

## SECTION I - INTRODUCTORY

- 1. The Handbook of Topography :-** This Handbook of Topography deals with all branches of survey and mapping that directly affect the preparation of topographical and geographical maps. It does not deal with the more specialized work of the Geodetic & Research Branch, nor with the preparation of cadastral maps for revenue purposes.

The subjects covered in the various chapters are indicated by their titles.

This Handbook is not a text-book, but a manual of departmental instructions for use in the Survey of India. No change may be made in the Handbook, nor may any Addl.SG/ Director issue an order modifying the Handbook without the orders of the Surveyor General of India; this applies equally to the tables and guides referred to in the Handbook.

- 2. Maintenance of Chapters. :** - The several chapters of the Handbook are published separately, and are kept up to date by the issue of correction slips embodying new orders, and by the issue of new editions of each chapter when necessary.

Responsibility for the maintenance of different chapters is as under:

Chapters	Purpose	GDC/Office responsible
Chapter- I	General duties, organization and instructions.	NGDC, Dehradun with the help of SGO.
Chapter – II	Constitution and duties of <b>Various Wings of a GDC.</b>	Addl. SG specialized zone. Dehradun/ Addl. SG (Adm)
Chapter- III	Triangulation and its <b>C</b> omputation	G&RB, Dehradun Addl. SG specialized zone. Dehradun
Chapter - IV	Theodolite Traversing	IIS&M, Hyderabad Addl. SG, IIS&M Hyderabad
Chapter - V	Plane Tabling <b>and the pamphlet "Instructions to plane tablers"</b>	AP GDC, Hyderabad Addl. SG, Southern Zone Bangalore.

Chapter –VI	Topographical Mapping	Hyderabad wing of Maharashtra & Goa GDC Hyderabad. Addl. SG Central Zone Jabalpur
Chapter – VII	Reconnaissance and Special Surveys	Addl. SG, Survey (Air) & Delhi GDC, New Delhi Addl. SG, Specialized Zone.
Chapter - VIII	Digitization	Addl. SG (Adm), SGO/Addl. SG, Central Zone / Addl. SG Specialised Zone, Addl. SG IIS&M
Chapter – IX	Forest Surveys and Maps	Not Required for revision
Chapter – XI	Geographical Maps	Printing Group Addl. SG Printing Zone Hyderabad
Chapter – XII	Photogrammetric Survey	Addl. SG (Adm), SGO/Addl. SG, Central Zone/ Addl. SG Specialised Zone, Addl. SG IIS&M/Addl. SG Southern Zone/ Project Director, DSSDI

Prior to the formation of the Military Survey Service in 1940 the Survey of India was responsible for training and for carrying out surveys in war, and Chapter VIII of this Handbook was devoted to this purpose. This responsibility was devolved on the Military Survey Service and the Survey of India was no longer concerned with military training. Chapter VII Trans-Frontier Reconnaissance and Chapter VIII – Special Surveys have now been combined into one new Chapter VII – Reconnaissance and Special Surveys. Now as the mapping technology has been changed in last few years and Survey of India has switched over completely to Digital Techniques, since

then it was felt that a new chapter about digital techniques and digitization must be introduced. So Chapter – VIII (Digitization) has been introduced which will cover all aspects of Digital data Generation, Maintenance of Data, Archival and Dissemination.

- 3. Corrections :-** Suggestions for corrections to the Hand book which involve *important changes of policy* should be submitted in the first instance to the Surveyor General, and his approval obtained before taking further action.

The Surveyor General's orders will be communicated in a circular letter to all Directors, and a draft correction slip will be sent to the Addl. SG, responsible for the maintenance of the chapter who will be responsible for its issue in correct form.

- 4. Record of Corrections:-** The Addl. SG responsible for the maintenance of each chapter will keep a "record copy" in which the necessary amendments will be entered and indexed, as soon as **any** new order affecting the chapter is issued.

- 5. New Editions :-** Soft copy will be maintained by the Addl. SG responsible for the maintenance of the chapter. Whenever the Addl. SG responsible considers that a new edition is necessary on account of change in technology and other reasons he should submit a corrected copy to the Surveyor General of India and apply for the sanction to reprint or publish a new edition.

- 6. Definitions :-** The following definitions explain the particular or primary meaning of certain technical terms as used in the Survey of India. Definitions of other technical terms will be found in the appropriate chapters. In order to avoid ambiguity, these terms should not be used in any other sense that is not made perfectly clear in the context.

(i) GDC – Geo spatial Data Centre.

(ii) OSM – Open Series Maps. These maps are on UTM (Universal Transverse Mercator) projection and WGS84( World Geodetic system 84) datum. These are unrestricted maps.

- (iii) DSM - Defence Series Maps. These maps are on LCC (**Lambert Conformal Conical**) projection and WGS84 datum. These maps are **meant** for Defence forces only.
- (iv) Map – Map is any representation of the earth' surface on a plane surface.
- (v) Geographical Map – A geographical map is one on such a small scale that features shown on it are generalized. It is usually produced by compilation from other **large scale** maps which have been prepared from actual surveys.
- (vi) **Body of a map** is that portion which represents the surface of the earth. It may include areas that are not covered by survey.
- (vii) **Edge or Neatline** is the limit of the body of the map.
- (viii) **Border** is the frame of lines which encloses the map.
- (ix) **Kodaline** is a photographic negative or positive on film of an original.
- (x) **Margin** is the space outside the **border** of a map.
- (xi) **Office copy** is a print of the published map mounted on cloth, on which all changes since publication (giving source of information) are recorded.
- (xii) **Plate** is a metal plate from which a map is printed.
- (xiii) **Press Order Proof (P.O.P.)** is a proof on which final corrections are entered.
- (xiv) **Primary scale** is the largest scale on which maps of any area are maintained as a departmental commitment.
- (xv) **Series** is a set of maps on one scale and one lay- out of which each component sheet is complete in itself.
- (xvi) **Topographical Surveys** and maps are those on sufficient large scales to enable individual topographical features to be identified on the ground by their shape and position.

**Note:- (All underlined words should be in Italic form, from (i) to (xvi))**

**7. Work of the Survey of India.-** The Survey of India is responsible for all geodetic, geophysical and topographical surveys and maps within India, including those of government forests, cantonments, and town guide maps; and for any special surveys and maps that the Government of India may authorize, such as those for international boundaries etc. Departments of the Government of India are required to place all demands for survey work on the Survey of India. It is also responsible for the production of geographical maps of Southern Asia up to certain limits.

Before 1905 the greater part of India had been surveyed on various scales, but there was no coordinated plan of operations; the nature of the surveys and the style of the maps were not suitable for modern requirements.

Based on the recommendations of the Indian Survey Committee of 1904-05, the whole system of survey, map drawing and map reproduction was reorganized. A fresh topographical survey of the whole of India was commenced in 1905.

The surveys made prior to 1905 are the only maps available of some areas; in some cases it is possible to make use of them in preparing modern surveys and maps : and in many cases, even when superseded by modern maps, they are of the utmost importance as records of boundaries. When superseded by modern surveys, a few copies of every map are kept for historical and record purposes in the Map Archival and Dissemination Centre Dehradun.

In 1989 with the advent of computers in the department, whole technology of surveying and mapping was changed. Need of digital data was felt and for that the maps available on 1:250K scale were scanned and digitization was started. At this time only three centres i.e DMC & MCC at Dehradun and DMC at Hyderabad were having the infrastructure and trained man power; so the task was allotted to these centres. To convert the 1:50K scale maps into digital form was an uphill task and it was felt that whole

Survey of India should be equipped with the modern technology as there was a huge demand of digital data. In 2003 GDCs ( Geospatial Data Centres) in each state were opened and digitization work started in each GDC.

Advent of GPS and Total Stations changed the whole scenario of providing control and detail surveying.

All the digital data was classified as “Restricted” so users had to obtain clearance from Ministry of Defence before obtaining the data and data given to them was classified as “Restricted”. With the increasing demand of SOI data mostly from private sectors it was felt that a new map policy should be framed allowing the data to be used by private sectors effectively for development activities in the country.

To remove the hindrances in obtaining the data Government of India issued a National Map Policy in 2005. As per the policy the responsibility for producing, maintaining the topographic map database for the whole country, vests with the Survey of India.

As per the National Map Policy all topographical maps will be produced in two series i.e OSM and DSM. All OSMs will be unrestricted while DSMs will be classified as appropriate.

All sheets for Northern state GDCs (13 GDCs) will be checked for ( Quality Control )& vital installation by NGDC dehradun and also archived in NGDC.

All sheets for Southern state GDCs (11 GDCs) will be checked for QC & vital installation by GIS & RS Directorate Hyderabad and also archived in GIS & RS Directorate Hyderabad.

All transaction of maps larger than 1:1M scale will be registered in Map Transaction Registry.

- 8. Keeping data/maps up to date** – Data/maps must be kept up to date as far as possible with the resources available. Data should be updated using the latest satellite imageries available and insertion and deletion files should

be prepared. 'Rapid ground verification' should be done thereafter, by using latest available techniques.

**9. Special Surveys** – Besides the geodetic, geophysical and topographical surveys which are its normal responsibility, and which may be carried out by ground and air methods, the Survey of India undertakes various special surveys. These may include :

- (a) Cadastral, **riverine** or other survey on behalf of State Governments and other authorities.
- (b) Rectangulation.
- (c) Large scale city surveys.
- (d) Large scale surveys for development projects.
- (e) Boundary Surveys.
- (f) Forest Surveys
- (g) Surveys for the preparation of Aerodrome landing and Approach **C**harts to the International Civil Aviation Organization specifications as required by the Director General of Civil Aviation.

Special surveys and mapping can be undertaken with the approval of the Surveyor General of India.

The programme of the department requires the approval of the Government of India.

**10. Departmental and Extra- Departmental Surveys and Maps.** – Surveys and Maps are classed as Departmental or

Extra-departmental under the following rules :

- (a) Departmental Surveys are those carried out under the orders of the Surveyor General Of India.
- (b) Extra Departmental Surveys are those carried out by agencies other than the Survey of India, or by officers of the Survey of India who have been placed on deputation or reverted to military duty or prepared for specific demand as paid for job by Survey of India staff.

(c) Departmental Maps are those produced by the Survey of India in pursuance of its responsibilities as defined. Geographical maps are usually classed as Departmental but such maps are prepared for a limited special purpose.

Departmental Maps are stocked for sale and issue and a complete list will be found in the Map Catalogue. Sale proceeds are credited to General Revenues and do not affect the Survey of India budget.

(d) Extra-Departmental Maps are prepared to meet some special demand and are not usually stocked for sale and issue. They may, however, be so stocked under orders from the Surveyor General of India when there is likelihood of some general demand for them. Sale proceeds appear as reduction in accounts. Extra Departmental Maps stocked for general sale are listed in the Map Catalogue.

Extra Departmental Maps may include,

- (i) Maps surveyed and drawn by other agencies such as GSGS (Geographical Section, General Staff) Branch but printed by the Survey of India)
- (ii) Maps prepared by Survey of India, either from Departmental or Extra Departmental Surveys in response to a specific demand.

## SECTION II - ORGANIZATION AND DUTIES

**Organisation of Survey of India as per Surveyor General of India office order No. W-340 / 709- GDC dated 15<sup>th</sup> May'09**

### **Surveyor General of India**

Headquarters

Dehradun

Post Box No.37, Dehradun-248001

Fax: 0135-2744064

**Survey of India constitutes of the following Nine Zones. Each Zone is headed by the Additional Surveyor General Zone.**

- Southern Zone
- Northern Zone
- Western Zone
- Eastern Zone
- Central Zone
- North-Eastern Zone
- Indian Institute of Surveying & Mapping
- Printing Zone
- Specialised Zone

### **Southern Zone, Bangalore**

Sarajapur Road, S.O.I.

Koramangala, 2<sup>nd</sup> Block

Bangalore-560034 Karnataka

Tel: 080-25533595, 25536088

Fax: 080-25533595

E-mail: [soigdc-ka@nic.in](mailto:soigdc-ka@nic.in)

### **Jurisdiction**

- 1) Kerala & Lakshadweep GDC, Thiruvananthapuram.
- 2) Karnataka GDC, Bangalore.

- 3) Tamil Nadu, Pondichery and Andaman & Nicobar Island GDC, Chennai.
- 4) Andhra Pradesh GDC, Hyderabad.

### **Northern Zone, Chandigarh**

Headquarters  
Dakishin Marg, Sector-32A  
S.O.I. Complex  
Chandigarh-160030  
Tel: 0172-2606916  
Fax: 0172-2606916

### **Jurisdiction**

- 1.) Jammu& Kashmir GDC, Jammu.
- 2.) Himachal Pradesh GDC, Chandigarh
- 3.) Punjab, Haryana & Chandigarh GDC, Chandigarh.
- 4.) Uttarakhand & West Uttar Pradesh GDC, Dehradun
- 5.) East Uttar Pradesh GDC, Lucknow

### **Western Zone, Jaipur**

Great Arc Bhawan,  
Plot No-19, Sector-10  
Vidhyadhar Nagar  
Jaipur-302023  
Rajasthan  
Tel :0141-2232341, 2236286  
Fax: 0141-2236286

### **Jurisdiction**

- 1.) Rajasthan GDC, Jaipur.
- 2.) Gujarat and Daman & Diu GDC, Gandhinagar.

### **Eastern Zone, Kolkata**

13- Wood Street  
Kolkata-700016  
West Bengal  
Tel :- 033-22833376  
Fax: 033-22800196

#### **Jurisdiction**

- 1.) West Bengal & Sikkim GDC, Kolkata.
- 2.) Orissa GDC, Bhubaneswar
- 3.) Bihar GDC, Patna.
- 4.) Jharkhand GDC, Ranchi.
- 5.) Chattisgarh GDC, Raipur.

### **Central Zone, Jabalpur**

Vijay Nagar  
Jabalpur-482002  
Madhya Pradesh  
Tel :0761-2644798, 2643182  
Fax: 0761-2643182

#### **Jurisdiction**

- 1.) Madhya Pradesh GDC, Jabalpur.
- 2.) Maharashtra & Goa GDC, Pune

### **North Eastern Zone, Shillong.**

Post Box No.-89  
Malki, Shillong-793001  
Meghayala  
Tel :-0364-2223368  
Fax: 0364-2224937, 2223170

### **Jurisdiction**

- 1.) Assam & Nagaland GDC, Guwahati.
- 2.) Meghayala & Arunachal Pradesh GDC, Shillong.
- 3.) Tripura, Manipur & Mizoram GDC, Silchar.

### **Indian Institute of Surveying & Mapping, Hyderabad**

Survey of India  
Uppal, Hyderabad-500039  
Tel :040-27201503, 27201507  
Fax: 040-27200286

### **Printing Zone, Hyderabad**

CST & MP Campus  
Uppal, Hyderabad-500039  
Tel :- 040-27206064  
Fax: 040-27202045

### **Jurisdiction**

- 1.) Northern Printing Group, Dehradun
- 2.) Western Printing Group, Delhi
- 3.) Eastern Printing Group, Kolkata
- 4.) Southern Printing Group, Hyderabad.

### **Specialised Zone, Dehradun**

Block No.-6, Post Box No.-200  
Hathibarakala Estate, Dehradun  
Block 6, Hathibarkala Estate  
Tel :02741428  
Fax: 0135-2747623

## **Jurisdiction**

- 1.) Survey (Air) & Delhi GDC, New Delhi.
- 2.) Geodetic & Research Branch, Dehradun.
- 3.) Digital Mapping Centre, Dehradun.
- 4.) National GDC, Dehradun.  
Map Archive & Dissemination Centre ( erstwhile B & P Directorate ),  
Dehradun.
- 5.) GIS & RS, Hyderabad.

**11. The Surveyor General of India :** The Surveyor General of India is the advisor to the Government of India on all Survey matters. He is also responsible, subject to such delegation of authority as he may take to Addl. SGs and Directors for all technical and administrative matters in the Survey of India.

At the Headquarters the Surveyor General of India is assisted by the Addl. Surveyor General (Adm), Addl. SG (HR), Addl. SG (Tech) , Director Finance and Assistant Surveyor General.

Addl. SG (Adm) holds the overall responsibilities for coordination and execution of Govt. Policies and Surveyor General's policy on all administrative and financial matters of the department. Addl. SG (Adm) is assisted by DSG (Adm) and DSG (Vig), who rank as Directors.

Addl. SG (HR) holds the overall responsibilities for coordination and execution of Govt. Policies and Surveyor General's policy on all Human Resource matters of the department. Addl. SG (HR) is assisted by DSG (HR) and DSG (Work Study), who rank as Directors. Addl. SG (HR), assists the Surveyor General in assessment of staff requirements of the department.

Addl. SG (Tech) holds the overall responsibilities for coordination and execution of Govt. Policies in consultation of the Surveyor General on all Technical matters of the department. Addl. SG (Tech) is assisted by DSG (Tech) and DSG (Strategic Planning & Policy), who rank as Directors.

Director IB(International Boundary) assists Addl. SG (Tech) on all the matters related with International Border.

The Assistant Surveyor General who ranks as a Superintending Surveyor is the executive head of the Surveyor General's Office.

Each Zone is under a Addl. SG usually assisted by a Deputy Surveyor General of Director rank. Each zone has few GDCs. Addl. SG Zone is responsible for implementation of SG's policies on technical, administrative and financial matters within the zone.

GDCs are of composite nature having static and field units both and each GDC is having its Data Management & GIS wing. NGDC, DMC, GIS & RS and MADC does not have Field units because of the specific nature of the job allotted to this GDCs. Each GDC is headed by a Director assisted by a Deputy Director. Director GDC is responsible for planning and distribution of all surveying and mapping tasks of GDC to various wings with defined targets.

- 12.State GDCs** - The Director of State GDC is responsible in his area for
- (a) Preparation of programmes for, and the execution of all surveying and mapping tasks allotted to him by Addl. SG Zone.
  - (b) Storage of digital data and Final Scrutiny of OSM data from NGDC or GIS&RS as per the responsibility.
  - (c) Storage of originals, air photographs, satellite imageries and maintenance of topographical maps.
  - (d) Patterning of OSM and DSM sheets.
  - (e) Liaison with adjoining Directors regarding surveys and mapping in sheets  
liaison with adjoining Directors regarding surveys and mapping in sheets astride mutual boundaries.
  
  - (f) Liaison with and advice to State Governments in connection with survey matters.
  - (g) Encouraging the sale and use of Geo spatial data and maps.
    - (h) Ensure Training to all personnel of the GDC.
    - (i) Timely submission of Reports and Returns.
    - (j) Annual O&M inspection of all the wings.

(k) Control of the Printing Office (if one is attached to the Circle/Directorate) for printing of the departmental and extra-departmental maps.

**13. The Addl.SG/Director, Geodetic and Research Branch** is responsible for all geodetic and geophysical surveys carried out in the department, the recording of survey data and their issue to the general public.

His responsibilities under the various headings are set out in more details below and comprise the following:

(a) Geodetic and Geophysical Surveys.

(i) Execution of all geodetic and geophysical surveys in the Department. This includes geodetic and other **precise** triangulation, traverse control **surveys** using satellite geodesy, **technique** geodetic astronomy, high precision, traverse, geodetic astronomy, high precision, precision and secondary **levelling**, gravity, magnetic and tidal surveys.

(ii) Advice to the surveyor General and Directors on all geodetic, geophysical and mathematical subjects connected with the work of the Department.

(iii) The organization and maintenance of a statistical section whose primary duty is the issue of survey data both to the Department and to external indentors.

(iv) The preservation of all records of research work carried out in any **Zone** of the Department in such a way that results are immediately available when required; and the scrutiny of technical journals and the recording of anything of interest to the Department.

(v) Research in connection with geodetic and geophysical matters.

(vi) Control of astronomical and magnetic observatories in Dehradun and tidal observatories at **ports and of tidal predictions and publications** of annual tide-tables for various ports in the Indian Ocean.

(vii) Preparation of auxiliary tables (for projection of maps and grids and other purposes) and computation forms.

(viii) Computations and adjustments of all geodetic and geophysical data. He is also responsible for the adjustment of topographical triangulation & Geodetic control using **Satellite Geodesy**.

(ix) Preservation and maintenance of all geodetic and geophysical stations and selected primary leveling bench-marks in India.

(x) Training of Departmental and Extra-departmental officers in geodetic work.

- a. Library- **M**aintenance of a library of scientific and technical books for the Department.
- b. Survey Museum- Maintenance of a museum of historical value for the Department.

**14. The Indian Institute of Surveying and Mapping** imparts survey training to technician, technologist and professional level Officials. The Institute runs basic, mid-career, graduate and advanced post-graduate level, management and user oriented courses in all aspects of surveying and mapping. The courses are designed to be employment oriented and their contents are revised and updated continuously to keep abreast with the technological advancements.

The Institute is well equipped with traditional and modern instruments used in Land Surveying, Geodesy, Conventional and Digital Cartography, Photogrammetry and Map Printing and is manned by highly qualified and experienced teaching staff. The training units, under the guidance of respective faculty heads of various disciplines, with the overall control of the Additional Surveyor General, IISM, carry out the training programmes. The Institute appreciates the importance of evaluation, as a tool for continuous instructional improvement.

The Institute with the assistance of the International Institute of Aerial Survey and Earth Sciences (ITC), Netherland, has introduced an advanced course on Integrated Digital Map Production System in 1991, which also fulfills the requirements of candidates to pursue M.Sc/M.Tech./Ph.D., programmes in related disciplines in the universities/statutory bodies in the country and abroad. Due to the rising demand from several state governments. Professionals in the field of modern cadastral surveys employing digital techniques, new courses in cadastral surveys and mapping have also been introduced from 1993.

The Institute, though primarily meant for the Indian Surveyors, also caters for the students from the neighbouring developing countries. The Institute also shares its survey education facilities with the Indian Universities and other Government Departments.

**The Institute comprises of:-**

- Faculty of Geodesy and Computer Sceinces.
- Faculty of Photogrammetry and Remote Sensing.
- Faculty of **Digital** Cartography and **Geographical** Information **S**ystems.

- Faculty of Topographical Surveys and Land Information Systems.

### **15. Map Archive & Dissemination Centre**

- (a) All old maps and records will be systematically archived after scanning in digital (raster) format. Proper backups will be maintained.
- (b) Archival of all types of paper maps and its issue to various map sale offices.
- (c) **Managing of** SOI Website and provide **up to date** complete information about availability of SOI maps/data.
- (d) **Managing of** SOI exhibitions at various seminars etc for publicity.
- (e) **Managing of** map sale counter in Dehradun.
- (f) **Managing of** Hathibarkala Estate.

**16. Responsibility for Accuracy** – The Officer in charge of the wing of GDC who rank as Superintending Surveyor, is personally responsible for the accuracy of all survey work carried out by his wing and also for the correctness of the sheets he submits for publication.

**(a)** The responsibility for the accuracy of maps prepared direct from surveys, and for compiled 1:250,000 maps and 1:1M State maps rests with the Officer in Charge of the office/wing where they are prepared. For Geographical maps and smaller scale maps, it rests with the **GDCs** where these are prepared.

**(b)** When a map is compiled in one office and prepared for reproduction in another office, the responsibility for the accuracy of the information to be shown on the map rests with the officer in charge, **where the compilation is executed.**

Overall responsibility for the quality of the data generated in the GDC rests with the Director of the concerned GDC.

### SECTION III –SURVEYS

**17. Frame work** – The first essential of all topographical Surveys is a sound geodetic control of framework. The first order control work in ITRF-05 has been already established by G&RB.

Since WGS-84 has been accepted as datum for all future **ground survey provision of precise in frame work** control using GPS has become very simple.

Extension of control using GPS to any distance is possible with highest accuracy required for topographical mapping. Local control can also be established with GPS within few centimeters accuracy with available technique. The establishment of control frame in the AOR (**Area of Responsibility**).will be the responsibility of local GDC.

In addition G&RB will be responsible for the following :-

- (a) Levelling of high precision.
- (b) Determination of magnetic declination.
- (c) Establishment of high resolution Geoid model for the country for direct conversion of ellipsoidal height to orthometric height.

**18. Definition of Surveys** – The following terms have the meanings ascribed to them below :-

- (a) *Old Surveys* are those carried out prior to 1905.
- (b) *Modern Surveys* are those carried out since 1905.
- (c) *Original Surveys* are modern surveys carried out for the first time on a specified scale.
- (d) *Revision Surveys* are those carried out in areas where existing original surveys are on the same or larger scale.
- (e) *Verification Surveys* are **Revision Surveys** directed towards the checking of specified items of detail reported to have undergone changes. In doubtful cases, the Director of the concerned GDC will decide whether a survey is to be classified as Revision or Verification.

- (f) *Blue print Surveys* are no more required in digital environment as there is no requirement of photography.
- (g) *Photogrammetric Surveys* are the best way to acquire terrain information with the help of Aerial/Satellite photography/imagery. Data capturing **using** photogrammetry is a rapid as well as accurate way than any other means. The captured data should be verified on ground, any other attribute information may also be collected during verification. For updation using photogrammetry, change of features should be shown **in** insertion/deletion guide and then guides should be kept in **photogrammetric** sheet file.

**19. Scales of Topographical Maps** – In accordance with the decision of Government of India, the authorized scale for publication of topographical maps of India should be as follows :-

- (a) The whole of India including the High Himalayas will be mapped on the scale 1:25,000.
- (b) The digital data / maps of scale 1:25,000; 1:50,000; 1:250,000 will be revised and kept upto date at the interval of 5 years in developed areas and 10 years in undeveloped areas.
- (c) 1:250,000 scale maps will be compiled from existing **1:25,000/1:50,000** scale maps for the whole country and will be revised at an interval of 10 years.
- (d) (i) The scale of 1:10,000 will be adapted for the Surveys of area which are highly developed as well as those of importance from the Defence and Geological point of view.
- (ii) The mapping on this scale will be in addition to the **survey** cover on 1:25,000 scale, as mentioned in para (i) above for the area concerned.

**20. Scale of Surveys** – For standard primary sheets the scale of surveys will be that of publication.

**21. Systems of co-ordinates.** – All the existing data on Polyconic / Everest will be converted to UTM/WGS-84. The OSM sheets will be

published in UTM/WGS-84. Rectangular grid on LCC will be shown on the DSM sheets.

**22. a) Records of Surveys and data** – GDCs will keep records of the different scales of Survey pertaining to their AOR. However one digital copy of DTDB should be archived in NGDC/GIS&RS also.

**b) Sheet file** : Sheet file of each of the map upto the final printing will be maintained by the concerned GDC. It will consist the following :

- (i) Original material used for digitization, has been done.
- (ii) All correction list.
- (iii) All proofs after correction.
- (iv) Deletion & Insertion Guides after updation.
- (v) Final plot sheet after signatures of the Director of the concerned GDC.

Sheet file will be sent for different stages of map printing but finally, after printing of the map, it will be lodged in with the concerned GDC.

## SECTION IV- MAPS

**23. Maps maintained by the Survey of India** – The Survey of India prepares and maintains the following maps, subject to the orders of the Government of India.

### Topographical Maps –

- (a) *The 1:25,000 series* with contours at 10 metres interval, each sheet covering an area of 7 ½ minutes of latitude by 7 ½ minutes of longitude.
- (b) *The 1:50,000 series* with contours normally at 20 meters interval. Each sheet covers an area of 15 of latitude by minutes X 15 minutes of longitude
- (c) *The 1:250,000 series* with contour normally at 100 meters interval. Each sheet covers 1 degree of latitude by 1 degree of longitude. This sheet is compiled from 1:50,000 scale sheets.

For high hill areas the contour interval for 1:50,000 scale sheet will be 40 meters and for 1:250,000 scale sheet will be 200 meters.

### 24. Geographical Maps :

- (a) *The 1:1 M India and Adjacent countries* series have been superseded by 1:0M International Maps of the world. Each sheet covers an area of four degrees of latitude by six degrees of longitude.
- (b) *Aeronautical Maps* – are maintained on 1:M scale of an area covering India and neighbouring countries.
- (c) *State Maps on 1:M scale* comprising one or two sheets according to the size of the state.
- (d) *The 1:2M 'South Asia Series'* each sheet generally covering an area of 8 degrees of latitude by 12 degrees of longitude.

**25. Other Maps** – (a) **Special Maps** – Certain Special maps of India are maintained of which the following are the most important :

- (i) Railway Map of India on scale 1:3.5M
- (ii) Road Map of India on scale 1:2.5M in 2 prints

(b) The other Maps are :

- (i) **The Wall Map of India and Adjacent countries** on 1:2.5 M, **1:8M**, 1:12M and 1:16 M
- (ii) Political Map of India on scale 1:4 M
- (iii) Physical Map of India on scale 1:15M, 1:4.5 M
- (iv) The World Map of India on 1:20 M, 1:40 M

Other maps also include, Plastic Relief Maps, Tourist Maps Series on 1:50,000 scale, Guide Maps, Trekking Maps, Antique Map Series, Discover India Series and District Planning Maps Series.

**26. Hindi Maps** – Few of the above defined maps are also being published in Devanagri Script.

**27. Layout of Map System** – The existing layout is based on 1:1M India and Adjacent countries series, but is now being replaced by International numbering system after introduction of OSM/DSM series.

**28. Projection** – UTM/WGS-84 will be used for all OSM series sheets, whereas DSM will be based on LCC/WGS-84.

**29. System of Reference** –

(a) Reference Squares – Each sheet is divided by a spherical graticule of different intervals. Each square is allotted a serial letter from West to East and a serial number from North to South. For 1:50,000 scale OSM Sheets, the interval is 2 ½ minutes.

(b) Grid on a Lambert Conical orthomorphic projection is used in DSM sheets. For this grid parameters have been provided by G&RB.

**30. Map Catalogue** – gives full particulars and prices of all departmental / Extra departmental maps.

**31. Surveyor General's Imprint** – All maps published by the Survey of India should bear the Surveyor General's imprint in the form

- a) Published under the direction of.....for departmental maps.
- b) Published under the authority of .....for extra departmental maps which are primarily based on departmental surveys.
- c) Published with the permission of .....or Based upon / Reproduced from Survey of India maps.....with the permission of.....for other publications which are in any way based on Survey of India maps.

**32. Date of Publication** – The **date** (year) printed below the Surveyor General's imprint will be treated as the data of the latest edition and therefore, will be the same as that given in the Edition footnote. This data will be the year in which the digital data sent for printing.

**33. Change of Imprint** – The Surveyor General's imprint and **date** below it will be altered whenever necessary to conform with a change in the number of **the** edition.

**34. Copyright and Royalty** – (a) *Departmental Maps* – The copyright of all departmental maps published by the Survey of India rests with the Government of India and they may not be published, copied, reproduced or used in part or in whole for incorporation in any other publication, without prior permission of the Surveyor General of India, who is entitled to charge royalty for such use by any other agency.

Applications for such permission should be made in the first instance to the **Director**, Northern Printing Group.

**35. Press Act** – The Director authorizing any publication is responsible for ensuring that it complies with the provisions of the Press Act.

Every publication, whether departmental or extra-departmental, must carry a publication imprint, e.g., "Printed at the Survey of India Offices.....". Reproductions from originals which do not show the name

of the originator or carry the Surveyor General's imprint, will carry an additional imprint in the general form : "Reproduced from originals supplied by.....and the Survey of India is not responsible for the accuracy of the detail appearing on the map".

A copy each of every map/publication, other than the restricted ones published has to be sent free of cost to all National Libraries. Three copies of restricted maps/publications have also to be reserved for supply to these Libraries when required.

**36. Editions** – (a) *A Provisional Edition* is a modern style map made entirely from old surveys.

(b) *A Preliminary Edition* is a modern style map made from modern extra-departmental surveys.

The above terms will only be applied to maps which include areas within the external boundary of India, and will not be applied to any map which falls wholly outside the external boundary of India, nor to any map which includes any area covered by modern departmental surveys. Such maps will bear edition numbers, as described in **subsequent** para below, without further qualifications.

**37. Reprint and Reissues** – Printing of maps may take one of the following forms :

- (a) *A reprint*, which involves no change whatever in the body of the map and no changes in the borders of any matter associated with the content of the map. Modification of colours or a modification in the mode of numbering the standard grid, will not be taken as a change. The introduction of a "green tree" printing will, however, constitute a change.
- (b) *A new edition or reissue*, in which changes occur. These changes may be the result of new survey or of extra departmental information, or change over to the metric system.

**38. Numbering of Editions** – (a) Editions of the maps published in metric system will be numbered serially from the first edition onwards. All types of editions of maps in foot pound system are

also numbered serially from the first edition except where other numbers have already been established. This may have occurred through:-

(i) An edition number have been already entered in the “Refer to” box of a map.

(ii) An edition number having been allotted before “Refer to” boxes were brought into use.

Edition numbers established under either (i) or (ii) above will not be altered even if incorrect or inconsistent between themselves.

(b) In addition the following general principles will be followed :-

(i) Editions will be stepped up when there are additions, deletions, alterations to details in the body of the sheet.

(ii) The edition numbers of metric system maps will be separate from those of F.P.S. System maps.

(iii) On the first editions of the metric system maps the editions of the current F.P.S. system maps will appear [also see example at **subsequent** para].

(iv) There will be no more F.P.S. system maps for general use after publication of the first editions of the metric system maps. It may be necessary to print F.P.S. system maps after publication of the first editions of **their** metric editions for some specific official purpose. In such cases the edition numbers of the metric editions should appear on the F.P.S. system maps. Information about such special F.P.S. system maps will not, however, appear on the subsequent metric edition maps for general use.

(c) Some examples are given below :-

Example 1. If early editions of a map were as follow :-

‘Provisional Issues 1905; 1907; 1<sup>st</sup> Edition 1913; 2<sup>nd</sup> 1930, the next edition after 1930 (say 1947) should be numbered ‘3<sup>rd</sup> edition 1947’. If, however, through the application of the rules issued in 1946, the 1947 edition has been numbered 5<sup>th</sup> edition in the ‘Refer to’ box, the next edition on 1-inch scale would (say in 1968)

be the 6<sup>th</sup> edition. The complete edition legend will then be as follows :-

Provisional Issues 1905, 1907; 1<sup>st</sup> Edition 1913; 2<sup>nd</sup> 1930'; 5<sup>th</sup> 1947; 6<sup>th</sup> 1968.

Example 2. If early editions of a map were as follows :-

'Provisional Issues 1905, 1907; 1<sup>st</sup> Edition 1913; 2<sup>nd</sup> 1930'. This sheet was reprinted in 1947 and the edition legend was altered to conform to the rulings of 1946, and then read as follows :-

'1<sup>st</sup> , 2<sup>nd</sup> Provisional Editions 1905, 1907; 3<sup>rd</sup> Edition 1913; 4<sup>th</sup> 1930'.

The correct edition note for the next edition (say in 1968) on 1-inch scale will be 'Provisional Issues 1905, 1907; 1<sup>st</sup> Edition 1913; 2<sup>nd</sup> / 4<sup>th</sup> 1930; 5<sup>th</sup> 1968'.

The insertion of the '2<sup>nd</sup> / 4<sup>th</sup> 1930' is essential as the sheet did issue bearing 2<sup>nd</sup> Edition in the first instance and 4<sup>th</sup> when reprinted in 1947.

Example 3. – If early editions of a map were as follows :-

'Provisional Issue 1905, Preliminary Edition 1907. 1<sup>st</sup> Edition 1913; 2<sup>nd</sup> 1930; Interim Edition 1939'.

This sheet reprinted in 1947 carried the edition note :-

'1<sup>st</sup> Provisional Issue 1905; 2<sup>nd</sup> Preliminary Edition 1907; 3<sup>rd</sup> Edition 1913, 4<sup>th</sup> 1930; 5<sup>th</sup> 1939'.

The correct edition numbering the next edition (say 1969) on 1-inch scale will be-

'Provisional Issue 1905; Preliminary Edition 1907; 1<sup>st</sup> Edition 1913, 2<sup>nd</sup> 1930; 3<sup>rd</sup>/5<sup>th</sup> 1939; 6<sup>th</sup> 1969'.

Cases of example 1 are likely to be sheets which have not been reprinted during the period 1946-1951.

Examples 2 and 3 will be met with on sheets which have not been reprinted during the period 1946-1951.

Example 4. – If the existing edition of the one-inch map was printed for some specific official purpose and not for general use and bears the following Edition Footnote :-

"1<sup>st</sup> Edition, 1932; 2<sup>nd</sup> 1961" then the next edition number of the sheet when reissued in 1969 for general or specific official use on account of changes of details etc; will be 3<sup>rd</sup> edition irrespective of the fact that copies for general use were not printed in 1961 and will have the following Edition Footnote :-

“1<sup>st</sup> Edition 1932; 2<sup>nd</sup> 1961; 3<sup>rd</sup> 1969”.

Example 5,- In case the area of the F.P.S. system sheet mentioned in Example 4 above is printed on Metric System (before reissuing the sheet on one-inch scale as 3<sup>rd</sup> 1969) it will have the following Edition Footnote :-

“1<sup>st</sup> Edition 1969. (Previous Editions on 1-inch scale; 1<sup>st</sup> 1932; 2<sup>nd</sup> 1961)”.

Example 6. – In case the existing metric edition of 1:50,000 sheet has the following Edition Footnote :- “1<sup>st</sup> Edition 1962.

(Previous Editions on 1-inch scale; 1<sup>st</sup> 1932; 2<sup>nd</sup> 1941; 3<sup>rd</sup> 1954)”.

And the same map is printed in 1968 on one-inch scale with changes in detail etc., for some specific official purpose then the Edition Footnote on the one-inch map will read :

“1<sup>st</sup> Edition 1932; 2<sup>nd</sup> 1941; 3<sup>rd</sup> 1954; 4<sup>th</sup> 1968. (Metric Edition on 1:50,000 scale; 1<sup>st</sup> 1962)”.

(d) Reprints will not involve renumbering.

**39. Edition Footnote** - A statement describing the current and past issues of every map (except reprints) should appear as a footnote in the south-west margin, with the date against each issue. Subject to the provisions of Para 38, it should take one of the following forms”:-

(c) For a map in metric system :-

‘1<sup>st</sup> Edition 1958; 2<sup>nd</sup> 1970.

(Previous Editions on 1-inch scale, 1<sup>st</sup> Provisional 1905; 2<sup>nd</sup> Preliminary 1913; 3<sup>rd</sup> 1950)’.

(d) For a map in Foot Pound system :-

‘1<sup>st</sup> (Provisional) Edition 1951; 2<sup>nd</sup> (Preliminary) Edition 1953; 3<sup>rd</sup> Edition 1958’.

In order to apply these rules consistently, issues described in existing footnotes as “Interim edition”, “Reprint with changes”, will be treated as editions which should have been numbered.

**40. New Editions** – The department has insufficient resources to bring out new editions of all maps whenever stocks have to be replenished. New editions of 1:50,000 sheets will therefore only be brought out between periodical revisions of the area (it is hoped that in future the periods between

revisions will normally be about 25 years) on the orders of the Surveyor General. Directors considering that the importance of an area justifies the production of a new edition of a 1:50,000/1-inch map at a shorter interval will refer the case to the Surveyor General. All new editions will be brought up-to-date, not only as regards new survey and information, but also as regards changes of symbols and style, unless express instructions to the contrary are issued by the Director, Map Archival & Dissemination Centre. Office copies showing the changes to be incorporated are maintained by Directors as described in para 50. Whenever, important information is embodied from office copy corrections only, a special footnote will be added warning the user that it is not based on accurate survey.

The Director, Map Archival & Dissemination Centre is responsible for putting in hand all work necessary for the reprint of a map in sufficient time before the stock is exhausted; but a new edition of a topographical map may be initiated by the Regional Director responsible, who should inform the Director, Map Archival & Dissemination Centre, whenever he considers that there is sufficient new material.

As a rule, new editions of topographical and State maps will be prepared under the direction of the GDC concerned.

**41. Office Copies** – These are maintained for all departmental maps as follows :-

- (e) The concerned GDCs maintain office copies for all maps except forest and cantonment maps within their respective areas which are on 1:250,000/¼ inch or larger scales, and in addition, for the State Maps for which they are responsible. The Director, Map Archival & Dissemination Centre, maintains office copies of smaller scale maps except State maps and also duplicate copies of all 1:250,000/¼-inch scale maps. The Director **General** of Military Survey will maintain office copies as required for all maps which contain areas within his responsibility.
- (f) Responsibility for collection of information for in-corporation in new editions rests with Directors as follows:-
  - (i) **GDCs Directors** : for information from State Governments and other local sources.

(ii) The **Director General** of Military Surveys, for information from all military sources.

(iii) The Director, Map Archival & Dissemination Centre, for information regarding Railways, Civil Aviation, National Road schemes and similar centralized sources.

The Director who collects the information is responsible for ensuring that it is sent to the Director responsible for maintenance of the office copies of the largest scale maps which may be affected. The Director **General** of Military Survey will, however, send all information collected by him to the Director, Map Archival & Dissemination Centre, who will be responsible for its further distribution within the Survey of India, as necessary.

**42. Map Record and Issue** – Stocks of all departmental maps are at present distributed between the Map Record and Issue Office, Dehradun, and Map Sales Office, New Delhi under the Director, Map Archival & Dissemination Centre, and similar offices under the control of some regional Directors. Bulk stocks of extra-departmental maps held for sale to the public or for departmental use are held by the Director responsible for the preparation of the maps.

A Map Record and Issue Office has the following duties :-

- (g) Storing of all departmental maps and such extra-departmental maps as are kept for stock and issue.
- (h) Issue of maps to Government officials and to the public.
- (i) Maintenance of ledgers showing receipt and issue of maps.
- (j) Mounting of maps.
- (k) Storage of all original and necessary records of the area of **responsibility of GDC- concerned**.

The Map Archive and Dissemination Centre, Dehradun in addition holds four or more record copies of every departmental map and two copies of every extra-departmental map published by the department and 3 copies of every restricted map reserved for the National Libraries and

stores all historical map records, excepting those transferred to the National Archives of India.

**43. Maintenance of Old Maps** – When an area covered by old surveys is covered by modern surveys on a smaller scale, the larger scale maps based on the old surveys will be superseded and stocks destroyed. If, however, the old maps contain information, e.g., village boundaries or trijunctions, which do not appear on the modern maps, the **Regional** Director concerned may recommend to the Director, Map Archive & Dissemination Centre, that a few extra copies should be retained for future reference. Such extra copies will be treated as historical records and not stocked for public sale.

**44. Sale Price** – The sale price of departmental maps described in para 10 (c) is fixed by the Surveyor General on the advice of the Director, Map Archival & Dissemination Centre. When fixing prices, the cost of **plate** making, printing and paper only is used as a basis and costs of survey, fair drawing/**digitization** and preparation of negatives are neglected.

**45. Map Sales Agents** – Rules for appointment of map sales agents may be ascertained from the Director, Map Archive & Dissemination Centre, Hathibarkala, Dehradun.