportionally.

- (ii) All the features are to be generalized after reduction to 1:15m.
- (iii) All the respective DGDB contour files to be merged together, and finally transformed to LCC projection to make it a consolidated contour file.

- (iv) In the consolidated contour file, contours with multiple of hundred to be retained, rest all to be deleted.
- (v) In the second stage of generalization of contour plate, all contours multiple of 400 metres to be retained and rest to be deleted above 2000 metre msl keeping in mind that all important mountain tops are retained.
- (vi) At the next stage, it is to be seen that the distance between consecutive contours should not be less than 1mm at publication scale. In case of high density of contours intermediate contours to be deleted to maintain distance.
- (vii) All contours with length/periphery less than 1cm in length to be deleted.
- (viii) Print out of contour plate to be taken on plastic base with 400 micron.
- (ix) With stencil-cut and paste method 3-d model to be created and finally clay model is constructed.
- (x) Clay model is to be fixed at platform of the 3d-compression machine.
- (xi) Using Halogen heating and compression technique flat plastic map available on 1:15m is to be converted to 3d surface.

12.2 Specification of India Political at scale 1:15M: Base map will be same as India political and will carry the following:

- (i) All International and state boundaries
- (ii) All state capital, major cities.
- (iii) Only important roads and rail network
- (iv) Important rivers.
- (v) Political tint as per the chart

12.2.1 Processing: (i) Political map of India to be reduced to 1:15m scale. All unwanted details to be deleted and finally available features to be generalized.

- (ii) Political tint plate to be generated using specific colour/tint as per the specification of the chart.
- (iii) After patterning, print-out to be taken on plastic base.
- (iv) Clay model constructed on 1:15m scale for physical map of India to be used and plastic flat map to be converted to 3d map using the available technology.

12.3 Specification of Relief maps (physical) of selected states 1:1.5M: Proposed state relief map will have the following information:

- (i) International, state and district boundaries.
- (ii) Important rivers.
- (iii) Major road and rail network

- (iii) names of all district head quarters, important cities, towns and tourist places.
- (iv) Important localities names, Hill names.
- (v) Projection and other parameters will be same as state maps
- (vi) Hypsometric tint can be prepared for each state separately considering their relief profile.

- 12.3.1 Processing of state relief map:**
- (i) State map available in 1:1m/1:1/2m to be brought down to 1.5m scale.
 - (ii) As per the specification, selected features to be retained and rest deleted.
 - (iv) Database to be generalized with a aim to produce the map on 1:1.5m
 - (v) DGDB contour data file to be taken and transformed to the projection of state map.
 - (vi) Contour density to be reduced by deleting unwanted contours. Important picks/ hill tops to be retained.
 - (vii) 3d model to be constructed using the same technique as that of physical map of India.