

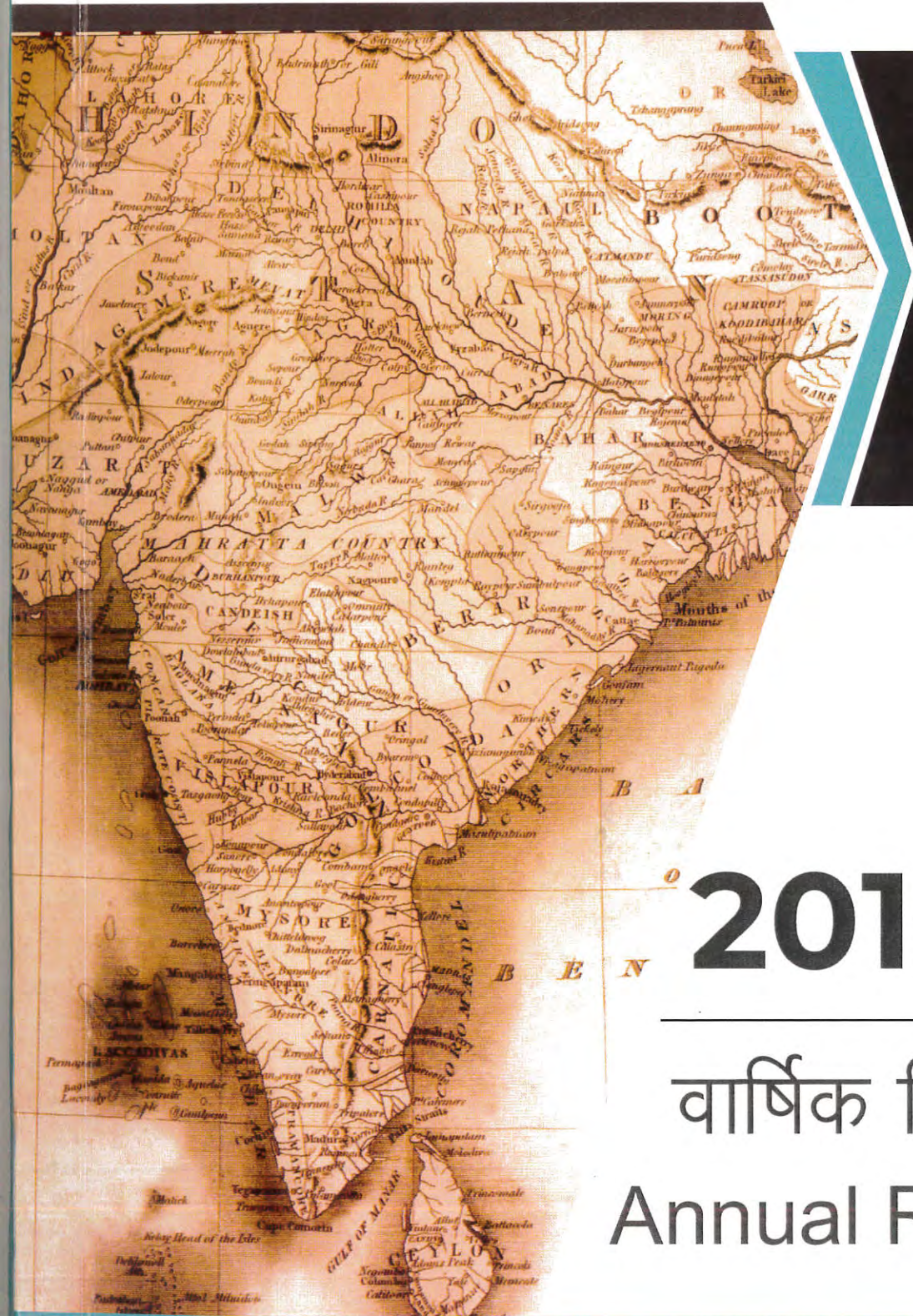


भारतीय सर्वेक्षण विभाग

(विज्ञान एवं प्रौद्योगिकी विभाग)

SURVEY OF INDIA

(Dept. of Science & Technology)



2016 -17

वार्षिक रिपोर्ट
Annual Report

VISION

Survey of India takes a leadership role in providing customer focused, cost effective and timely geo-spatial data, information and intelligence for meeting the needs of security, sustainable national development and new information markets.

MISSION

Survey of India dedicates itself to the advancement of theory, practice, collection and applications of geo-spatial data, and promotes an active exchange of information, ideas, and technological innovations amongst the data producers and users who will get access to such data of highest possible resolution at an affordable cost in the near real-time environment.

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SURVEY OF INDIA

(विज्ञान एवं प्रौद्योगिकी विभाग)
**(DEPARTMENT OF SCIENCE
& TECHNOLOGY)**

वार्षिक रिपोर्ट
ANNUAL REPORT

2016 - 2017



भारत के महासर्वेक्षक के आदेश से प्रकाशित

PUBLISHED BY THE ORDER OF THE SURVEYOR
GENERAL OF INDIA

INTRODUCTION:

Survey of India, under the Department of Science & Technology, Govt. of India, has been engaged in production and maintenance of various types of Topographical, Geographical and many other public series maps on various scales covering India, for the defence and development of the nation. Besides, being grouped under 'Scientific Surveys' the Govt. of India business rule, it has also been called upon extensively to deploy its expertise in the field of geodetic and geophysical surveys, study of seismocity and seismotectonics, environmental and disaster management, participation in Indian scientific expeditions to Antarctica, glaciology programmes and other projects related to digital cartography and digital photogrammetry etc. to provide basic data for Science & Technology requirements.

1. CHARTER OF DUTIES:

The charter of duties and responsibilities of the Survey of India (SOI) are enumerated below :-

- (a) Provision and maintenance of geodetic plan and height control network and provision and maintenance of gravimetric and geomagnetic control network.
- (b) Provision of topographical maps for the entire country to meet the national requirements, including those of defense forces.
- (c) Collection of tidal data along the coast line and islands and Tidal predictions for 44 ports in the Indian Ocean, Arabian Sea and the Bay of Bengal including ports in Myanmar, Iran, Sri Lanka and Sultanate of Oman in the interest of good Neighborly relations.
- (d) Compilation/ mapping and production of geographical maps e. g Railway Map, Road Map, Political Map, Physical Map etc.
- (e) Preparation of the International Map of the World (IMW) series and the World Aeronautical Charts (WAC) series as a commitment to the International Civil Aviation Organization (ICAO).
- (f) Surveys for development projects, e.g., power and irrigation, mineral exploration, urban and rural development etc.
- (g) Surveying and mapping of forest areas, large cities and preparation of guide maps of cities/ towns/ places of interest.
- (h) Surveying and mapping of Cantonments, surveying and mapping for aeronautical maps/ charts for the IAF.
- (i) Standardization of geographical names.
- (j) Demarcation of the external boundary of India, its correct depiction on maps published within the country. Also advising the Government of India on the demarcation of inter-state boundaries.
- (k) Training of officers and staff of the department, trainees from other central and state government departments and trainees from foreign countries.
- (l) Promotion of Research & Developmental activities in the field of geodesy, photogrammetry, cartography and printing techniques etc.

- (m) Introduction of modern technology in the related fields of data acquisition, Data processing and Geo- Information management.
- (n) Co-ordination and control in providing aerial photographic cover for the whole country.
- (o) Collaboration with training organizations, educational institutions and scientific bodies on specific projects to promote research and developmental activities.
- (p) Representation at various international and national conferences to promote the growth of surveying and cartography and to introduce the state-of-the-art technology for optimum results
- (q) Support to Third World countries e.g., Nigeria, Afghanistan, Kenya, Iraq, Nepal, Sri Lanka, Zimbabwe, Indonesia, Bhutan, Myanmar and Mauritius etc. by providing technical know-how and expertise in various disciplines of surveying and survey education.

Besides above activities, the Surveyor General of India is associated with the under mentioned Expert Groups/ Committees/ High Level forums

- (a) De-facto leader/Member of Indian representation in all United Nations Groups, High level forums, Committee, Divisions, Sessions and conferences on Cartography, Geo- information management & Surveying and Toponomy.
- (b) Chairman of Standing Committee on Cartography and Mapping under NNRMS Programme.
- (c) Member of Central Geological Planning Board (GPB) for Management of Geological Survey of India.
- (d) Member of Governing Body of Wadia Institute of Himalayan Geology, State Remote Science Centres, Central Ground Water Board, NWDA, CWC etc
- (e) The Surveyor General of India acts as an adviser to various ministries of the Government of India on all surveying and cartographic matters. Survey of India also renders advice on the specifications of surveys and furnishes necessary data / maps to various central and state government departments for development, planning and defence applications.

2. NATIONAL MAP POLICY (NMP) - 2005:

Preamble:

All socio-economic developmental activities, conservation of natural resources, planning for disaster mitigation and infrastructure development require high quality spatial data. The advancements in digital technologies have now made it possible to use diverse spatial databases in an integrated manner. There responsibility for producing, maintaining and disseminating the topographic map database of the whole country, which is the foundation of all spatial data vests with the Survey of India (SOI). Recently, SOI has been mandated to take a leadership role in liberalizing access of spatial data to user groups without jeopardizing national security. To perform this role, the policy on dissemination of maps and spatial data needs to be clearly stated.

Objectives:

To provide, maintain and allow access and make available the National Topographic Database (NTDB) of the SOI conforming to national standards.

To promote the use of geospatial knowledge and intelligence through partnerships and other mechanisms by all sections of the society and work towards knowledge based society.

TWO SERIES OF MAPS:

To ensure that in the furtherance of this policy, national security objectives are fully safeguarded, it has been decided that there will be two series of maps namely

(a) Defence Series Map (DSM):

These will be the topographical maps (on Everest/WGS-84 Datum and Polyconic /UTM Projection) on various scales (with heights, contours and full content without delution of accuracy). These will mainly cater for defence and national security requirements.

This series of maps (in analogue or digital forms) for the entire country will be classified, as appropriate, and the guide lines regarding their use will be formulated by the Ministry of Defence.

(b) Open Series Map (OSM):

OSMs will be brought out exclusively by SOI, primarily for supporting development activities in the country. OSMs shall bear different map sheet numbers and will be in UTM Projection on WGS-84 datum. Each of these OSMs (in both hard copy and digital form) will become “Unrestricted” after obtaining a one-time clearance of the Ministry of Defence. The content of the OSMs will be as given in Annexure ‘B’. SOI will ensure that no civil and military Vulnerable Areas and Vulnerable Points (VA’s/VP’s) are shown on OSMs. The SOI will issue from time to time detailed guidelines regarding all aspects of the OSMs like procedure for access by user agencies, further dissemination sharing of OSMs amongst user agencies with or without value additions, ways and means of protecting business and commercial interests of SOI in the data and other incidental matters. Users will be allowed to publish maps on hard copy and web with or without GIS database. However, if the international boundary is depicted on the map, certification by SOI will be necessary. In addition, the SOI is currently preparing City Maps. These City Maps will be on large scales in WGS-84 datum and in public domain. The contents of such maps will be decided by the SOI in consultation with Ministry of Defence.

National Topographical Data Base (NTDB) :

SOI will continue to create, develop and maintain the National Topographical Data Base (NTDB). NTDB in analogue and digital forms consisting of following data sets:

- (a) National Spatial Reference Frame,
- (b) National Digital Elevation Model,
- (c) National Topographical Template,
- (d) Administrative Boundaries, and
- (e) Toponymy (place names).

Both the DSMs and OSMs will be derived from the NTDB.

Map Dissemination and Usages:

Open Series Maps of scales larger than 1:1 million either in analogue or digital formats can be disseminated by SOI by sale or through an agreement to any agency for specific end use. This transaction will be registered in the Registration database with details of the receiving agency, end use etc.

3. NATIONAL DATA SHARING ACCESSIBILITY POLICY NDSAP-2012:

Preamble:

Asset and Valuable potential of data are widely recognised at all levels. Data collected or developed through public investments, when made publicly available and maintained over time, their potential value could be more fully realised. There has been an increasing demand by the community, that such data collected with the deployment of public funds should be made more readily available to all, for enabling rational debate, better decision making and use in meeting civil society needs.

A large quantum of data generated using public funds by various organisations and institutions in the country remains inaccessible to civil society, although most of such data may be non- sensitive in nature and could be used by public for scientific, economic and developmental purposes. The National Data Sharing and Accessibility Policy (NDSAP) is designed so as to apply to all sharable non – sensitive data available either in digital or analogue forms but generated using public funds by various Govt. of India. The NDSAP policy is designed to promote data sharing and enable access to Govt. of India owned data for national planning and development.

Objective:

The objective of this policy is to facilitate the access to Govt. of India owned sharable data and information in both human readable and machine readable forms through a network all over the country in a proactive and periodically updated manner, within the framework of various related policies. Acts and rules of Govt. of India, thereby permitting wider accessibility and use of public data and information.

4. CITIZEN CHARTER:

Survey of India, under the Ministry of Science and Technology, Government of India, is the national survey and mapping organization and has mandate to take a leadership role in liberalizing access of spatial data to user groups without compromising with the national security. The responsibility for producing, maintaining and disseminating the topographic map database of the whole country, which is the foundation of all spatial data vests with Survey of India (SOI). In order to improve the delivery of our services, Survey of India has decided to formulate this Citizens' Charter.

This Charter is the declaration of our vision, values and standards to achieve excellence in the formulation and implementation of National Map Policy for the benefit of Public, Govt. / Private organizations and other stakeholders. This Citizens' Charter will also be the benchmark to determine our efficiency and would be a dynamic document, which would be reviewed at least once in five years.

Our Strategy:

The strategy for achieving our mission shall comprise the following:

- Benchmarking of products / data.
- Enhancing the use of information technology.
- Measuring conformance to service delivery standards.
- Evolving cooperative initiatives with other government and private agencies.

Our Clients:

Government and private organizations as well as private individuals associated with defence / security, information technology, education and research, navigation, tourism, disaster management, engineering and production, environment, mining, drilling, development, agriculture, fishing, utilities etc.

Our Expectations:

We expect citizens to:

- Uphold and respect the rules and regulations governing the geospatial data dissemination.
- Fulfill their duties and legal obligations in time.
- Be honest in furnishing information.
- Be co-operative and forthright in inquiries and verifications.
- Avoid unnecessary litigation.

This will enable us to serve the nation in an effective and efficient manner.

Our Commitment:

We shall strive to:

- Be at the service of our country
- Work to ensure the national security.
- Make our procedures and transactions as transparent as possible
- Carry out our tasks with:
 - integrity and judiciousness
 - impartiality and fairness
 - courtesy and understanding
 - objectivity and transparency
 - Promptness and efficiency.

5. INTERNATIONAL BOUNDARIES:

(i) Boundary Survey Work:

Survey of India has been given the responsibility by the Ministry of External Affairs for all surveying works i.e. Boundary demarcation, relocation of boundary pillars of International boundary with Nepal, Bhutan, Bangladesh, Myanmar, Pakistan and China. SOI also advises State Govt. and Govt. of India on matters of International Boundary and State / UTs Boundaries and carries out Surveys as and when required to resolve the disputes as Extra- Departmental jobs.

Surveying tasks associated with the International Boundary were carried out as given below.

- **Indo- Myanmar International Border:** Joint demarcation /relocation /inspection /maintenance works.
- **Indo- Bhutan International Boundary (West Bengal & Arunachal Pradesh – Bhutan Sector):** Joint inspection of missing / damaged boundary pillars.

- **Indo- Pak International Border (Punjab and Rajasthan Sector):** Joint inspection / maintenance of boundary pillars.
- **Indo- Nepal International Border:** Joint demarcation /relocation /inspection /maintenance works.



Indo- Nepal International boundary work

- **Indo-Myanmar International Boundary (Manipur & Mizoram – Myanmar Sector):** Joint Inspection, Repair, Restoration, Reconstruction and Maintenance of boundary pillars.



Pillar construction work in International Border in Mizoram- Myanmar Sector

- **Indo- Bangladesh International Border:** Joint demarcation /relocation /inspection /maintenance works

(ii) Conference / Meeting

(1) India – Myanmar Boundary

- 10th meeting of Heads of the Departments of India- Myanmar on joint inspection, Repair, Reconstruction, Restoration and Maintenance of boundary pillars was held at Dehradun from 6th to 7th Sept, 2016. Dr. Swarna Subba Rao, Surveyor General of India led the Indian delegation while Myanmar delegation was led by Mr. U Than Hlaing, Director General, Survey Department, Govt. of Republic of the Myanmar.



Myanmar delegation in Surveyor General's Office, Dehradun

- 22nd Sectoral Level Meeting between India & Myanmar at Mandalay (Myanmar) from 19 to 20th Dec, 2016, Indian delegation led by Sh. Satender Garg, Joint Secretary, (NE) MHA while Sh. S.K. Sinha, Director, IBD(SGO) New Delhi participated in the meeting.
- Director Level meeting between Survey Departments of India & Myanmar on joint inspection, Repair, Restoration, Reconstruction and Maintenance of boundary pillars on Indo- Myanmar was held in New Delhi from 16 to 17th Feb, 2017. Indian delegation was led by Lt. Col. Col Rajat Sharma, Director, Meghalaya & Arunachal Pradesh GDC while Myanmar delegation was led by Mr. U Sein Min, Director Survey Department, Myanmar.

(2) India – Bangladesh Boundary

- The 42nd Joint Boundary Conference (Mizoram Sector) between India – Bangladesh was held in Dhaka, Bangladesh from 22nd to 23rd Aug, 2016. Indian delegation was led by Sh. Sanjay Kumar, Director WB & Sikkim GDC while the Bangladesh delegation was led by Brigadier General, Md. Abul Kher, Surveyor General of Bangladesh. In this conference decisions have been taken for the finalization of the upcoming field season 2016-17.
- The 83rd Joint Boundary Conference (Tripura Sector) between India – Bangladesh was held at Chittagang, Bangladesh from 28th to 29 Dec, 2016. Indian delegation was led by Sh. Sanjay Kumar, Director WB & Sikkim GDC.

(3) India – Pakistan Boundary

- Bi – Annual Meeting between India – Pakistan was held in Lahore (Pakistan) from 25 to 28th July, 2016. Indian delegation was led by Sh. K.K. Sharma, Director General, BSF while Pakistan side was led by Maj. Gen. Umar Farook Burki, Director General Pakistan Rangers, Punjab. Maj. Gen. R P Syan, Addl Surveyor General, Northern Zone, Chandigarh represented SoI in this meeting.
- Joint Director’s Inspection and Review of progress of international boundary pillars along Indo- Pak boundary was carried out from 20th to 22 Feb, 2017. Indian delegation was led by Sh. Chandra Pal, Director, Punjab Haryana & Chandigarh GDC while Pakistani side was led by Mr. Nadeem Ahmad Ch. Director, Eastern Circle, Survey of Pakistan.



Joint Director’s Inspection at India- Pakistan International boundary (Punjab- Sector)

(4) India – Nepal Boundary

- The 5th meeting of SOC meeting was held at Dehradun from 28th to 30th Sept, 2016, Indian delegation was led by Sh.R.K. Meena, Director, UK & West UP GDC and the Nepalese delegation was led by Sh. Suresh Man Shetha, Deputy Director General, Topographical Survey Branch, Survey Department, Govt. of Nepal. In this meeting riverine pillars were redesigned.
- The 4th meeting of the India -Nepal- Boundary Survey Official Committee (SOC) was held in Kathmandu, Nepal from 20th to 22nd June .2016. Indian delegation was led by Sh.R.K. Meena, Director, UK & West UP GDC while Nepalese delegation was led by Sh. Suresh Man Shetha, Deputy Director General, Topographical Survey Branch, Survey Department, Govt. of Nepal.
- The 3rd meeting of Indo- Nepal Boundary Working Group(BWG) was held in Kathmandu (Nepal) from 23rd to 25th June, 2016. Indian delegation was led by Dr. Swarna Subba Rao, Surveyor General of India. The Nepalese delegation was led by Sh. Krishna Raj B.C, Director General, Survey Department, Govt. of Nepal.

(5) India – Bhutan Boundary

- 11th India – Bhutan Secretary Level meeting was held in New Delhi from 7th to 8th Nov, 2016 on Border Management and Security. Sh. S.K. Sinha, Director, International Boundary Directorate, (SGO) represented SoI in this meeting.
- Joint Technical Level meeting between Department of India and Bhutan on boundary talks was held at Shillong from 30th Nov to 1st Dec, 2016. Indian delegation was led by Lt. Col. Rajat Sharma, Director, Meghalaya & Arunachal Pradesh GDC while Bhutanee delegation was led by Mr. Choeki Khorlo, Specialist Director General, International Boundary, Thimpu.

6. TECHNICAL ACTIVITIES IN SOI :

Topographical Data Base (NTDB) plays very significant role in the planning for developmental activities of the Nation. Survey of India, the National Survey and Mapping Organisation of the country, under the Department of Science & Technology, Ministry of Science & Technology has the unique responsibility of providing timely, updated, cost effective and accurate Topographical Data Base for expeditious and integrated development and ensure that all resources contribute their full measure to the progress, prosperity and security of our country now and for generations to come. In this prominent role, the Department ensures that the country's domain is explored and mapped suitably to meet the emerging needs of the user community.

Survey of India is also responsible for Geodetic Control (Horizontal and Vertical) and Geodetic & Geophysical surveys, Production of Aeronautical Charts; undertaking specialised surveys for Developmental Projects, demarcation of the external boundaries of India, ensuring their accurate depiction on the maps published in the country and also advice on the demarcation of inter-state boundaries.

6.1 Departmental work:

6.1.1 Generation of National Topographical Digital Database on Various Scales:

National Digital Topographical Data Base of the entire country on 1:250, 50K and some parts of the country on 1:25K scales has already been completed. Generation of Digital Topographical Data Base of remaining existing maps on 1:25K scale available in the form of hard copy as printed maps, PT sections, Air Survey sections, scribing sections etc are in progress.

Progress of Digitisation on 1:25K during the year is as under.

Digitisation (sheets)	QC(sheets)	Preparation of OSM (sheets)
365	1061	700

6.1.2 Updation of National Topographical Database on various Scales:

Survey of India is the National Mapping Agency (NMA) of the country and bears the responsibility to ensure that the country's domain is surveyed and mapped suitably. SOI provides topographical base maps on 1:25K, 50K, 250K scales to cater for the security and developmental needs of Geo- Spatial data of the country.

To fulfill the requirements of high quality spatial data for socio- economic developmental activities, conservation of natural resources, planning for disaster mitigation, expeditious infrastructure and development works of the nation, Survey of India has proposed and executed the work of preparation of updated OSM and DSM datasets (DTDB & DCDB) with pre- field updation using High Resolution Satellite Imagery (HRSI) followed by revision survey on ground and the same is being undertaken by all Geo- spatial Data Centers.

SOI has completed the updation of Topographical data on 1:250K, 1:50K and 1:25K scales as detailed below.

1:50K scale

Pre-field updation (sheets)	Revision Survey (sheets)	Post Field Updation (sheets)
05	14	14

1:25K scale

Pre- field updation (sheets)	Revision Survey (sheets)	Post field updation (sheets)
126	34	12

6.1.3 Generation Of OSM Hindi and OSM Regional Languages Version:

Survey of India has completed Open Series Maps (OSMs) on 1:50,000 scale English version and are available for use by the users. To fulfill the requirements of OSM Hindi version and Regional languages version, Preparation of OSM (Hindi) and OSM (Regional Languages) is going on and is as under.

OSM Hindi (sheets)	OSM Regional Language(sheets)
43	06

6.1.4 Providing OSM DTDB data for WEB services like WMS /WFS:

Survey of India has been providing Web Map Service (WMS) based on 1:50K OSMs through SOI portal “surveykshan.gov.in” for the open viewing as mandated by the NDSAP- 2012. Efforts are underway to provide the data service of feature data through Web Feature Service (WFS).Progress of WMS and WFS during the year is as under.

Web Map Service(sheets)	Web Feature Service(sheets)
285	357

6.1.5 Special Series Maps / Small Scale Geographical Maps:

Special series maps viz Guide Maps / Tourist Maps and small scale Geographical Maps viz State maps (on various scales) are also prepared.

Guide Maps	State Maps
03(Raipur, Delhi & Tirumala Tirupati)	04 (Andhra Pradesh, Manipur & Mizoram, Sikkim & Uttarakhand)

6.2 GEODETIC AND GEOPHYSICAL:

(1) Geodetic

SoI has provided both vertical and horizontal Geodetic control for departmental and various extra departmental projects of national importance, such as:-

- Dam Deformation Studies
- Crustal Movement Studies
- Control Surveys and Tunnel Alignment Surveys for various Hydroelectric and River Valley Projects.
- Verticality of the minarets of historical monuments / Stability of variou Engineering Structure.

The following tasks were carried out by the Department to provide the horizontal and vertical control for fixing alignment of various structures, Dam deformation studies, Crustal movement studies & Monitoring stability of National Heritage Monuments etc.

i)	Recce /GPS Observation	31 Stations
ii)	High Precision Levelling for Redefinition of Indian Vertical datum	(Fore & Back) 350 lin.km.
iii)	Precision Levelling for Project Surveys	71.6 Lin km (F/B)
iv)	EDM Distance	28.42 km
v)	Traverse	112.4 lin.km.
vi)	Angular observation for projects	266 Stations
vii)	No. of Bases	114 No.
viii)	GPS observation for projects	228 Stations

(2) Gravity

Geoid Model of India is under progress.

(3) Geomagnetic

Geomagnetic Observatory Sabhawala - Automatic recording by Askania and DFM Variometer for the variation of the three geomagnetic elements i.e. Horizontal Force (HF), Vertical Force (VF) Declination (D) and their absolute measurement were continued throughout the year. Absolute measurement from DIM and ENVI-Mag has been done in order to control the base line values of Variographs. Data has been made available for scientific studies to other Govt. Departments also.

(4) Tidal Works

Survey of India maintains a series of tidal observatories located all along Indian Coast and Islands. Tidal observations are carried out on regular basis for tidal predictions. Tidal data generated through tide gauges installed in tidal observatories is quality controlled and then used for upgradation of Harmonic constituents. These in tune are used for tidal predictions which are brought out in the form of Indian Tide Tables. Indian Tide Table– 2017 and Hugli River Tide Table, 2017 was published.

Aftermath Tsunami of 26th December 2004, Survey of India has contributed immensely in establishing **Tsunami Early Warning System**. Under the project “**Modernization and Expansion of Indian Tide - Gauge Network**” along east and west coast of India and its Islands and it was decided to equip all its tidal observatories with State- of- the- Art digital tide gauges and Dual frequency GPS receivers co-located with Real Time Data Transmission facilities through dedicated V-SAT network.

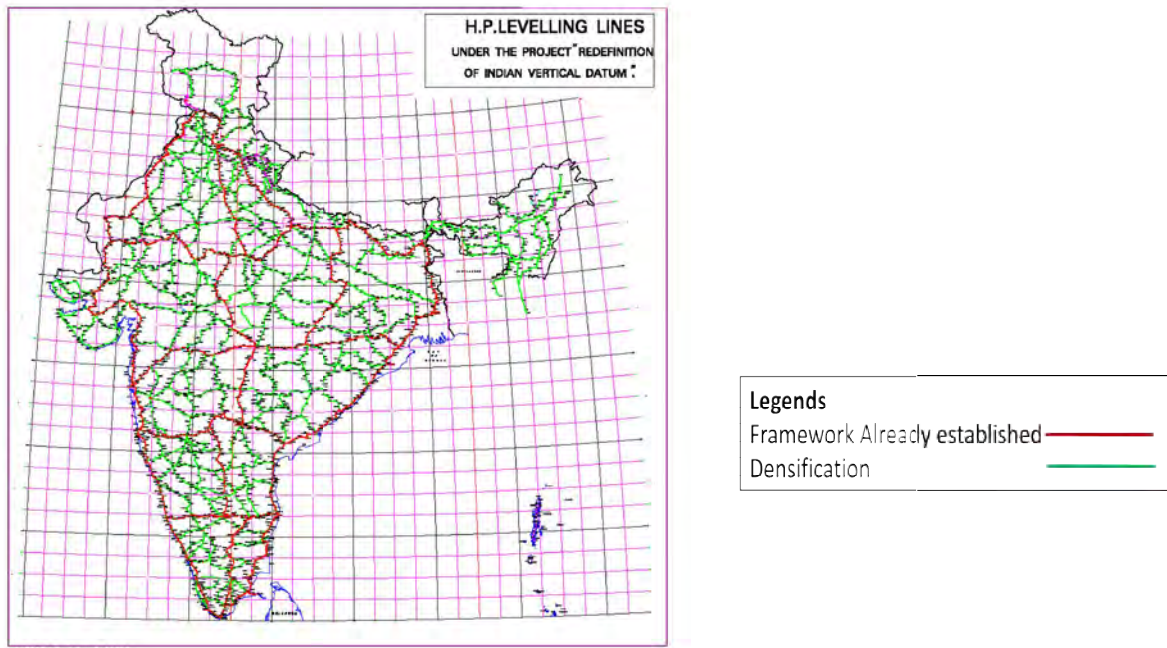
Real Time GPS and Tidal data received through VSAT network from various ports at National Tidal Data Centre(NTDC) Dehradun. Following ports have been maintained and inspected time to time during the year under report Port Blair and Aerial Bay, Kandla, Vadinar, Tuticorin, Nagapattinam, Chennai, Cuddalore, Aerial Bay, Nancowry, Campbell Bay, Kakinada, Machlipatnam, Mumbai JNPT, Okha, Marmagao, Karwar, New Mangalore, Cochin, Kanyakumari, Paradip, Haldia, Visakhapatnam, Garden Reach and Port Blair.



(5) **Redefinition of Indian Vertical Datum, Densification of Level Net and H.P. Levelling for Geoid Model**

Survey of India has the mandate to provide the highly precise geodetic horizontal and vertical control frame work spread throughout the country. In addition to the provision of geophysical framework for entire country which includes establishment of gravity network, geomagnetic network. This geophysical control is provided in the systematic manner. To carry out High Precision Levelling covering the entire country, so as to form a national vertical framework.

During the year under report, Recce / construction of Bench marks 340 lin km, H.P./ Precision Levelling (Fore direction) 171 lin km. and H.P. / Precision leveling (Back direction) 179 lin km.



6.3 Extra Departmental Work:

(1) NUIS Project:

Survey of India in collaboration with Ministry of Urban Development has undertaken the task of mapping of 152 towns on 1:2000 scales for core area and 1:10,000 scale for the peripheral areas under National Urban Information Scheme (NUIS) and the progress is as under

Scale of Mapping	No. of Towns
1:10,000 (1:10K)	All 152 Towns have been completed
1:2,000 (1:2k)	All 152 Towns have been completed

(2) Mapping and Delineation of Hazard Line:

To delineate, map and benchmark the coastal hazard line all along the mainland coast of India under World Bank Assisted "Integrated Coastal Zone Management" (ICZM) project, where Survey of India has to generate a 0.5 meter elevation contour map on 1:10,000 scale as base map to delineate the Hazard Line for the entire mainland coast of India. (Strip width of maximum 7 km from line towards main-land)

Eight coastal GDCs (comprising 105 Sub Blocks) of Survey of India i.e. Gujarat, Maharashtra, Karnataka, Kerala, Tamilnadu, Andhra Pradesh, Orissa and West Bengal are engaged in various ICZM activities viz. Field control, Quality control works, Data handling etc.

GPS Observation & Leveling	Aerial Photography & Tidal observation	QA/QC for height control points (Sub-Blocks)	Aerial Triangulation completed (Sub -Blocks)	Feature Extraction completed (Sub-Blocks)
completed	completed	86	74	65

(3) Coal Mine Project:

Preparation of updated Topographical Maps of Major Indian Coal fields (27 coal fields comprising of 5131 sheets) on 1:5000 scale with contour interval 2 meters in plain and 3-5 meters in case of hilly terrain in GIS Digital format based on Digital Photogrammetric Techniques using high resolution aerial photographs and adequate ground verification. This project is being executed by Survey of India with its departmental resources. Project execution is distributed among the 7 Field Directorates of the Department. i.e. Chhattisgarh(7 Coal fields),Jharkhand (10 Coal fields), Madhya Pradesh (2 Coal fields), Maharashtra & Goa (4 Coal fields), Meghalaya & Arunachal Pradesh (1 Coal field), Orissa (2 Coal fields) , and West Bengal & Sikkim GDC (1 Coal field).

Following stages of works are being carried out in the project.

- Primary Control provision i.e. construction of BM/ GPS pillars, GPS observation and DT leveling.
- Model Block Control point (MCP) provision i.e. GPS observation and ST leveling.
- 2D Feature Extraction work
- 3D Feature Extraction work
- Field verification
- Preparation of final deliverables.



GPS Control for CMPDI Project

Primary control & GCP	Leveling (lin.km)	2D feature extraction (sheets)	3D feature extraction (sheets)	Field verification (sheets)	Post field work (sheets)
Completed for all 27 coal fields	9922.3	1922	1749	1295	858

(4) Map the Neighbourhood in Uttarakhand (MANU) Project:

Survey of India (SoI) has been assigned to prepare Digital Elevation Model (DEM) and also has to provide the map on 1:10K scale for disaster affected area of Uttarakhand for macro and micro level planning and post disaster scientific application by other agencies involved in MANU project.

Data Acquisition work in part of the area by using Modern Techniques of Air- Borne LiDAR and digital Aerial Photography of Disaster affected Areas of “Char Dham and Pindar Valley” has been already completed.

The following work has been completed during the year.

Reconnaissance (lin.km.)	Grid generation	GPS observation	Levelling for DEM checking (lin.km.)
340	7	302	370

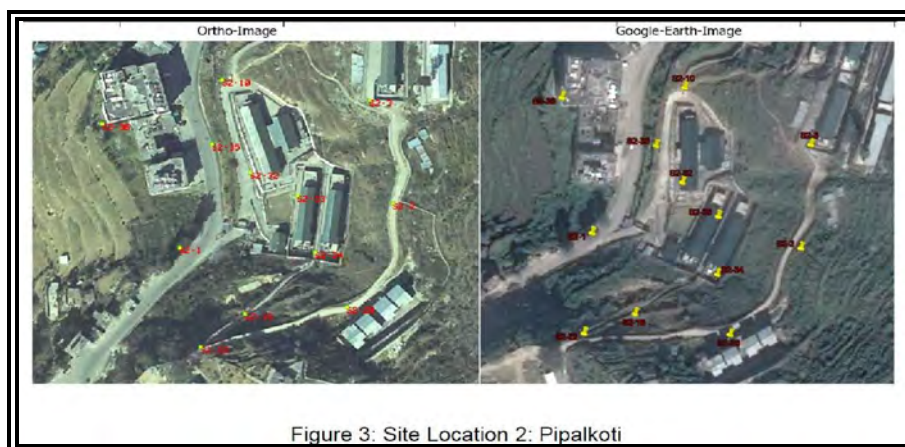


Figure 3: Site Location 2: Pipalkoti

(5) National Hydrology Project (NHP):

Survey of India (SoI) has been identified as one of the Central Implementation Agency in the scheme of National Hydrology Project to generate, prepare and provide various types of Geo-spatial datasets i.e. for mapping/ preparing the Digital Elevation Model (DEM) of 0.5m, 5m & 10 m for River Basin areas (plain), up to 5 km on both the sides of river and GIS ready data of SOI Topo sheets on 1:25 K scale under the **Component B: Water Resources Information System** and **Component D: Institutions Capacity Enhancement**.

Component B: Water Resources Information System (WRIS): Under this component Survey of India has to provide basic foundation data as under

- i) National Digital Elevation Model (DEM) for improved flood hazard mapping and other planning purposes.
- ii) Local high resolution surveys (such as LIDAR) for flood prone areas to support flood risk mapping and management action plans.

Component D: Institutional Capacity Enhancement: Through this Survey of India will build and provide infrastructure and communication equipment, capacity building and extensive training programs.

Key components for SOI:

The key components which SOI as a central implementing agency is addressing through NHP are as under:

- 1.
 - i) Digitisation of existing topographical database of 1:25K scale survey
 - ii) Generation of Digital Elevation Model from the contours of 1:25K scale survey. Gaps to be filled from 1:50K scale survey.
 - iii) Updation of existing 1:25K scale maps using satellite imagery.
- 2.
 - i) Acquisition and processing of Lidar data for generation of high resolution Digital Elevation Model.
 - ii) Creation of geoid model for reducing ellipsoidal hts from LiDAR to MSL hts. in flood prone areas.
- 3.
 - i) Capacity building /training to SOI officers in geospatial domain.
 - ii) Strengthening IT infrastructure of Geospatial data centres of SOI for data processing and dissemination.

(6) Special Survey for Indian Air Force:

Survey of India also prepared IAF-OGM, PGM, JGM, Landing Approach charts LAC, LNC etc. and carried out abstracting survey work for Indian Air Force. SOI has completed the following maps and data for IAF.

IAF Work	Work completed
IAF (OGM) - 5000 Series (1:1M)	38 sheets
IAF (PGM) - 5014 Series (1:1/2M)	41 sheets
IAF – JGM 1080 Series (1:2M)	17 sheets
IAF- LAC Series (1:50K)	02 parts
IAF- LNC Series (1:2M)	08 parts
Obstacle Survey of Airfield	Daman Airfield
IAF Airfield (Verification)	17 Airfields

6.4 OTHER SPECIAL SURVEY PROJECTS:

The following projects were continued / carried out during the year 2016 – 2017

SPECIAL SURVEY PROJECTS		
Sl, No.	Name of GDC/Centre	Name of Special Survey
1.	Andhra Pradesh	Garla Reserved Forest Boundary Survey
	-do-	Andhra Pradesh State Capital City Survey
	-do-	Bharat Electronics Ltd. Machlipatnam Project
	-do-	ECE Industries Ltd. Project
2.	G&RB	Punatsangchhu H E Project, Stage- II, Bhutan
	-do-	Kholongchhu HE Project, Bhutan
	-do-	Rihand Dam Project
	-do-	Tapovan Vishnugad HE Project
	-do-	Sela Urthing HE Project
	-do-	SPROC Project
3.	GIS & RS	Updation of National and State Highways
4.	Jharkhand	Neyveli Project
5.	Karnataka	DRDO Project
	-do-	NWKSRTC, Hubballi Survey Project
	-do-	IAF Bengaluru Survey aProject
6.	Himachal Pradesh	Surgani – Sundla HE Project
	-do-	Chanju HE Project
	-do-	Deothal- Chanju HE Project
	-do-	Manali –Aut HE Project
	-do-	Sunni Dam HE Project
	-do-	International Roerich Memorial Trust (IRMT)
7.	NGDC	Northern Railway Project
8.	Rajasthan	Tahsil level boundary Updation & Verification
9.	UP West & Uttrakhand	MDDA/ Forest Department Mussoorie Project
	-do-	Rajaji National Park Project
	-do-	Tapovan Vishnugad HE Project
10.	West Bengal & Sikkim	BANDU (Puruliya) Pumped Storage Project

6.5 STATUS OF PRINTING:

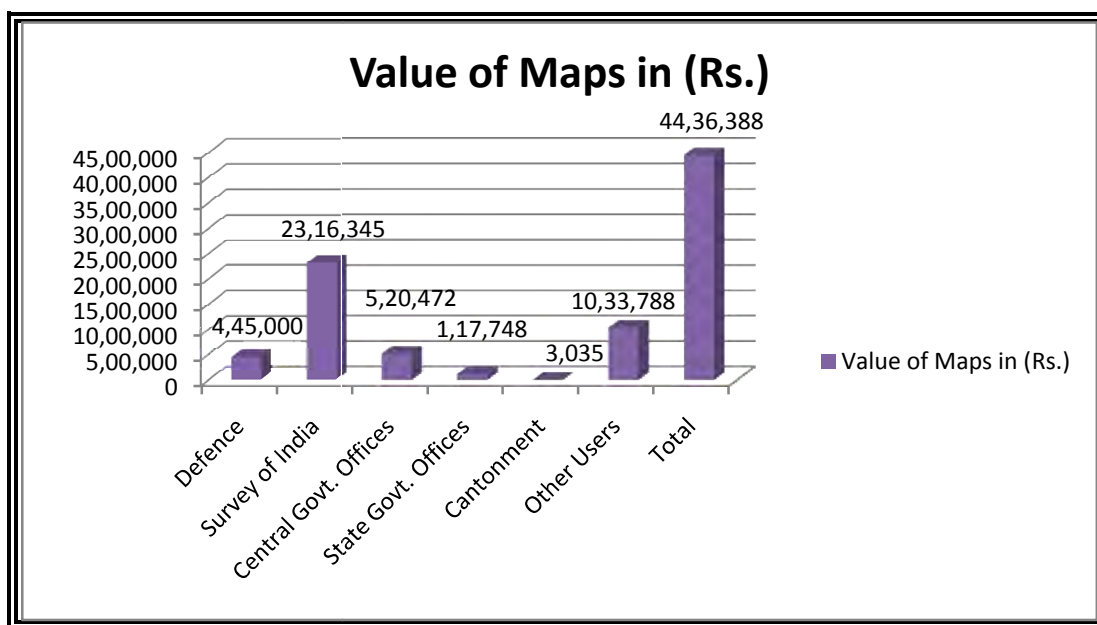
The following maps/specials products were printed during the period of report :-

STATUS OF PRINTING OF MAPS		
Sl. No.	Name of Job	No of Maps
1.	Topo/ OSM (Final & Reprint)	122
2.	OSM (Hindi New Edition)	4
3.	DSM (50 & 250K)Maps	184
4.	IAF(PGM,OGM,OLM,LAC etc.)	100
5.	State, Guide, Geographical, Railways & Tourists Maps etc	2
6.	3 D Plastic Relief Maps	1

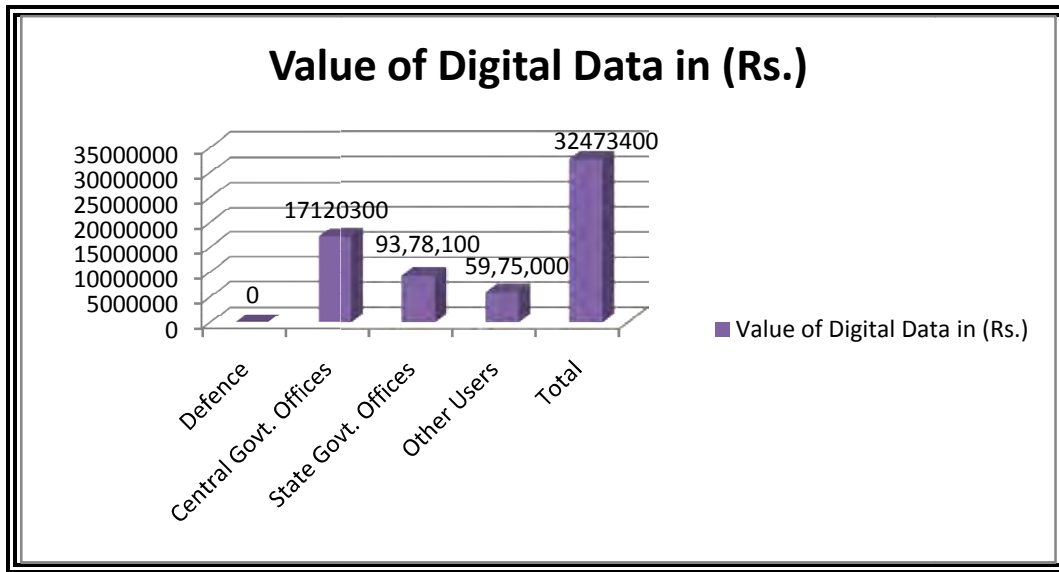
Name of Publication	Status
Hugli River Tide Table,2017	Published
Indian Tide Table,2017	Published
Annual Magnetic Bulletin 2015 of Sabhawala observatory	Supplied to IIG, Mumbai
Magnetic Declination Chart Epoch 2015.0	Published
Magnetic Declination epoch Chart 2020.0	Under progress

6.6 SALE OF MAPS AND DIGITAL DATA:

Sl.No.	Name of Organisation	Value of Maps in (Rs.)
1.	Defence	4,45,000
2	Survey of India	23,16,345
3.	Central Govt. Offices	5,20,472
4.	State Govt. Offices	1,17,748
5.	Cantonment	3,035
6.	Other Users	10,33,788
	Total	44,36,388



Sl.No.	Name of Organisation	Value of Digital Data in (Rs.)
1.	Defence	0
2	Central Govt. Offices	1,71,20,300
3.	State Govt. Offices	93,78,100
4.	Other Users	59,75,000
Total		3,24,73,400



7. COLLABORATIVE SCIENTIFIC ACTIVITIES:

Following collaborative scientific activities in the field of Geodesy and Geophysics were continued:

- (1) Magnetic data has been supplied regularly to IIG, Mumbai and also supplied to World Data Centre whenever it required.
- (2) Supply of Mean Sea Level data of 18 Indian ports to International Permanent Service for Mean Sea Level (IPSM SL), U.K. for various scientific studies by the International Geodetic Community.

8. RESEARCH AND DEVELOPMENT:

The main thrust of the research and developmental activities of the Geodetic & Research Branch during the period under report has been focused towards:

- (1) Digitization and correction work for the area mapped during 35th Indian Scientific Expedition to Antarctica has been completed.

(2) 36th Indian Scientific Expedition to Antarctica:

Expedition was conducted by National Centre for Antarctic & Ocean Research, Goa, Ministry of Earth Science, Govt. of India. Two teams from SoI visited Antarctica. Detail survey work has been completed for Bharti (Larsemann Hill) – 2.4sq.km. on scale 1:10,000 with contour interval 5 meter with GPS observation at 27 GPS stations and Maitri (Schirmacher Oasis) – 3.06 sq.km. on scale 1:5,000 with contour interval 2 meter with GPS observation at 31 GPS stations.



Surveying work in Antarctica

- (3) SoI has been jointly engaged with Indian Institute of Remote Sensing (IIRS), for Project Delhi for which reconnaissance and establishment of two new Type 'B' Bench Marks, site selection of 72 BMs. Leveling on 72+2 BMs and levelling about 30 lin km in fore direction and 20 lin km in back direction at New Delhi has been completed.
- (4) Site selection for establishment of 36 Tertiary BM for R&D Project, Mohali (Punjab) & Chandigarh jointly with IIRS has been completed.
- (5) Processing / analysis of GPS data of Antarctica with respect to Indian permanent station was carried out for crustal deformation, seismotectonic and plate motion studies with respect to Indian plate.
- (6) Backup and archival of data received from permanent GPS/GNSS stations.
- (7) Downloading of precise ephemeris of IGS stations from web sites has been continued.
- (8) Adjustment of Second Level Net in India (data compilation).
- (9) Data processing / analysis and tidal predictions for year 2016 and 2017.
- (10) As a sequel to above programs, the following activities were initiated / completed.
- (11) Data acquisition with Global Positioning System in static relative mode to obtain transformation parameters between the Everest Spheroid and WGS-84.
- (12) Gravity data acquired for equal crustal movement studies across faults / thrust zones as well as for Geodetic and Geophysical studies for International Geodynamics projects is being restructured and formatted, so as to meet the requirements (of redesigned mathematical model).
- (13) Research & Development Programme in Sea level studies, Glaciology, Earthquake prediction etc.

9. CONFERENCES / SEMINARS / WORKSHOPS /MEETINGS:

- (1) Maj Gen R.P. Sian, Addl. SG. Northern Zone, Chandigarh attended the 313th Council Meeting of Institution of Surveyors at New Delhi being Vice President on 06.05.2016.
- (2) Sh. R.K. Meena, Deputy Surveyor General and Sh Pankaj Mishra, Superintending Surveyor, SGO attended orientation workshop for NHP (MOWR) at New Delhi from 09.05.2016 to 11.05.2016.
- (3) Shri Nitin Joshi, Director, Geodetic & Research Branch, attended a meeting with Members of Everest Foundation regarding re-measurement of Mount Everest at Survey (Air) & Delhi GDC, Survey of India, New Delhi on 07th June, 2016.
- (4) Sh. D.N. Pathak, Deputy Surveyor General, attended a meeting for Promotion of Space Technology Application in Urban and Regional Planning through Education on 14.06.2016 in New Delhi.
- (5) Maj. Vivek Malik, DSS, attend the meeting at New Delhi regarding Interstate Boundary demarcation between Himachal Pradesh and Jammu & Kashmir at Zanskar Sumo and Sarchu area on 25.06.2016.
- (6) Sh. Rajan Kumar Nigam, Deputy Surveyor General, attended 3rd National Conference on Survey & Mapping at Holiday Inn, Mayur Vihar, New Delhi from 07.09.2016 to 08.09.2016.
- (7) Dr. Swarna Subba Rao, Surveyor General of India, held discussion with the Chief Secretary, State Government regarding demarcation of Saraswati River at Chandigarh on 14.09.2016.
- (8) Sh. K. K. Soni, Director, Admn. & Finance, held discussion with the ASGI on court cases pending in High Court, Nainital and CAT, on 18.09.2016.
- (9) Sh. Nitin Joshi, Director, Geodetic & Research Branch, held discussions at DST, New Delhi regarding “Proposal on re-measurement of Height of Mt. Everest on 20th September, 2016.
- (10) Dr. Swarna Subba Rao, Surveyor General of India, inaugurated Telangana & AP GDC at Hyderabad on 29.09.2016. Senior officers of the Department were also present at this occasion.
- (11) Dr. Swarna Subba Rao, Surveyor General of India, attended meeting of Central Ground Water Board (CGWB) at New Delhi on 26.09.2016.
- (12) Sh. K. K. Soni, Director, Admn. & Finance, delivered lectures in training programme at DRDO, SASE, at Chandigarh on 27.09.2016.
- (13) Dr. Swarna Subba Rao, Surveyor General of India attended workshop on Urban Planning & Infrastructure Development at Gayatri Vidhya Parishad, Vishakhapatnam on 28.09.2016.
- (14) Dr. Swarna Subba Rao, Surveyor General of India, attended meeting with the Secretary Adm. Reforms & Public Grievances, New Delhi on 05.10.2016.
- (15) Dr. Swarna Subba Rao, Surveyor General of India, attended meeting on Indo- Norway Cooperation at ICRISAT, Hyderabad 02.11.2016.

- (16) **36th INCA International Congress Seminar** was organized by Indian National Cartographic Association from 9th to 11th November, 2016 at Visvabharti, Shantiniketan, West Bengal on the theme “**Cartography For Analysis And Management Of Climate Change**”. An Exhibition was organized by SoI in the compound showcasing rich history of the department. Dr. Swarna Subba Rao, Surveyor General of India, along with senior officers of SoI were also present in the seminar.
- (17) Col Amardeep Singh, Deputy Surveyor General, attended meeting with Asstt. Solicitor General UK High Court, Nainital on 10.11.2016.
- (18) Lt Col S. Borkar, DSS, Assistant Surveyor General, visited Hyderabad to attend lectures by Prof. Rene Forsberg, DTU on Geoid Modeling at IIS&M from 17.11.2016 to 18.11.2016.
- (19) Dr. Swarna Subba Rao, Surveyor General of India, “Next Generation Spatial Technology and Applications” at Bengaluru ITE biz 2016 on 30.11.2016
- (20) Prof. Rene Forsberg, Head of Geodynamics Department, National Space Institute, Denmark made a lecture on “Capacity Building on Geoid Model” at IIS&M, Hyderabad organised by G&RB. Sh. U.N. Gurjar, Addl SG, Sh. U.N. Mishra, DSG, Sh. Ravindra Kumar, DD, attended the lecture.
- (21) **2nd India International Science Festival-2016** was organized by Ministry of Science and Technology and Ministry of Earth Sciences in association with Vijnana Baharti (VIBHA) from 7th to 11th December, 2016 at CSIR-National Physical Laboratory, New Delhi. Sh. Dhiraj Shah, Deputy Director, Northern Zone led the SoI delegation in this event.
- (22) Sh. Nitin Joshi, Director, Geodetic & Research Branch, made a presentation on “Proposal for Establishing “Virtual Reference Station Infrastructure” at Ministry of Rural Development, Department of Land Resources, New Delhi on 19th January, 2017.
- (23) Officers and Staff of APGDC & TGDC attended the 104th Indian Science Congress (ISC) from 03.01.2017 to 07.01.2017 at Tirupati.
- (24) **Geospatial World Form -2017/ Digital Cartographic Summit** was organized at Hyderabad International Convention Centre, Hyderabad by Geospatial Media and Communication Private Limited, Noida from 23rd to 25th January, 2017, in order to mark the 250 year celebrations, SoI also organized a two days Scientific seminar in partnership with International Cartographic Association and Geospatial Media. Dr. Swarna Subba Rao, Surveyor General of India led the delegation of SoI into GWF.
- (25) Sh. Nitin Joshi, Director, Geodetic & Research Branch, held discussion on K-GIS Project with the Addl Chief Secretary, Department of IT, BT and S&T on 16th February, 2017 and with Director, Karnataka GDC on 17th February, 2017.
- (26) Dr. Swarna Subba Rao, Surveyor General of India, attended a meeting with Mr. Kim Kyung – Han, New Minister counsellor at South Korean Embassy, New Delhi on 23.02.2017.
- (27) Dr. Swarna Subba Rao, Surveyor General of India, attended a meeting with the counsellor at South Korean Embassy, New Delhi on 06.03.2017.

(28) Sh. D.N. Pathak, Director, DSA & DGDC, attended “Meeting of Expert Group for Preparation of Flood Hazard Atlas” at NDMA Bhawan, New Delhi on 08.03.2017.

(29) Sh. D.N. Pathak, Director, DSA & DGDC, participated in Technical Advisory Committee (TAC) of Forest of Survey of India on 20.03.2017.

10. TECHNICAL PAPERS:

-Nil-

11. FOREIGN VISITS / STUDY TOURS / DEPUTATION:

(1) Dr. Swarna Subba Rao, Surveyor General of India visited Oslo, Norway from 17th to 23rd July, 2016 under Indo- Norwegian Cooperation Project between Norwegian Geotechnical Institute (NGI) and DST. NGI and DST have been successfully cooperating on science and technological inputs for mitigation of natural disaster in Uttarakhand.

(2) Sh. Rajiv Kumar Srivastava, Suptdg. Surveyor, O.C. Geophysical Wing, Geodetic & Research Branch, participated in the 12th International Geoid School International Association of Geodesy (IAG), held at Mongolian University of Science & Technology, Ulaanbaatar, Mangolia from 06-06-2016 to 10-06-2016.

(3) Sh. U.N. Gurjar, Addl. S.G, Sh. T. Sanjeev Kumar, DSG, Sh. S.V. Singh, DSG, Sh. Ravinder Kumar, SS and Sh. T. Shivanand Kumar, OS of Indian Institute of Surveying & Mapping, Hyderabad visited GISTDC, Thailand during the last week of June,2016 on Indo- Thai co-operation project.

(4) Sh. Nitin Joshi, Director and Rajiv Kumar Srivastava, Deputy Director, Geodetic & Research Branch, visited Bhutan to inspect the work of Punatsangchhu H. E. Project, Phase-II, from 21st December, 2016 to 26th December, 2016 and also held discussions with the Project Authority.

12. VISIT TO SOI OFFICES:



Dr. Harsh Vardhan, Hon'ble Minister of Science & Technology and Earth Sciences during a visit to Surveyor General's Office, Dehradun

Indian Institute of Surveying & Mapping

- (i) 20 students and 2 faculty members of Civil Engineering Department, National Institute of Technology, Warangal.
- (ii) 4 officers from National Institute of Hydrology, Goa.
- (iii) 60 students and 3 faculty members of Tamilnadu Agriculture University, Trichy.
- (iv) 4 students and 2 Senior Scientists from school of Geoinformatics, RSAC, Lucknow.
- (v) 5 students of Prof. Jayashankar, Telangana State Agriculture University, Hyderabad.
- (vi) 32 students and 4 staff members of Savitribai Phule Pune University, Pune.
- (vii) 90 students and faculty members of Methodist College of Engineering & Technology, Hyderabad.

(1) National Survey Museum (G &RB)

- (i) Er. Dharmendra Dubey, Head, Deptt. Of Civil Engineering, Ashoka Institute of Technology, Pahariya, Sarnath, Varanasi.
- (ii) Sh. Ratan Vaswani, Project Curator, India exhibition, Science Museum, London.
- (iii) Dr. Bhoop Singh, Senior Advisor and Head NRDMS, DST, with two dignitaries. Mr. Arild Oksnevad, Norwegian and Mr. Helge Christian Smebye, Norwegian.
- (iv) Mr. Thulasidharam with 14 students from CET, Trivandrum.
- (v) Prof. Dr. P.S.N. Rao, Chairman, Delhi Urban Art Commission.
- (vi) Shri Ujjal Deka Baruah, Asst. Professor, Deptt. Of Geography, Guwahati University, Assam alongwith 35 students.
- (vii) Ms Kathryn Price, Archaeologist/ Museum Researcher from United Kingdom, visited National Survey Museum Geodetic & Research Branch, Dehra Dun on 16-05-2016.
- (viii) Mr. Faisal Abdullah Al Balushi, from Oman.
- (ix) Mr. Prasun Kumar Gupta and Dr. U.P. Verma, Gipi Niwaran with 52 trainees from Deptt. Of Space, IIRS, Dehra Dun.
- (x) Mr. Boris Skopljak, from United Kingdom.
- (xi) Sh. B. S. Rawat, J.S., DST visited.
- (xii) Dr. P. R., Goswami, Former Director, Ministry of Culture, Govt. of India.
- (xiii) Mr. Jatindra Nath Swain, Commissioner, Survey of Settlement Tamilnadu, Chennai.
- (xiv) Mr. Stauch Werner alongwith Ms Zuzana Maria Schweir from Switzerland.
- (xv) Mr. Alan Volbercht, PLS from California, USA.
- (xvi) Mr. Rohart Michel with Mrs. Ducrot, French.
- (xvii) Mr. Ian Blathfor, Dr. Matilda Phoebe Blyth, Mr. Matthew Kimberley and Ms. Elise Foster, from London.

- (xviii) Mr. Jermy Charles Houdret with Ms. Jessica Eveleen Houdret (British citizen) from United Kingdom.
- (xix) Mr. Dovan Mong from Vietnam, Mr. Kiriti Hetige Chamka Perera from Sri Lanka and Mr. Abubakar Giginiya from Nigeria undergoing Hydrographic Surveying Specialization Course at National Institute of Hydrography.
- (xx) Dr. P.G. Sonavane and Dr. S.P. Sonavane from Walchand College of Engineering, Sangli (Maharashtra)
- (xxi) Mr. Jesus Jimenez and Mr. Alicia Jimenez Lahuerta, Spaniard from Spain.
- (xxii) Sh. Shamik Bag from Hindustan Times, Kolkata.
- (xxiii) Sh. K.S. Chauhan with 18 officers of SSB Academy, Srinagar Garhwal.
- (xxiv) Dr. V.S.Rathore with 8 students from Birla Institute of Technology, Ranchi.
- (xxv) Sh. Mithilesh Mishra, IAS, Director, Land Records Survey, Bihar.
- (xxvi) Prof. G.P. Singh and Prof M.J.K. Srivastava with 43 students from Department of Geophysics, Benaras Hindu University, Varanasi.

13. CULTURAL AND EDUCATIONAL ACTIVITIES:

- (i) Hindi Pakhwada was celebrated at various offices in Survey of India located at different cities from 14.09.2016 to 30.09.2016. During this period various activities : Hindi essay writing, Good hand writing, Noting – drafting, General knowledge, Poem and quiz competitions were organized to encourage the officers and staff to work in “**Rajbhasha Hindi**” during the period.



Surveyor General of India inaugurating Rajbhasha Hindi prize distribution ceremony at Surveyor General's Office, Dehradun

(ii) National Science Day

National Science Day was celebrated on 28th February, 2017 at various offices of Survey of India located at different places of the country. The Theme on this National Science Day was “**Science & Technology for Specially Abled Persons**”. A number of activities like Display of Instruments, latest technology used by the department, Essay writing competition, sports quiz, contest etc were organized for the general public especially students of various schools, colleges and institutions located in various regions visited the National Survey Museum and offices of the department. An open day was observed on this day. Instruments historical as well as modern were displayed for the benefit of visitors to understand the changes that have taken place in the terms of technology transformation and their application to multidisciplinary activities of the Survey of India.

(iii) Swachh Bharat Pakhwara

Different programmes on Swachh Bharat Abhiyan were conducted in Survey of India office premises to propagate the Swachh message among the staff. Poster competition was also organized in nearby schools to make aware regarding Swachh Bharat Mission. observed from 16.05.2016 to 31.05.2016. Officers / Staff participated and took oath to keep India clean and all the staff did the work to clean the Survey of India complex and its surroundings.

14. USE OF HINDI IN OFFICIAL WORK

In accordance with the Official Language Rules, 1976, 15 Geo-Spatial Data Centres / Directorate/Printing groups including Headquarter of Survey of India are located in Region ‘A’ while 6 Geo-Spatial Data Centre in Region ‘B’ and 20 Geo-Spatial Data Centres/Training Institutes /Printing groups are in Region ‘C’. The position regarding the use of Hindi in the Department for the year 2016-2017 remained as under.

(a) CORRESPONDENCE

During the year 2016-17 intensive measures were taken for transacting the official work of the union in Hindi by the various offices of the department. 4285 documents were issued bilingually under section 3(3) of the Official Languages Act, 1963. Letters received in Hindi were replied to in Hindi. Regionwise position regarding correspondence in Hindi remained as under.

Sl. No.	Correspondence in Hindi by the offices located in Regions- ‘A, B & C	% of Use
1.	Correspondence in Hindi by the offices located in Region ‘A’	
1.1	With ‘A’ and ‘B’ Region	85%
1.2	With ‘C’ Region	66.8%
2.	Correspondence in Hindi by the offices located in Region ‘B’	
2.1	With ‘A’ and ‘B’ Region	91.2%
2.2	With ‘C’ Region	69.5%
3.	Correspondence in Hindi by the offices located in Region ‘C’	
3.1	With ‘A’ and ‘B’ Region and ‘C’	39.2 %

(b) TRAINING

During the period under report 06 officers/employees passed Hindi Prabodh, Praveen and Pragma examination and 05 LDC’s passed Hindi Typing examination, under Hindi Teaching Scheme.

(c) HINDI WORKSHOP/SEMINAR/CONFERENCE

With a view to acquaint with the Official Language orders / rules and the target laid down in the Annual Programme Hindi workshops were organized in Surveyor General's Office, Dehradun, Eastern Printing Group, West Bengal & Sikkim GDC, Kolkata, Karnataka GDC, Bangluru. 73 officers/employees received training in these workshops.

Shri Dhoom Singh, Assistant Director (O.L.) and Shri K.S. Negi, Hindi Translator, Surveyor General's Office, Dehradun attended the Regional Rajbhasha Puraskar Conference, Agra on 26.08.2016

(d) INCENTIVE SCHEME

During the year 2016-2017 incentive schemes for noting and drafting for doing Official work in Hindi, Hindi typing and Hindi stenography remained continued.

(e) INSPECTION

During the year inspection regarding the use of Hindi Shri Dhoom Singh, Assistant Director (O.L.) and Smt. Saroj Baluni, Hindi Translator, Surveyor General's Office, Dehradun was carried out in six offices located at Dehradun – Northern Printing Group, Map Record and Dissemination Centre, Digital Map Centre, Geodetic & Research Branch, Dehradun, National GDC and Uttarakhand & Western Uttar Pradesh GDC, Dehradun from 09-01-2017 to 11-01-2017.

(f) ORGANISE OF HINDI DAY/FORTNIGHT/FUNCTION

During the year Hindi day/Hindi fortnight/Hindi functions were organized in the month of September in various offices of the Department. To encourage the use of Hindi various competitions pertaining to Hindi were organized on this occasion and the winners were awarded. Chal Vaijayanti Running Shield was given to the E-2 Section for doing maximum work in Hindi in Surveyor General's Office, Dehradun. On the occasion of Prize distribution Ceremony Hindi quiz competition was also organized besides recitation of poems in Hindi.

(g) PUBLICATION OF IN-HOUSE MAGAZINE IN HINDI

The following offices published in-house magazines in Hindi during the period under report.

Sl. No.	Name of Office	Magazine Name
1.	Surveyor General's Office, Dehradun	Sarvekshan Darpan
2.	Town Official Language Implementation Committee, DDun	Doonvani
3.	Geodetic & Research Branch, Dehradun	Jhalak
4.	Northern Zone, Chandigarh	Jagruti
5.	Andhra Pradesh GDC, Hyderabad	Kalakal
6.	Southern Printing Group, Hyderabad	Prerna
7.	GIS & Directorate Remote Sensing, Hyderabad	Pushpanjali
8.	West Bengal & Sikkim GDC, Kolkata	Sarvekshan
9.	Indian Institute of Surveying and Mapping, Hyderabad	Pratibimb

(h) MEETINGS

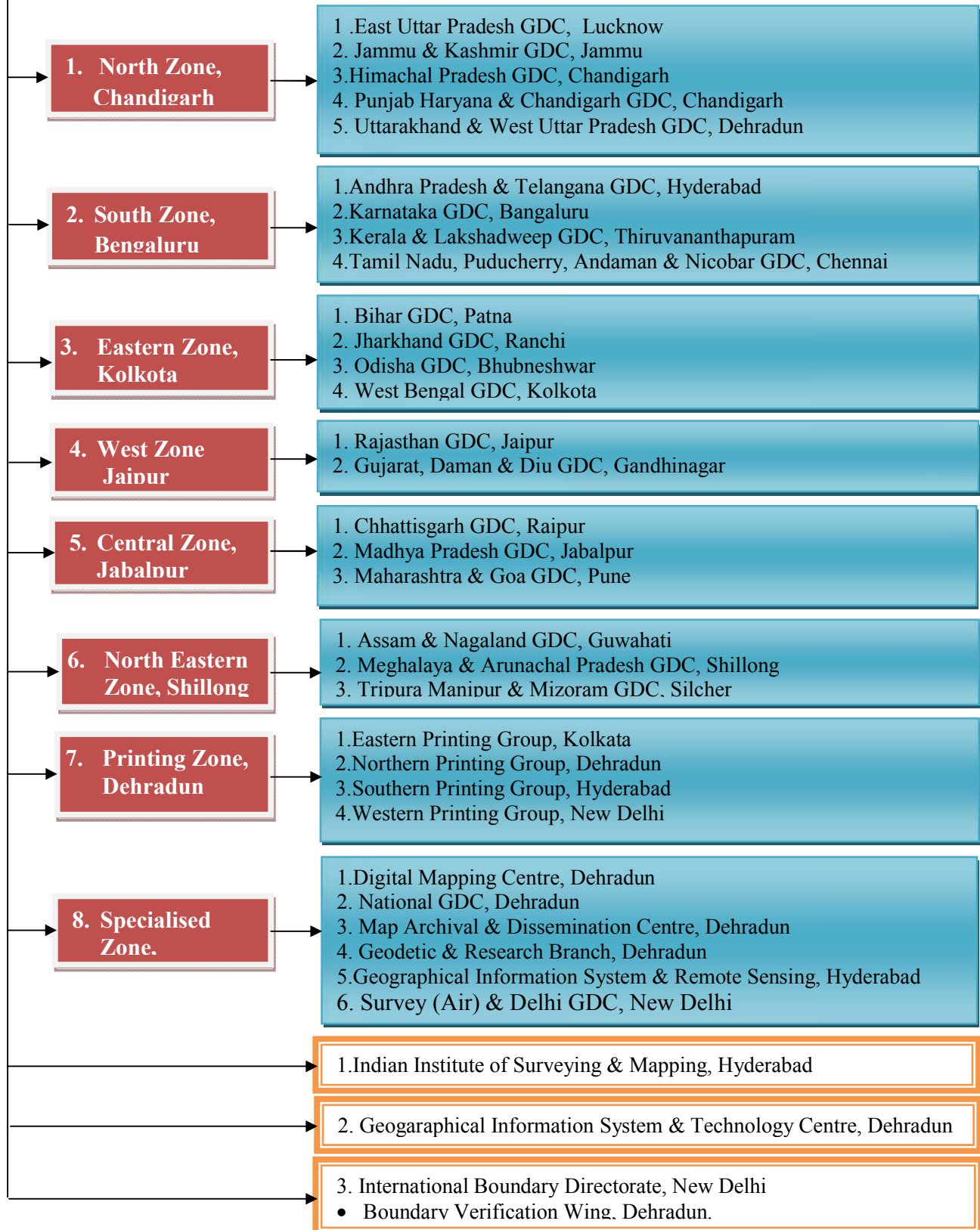
During the year 2016-2017 quarterly meetings of the Official Language Implementation Committee were held in almost all the Geo-Spatial Data Centres / Directorate etc. of the Department located in Region 'A', 'B' and 'C'. In these meetings discussions were held to achieve the targets given in the Annual Programme issued by the Govt. for transacting the Official work of the union in Hindi.

During the year half yearly meetings of the Town Official Language Implementation Committee, Dehradun were held in the chairmanship of Surveyor General of India.

15.

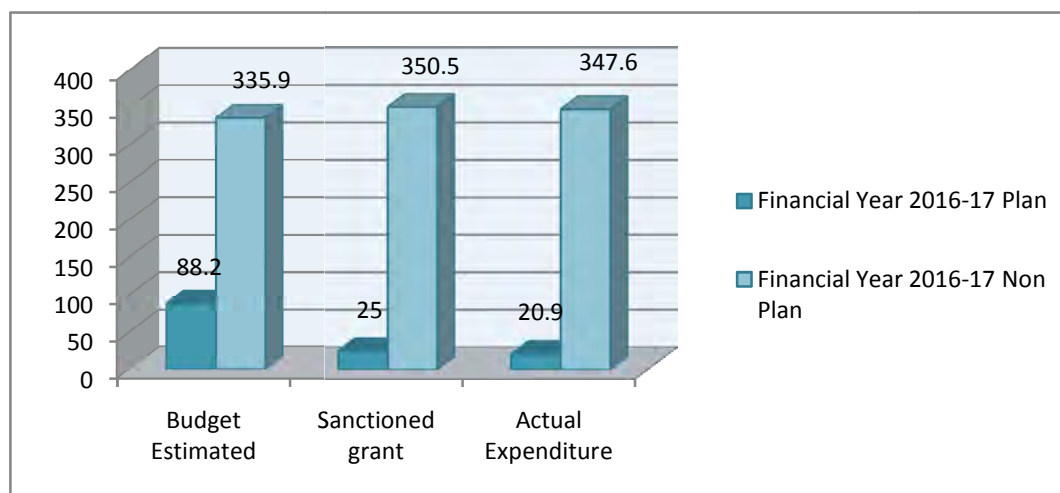
ORGANOGRAM OF SURVEY OF INDIA

Office of the Surveyor General of India, Dehradun



16. EXPENDITURE OCCURRED DURING THE PERIOD:

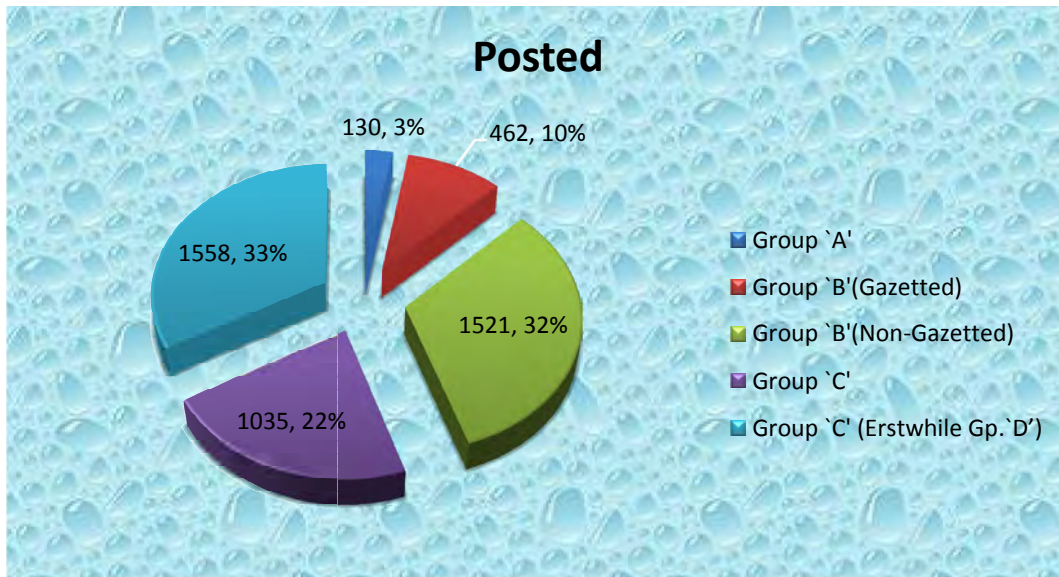
EXPENDITURE OF SURVEY OF INDIA		
Expenditure Type (In Crores)	Financial Year 2016-17	
	Plan	Non Plan
Budget Estimate	88.2	335.9
Sanctioned Grant	25.0	350.5
Actual Expenditure	20.9	347.6



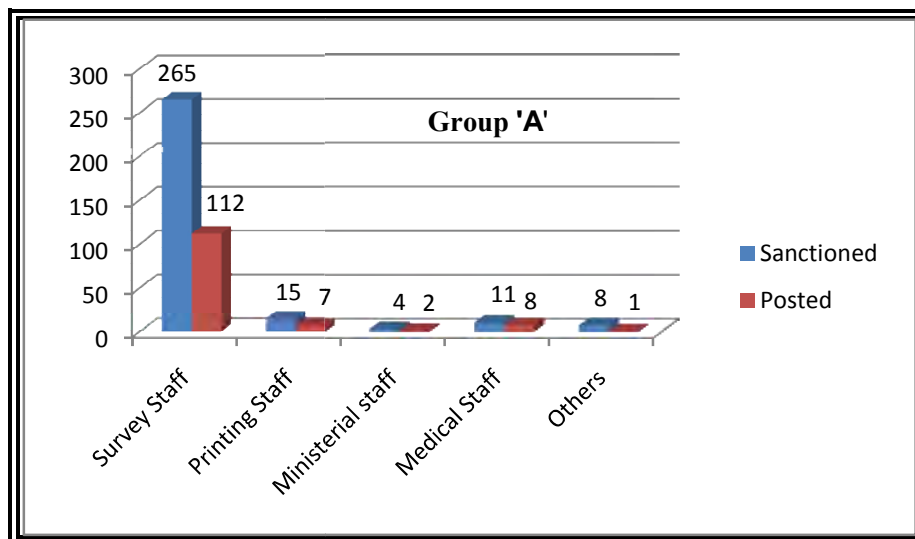
17. MAN POWER RESOURCES:

Strength as on 01-01-2017

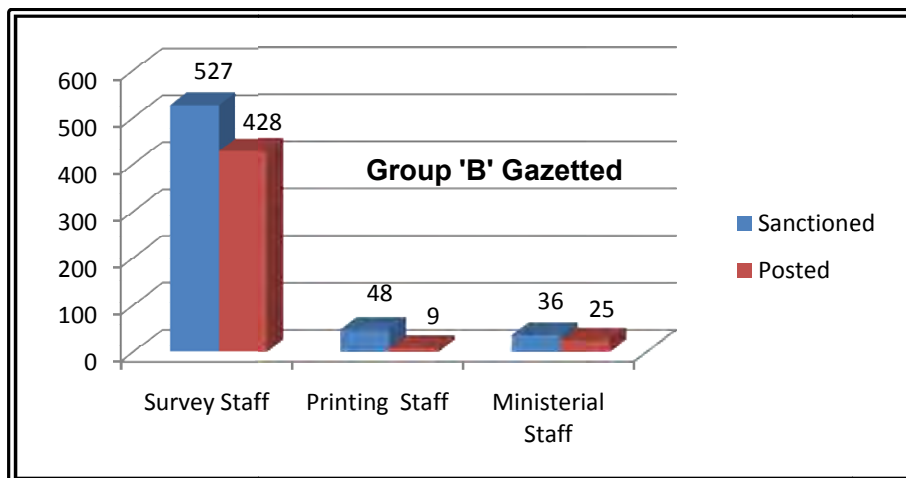
Service Groups	Sanctioned	Posted
Group `A`	394	130
Group `B` (Gazetted)	611	462
Group `B` (Non - Gazetted)	1542	1521
Group `C`	3810	1035
Group `C` (Erstwhile Gp.`D`)	4454	1558
Total	10811	4706



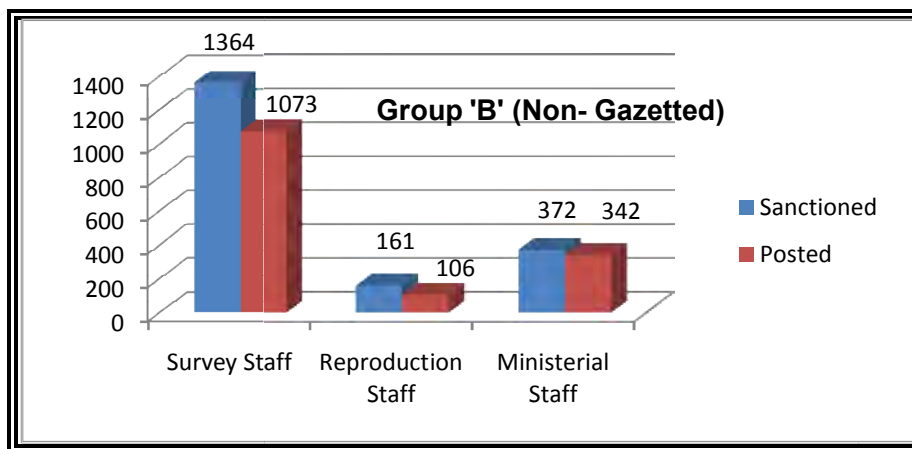
Group 'A' Officers		
	Sanctioned	Posted
Survey Staff	265	112
Printing Staff	15	7
Ministerial staff	4	2
Medical Staff	11	8
Others	8	1
Total	330	130



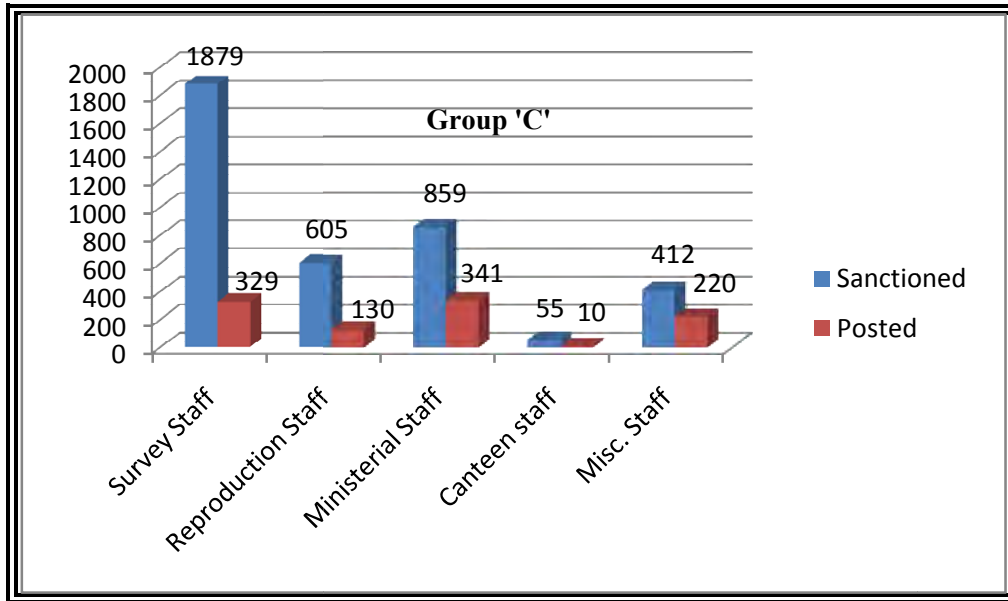
Group 'B' (Gazetted) Officers		
	Sanctioned	Posted
Survey Staff	527	428
Printing Staff	48	9
Ministerial staff	36	25
Total	611	462



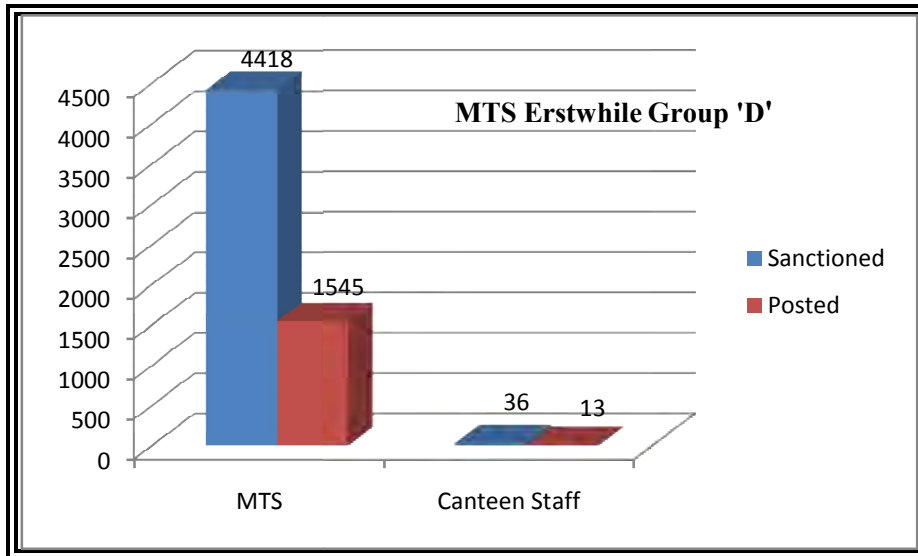
Group 'B' (Non-Gazetted) Officers		
	Sanctioned	Posted
Survey Staff	1364	1073
Reproduction Staff	161	106
Ministerial staff	372	342
Total	1897	1521



Group 'C' Officers		
	Sanctioned	Posted
Survey Staff	1879	329
Reproduction Staff	605	130
Ministerial staff	859	341
Canteen staff	55	10
Misc. Staff	412	220
Total	3810	1030



MTS Erstwhile Group 'D'		
	Sanctioned	Posted
MTS	4418	1545
Canteen Staff	36	13
Total	4454	1558



18. ACADEMIC AND CAPACITY BUILDING:

Indian Institute of Surveying & Mapping (IISM), The Premier Institute of Surveying Training for India and Various Afro - Asian Countries, imparting training to the officers and staff of Survey of India and other Government organizations, Private individuals and Scholars from various Afro-Asian countries. IISM, Hyderabad also conducts M.Tech. (Geomatics) and M.Sc. (Geospatial Science) post graduate programme of two years duration in collaboration with Jawaharlal Nehru Technological University (JNTU), Hyderabad.

251 trainees including 7 foreign, 43 extra-departmental have been undergoing training in various courses run by Indian Institute of Surveying & Mapping, Hyderabad as per details given below.

REGULAR/ SCHEDULED COURSES

SL. NO.	COURSE NO.	NOMENCLATURE	DEPARTMENTAL	EXTRA DEPARTMENTAL	FOREIGN	OTHERS	TOTAL
1	125.03	Administrative Management	07	0	0	0	07
2	170.01	Use of Total Station and GPS for beginners	01	05	0	0	06
3	170.02	Use of Total Station and GPS for beginners	02	03	0	0	05
4	340.48	Digitisation of Cartographic Documents	0	03	0	0	03
5	340.49	Digitisation of Cartographic Documents	0	03	0	0	03
6	400.93 #	Surveying Supervisor	0	0	06	0	06
7	400.94(A)#	Surveying Supervisor	102	0	0	0	102
8	400.94(B)#	Surveying Supervisor	03	0	0	0	03
9	400.94(C)	Surveying Supervisor	05	0	0	0	05
10	400.95	Surveying Supervisor	04	0	0	0	04
11	440.24	Digital Cartographic &GIS Application	01	02	0	0	03
12	440.25	Digital Cartographic &GIS Application	03	0	0	0	03
13	480.44	Digital Photogrammetry & Remote Sensing	03	0	0	0	03
14	480.04	Digital Photogrammetry & Remote Sensing	0	02	0	0	02
15	495.22	Fundamentals of Survey Engineering	16	0	0	0	16
16	500.75#	Surveying Engineer	27	0	0	0	27
17	500.76	Surveying Engineer	01	0	0	0	01
18	690.34	Control & Detail Survey by GPS & Total Station	0	17	0	0	17
19	690.35	Control & Detail Survey by GPS & Total Station	0	03	0	0	03
20	695.02	Control & Detail Survey by GPS & Total Station, Map Updation using Mobile Mapping system	07	0	0	0	07
21	700.24#	Advance Geodesy	03	0	01	0	04
22	700.25	Advance Geodesy	04	0	0	0	04
23	710.31	Advance Photogrammetry & Remote Sensing	04	0	0	0	04
24	710.31#	Advance Photogrammetry & Remote Sensing	04	0	0	0	04
25	740.10	Advanced Course on Digital Cartography & GIS	04	0	0	0	04
26	780.03	GPS, Total Station, Mobile Mapping, GIS & Digital Photogrammetry	0	05	0	0	05
		Total	201	43	07	0	251
# Courses continuing from previous year							

SPECIAL COURSES FOR SPECIFIC USERS

SL. NO.	COURSE NO.	NOMENCLATURE	DEPARTMENTAL	EXTRA DEPARTAMENTA	FOREIGN	OTHERS	TOTAL
	Spl	Training on Surveying for the students of IIT, Hyderabad	0	0	0	23	23
2	Spl	Training in Application of GIS for Land use planning for the students of Bapatla Engineering College, AP	0	0	0	07	07
3	Spl.	Training in Modern Surveying Techniques for the student of Vasavi Eng. College, Hyderabad.	0	0	0	34	34
4	Spl.	Training in Modern Surveying Techniques for the student of Vasavi Eng. College, Hyderabad.	0	0	0	33	33
5	Spl.	Photogrammetry for students of VNIT, Nagpur	0	0	0	09	09
6	Spl.	One day training for IAS Trainee Officers from Survey Training Academy, Hyderabad	0	04	0	0	04
7	Spl	Training programme on Applications of Geo-informatics in water Resources Projects	0	06	0	0	06
8	Spl	Control & Detail Survey by GPS & Total Station , Map updation using Mobile Mapping System for Bangladesh Officials.	0	0	10	0	10
9	Spl.	Cartography for Bangadesh Officials	0	0	12	0	12
10	Spl.	GPS, Total Station, Mobile Mapping & GIS for Bhutan Officials	0	0	10	0	10
		Total	0	10	32	106	148

HORT TERM AWARENESS COURSES

SL. NO.	COURSE NO.	NOMENCLATURE	DEPARTMAL	EXTR DEPARTMENA	FOREIGN	OTHERS	TOTAL
1	790.11	GPS and Total Station – Concepts & Applications	03	0	0	0	03
2	800.12	Datum, Co-ordinates system & Map Projection – Concept for Advanced Map user	01	07	0	0	08
		Total	04	07	0	0	11

19. REPRESENTATION OF SC/ST & OBCs:

SC/ST/OBC REPORT- I

ANNUAL STATEMENT SHOWING THE REPRESENTATION OF SC's, ST's AND OBC's AS ON 01-01-2017 AND NUMBER OF APPOINTMENTS MADE DURING THE PRECEDING CALENDAR YEAR- 2016

Ministry / department / attached / subordinate office :- Survey of India, Dehradun

Groups	Representation of SCs/STs/OBCs (As on 01-01-2017)				Number of appointments made during the calendar year 2015											
	Total Number of Employees	SCs	STs	OBCs	By Direct Recruitment				By Promotion			By Deputation /Absorption				
					Total	SCs	STs	OBCs	Total	SCs	STs	Total	SCs	STs	OBCs	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Group A	132	11	4	12	25	3	2	7	0	0	0	0	0	0	0	
Group B	455	78	56	17	0	0	0	0	35	4	2	0	0	0	0	
Group C (Excluding Sweepers)	4083	982	343	293	9	7	0	2	362	2	0	0	0	0	0	
Group C (Sweepers)	71	69	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	4741	1140	403	322	34	10	2	9	397	6	2	0	0	0	0	

SC/ST/OBC REPORT – II

ANNUAL STATEMENT SHOWING THE REPRESENTATION OF SC's, ST's AND OBC's IN VARIOUS GROUP 'A' SERVICES AS ON 01.01.2017 AND NUMBER OF APPOINTMENTS MADE IN THE SERVICE IN VARIOUS GRADE IN THE PRECEDING CALENDAR YEAR – 2016

Ministry / Department / Attached / Subordinate Office :- Survey of India

Level in Pay Matrix	Representation of SCs/STs/OBCs (As on 01-01-2017)				Number of appointments made during the calendar year 2016									
	Total Number of Employees	SCs	STs	OBCs	By Direct Recruitment				By Promotion			By Other Method		
					Total	SCs	STs	OBCs	Total	SCs	STs	Total	SCs	STs
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Level 10 (56,100-1,77,500)	42	4	3	9	25	3	2	7	0	0	0	0	0	0
Level 11 (67,700-2,08,700)	30	1	0	0	0	0	0	0	0	0	0	0	0	0
Level 12 (78,800-2,09,200)	18	0	1	0	0	0	0	0	0	0	0	0	0	0
Level 13 (1,18,500-2,14,100)	34	3	1	3	0	0	0	0	0	0	0	0	0	0
Level 14 (1,44,200-2,18,200)	7	1	2	0	0	0	0	0	0	0	0	0	0	0
Level 15 (1,82,200-2,24,100)	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	132	09	07	12	25	03	2	07	0	0	0	0	0	0

PWD REPORT - I

20. SC/ST/OBC & PERSONS WITH DISABILITIES

ANNUAL STATEMENT SHOWING THE REPRESENTATION OF THE PERSONS WITH DISABILITY IN SERVICES (As on 01-01-2017)

Ministry / Department :- Ministry of Science & Technology

Attached / Subordinate Office :- Survey of India

GROUP	Number of Employees				
	Total	In Identified Posts	VH	HH	OH
1	2	3	4	5	6
Group A	132	0	0	0	0
Group B	455	4	0	0	4
Group C/ Group D	4083	23	0	0	23
Group D (Safai Karamchari)	71	0	0	0	0
Total	4741	27	0	0	27

Note: (I) VH Stands for Visually Handicapped (persons suffering from blindness or low vision)
 (II) HH Stands for Hearing Handicapped (persons suffering from hearing impairment)
 (III) OH stands for Orthopaedically Handicapped (persons suffering from locomotor disability or cerebral palsy)

STATEMENT SHOWING THE NUMBER OF PERSONS WITH DISABILITIES IN SERVICES
(AS ON 01.01.2017)

Ministry / Department :- Ministry of Science & Technology
Attached / Subordinate Office :- Survey of India

GROUP	Representation of VH/HH/OH (As on 01.01.2017)				No. of Appointment made during the calendar year 2016											
					By Direct Recruitment				By Promotion				By Deputation			
	Total	VH	OH	HH	Total	VH	OH	HH	Total	VH	HH	OH	Total	VH	HH	OH
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
GROUP A	132	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUP B	455	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUP C (Excluding Safai Karamchari)	4083	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0
GROUP C (Safai Karamchari)	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	4741	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: (I) VH Stands for Visually Handicapped (persons suffering from blindness or low vision)
(II) HH Stands for Hearing Handicapped (persons suffering from hearing impairment)
(III) OH stands for Orthopaedically Handicapped (persons suffering from locomotor disability or cerebral palsy)

संरक्षक
डॉ० स्वर्ण सुब्बा राव
भारत के महासर्वेक्षक
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श्री विनायक बिष्ट
सर्वेक्षण सहायक
DATA COLLECTION, COMPILATION & PREPARATION
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FOREWORD

Survey of India is the oldest scientific department of the Govt. of India established in 1767. Survey of India has to pioneer un-trodden lands for others to follow and build upon. They have to go to the deepest forests, deserts and the highest snowy mountains; in fact they are the first to reach virgin and uninhabited areas. There they ceaselessly, faithfully and unobtrusively toil to produce the maps so essential for development, defense and administration. Topographical maps have played an invaluable role in the saga of India's nation building and were pivotal in the foundation of almost all major development activities of the modern India.

The topography of the Indian subcontinent varies from the snow-covered Himalayan peaks of the world's highest mountains to the rich and fertile plains of the Ganges, with large undulating areas, thick jungles, deserts, mighty rivers, swamps and a long coastline. The area of independent India (3.8 million sq. kilometers) is largely inhabited by the descendants of migrants from across the Himalaya and, today, it consists of a mixture of various races, cultures, languages and religions.

The early history of surveys in India followed the East India Company's expanding areas of influence and conquest. Fortunately, this quest to explore, expand and conquest more and more areas in India lead to the establishment of a regular government survey organization, one of the earliest country in the world to do so and commence systematic and scientific surveys.

Forerunners of army of the East India Company and Surveyors had an onerous task of exploring the unknown. Bit by bit the tapestry of India terrain was completed by the painstaking efforts of a distinguished line of Surveyors such as Col Lambton and Sir George Everest. Foundation for the scientific survey and mapping of the country was laid with The Great Trigonometric Survey (GTS) in 19th century, by these noted Surveyors.

After Independence, there was an upsurge of development all over the country which has continued till today. With planning for economic development, hundreds of schemes required survey data for scientific planning and execution. The survey of India had to divert most of its potential for developmental projects, the normal topographical surveys being relegated to a secondary place.

Apart from geodetic, topographical, SOI caters for the survey needs of all developmental projects in the country. Numerous developmental surveying & mapping tasks for small/Medium/Large projects as detailed under were carried out by the SOI for various Central/State Government agencies, Central/State PSUs and other organizations.

The Department has met the challenges of surveying the indomitable Himalaya, blazing deserts and disease and animal – infested jungles. The Department is continuously striving to keep abreast of modern technology and has successfully entered the era of Digital Mapping and Geographic Information Systems.

Presently, Survey of India is organized into 08 zones, 23 Geo-spatial Data Centers/Regional directorates, 06 specialized directorates and 01 Training directorate covering 29 States and 09 UTs. The manpower resource consists of total 4700 personnel. Each Zone office has several regional directorates under it, each regional directorate is responsible to cater for all topographical and developmental surveying & mapping requirements of that State or group of small States.

The Specialized Directorates are the Geodetic and Research Branch, International Boundary Directorate, GIS & Remote Sensing Directorate, National Geo-Spatial Data Centre, Digital Mapping Centre and Map Archival & Dissemination Center.

The Training directorate i.e. Indian Institute of Surveying and Mapping (IISM) runs Basic, Refresher, Specialized and Advanced courses in Photogrammetry, Geodesy, Cartography and GIS domains.

National Map policy (NMP) – 2005 has mandated SOI to prepare National Topographic Database (NTDB) and provide Dual Series Maps viz DSM (Defence Series Maps) to cater the need of defense forces and OSM (Open Series Maps) for all other users.

I appreciate the efforts put in by Sh. Pankaj Mishra, DSG (Tech), Sh. Pardeep Singh, Technical Secretary, and Sh. Vinaik Bist, Survey Assistant for preparing "ANNUAL REPORT 2016-17" which gives a bird eye view of the achievements of the department during 2016-17.

Dr. Swarna Subba Rao
Surveyor General of India

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