



FORMULATION OF GIS BASED MASTER PLAN FOR AMRUT CITIES

Design & Standards



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Design and Standards



**Town & Country Planning Organisation
Ministry of Urban Development
Government of India
&
National Remote Sensing Centre
Deptt. Of Space
Government of India**

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ACRONYMS

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
Admin	Administrative
AOI	Area of Interest
ASPRS	American Society for Photogrammetry and Remote Sensing
ATM	Automated Teller Machine
BOD	Biological Oxygen Demand
BPL	Below Poverty Level
BRTS	Bus Rapid Transit System
CBR	Crude Birth Rate
CE	Circular Error
CFL	Compact fluorescent lamp
CGWB	Central Ground Water Board
CHC	Community Health Centre
Cline	Central Line
CNG	Compressed Natural Gas
CO	Carbon Monoxide
D.P	Development Plan
DD	Date
DEM	Digital Elevation Model
DGPS	Differential Global Positioning System
Dia	Diameter
DIC	District Industries Centre
DoS	Department of Space
Drain	Drainage
DTM	Digital Terrain Model
DU	Dwelling Unit
EB	Enumeration Block
EO	Earth Observation
GCP	Ground Control Point
GDOP	Geometric Dilution of Precision
GIS	Geographic Information System
GLR	Ground Level Reservoir
GoI	Government of India
GPS	Global Positioning System
GSI	Geological Survey of India
HH	Household
HHI	Household Industry

HP	Horse Power
HPMV	High Pressure Mercury Vapour
HQ	Head quarters
HRIDAY	Heritage City Development and Augmentation Yojana
hrs	Hours
HT	High Tension
ID	Identification Number
IGS	International Ground Station
IMR	Infant Mortality Rate
IR	Infra-red
IRC	Indian Roads Congress
ISO	International Organization for Standardization
ISRO	Indian Space Research Organisation
IT	Information Technology
ITRF	International Terrestrial Reference Frame
LE	Linear Error
LFDC	Large Format Digital Camera
LISS	Linear Imaging Self-Scanner
LPCD	Litre per Capita per Day
LPG	Liquefied Petroleum Gas
LT	Low Tension
Mat	Material
mg/L	Milligrams per Litre
MILMA	Brand household name of The Kerala Co-operative Milk Marketing Federation
MKWH	Million KiloWatt per Hour
MLD	Mega Litter per Day = 10^6 L/day (unit of water storage in dams and reservoirs)
MMTS	Multi-Modal Transport System
MoUD	Ministry of Urban Development
MRTS	Metro Rapid Transit System
MSL	Mean Sea Level
MW	MegaWatt
NAS	Network Attached Storage
NCC	Natural Colour Composite
NDMA	National Disaster Management Authority
NGO	Non-Government Organization
NHAI	National Highway Authority of India
NMP	National Map Policy
NNRMS	National Natural Resource Management System

NO	Nitric Oxide also known as Nitrogen Monoxide
NRSC	National Remote Sensing Centre
NSDI	National Spatial Data Infrastructure
NSSO	National Sample Survey Organisation
NUIS	National Urban Information System
OGC	Open Geospatial Consortium
PAN	Panchromatic
pH	Potential of Hydrogen
PHC	Primary Health Care
PPP	Public Private Partnerships
QA	Quality Assurance
QC	Quality Check
R & B Dept.	Roads and Buildings Department
RGI	Registrar General of India
RMSE	Root Mean Square Error
RPC	Rational Polynomial Coefficient
RWA	Resident Welfare Association
SEZ	Special Economic Zone
SO ₂	Sulphur di-oxide
SPM	Suspended Particulate Matter
STPD	State Town Planning Department
TCPO	Town & Country Planning Organisation
TV	Television
UA	Urban Agglomeration
UFS	Urban Framework Survey
ULB	Urban Local Body
ULU	Urban landuse/landcover
URDPFI	Urban and Regional Development Plans Formulation and Implementation
UT	Union Territory
UTM	Universal Transverse Mercator
VHRS	Very High Resolution Satellite
WBM	Water Bound Macadam
WFPR	Workforce Participate Rate
WGS84	World Geodetic System (WGS) established in 1984
SHG	Self Help Group
LCS	Low Cost Sanitation
WTP	Water Treatment Plant

1.0.0 INTRODUCTION

The urban settlements of the country have experienced relatively rapid population growth and the percentage of India's population living in urban areas has more than doubled from 14% at the time of independence to 31.8 % in 2011 (Census of India). This is expected to increase even further to nearly 40% by 2026 and is expected to be more than 50% by 2051. The class-wise distribution of statutory towns/cities as per Census 2011 is as follows.

S.No	Class	Population Range	No. of Statutory Towns 2011 Census
1	Metro	10 lakh plus	53
2	Class I	1-9.99 lakhs	430
3	Class II	50,000- 99,999	546
4	Class III	20,000- 49,999	1321
5	Class IV	10,000-19,999	1091
6	Class V	5000-9,999	474
7	Class VI	Below 5000	133
	Total		4041

Most of the urban settlements, especially smaller urban settlements, are characterized by haphazard and unplanned growth, non-conforming land uses, mushrooming unauthorized colonies, and land conversion from agriculture to urban resulting in environmental degradation and poor quality of life. The proper management of urban areas calls for accurate and vital information to be available on a regular basis.

Master Plan/Development Plan is the major tool for urban land management, providing detailed landuse allocation for the sustainable development of city/town. Most master/development plans are made for 20-year periods, in phases of five years for periodic review and revision. Formulation of master plans start with base map preparation, existing land use surveys and collection of socio-economic data necessary for reviewing the existing situation and proposing the future land use plan. With the advances in remote sensing and geographic information system, the plan making process can be expedited with integration of both spatial and attribute data, which enables detailed assessment of spatial growth of towns/cities, landuse status, physical infrastructure facilities, etc. in anticipation of the projected population growth.

The most crucial information for formulation of Master Plan is an accurate and updated Base Map of the planning area, showing roads and building layouts, spatial extent of development and information on the use of each parcel of land etc. Preparation of base maps from Very High Resolution Satellite (VHRS) Images and Geographic Information System (GIS) technology can be time and cost effective solution. Under the National Urban Information System (NUIS) Scheme, urban GIS database for 152 towns was prepared using 2.5m

(Cartosat-1+LISS-IV) remote sensing images. This GIS database has been hosted on ISRO's geo-spatial platform Bhuvan and a web-based GIS (Bhuvan-NUIS) for accessing, editing and managing the database was developed. NUIS Scheme has provided the basic foundation for understanding and experiencing the utilisation of remote sensing & GIS technologies for urban base and thematic mapping and GIS database creation.

2.0.0 NEED FOR REVISION OF EXISTING NUIS DESIGN AND STANDARDS

Although State Town and Country Planning Departments (STPDs) had initiated the utilisation of NUIS database at 1:10000 scale for Master Plan formulation on Bhuvan, it was felt that 1:10000 scale database content and accuracy was inadequate for this purpose. During an Interactive Workshop with Chief Town Planners/Directors of the States/UTs conducted by Town & Country Planning Organisation/Ministry of Urban Development (TCPO/MoUD) on 17th February 2015, the following technical criteria were suggested for generation of comprehensive GIS database for Master Plan formulation:

1. Utilisation of Very High Resolution Satellite (VHRS) Data for preparing large scale urban base map at 1: 4000 scale or better.
2. Use of GIS based Master Plan formulation approach as per URDPFI, 2014 Guidelines.
3. Existing NUIS Design and Standards are pertinent to 1:10000 scale mapping. This may not be appropriate for large scale mapping in terms of the input satellite data, map content, geometry, accuracy, etc.
4. It was also observed that various Town & Country Planning Organisation/Departments are following different methods and procedures for base map preparation and GIS database generation using remote sensing & GIS technology which calls for national standards.
5. Hence, the existing NUIS Design and Standards are to be revised to support generation of comprehensive GIS databases to meet the requirements of mapping under National flagship schemes like Smart Cities, AMRUT, HRIDAY and also other State level urban development projects.

2.1.0 Formulation of GIS based Master Plan for AMRUT Cities

Government of India launched Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 2015 as Centrally Sponsored Scheme with the objectives to (i) ensure that every household has access to a tap with assured supply of water and a sewerage connection; (ii) increase the amenity value of cities by developing greenery and well maintained open spaces (e.g. parks); and (iii) reduce pollution by switching to public transport or constructing facilities for non-motorized transport (e.g. walking and cycling). One purpose of the Mission is to improve governance through a set of Reforms. During the Mission period, 11 reforms are being implemented.

Formulation of GIS-based Master/Development Plans for 500 AMRUT Cities is one of the important reforms under AMRUT, which has been approved as a 100% centrally funded sub-scheme with budget outlay of Rs. 515.00 crores.

The major objectives of the sub-scheme are:

- To develop common digital geo-referenced base maps and land use maps using Geographical Information System (GIS) and
- Master Plan Formulation for 500 cities that are selected as AMRUT Cities.

In order to develop national level Design and Standards, Ministry of Urban Development constituted a Committee with the members from ISRO, central and STPDs (Annexure I). The Committee held detailed deliberations and interactions with Central and State Town Planning departments and experts and recommended that mapping at 1:4000 scale is ideal for formulation of Master Plans/Development Plans as per currently available satellite data. The Design & Standards has been prepared for geo-spatial database creation as per the requirement. The approval of the Design and Standards document from the Chairman of the Committee for Revision of NUIS Guidelines and Design Standards and Ministry of Urban Development is at Annexure II A&B.

Since base map preparation and master plan formulation is to be done by different States as per their respective acts, for a wide variety of cities and towns, if required, State Governments may add to the Design and Standards as per their requirements under intimation to Chief Planner, TCPO.

3.0.0 ELEMENTS OF STANDARD

Remote Sensing data, Base map & Urban Land use GIS database including spatially linked socio-economic attribute information and administrative boundaries are important datasets for the formulation of Master Plans. Development of uniform design and standards is necessary to enable the central and state level departments to adopt the implementation of national/state urban schemes. The main elements of Standards are given below.

1. Remote Sensing Image Standards
2. Spatial Reference Standards
3. Geo-spatial Data Content and GIS Database Standards
4. Quality Assurance/Quality Check
5. GIS database dissemination to ULBs for Master Plan formulation
6. Metadata standards

3.10 Remote Sensing Image Standards

Very High Resolution satellite images or Aerial Large Format Digital Camera (LFDC) multi-spectral photography data are the best input sources for large scale mapping. The following tables describe the input image standards-

1. Raw image standards- required for satellite data procurement

2. Ground Control Points (GCPs) – for geo-referencing/ortho-rectification of satellite image
3. Geo-referenced/Ortho-rectified image – the final image used for feature extraction.

3.11 Raw Image Standards

Table 1: Raw Image Standards

S. No	Description	Value	Remarks
1	Spatial Resolution	0.5 metres or Better	
2	Spectral Resolution	PAN Sharpened (Bands: Panchromatic, Red, Green, Blue and Near Infrared)	IR band is optional
3	Band to Band registration	Less than 1/4 th of pixel size	
4	Radiometry	10 bit or better	
5	Image Resampling	Nearest Neighbourhood	
6	a. Monoscopic/Stereoscopic	Plain Areas: Monoscopic Highly Hilly areas: Stereoscopic	Need of Stereoscopic to be reviewed case by case. If the city is built on the terrain slope more than 15 degrees.
	b. Monoscopic data View angle	Less than 10 degree from nadir	In specific cases, maximum upto 15 degrees view angle shall be allowed
	c. Stereoscopic	One of the stereo image view angle should be less than 10 degrees from nadir	Base to Height(B/H) ratio: $0.6 < B/H < 0.8$
7	Vantage imaging	Fresh acquisition: Within 6 months Archived Data: Less than 1 year	If one town/city is covered by multiple scenes, the time difference among the scenes should be less than 3 months.
8	Product type	Image data should be associated with corresponding Rational Polynomial Coefficients (RPCs) Format: 1. image data: Geo-tiff	Ortho-kit data with RPCs

S. No	Description	Value	Remarks
		2. RPCs : Open standards	
9	Spatial Reference	Datum : WGS84 Projection : UTM	
10	Cloud Coverage	Zero % in the core town/city, Less than 10% in the periphery of town/city limits	Cloud free data is preferable

3.12 Ground Control Points (GCPs) Standards required for Photogrammetric Block Adjustment and Ortho-rectification of satellite data

Table 2: Ground Control Points (GCPs) Standards

S. No	Description	Value	Remarks
1	Survey method used for GCPs	Differential GPS Survey (DGPS)	DGPS survey points should be processed using closed network traverse. The reference station coordinate shall be computed using ITRF (International Terrestrial Reference Frame)
2	Accuracy	Positional accuracy (X,Y): better than 0.5mts Height accuracy (Z) : better than 0.5mts	With reference to absolute accuracy of Reference station coordinates in ITRF
3	Spatial reference	Horizontal Datum : WGS84 Projection : UTM Vertical Datum : WGS84 or MSL Units : Meters	Towns for which Stereo data is selected: The GCPs vertical Datum must be MSL.
4	No. of GCPs	a. Uniform Distribution for the entire city/town planning area b. At least one GCP for every 5 sq. km. c. At the overlap of images GCPs should be available d. The position of GCPs should be on the non-variable features	GCPs must be clearly visible in the Satellite image. GPS reference station shall be a monument in Cement concrete and embedded brass-plate to ensure station revisit, whenever the need arises.

(Brief DGPS survey method is given Annexure-II)

3.13 Ortho-rectification of Satellite data Standards

Table 3: Ortho-rectification of Satellite data Standards

S. No	Description	Value	Remarks
1	Procedure/Methodology	Photogrammetric Bundle block adjustment for monoscopic or stereoscopic data using Control points	Photogrammetric Bundle Block level accuracy better than one pixel
2	Ortho-rectification	DEM Source: Monoscopic data: Carto DEM or open source DEMs Stereoscopic data: DEM/DTM generated from the stereo pair	
Ortho-rectified image Output Format			
4	Spatial Reference	Datum: WGS 84 Projection : UTM/Geographic	
5	Spatial Resolution	0.5 meters or better	
6	Spectral resolution	PAN sharpened Natural Color Composite (NCC)	
7	Radiometry	Input Data radiometric resolution	
8	Planimetric Accuracy	<ul style="list-style-type: none"> • RMSE (Root Mean Square Error) = better than 1mts • CE 90 (Circular error) = $2.4 \times \text{RMSE}_{xy}$ • LE 90 (Linear error) = $2.4 \times \text{RMSE}_z$ 	CE 90 & LE 90 means 90% of samples fall within that range.
9	Resampling	Nearest Neighbourhood	While interpretation of image online resampling may be changed to bi-linear or cubic as per interpreter's choice.
10	Format	Town/city mosaic in Geo-tiff	

3.2.0 Spatial Reference Standards

Spatial reference standards define the coordinate system, geographic extent of city level GIS databases.

3.2.1 Coordinate System

Spatial reference is selected as per National Map Policy (NMP) 2006, accordingly spatial reference standards are given below:

Table 4: Spatial Reference Standards

S. No	Description	Value	Remarks
1	Datum	WGS84	
2	Projection	<ul style="list-style-type: none">➤ For mapping/printing maps/publishing =UTM, if city falls in more than one UTM zone, the maximum covered zone will be considered.➤ For GIS database, storing &management = Geographic	Data will be stored in Geographic co-ordinate system and will be projected to UTM online for mapping/interpretation, analysis & printing.
3	Extent	Extent of each town = Minimum bounding box to Planning area boundary with 5 km. buffer	Additional 5 km. buffer is selected to cater to accommodate the near future increase in Planning Area.

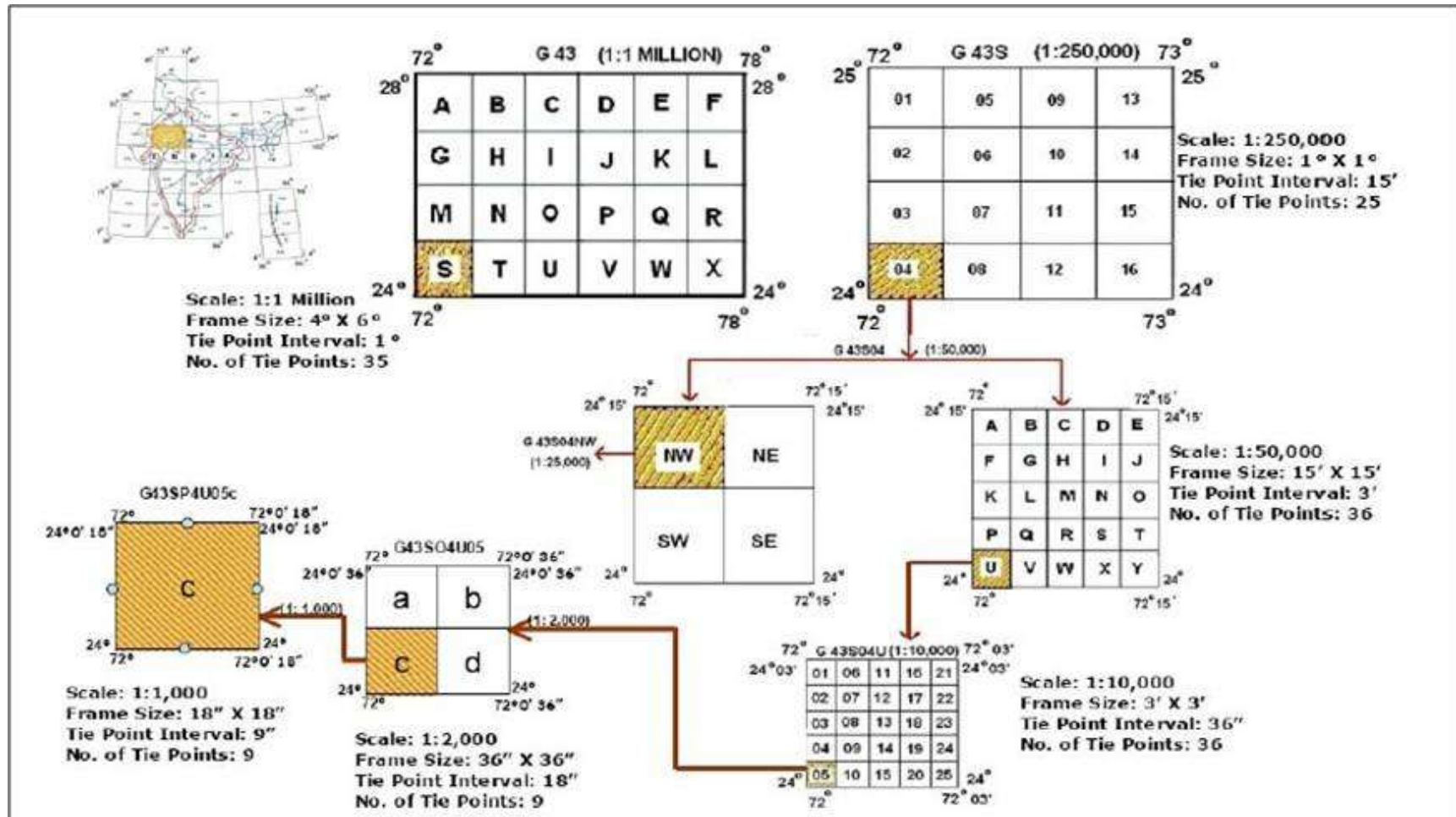
3.2.2 Map sheet frame for hardcopy prints

With the advancements in GIS, the utilisation of hard copy maps is limited to the field work and field verification of data. The digital GIS environment can be used for spatial and attribute data analysis and GIS based Master plan formulation. The proposed 1:4000 scale under this scheme is not compatible to National Scheme of Map series. In view of this, it is proposed to use the existing National Map Scheme which was developed and adopted in NUIS Scheme.

Whenever required hard copy maps can be printed for visualisation purpose at different scale for example at 1: 10000 for town/city map; 1:2000 or 1:1000 for field verification and data collection purpose. The Schematic Representation of Map Frame and Tie Points is given in Figure 1.

To enable the compatibility of cadastral map scales, it is proposed to adopt State specific cadastral map sheet series at 1:4000 scale, 1:8000 scale or any other specific scale. The extent of the Map sheet, Map sheet number and size shall be according to the scale adopted by the respective State/UT.

Figure 1: Schematic Representation of Map Frame and Tie Points



3.3.0 Geo-Spatial Data Content and GIS Data Structure Standards

3.3.1 Geo-Spatial Data Content

Existing Urban Land use/Land cover, base map and utilities network data at 1: 4000 scale and city local data in GIS format are the important inputs for formulation of GIS based Master Plan and Infrastructure Development Plan. These geo-spatial data layers and their basic source are given in Table - 5.

Table 5: Geo-Spatial Data Content

Sl No.	Spatial Layers	Source for Spatial data generation	Classification based on Use & Attributes	
			Classes	Sub Classes
I	Base layers	Very High Resolution satellite data	5	46
	1. Road			
	2. Rail			
	3. Bridges			
	4. Flyovers			
	5. Water bodies			
II	Urban Land Use/Land cover	Very High Resolution satellite data	28	220
III	Building Footprints	Very High Resolution satellite data	22	144
IV	Utilities			
	1. Water Supply Network	Urban Local Bodies	1	12
	2. Storm Water Drainage Network		1	2
	3. Sewerage Network		1	8
	4. Power Supply Network		1	8
	5. Gas Distribution Network		1	6
V	Hypsography			
	1. Digital Elevation Model(DEM) Type : Digital Terrain Model (DTM)	Topographic Survey; existing DEMs or contour maps.	1	1
	2. Contour		1	1
	3. Ground Control Points		1	2
VI	Cadastral Layer	Urban Local Bodies /State Revenue Department	1	-

SI No.	Spatial Layers	Source for Spatial data generation	Classification based on Use & Attributes	
			Classes	Sub Classes
VII	Boundaries			
	1. Administrative boundaries	State Revenue Department	1	7
	2. Planning boundaries	Urban Local Bodies	1	8
	3. Municipal boundaries	Urban Local Bodies	1	4
	4. Other Boundaries – Enumeration Block(EB), Urban Framework Survey(UFS) & Mining Area	EB from Registrar General Of India (RGI), UFS from National Sample Survey Organisation (NSSO) & Mining area boundary from concerned State Departments.	1	3
VIII	Hazard Prone Areas	Information from NRSC, ISRO, GSI, NDMA, Other State & Central Government Dept.	1	3

Totally there are 69 major classes and 475 sub-classes for 1:4000 scale urban geo-spatial data for GIS based Master Plan formulation under AMRUT scheme. Details of classification and sub-classification are given in the subsequent Tables 6 to 25.

3.3.2. Feature Geometry

The size, shape and scale at which the geo-spatial feature is mapped define its geometric representation in GIS. Area features like water bodies are represented in polygon geometry; line features like water supply network are represented in line geometry; point features like Electric Pole are represented in point geometry. Some of the area features like roads are represented in both polygon and line geometry. For example, the width of road is represented in polygon and road centreline is represented in line geometry. In such cases attributes are associated with line feature. The basic criteria to define the geometry of geo-spatial features are given below:

- Features having an area more than of 5 pixels by 5 pixels (as per image standards 6.25 sq. mt.) shall be represented as polygons. In other cases, where the features have area less than 5 pixels by 5 pixels, defined as point or line based on the feature type.

- In the Road layer, Roads having width of 7.5m and more will be captured as polygon and the road centre as line. Roads having width of less than 7.5m will be captured only as line.
- Rail feature, shall be captured as line. Railway track area shall be captured as polygon.
- All utility network layers are defined as lines and the nodes (starting point, intersections, valves, end points etc.) defined as points.
- Features such as garbage collection point, electric poles, cell towers etc., are defined as point.

3.3.3. GISData Structure

Geographic/urban feature is classified and further sub-classified based on its use & attributes. Cities in plain terrain or rolling terrain, ortho-rectified satellite image is used to capture the features in 2-dimension. As mentioned in image standards (Table 1), the cities in high relief hilly areas, the stereo data is used to capture the features in 3-dimension. In 3D mapping, x,y,z of the each vertex is stored in the feature geometry. According to the feature dimensionality (2D or 3D), the GIS data structure of polygon, line or point features can be 2 dimension or 3-dimension. OGC compliant GIS database models like shape file, geodatabase, oracle spatial data model, Postgres data model etc., may be implemented for generation of GIS layer data structure for storing spatial & attribute data.

3.3.4. Coding Scheme

Each GIS feature is assigned with a unique four character alphanumeric code. The code is unique with respect to the feature, irrespective of its geometry and layer. The first two characters of the code represent the Class and next two characters represent the Sub Class. For example, **Code: 01-02**; 01 represents Road Class; 02 represents the Road Sub-class State Highway.









































3.3.5. Layer wise Data content, Classification and GISdata Structure

Table 6 to Table 25 describes Layer wise geo-spatial data content with class & sub-class and GIS data structure with nomenclature of the geo-spatial layer, attributes, fields and field properties to be implemented using OGC compliant GIS software. *For example, Table 6 gives the Road: Geo-spatial data content, Table 6a & 6b gives the GIS Data Structure for Road centreline and Road polygon respectively.*

I. BASE LAYERS:

The road feature will be captured as both Polygon and Line. Road area is represented as polygon and Road centreline as Line.

Table 6: Road: Geo-Spatial Data Content

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	01-01	Road	National Highway	Polygon / Line	 
	01-02		State Highway	Polygon / Line	 
	01-03		Major District Road	Polygon / Line	 
	01-04		Other District Road	Polygon / Line	 
	01-05		Expressway	Polygon / Line	 
	01-06		Bypass	Polygon / Line	 
	01-07		Ring Road	Polygon / Line	 
	01-08		Service Road	Polygon / Line	 
	01-09		Major City Road [#]	Polygon / Line	 
	01-10		Minor City Road [#]	Polygon / Line	 
	01-11		Other Public Road	Polygon / Line	 
	01-12		Other Private Road	Polygon / Line	 
	01-13		BRTS	Polygon / Line	 
	01-14		Cycle Track	Polygon / Line	 
	01-15		Village road	Polygon / Line	 
	01-16		Foot path	Line	 
	01-17		Cart track	Line	 
	01-18		Ropeway	Line	 
	01-19		Carriageway*	Line	 
	01-20		Right of way*	Line	 

[#]Roads having width of 10.5m/11m and more will be called Major City Road and less than 10.5m/11m as Minor City Road (for information, the road widths mentioned are as per IRC standards)

*Source for Carriageway and Right of way: Revenue records.

Table 6a: Road Line GIS Data Structure
Geo-spatial Layer Name: Road_CLine

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Road Id	Rd_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 6
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 6
Length in km.	Length_km.	Double	10 Up to 4 decimals	Length (in km.)
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road Name	Rd_Name	Text	30	Specific Name of the feature, if any

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Road Construction Material	Cons_Mat	Text	10	Concrete/Asphalt/WBM/Any Other
Carriage Width (in mt.)	CW_Width	Double	10 Up to 4 decimals	Carriage Width in metres
Right of Way Width (in mt.)	ROW_Width	Double	10 Up to 4 decimals	Right of Way Width in metres
Maintained By	Maintain	Text	15	Municipal body/NHAI/R & B Dept./Other
Foot Path	FP	Text	3	Yes/No
Foot path width (in mt. in case Yes)	FP_Width	Double	10 Up to 2 decimals	Footpath Width in metres
Foot Path Construction material	FP_Cons_Ma	Text	15	Shabad/Tiles/Concrete/Other Stone

Table 6b: Road Polygon GIS Data Structure
Geo-spatial Layer Name: Road_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 6
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 6
Road Name	Rd_Name	Text	30	Specific Name of the road, if any

Table 7: Rail – Geo-Spatial Data Content

All the railway lines will be captured as lines in Base layer and the railway track area shall be captured as polygon in Urban Land Use layer.

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
2	02-01	Rail	Broad Gauge	Line	+++++
	02-02		Narrow Gauge	Line	+++++
	02-03		Meter Gauge	Line	+++++
	02-04		Metro/MRTS	Line	+++++
	02-05		MMTS	Line	+++++

Table 7a: Rail Line GIS Data Structure

Geo-spatial Layer Name: Rail_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Rail Id	Rail_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 7
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 7
Railway Line Name	Rly_Name	Text	30	Specific Name of the railway line, if any

Table 8: Bridges/Flyovers –Geo-Spatial Data Content








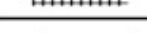


S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
3	03-01	Bridges	<i>Culvert</i>	Line	
	03-02		<i>Tunnel</i>	Line	
	03-03		<i>Bridge across river</i>	Line	
	03-04		<i>Over Bridge</i>	Line	
	03-05		<i>Under Pass</i>	Line	
	03-06		<i>Road Bridge across Rail</i>	Line	
	03-07		<i>Subway</i>	Line	
	03-08		<i>Foot over bridge</i>	Line	
	03-09		<i>Rope bridge</i>	Line	
4	04-01	Flyovers	<i>Flyover</i>	Line	

Table 8a: Bridges & Flyovers GIS Data Structure

Geo-spatial Layer Name: Bridge_Flyover_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Bridge & Flyover ID	Br_Fly_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 8
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 8
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_C Line
Road Name	Rd_Name	Text	30	Road Name same as in Road_C Line
Rail Id	Rail_ID	Alphanumeric	15	Rail ID same as in Rail_Line
Railway Line Name	Rly_Name	Text	30	Railway Line Name same as in Rail_Line
Ward Number	Ward_No	Alphanumeric	10	Ward Number

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Locality Name	Locality	Text	50	Locality Name
Bridge/Flyover Width (in mt.)	Width	Double	10 Upto 2 decimals	Width in metres
Bridge/Flyover Length (in mt.)	Length	Double	10 Upto 2 decimals	Length in metres
Construction Material	Cons_Mat	Text	15	Iron/Masonry/Concrete/Any Other
Construction Year	Cons_Yr	Text	4	Year of Construction

Table 9: Water bodies – Geo-Spatial Data Content












S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
5	05-01	Water Bodies	<i>River</i>	Polygon	
	05-02		<i>Stream</i>	Polygon / Line	
	05-03		<i>Canal</i>	Polygon / Line	
	05-04		<i>Drain</i>	Polygon / Line	
	05-05		<i>Ponds</i>	Polygon	
	05-06		<i>Lake</i>	Polygon	
	05-07		<i>Tank</i>	Polygon	
	05-08		<i>Island (River/Lake)</i>	Polygon	
	05-09		<i>Reservoir</i>	Polygon	
	05-10		<i>Back Water</i>	Polygon	
	05-11		<i>Sea</i>	Polygon	

Table 9a: Water bodies Line (Stream, Canal, Drain) GIS Data Structure

Geo-spatial Layer Name: Waterbodies_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 9
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 9
Name of the Waterbody	Name	Text	50	Specific Name of the Stream, Canal, Drain, if any

Table 9b: Water bodies Polygon GIS Data Structure
















Geo-spatial Layer Name: Waterbodies_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 9
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 9
Name of the Waterbody	Name	Text	50	Specific Name of the waterbody, if any

II. URBAN LAND USE/LAND COVER:

Table 10: Urban Land use/Land cover - Geo-Spatial Data Content

All the urban land uses are extracted as polygons, except a few, such as Community Toilet, Fire Station, Garbage Collection points, Landfill sites & Dumping yard, Cell towers, Slums, Bus Stops, Trees etc, which are extracted as points. Out of these urban land use point features, some of them have feature specific attributes which are provided in the following respective attribute and GIS structure tables.

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	06-01	Residential	<i>Residential Area/Colony</i>	Polygon	
	06-02		<i>Township</i>	Polygon	
	06-03		<i>Housing scheme</i>	Polygon	
2	07-01	Commercial	<i>Retail</i>	Polygon	
	07-02		<i>Wholesale</i>	Polygon	
	07-03		<i>General Business</i>	Polygon	
	07-04		<i>Hotel / Lodge / Restaurant</i>	Polygon	
	07-05		<i>Shopping Centre / Mall</i>	Polygon	
	07-06		<i>Multiplex / Cinema</i>	Polygon	
	07-07		<i>Function Hall / Marriage Garden</i>	Polygon	
	07-08		<i>Warehouse</i>	Polygon	
	07-09		<i>Storage Godown</i>	Polygon	
	07-10		<i>Resort</i>	Polygon	
	07-11		<i>Petrol Pump / LPG filling station</i>	Polygon	
	07-12		<i>Informal Shop</i>	Polygon	

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
	07-13		<i>Hostel</i>	Polygon	
	07-14		<i>Market (Daily & Weekly) / Mandi</i>	Polygon	
3	08-01	Industrial	<i>Manufacturing</i>	Polygon	
	08-02		<i>Service</i>	Polygon	
	08-03		<i>Chemical</i>	Polygon	
	08-04		<i>Pharmaceutical</i>	Polygon	
	08-05		<i>Textile</i>	Polygon	
	08-06		<i>IT Parks</i>	Polygon	
	08-07		<i>Industrial Estate / SEZ</i>	Polygon	
	08-08		<i>Agro based & Food Processing</i>	Polygon	
	08-09		<i>Obnoxious</i>	Polygon	
	08-10		<i>Cottage and Household</i>	Polygon	
	08-11		<i>Other Industries</i>	Polygon	
4	09-01	Mixed	<i>Residential & Commercial</i>	Polygon	
	09-02		<i>Residential & Household Industry</i>	Polygon	
	09-03		<i>Residential & Educational</i>	Polygon	
	09-04		<i>Residential & Health Services</i>	Polygon	
	09-05		<i>Commercial & Industrial</i>	Polygon	
	09-06		<i>Commercial & Health Services</i>	Polygon	
	09-07		<i>Commercial & Educational</i>	Polygon	
	09-08		<i>Commercial & Recreational</i>	Polygon	
	09-09		<i>Residential & Commercial & Institutional</i>	Polygon	
5	10-01	Educational	<i>School</i>	Polygon	
	10-02		<i>College</i>	Polygon	
	10-03		<i>University</i>	Polygon	
	10-04		<i>Vocational Institute</i>	Polygon	

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
	10-05		Anganwari	Polygon	
	10-06		Training Institute	Polygon	
6	11-01	Health Services	Govt. Hospital	Polygon	
	11-02		Private Hospital	Polygon	
	11-03		Diagnostic Centre	Polygon	
	11-04		Clinic/Dispensary	Polygon	
	11-05		Nursing Home	Polygon	
	11-06		Primary/Community Health Centre	Polygon	
7	12-01	Central Govt. Property	Office	Polygon	
	12-02		Quarter	Polygon	
8	13-01	State Govt. Property	Office	Polygon	
	13-02		Quarter	Polygon	
9	14-01	Railway	Railway Property [@]	Polygon	
10	15-01	Public & Semi-public	Private Office	Polygon	
	15-02		Banks	Polygon	
	15-03		Credit Society	Polygon	
	15-04		Foreign Establishment	Polygon	
	15-05		Police Station	Polygon	
	15-06		Cantonment/Battalion	Polygon	
	15-07		Jail	Polygon	
	15-08		Crematorium Burial Groun /Grave Yard	Polygon	
	15-09		Guesthouse	Polygon	
	15-10		Community hall	Polygon	
	15-11		Dharmashala	Polygon	
	15-12		Tourist Facility Centre	Polygon	
	15-13		Auditorium	Polygon	
	15-14		Convention Centre	Polygon	
	15-15		Museum	Polygon	
	15-16		Public Library	Polygon	
	15-17		Art Gallery & Cultural Centre	Polygon	
	15-18		LPG/CNG Gas Booking Office	Polygon	
	15-19		Ticket Booking & Reservation Office	Polygon	
	15-20		Stock Exchange	Polygon	
	15-21		Disaster Management Centre	Polygon	

[@]includes Office, Quarters, Recreational Space, Institutions etc. under Railways

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
	15-22		<i>Metrological Station</i>	Point	
	15-23		<i>Dhobi Ghat</i>	Polygon	
	15-24		<i>Crech/Day Care</i>	Polygon	
	15-25		<i>Public/Community Toilet</i>	Polygon	
	15-26		<i>Social Welfare Centre</i>	Polygon	
	15-27		<i>Orphanage</i>	Polygon	
	15-28		<i>Old Age Home</i>	Polygon	
	15-29		<i>Night Shelter</i>	Polygon	
	15-30		<i>Fire Station</i>	Polygon	
	15-31		<i>ATM</i>	Point	
11	16-01	Religious	<i>Temple</i>	Polygon	
	16-02		<i>Mosque</i>	Polygon	
	16-03		<i>Idgah</i>	Polygon	
	16-04		<i>Church</i>	Polygon	
	16-05		<i>Gurudwara</i>	Polygon	
	16-06		<i>Monastery</i>	Polygon	
	16-07		<i>Synagogue</i>	Polygon	
	16-08		<i>Chhatri</i>	Polygon	
12	17-01	Recreational	<i>Garden</i>	Polygon	
	17-02		<i>Park</i>	Polygon	
	17-03		<i>Play Ground</i>	Polygon	
	17-04		<i>Club</i>	Polygon	
	17-05		<i>Sports Centre</i>	Polygon	
	17-06		<i>Gymnasium</i>	Polygon	
	17-07		<i>Swimming Pool</i>	Polygon	
	17-08		<i>Stadium</i>	Polygon	
	17-09		<i>Planetarium</i>	Polygon	
	17-10		<i>Aquarium</i>	Polygon	
	17-11		<i>Open Air Theatre</i>	Polygon	
	17-12		<i>Golf Course</i>	Polygon	
	17-13		<i>Race Course</i>	Polygon	
	17-14		<i>Exhibition Ground</i>	Polygon	
	17-15		<i>Amusement /Theme Park</i>	Polygon	
13	18-01-01	Public Utilities	<i>Water Treatment Plant</i>	Polygon	
	18-01-02		<i>Water Pumping Station</i>	Polygon	
	18-01-03		<i>Ground Level Reservoir</i>	Polygon	

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
	18-03-01		<i>Sewage Treatment Plant</i>	Polygon	
	18-03-02		<i>Sewage Pumping Station</i>	Polygon	
	18-04-01		<i>Electric Power Plant</i>	Polygon	
	18-04-02		<i>Electric Sub-Station</i>	Polygon	
	18-05-01		<i>City Gate Metering Stations</i>	Polygon	
	18-05-02		<i>Area Regulator Stations</i>	Polygon	
	18-06		<i>Rain Water Harvesting System</i>	Polygon	
	18-07		<i>Effluent Treatment Plant</i>	Polygon	
14	19-01	Solid Waste Management	<i>Land Fill Site</i>	Polygon	
	19-02		<i>Dumping Yard</i>	Polygon	
	19-03		<i>Recycling Plant</i>	Polygon	
	19-04		<i>Garbage Collection Point/Dumper</i>	Point	
15	20-01	Communication	<i>Telephone exchange</i>	Polygon	
	20-02		<i>Post/Telegraph Office</i>	Polygon	
	20-03		<i>Radio/TV Station</i>	Polygon	
	20-04		<i>Satellite & Telecommunication Centre</i>	Polygon	
	20-05		<i>Public Telephone Booth</i>	Point	
	20-06		<i>Cell Tower</i>	Point	
	20-07		<i>WiFi Hotspot</i>	Point	
16	21-01	Heritage	<i>Monument</i>	Polygon	
	21-02		<i>Fort</i>	Polygon	
	21-03		<i>Archaeological Site</i>	Polygon	
17	22-01	Slum	<i>Notified Slum</i>	Polygon	
	22-02		<i>Non- notified Slum</i>	Polygon	
	22-03		<i>Squatter / Kachibasti</i>	Polygon	
18	23-01	Vacant Land	<i>Private Vacant</i>	Polygon	
	23-02		<i>Municipal Asset</i>	Polygon	
	23-03		<i>Government Asset</i>	Polygon	
	23-04		<i>Reclaimed Land</i>	Polygon	
	23-05		<i>Layout / Plotted</i>	Polygon	
19	24-01	Transportation	<i>Bus stand /Terminus</i>	Polygon	

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
	24-02		Railway Station	Polygon	
	24-03		Railway Yard / Siding	Polygon	
	24-04		Railway Track Area	Polygon	
	24-05		Airport / Airstrip	Polygon	
	24-06		Helipad	Polygon	
	24-07		Port	Polygon	
	24-08		Harbour	Polygon	
	24-09		Jetty	Polygon	
	24-10		Truck Terminus	Polygon	
	24-11		Freight Complex	Polygon	
	24-12		Taxi Stand	Polygon	
	24-13		Auto Stand	Polygon	
	24-14		Cycle rickshaw/Cycle /Cart stand	Polygon	
	24-15		Bus Bay	Polygon	
	24-16		Bus Stop	Polygon/Point	
	24-17		Transport Nagar	Polygon	
20	25-01	Traffic related	Traffic Island	Polygon	
	25-02		Median / Divider	Polygon	
	25-03		Parking Space / Area	Polygon	
21	26-01	Rural	Village / Abadi Area	Polygon	
22	27-01	Green Areas	Reserved Forest	Polygon	
	27-02		Protected Forest / Notified Forest	Polygon	
	27-03		Social	Polygon	
			Green belt	Polygon	
	27-04		Tree Clad Area	Polygon	
	27-05		Tree	Point	
23	28-01	Agricultural Land	Cropland	Polygon	
	28-02		Fallow land	Polygon	
	28-03		Plantations	Polygon	
	28-04		Orchard	Polygon	
	28-05		Horticulture	Polygon	
	28-06		Plant nursery	Polygon	
24	29-01	Wetlands	Waterlogged	Polygon	
	29-02		Low lying area	Polygon	
	29-03		Marshy	Polygon	
	29-04		Swampy	Polygon	
	29-05		Mudflat	Polygon	
	29-06		Creek	Polygon	









































S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
25	30-01	Wastelands	Scrubland	Polygon	
	30-02		Barren	Polygon	
	30-03		Rocky	Polygon	
	30-04		Sandy area	Polygon	
	30-05		Salt affected	Polygon	
	30-06		Gullied	Polygon	
26	31-01	Specific Land Use	Hill / Mountain	Polygon	
	31-02		Snow covered area	Polygon	
	31-03		Mining Area	Polygon	
	31-04		Grazing land	Polygon	
	31-05		Pastures	Polygon	
	31-06		Meadows	Polygon	
	31-07		Tea/Coffee Garden	Polygon	
	31-08		Ghats	Polygon	
	31-09		Coral Reef	Polygon	
	31-10		Sand Dunes	Polygon	
27	32-01	Eco-Sensitive Areas	Bird Sanctuary	Polygon	
	32-02		Bio-diversity Park	Polygon	
	32-03		Botanical Garden	Polygon	
	32-04		Zoo	Polygon	
	32-05		National Park	Polygon	
	32-06		Mangrove	Polygon	
	32-07		Oxbow Lakes	Polygon	
	32-08		Paleo channels	Polygon	
28	33-01	Others	Salt pan	Polygon	
	33-02		Aquaculture	Polygon	
	33-03		Brick kiln	Polygon	
	33-04		Quarry	Polygon	
	33-05		Dam	Polygon	
	33-06		Barrage	Polygon	
	33-07		Aqueduct	Polygon	
	33-08		Weir	Polygon	
	33-09		Farm house	Polygon	
	33-10		Dairy farm	Polygon	
	33-11		Poultry farm	Polygon	
	33-12		Nursery	Polygon	
	33-13		Slaughter House	Polygon	
	33-14		Dairy Booth	Polygon/Point	
	33-15		Lighthouse	Point	
	33-16		Beach	Polygon	

Table 10a: Urban Land use/Landcover Polygon GIS Data Structure***Geo-spatial Layer Name: ULU_Poly***

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 10
Class	Class	Text	25	Class as given in Table 10
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 10
Area in sq. mt.	Area	Double	10 Up to 4 decimals	Area of corresponding feature in sq. mt.
Name	Name	Text	50	Name of the Landmark

Table 10b: Community Toilet GIS Data Structure***Geo-spatial Layer Name: Community_toilet***

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Toilet ID	CT_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_C Line
Road Name	Rd_Name	Text	30	Road Name same as in Road_C Line
Locality Name	Locality	Text	50	Locality Name
Toilet Status	Status	Text	15	Working/Not working
Toilet Type	Type	Text	15	Eco-friendly/General
Mode of Construction	Mode	Text	5	Public/PPP

Table 10c: Fire Station GIS Data Structure
Geo-spatial Layer Name: Fire_Station

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Fire Station ID	FS_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_C Line
Road Name	Rd_Name	Text	30	Road Name same as in Road_C Line
Locality Name	Locality	Text	50	Locality Name
Fire Station Status	Status	Text	15	Working/Not working

Table 10d: Garbage Collection Points/Dumper GIS Data Structure
Geo-spatial Layer Name: Garb_Coll_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Garbage collection point ID	GC_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_C line
Road Name	Rd_Name	Text	30	Road Name same as in Road_C line
Locality Name	Locality	Text	50	Locality Name
Type of garbage	Garb_Type	Text	30	Domestic/Biomedical/Kitchen/Construction/Mixed
Status of Garbage collection point	Status	Text	30	Temporary/Permanent and Collection point/Transfer point
Coverage area of a collection point	Cov_area	Double	10 Up to 4 decimals	Coverage area (No of houses or colonies covered by a point)

Table 10e: Landfill Sites and Dumping Yard GIS Data Structure

Geo-spatial Layer Name: Landfill_Dumpyard_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Landfill site/Dumping Yard point ID	LD_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Name of the Landfill site/Dumping Yard	Name	Text	30	Specific Name of the landfill site or dumping yard, if any

Table 10f: Cell Towers, Wi-Fi Hotspots & Public Telephone Booth GIS Data Structure

Geo-spatial Layer Name: Communication_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Communication Point ID	Com_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Description	Descr	Text	15	On Building/On ground

Table 10g: Slums GIS Data Structure
Geo-spatial Layer Name: Slum_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Slum ID	Slum_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Slum Number	Slum_Num	Text	10	Slum Number (from ULBs)
Name of the Slum	Slum_Name	Text	30	Name of the Slum
Locality Name	Locality	Text	50	Locality Name
Notified Area	Notfd_Area	Double	10 upto 4 Decimals	Notified Area if any, from ULBs

Table 10h: Bus Stop GIS Data Structure
Geo-spatial Layer Name: Bus_Stop_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Bus stop ID	BS_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name

Table 10i: Tree GIS Data Structure
Geo-spatial Layer Name: Tree

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 10

Table 10j: Other Urban Landuse Points: ATM, Meteorological Station, Dairy Booth, Light House and Other if any GIS Data Structure

Geo-spatial Layer Name: ULU_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Point ID	Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Class	Class	Text	25	Class as given in Table 10
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name

II. BUILDING FOOTPRINT:

Buildings falling within each of the Class/Sub-class of urban land use/land cover shall be represented in the same Sub-class of Building Footprint Layer. For example, buildings falling within 'Commercial Retail' urban landuse/land cover area will be represented as 'Commercial Retail' buildings. The building footprints shall overlap with urban landuse/land cover.


A single symbol  shall be used for representation of all buildings. The Sub-Class details for each building will be provided as an attribute.

Table 11: Building Footprint – Geo-Spatial Data Content

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY
1	06-04	Residential	House	Polygon
	06-05		Group of Houses	Polygon
	06-06		Apartment	Polygon
2	07-01	Commercial	Retail	Polygon
	07-02		Wholesale	Polygon
	07-03		General Business	Polygon
	07-04		Hotel/Lodge/Restaurant	Polygon
	07-05		Shopping Centre/Mall	Polygon
	07-06		Multiplex/Cinema	Polygon

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY
	07-07		<i>Function Hall/ Marriage Garden</i>	Polygon
	07-08		<i>Warehouse</i>	Polygon
	07-09		<i>Storage Godown</i>	Polygon
	07-10		<i>Resort</i>	Polygon
	07-11		<i>Petrol Pump/LPG filling station</i>	Polygon
	07-12		<i>Informal Shop</i>	Polygon
	07-13		<i>Hostel</i>	Polygon
3	08-01	Industrial	<i>Manufacturing</i>	Polygon
	08-02		<i>Service</i>	Polygon
	08-03		<i>Chemical</i>	Polygon
	08-04		<i>Pharmaceutical</i>	Polygon
	08-05		<i>Textile</i>	Polygon
	08-06		<i>IT Parks</i>	Polygon
	08-07		<i>Industrial Estate/SEZ</i>	Polygon
	08-08		<i>Agro based & Food Processing</i>	Polygon
	08-09		<i>Obnoxious</i>	Polygon
	08-10		<i>Cottage & Household</i>	Polygon
	08-11		<i>Other Industries</i>	Polygon
4	09-01	Mixed	<i>Residential & Commercial</i>	Polygon
	09-02		<i>Residential & Household Industry</i>	Polygon
	09-03		<i>Residential & Educational</i>	Polygon
	09-04		<i>Residential & Health Services</i>	Polygon
	09-05		<i>Commercial & Industrial</i>	Polygon
	09-06		<i>Commercial & Health Services</i>	Polygon
	09-07		<i>Commercial and Educational</i>	Polygon
	09-08		<i>Commercial and Recreational</i>	Polygon
	09-09		<i>Residential & Commercial & Institutional</i>	Polygon
5	10-01	Educational	<i>School</i>	Polygon
	10-02		<i>College</i>	Polygon
	10-03		<i>University</i>	Polygon
	10-04		<i>Vocational Institute</i>	Polygon
	10-05		<i>Anganwari</i>	Polygon
	10-06		<i>Training Institute</i>	Polygon
6	11-01	Health Services	<i>Govt. Hospital</i>	Polygon
	11-02		<i>Private Hospital</i>	Polygon

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY
	11-03		<i>Diagnostic Centre</i>	Polygon
	11-04		<i>Clinic/Dispensary</i>	Polygon
	11-05		<i>Nursing Home</i>	Polygon
	11-06		<i>Primary/Community Health Centre</i>	Polygon
7	12-01	Central Govt. Property	<i>Office</i>	Polygon
	12-02		<i>Quarter</i>	Polygon
8	13-01	State Govt. Property	<i>Office</i>	Polygon
	13-02		<i>Quarter</i>	Polygon
9	14-01	Railway	<i>Railway Property[@]</i>	Polygon
10	15-01	Public & Semi-public	<i>Private Office</i>	Polygon
	15-02		<i>Banks</i>	Polygon
	15-03		<i>Credit Society</i>	Polygon
	15-04		<i>Foreign Establishment</i>	Polygon
	15-05		<i>Police Station</i>	Polygon
	15-06		<i>Cantonment /Battalion</i>	Polygon
	15-07		<i>Jail</i>	Polygon
	15-08		<i>Crematorium/Burial Ground/Grave Yard</i>	Polygon
	15-09		<i>Guesthouse</i>	Polygon
	15-10		<i>Community hall</i>	Polygon
	15-11		<i>Dharmashala</i>	Polygon
	15-12		<i>Tourist Facility Centre</i>	Polygon
	15-13		<i>Auditorium</i>	Polygon
	15-14		<i>Convention Centre</i>	Polygon
	15-15		<i>Museum</i>	Polygon
	15-16		<i>Public Library</i>	Polygon
	15-17		<i>Art Gallery & Cultural Centre</i>	Polygon
	15-18		<i>LPG/ CNG Gas Booking Office</i>	Polygon
	15-19		<i>Ticket Booking & Reservation Office</i>	Polygon
	15-20		<i>Stock Exchange</i>	Polygon
	15-21		<i>Disaster Management Centre</i>	Polygon
	15-24		<i>Crech/Day Care</i>	Polygon
	15-25		<i>Public/Community Toilet</i>	Polygon
	15-26		<i>Social Welfare Centre</i>	Polygon
	15-27		<i>Orphanage</i>	Polygon
	15-28		<i>Old Age Home</i>	Polygon
	15-29		<i>Night Shelter</i>	Polygon
	15-30		<i>Fire Station</i>	Polygon

[@]includes Office, Quarters, Recreational Space, Institutions etc. under Railways

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY
11	16-01	Religious	Temple	Polygon
	16-02		Mosque	Polygon
	16-03		Idgah	Polygon
	16-04		Church	Polygon
	16-05		Gurudwara	Polygon
	16-06		Monastery	Polygon
	16-07		Synagogue	Polygon
	16-08		Chhatra	Polygon
12	17-01	Recreational	Garden	Polygon
	17-02		Park	Polygon
	17-04		Club	Polygon
	17-05		Sports Centre	Polygon
	17-06		Gymnasium	Polygon
	17-07		Swimming Pool	Polygon
	17-08		Stadium	Polygon
	17-09		Planetarium	Polygon
	17-10		Aquarium	Polygon
	17-11		Open Air Theatre	Polygon
	17-12		Golf Course	Polygon
	17-13		Race Course	Polygon
	17-14		Exhibition Ground	Polygon
	17-15		Amusement /Theme Park	Polygon
13	18-01-01	Public Utilities	Water Treatment Plant	Polygon
	18-01-02		Water Pumping Station	Polygon
	18-01-03		Ground Level Reservoir	Polygon
	18-03-01		Sewage Treatment Plant	Polygon
	18-03-02		Sewage Pumping Station	Polygon
	18-04-01		Electric Power Plant	Polygon
	18-04-02		Electric Sub Station	Polygon
	18-07		Effluent Treatment Plant	Polygon
14	19-03	Solid Waste Management	Recycling Plant	Polygon
15	20-01	Communication	Telephone Exchange	Polygon
	20-02		Post /Telegraph Office	Polygon
	20-03		Radio/TV Station	Polygon
	20-04		Satellite & Telecommunication Centre	Polygon
16	21-01	Heritage	Monument	Polygon
	21-02		Fort	Polygon
	21-03		Archaeological Site	Polygon
	24-01		Bus stand /Terminus	Polygon
17	24-02	Transportation	Railway Station	Polygon
	24-03		Railway Yard / Sliding	Polygon

S.No	CODE	CLASS	SUB-CLASS	GEOMETRY
	24-05		<i>Airport / Airstrip</i>	Polygon
	24-07		<i>Port</i>	Polygon
	24-08		<i>Harbour</i>	Polygon
	24-10		<i>Truck Terminus</i>	Polygon
	24-11		<i>Freight Complex</i>	Polygon
	24-17		<i>Transport Nagar</i>	Polygon
18	25-04	Traffic related	<i>Multi-level Parking</i>	Polygon
19	26-02	Rural	<i>House</i>	Polygon
	26-03		<i>Group of Houses</i>	Polygon
	26-04		<i>Apartment</i>	Polygon
20	31-07	Specific Land use	<i>Tea/Coffee Garden</i>	Polygon
21	32-01	Eco-Sensitive Areas	<i>Bird Sanctuary</i>	Polygon
	32-02		<i>Bio-diversity Park</i>	Polygon
	32-03		<i>Botanical Garden</i>	Polygon
	32-04		<i>Zoo</i>	Polygon
	32-05		<i>National Park</i>	Polygon
22	33-09	Others	<i>Farm house</i>	Polygon
	33-10		<i>Dairy farm</i>	Polygon
	33-11		<i>Poultry farm</i>	Polygon
	33-13		<i>Slaughter House</i>	Polygon
	33-14		<i>Dairy Booth</i>	Polygon

Table 11a: Buildings GIS Data Structure

Geo-spatial Layer Name: Building footprint

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 11
Class	Class	Text	25	Class as given in Table 11
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 11
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Colony Name	Colony	Text	50	Colony Name
Number of floors	No_floors	Numeric	5	Number of floors in a building
Construction Type	Cons_type	Text	15	Pucca/Semi Pucca/Kutchha
Area in sq. mt.	Area	Double	10 Up to 4 decimals	Area of corresponding building footprint
Description	Descr	Text	50	Name of building and Details, if any

IV. UTILITIES:

Utility Layers:

All utility layers like Water Supply Network, Drainage Network, Sewage Network, Electricity Supply Network, Natural Gas Distribution Network database will be prepared from the data collected by ULBs from the concerned engineering and line departments.

All network lines are represented as lines and the nodes (starting point, intersections, valves, end points etc.) are represented as points.

Table 12: Water Supply Network – Geo-Spatial Data Content






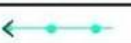






S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	18-01-01	Water Supply Network	Water Treatment Plant	Point	
	18-01-02		Water Pumping Station	Point	
	18-01-03		Ground Level Reservoir	Point	
	18-01-04		Raw Water Main Pipeline	Line	
	18-01-05		Pumping Line	Line	
	18-01-06		Distribution Pipeline	Line	
	18-01-07		Service Pipeline	Line	
	18-01-08		Supply Valve	Point	
	18-01-09		Over Head Tank	Point	
	18-01-10		Public Stand Post	Point	
	18-01-11		Tube Well	Point	
	18-01-12		Hand Pump	Point	

Table 12a: Water Supply Network Line GIS Data Structure

Geo-spatial Layer Name: Water_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Water Supply ID	WS_Line_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 12
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 12
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Distance from road (in mt.)	Dis_frm_r d	Double	10 Upto 2 Decimals	Distance from road in meters
Construction Material	Cons_Mat	Text	10	PSC/DI/HDPE/MS/RCC/Others/GI/A C/CI/PVC
Pipe Dia in mt.	Pipe_Dia	Numeric	5	Pipe Diameter in meters

Table 12b: Water Supply Network Points GIS Data Structure

Geo-spatial Layer Name: Water_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Water Supply ID	WS_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 12
Sub_Class	Sub_Class	Text	50	Sub Class as given in Table 12
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Locality Name	Locality	Text	50	Locality Name
Capacity	Capacity	Text	10	Capacity of Treatment plant, Pumping station, GLR, overhead tank in the respective units

Table 13: Storm Water Drainage Network – Geo-Spatial Data Content



S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
2	18-02-01	Storm water Drainage	Storm Water Drain	Line	
	18-02-02		Storm Water Vent	Point	

Table 13a: Storm water Drainage Network Line GIS Data Structure
Geo-spatial Layer Name: Str_Drain_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Storm Water Drainage ID	Dr_Line_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 13
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 13
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Distance from road (in mt.)	Dis_frm_rd	Double	10 Upto 2 Decimals	Distance from road in meters
Depth in mt.	Depth	Double	10 Upto 2 Decimals	Depth of Drainage in meters
Construction Type	Cons_Type	Text	10	Box/Open Channel
Network Line Type	NW_Type	Text	15	Mainline/Service/Pumping

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Name of the Storm water drain	Name	Text	50	Specific Name if any

Table 13b: Storm water Drainage Network Points GIS Data Structure

Geo-spatial Layer Name: Str_Drain_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Storm Water Drainage ID	Dr_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 13
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 13
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Distance from road(in mt.)	Dis_frm_rd	Double	10 Upto 2 Decimals	Distance from road in meters

Table 14: Sewerage Network – Geo-Spatial Data Content









S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	18-03-01	Sewerage Network	Sewage Treatment Plant	Point	
	18-03-02		Sewage Pumping Station	Point	
	18-03-03		Pumping Line	Line	
	18-03-04		Main Sewer Line	Line	
	18-03-05		Branch Sewer Line	Line	
	18-03-06		Service Sewer Line	Line	
	18-03-07		Manhole	Point	
	18-03-08		Vent Valve	Point	

Table 14a: Sewerage Network Line GIS Data Structure*Geo-spatial Layer Name: Sew_NW_Line*

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Sewerage ID	SW_Line_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 14
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 14
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Distance from road (in mt.)	Dis_frm_rd	Double	10 Upto 2 Decimals	Distance from road in meters
Depth in mt.	Depth	Double	10 Upto 2 Decimals	Depth of Sewer line in meters
Pipe Dia in mm.	Pipe_Dia	Double	10 Upto 2 Decimals	Pipe Diameter in millimeters
Construction Material	Cons_Mat	Text	10	RCC/CI/SWG/PVC/GI/AC/Others

Table 14b: Sewerage Network Points GIS Data Structure*Geo-spatial Layer Name: Sew_NW_Pnt*

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Sewerage ID	SW_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 14
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 14
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Distance from road (in mt.)	Dis_frm_rd	Double	10 Upto 2 Decimals	Distance from road in meters

Table 15: Power Supply Network – Geo-Spatial Data Content









S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	18-04-01	Power	Electric Power Plant	Point	
	18-04-02		Electric Sub-Station	Point	
	18-04-03		Transmission Tower	Point	
	18-04-04		Transformer	Point	
	18-04-05		33 Kv Line	Line	
	18-04-06		11 Kv Line	Line	
	18-04-07		Pole	Point	
	18-04-08		Street Light	Point	

Table 15a: Power Supply Network Line GIS Data Structure

Geo-spatial Layer Name: Power_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Power Supply ID	PS_Line_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 15
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 15
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Name of Power Line	Pow_Name	Text	30	Power Line Name if any

Table 15b: Power Supply Network Points GIS Data Structure

Geo-spatial Layer Name: Power_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Power Supply ID	PS_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 15
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 15
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Capacity	Capacity	Text	10	Capacity of Power Plant, Sub-station and Transformer, in the respective units
Street Light-ID	St_Lt_ID	Alphanumeric	5	Unique Id for Street Light
Type of Street Light Pole	Pole_Type	Text	15	Iron/Concrete/Other
Type of Street Light	St_Lt_Ty	Text	15	HPMV/Sodium/Tube Light/CFL/High Mast/Others
Source of Energy	Sou_Energy	Text	15	Electricity/Others/Solar

Table 16: Gas Distribution Network- Geo-Spatial Data Content







S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	18-05-01	Natural Gas	City Gate Metering Station	Point	
	18-05-02		Area Regulator Station	Point	
	18-05-03		Main Distribution Line	Line	
	18-05-04		Branch Distribution Line	Line	
	18-05-05		Regulator	Point	
	18-05-06		Flow Meter	Point	

Table 16a: Gas Distribution Network Line GIS Data Structure*Geo-spatial Layer Name: Natural_Gas_NW_Line*

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Gas Distribution ID	GD_Line_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 16
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 16
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name

Table 16b: Gas Distribution Network Points GIS Data Structure*Geo-spatial Layer Name: Natural_Gas_NW_Pnt*

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Gas Distribution ID	GD_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 16
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 16
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name

V. HYPSOGRAPHY:

Table 17: DEM Layer

Towns for which monoscopic data is selected, the DEM shall be generated by Total Station survey and Towns for which stereo data is selected, the DEM shall be generated from stereo data. The DEM is a DTM which represent bare earth surface.

S.No	CLASS	ACCURACY	PIXEL VALUE	GEOMETRY
1	Digital Terrain Model (DTM)	0.5 m	Height in metres	Raster

Table 18: Contour- Geo-Spatial Data Content

Contour shall be generated from the DTM.


S.No	CODE	CLASS	CONTOUR INTERVAL	GEOMETRY	SYMBOL
1	34-01	Contour	1 m	Line	

Table 18a: Contour Layer GIS Data Structure

Geo-spatial Layer Name: Contour_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 18
Contour Value	Cntr_Val	Numeric	5	Height in metres

Table 19: Ground Control Points (GCPs) Layer- Geo-Spatial Data Content

DGPS survey is used for generation of GCPs. DGPS survey data shall be processed using closed network traverse and the reference station coordinate shall be computed using ITRF reference frame.



S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	35-01	GCP	Reference station	Point (X,Y,Z)	
	35-02		Rover Station	Point (X,Y,Z)	

Table 19a: Ground Control Points GIS Data Structure

Geo-spatial Layer Name: GCP_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Ground Control point ID	GCP_Id	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 19
Sub-Class	Sub_Class	Text	25	Sub Class as given in Table 19
X Coordinate	X	Double	Up to 8 decimals	X Coordinate
Y Coordinate	Y	Double	Up to 8 decimals	Y Coordinate
Z Coordinate	Z	Double	Up to 8 decimals	Z Coordinate
Description of the Ground Control point	Descr	Text	250	Description
Monument	Monument	Text	5	Yes/No
Sketch Map or Image	Sketch	Blob		Sketch Map or Image to be attached
Ground Photo	Gr_Photo	Blob		Ground Photo to be attached

VI. CADASTRAL LAYER:

Table 20: Cadastral Layer- Geo-Spatial Data Content

Cadastral layer will be prepared from the data collected by ULBs from the line departments.


S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	36-01	Cadaastre	-	Polygon	

Table 20a: Cadastral Layer GIS Data Structure

Geo-spatial Layer Name: Cadaastre_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 20
Survey Number	Survey_Num	Alphanumeric	15	Khasra Number/Survey Number
Area	Area	Double	Up to 4 decimals	Area of Village Cadaastre or Parcel

VII. BOUNDARIES:

Table 21: Administrative Boundaries – Geo-Spatial Data Content


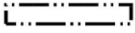
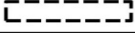




S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	37-01	Administrative Boundaries	International Boundary	Polygon	
	37-02		State Boundary	Polygon	
	37-03		District Boundary	Polygon	
	37-04		Tehsil / Mandal / Block Boundary	Polygon	
	37-05		Village Boundary	Polygon	
	37-06		Forest Boundary	Polygon	
	37-07		Revenue Boundary	Polygon	

Table 21a: Administrative Boundaries GIS Data Structure

Geo-spatial Layer Name: Admin_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 21
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 21
Area in sq. km.	Area	Double	Up to 4 decimals	Area of corresponding Admin boundary
Name	Name	Text	50	Name of the Admin Boundary

Table 22: Planning Boundaries – Geo-Spatial Data Content








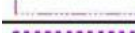
S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
2	38-01	Planning Boundaries	Planning Area Boundary	Polygon	
	38-02		Highway Corridor Development Zone	Polygon	
	38-03		Peripheral Control belt boundary	Polygon	
	38-04		Controlled Area boundary	Polygon	
	38-05		Urbanisable Area Boundary	Polygon	
	38-06		Industrial Zone / Area	Polygon	
	38-07		Special Economic Zone	Polygon	
	38-08		National Park / Sanctuary / Conservation Area	Polygon	

Table 22a: Planning Boundaries GIS Data Structure

Geo-spatial Layer Name: Planning_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 22
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 22
Area in sq. km.	Area	Double	Up to 4 decimals	Area of corresponding Planning boundary
Name	Name	Text	50	Name of the Planning Boundary

Table 23: Municipal Boundaries – Geo-Spatial Data Content

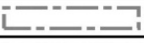
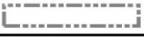

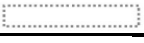
S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
3	39-01	Municipal Boundaries	<i>Municipal Boundary</i>	Polygon	
	39-02		<i>Zone Boundary</i>	Polygon	
	39-03		<i>Ward Boundary</i>	Polygon	
	39-04		<i>Taxzone Boundary</i>	Polygon	

Table 23a: Municipal Boundaries GIS Data Structure

Geo-spatial Layer Name: Municipal_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 23
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 23
Area in sq. km.	Area	Double	Up to 4 decimals	Area of corresponding Municipal boundary
Name	Name	Text	50	Name of the Municipal Boundary
Ward Number	Ward_No	Numeric	5	Ward Number in case of Ward boundary
Taxzone Number	Taxzone_No	Numeric	5	Tax zone Number in case of Tax zone boundary

Table 24: Other Boundaries (EB, UFS, Mining area) – Geo-Spatial Data Content




S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
4	40-01	Other Boundaries	<i>Urban Frame Survey Boundary</i>	Polygon	
	40-02		<i>Enumeration Block Boundary</i>	Polygon	
	40-03		<i>Mining Area Boundary</i>	Polygon	

Table 24a: Boundaries (EB, UFS, Mining area) GIS Data Structure

Geo-spatial Layer Name: Other_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 24
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 24
Area in sq. km.	Area	Double	Up to 4 decimals	Area of corresponding Admin boundary
Enumeration Block Number	EB_No	Numeric	5	Enumeration Block Number
Urban Frame Survey Number	UFS_No	Numeric	5	Urban Frame Survey Number

Table 25: Hazard Prone Areas – Geo-Spatial Data Content

Database available with NRSC/ISRO, GSI, NDMA, Other State & Central Government Departments will be incorporated into the final database.




S.No	CODE	CLASS	SUB-CLASS	GEOMETRY	SYMBOL
1	41-01	Hazard	Flood	Polygon	
	41-02		Earthquake	Polygon	
	41-03		Landslide	Polygon	

Table 25a: Hazard prone Areas - GIS Data Structure

Geo-spatial Layer Name: Hazard_poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 25
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 25

3.3.6. Accuracy Standards

The geo-spatial data has to meet the feature's Planimetric accuracy and thematic accuracy in compliance to the 1:4000 scale databases.

Planimetric Accuracy

Large scale Base maps and thematic databases, at 1:4000 scale, shall be in compliance to 0.25mm of the scale (as per ASPRS, NNRMS standards).

Thematic Accuracy of Classification

Urban Landuse classification is based on attribute data and therefore it has to be done based on the latest attribute data.

3.4.0 Quality Assurance/Quality Check

Quality Assurance and Quality Check (QA/QC) shall be carried out at all levels of project execution. The main products covered under QA/QC are (i) Input high resolution satellite data (ii) Geo-referenced/Ortho-rectified satellite data (iii) GIS Feature extraction from high resolution data (iv) Final GIS database (v) Supply of the GIS database to the respective ULBs for Master Plan formulation.

QA/QC is carried out at two different stages - (1) In-progress/Internal QA/QC and (2) External QA/QC for each of the product.

(1) In-progress/Internal QA/QC: In-progress QA/QC shall be carried out during the generation of the product by the product generation team. The Internal quality check is carried out for each product as per the prescribed product specifications/standards, by the identified QA/QC expert of the product generation team. In-progress/Internal QA/QC shall ensure 100% quality check and accord certification.

(2) External QA/QC: Expert in the respective product domain and outside the product generation team shall carry out the random quality check, up to maximum of 15% of product quantity and accord certification. The non-compliance products as per the specifications shall be rejected. Rejected products will be regenerated by the product generation team within the stipulated time.

Apart from the product specifications and standards the following parameters are important in assuring the final GIS database product quality.

- a. Completeness:** Entire study area should be covered – (i) There should not be any gaps within the study area/AOI (ii) Ensure that all features are mapped, as per the feature content, which are present in the study area/AOI.

- b. **Correctness** : (i) Feature extraction should ensure correct interpretation, shape of the feature as per the image and feature geometry definition (ii) The feature classification as per the ground truth and attribute data.
- c. **Conformity**: GIS database should conform to the specifications i.e. Classification of the features should conform to the Geo-Spatial Data content and GIS Data Structure tables given in the Section 3.3.5 (Table 6 - 25). Also, the classification of features should be as per the Attribute data, verified and certified by the ULBs.
- d. **Consistency**: Interpretation, feature extraction/digitization, its geometry should be consistent in all parts of the Study area.
- e. **GIS Compatibility**: The Geo-Spatial Data should conform to the co-ordinate system and extent as given in section 3.2.1 (Table 4) and conform to the GIS data structures given in section 3.3.5 (Table 6 - 25). It should be topological clean, free from errors such as sliver polygons, duplicates, overlaps and gaps.

Attribute Data Quality Check: Attribute data is collected from field and line departments and shall be verified and certified by the respective Urban Local Bodies with the Time stamp.

Note: Each product specification and standards are given in the respective sections of the document. The project execution team may design appropriate QA/QC forms for carrying out the In-progress/Internal, External QA/QC and certification.

3.5.0 GIS database Dissemination to ULBs for Master Plan Formulation

Maintenance of GIS database at ULBs for GIS based Master Plan formulation demands the basic pre-requisites such as computer hardware infrastructure like workstations and error resistance storage like NAS, GIS software packages and IT experts at ULB level. In view of this, NRSC/ISRO and TCPO/MOUD has developed web based application “Bhuvan-NUIS for GIS based Master Plan formulation” and imparted the nationwide training & capacity building for Town Planning personnel. The main features/advantages of Bhuvan-NUIS are:

Databases

- Ortho-rectified Satellite image
- Existing Urban GIS database (Layer wise) including attribute information, Admin boundaries.
- Older versions of databases
- 1:4000 Scale GIS database for Formulation of Master Plan
- Meta data

GIS Tools for Master Plan formulation for the ULBs

- GIS data can be edited/modified and updated with latest Satellite images/ground information

- Local attribute data can be updated or new attributes can be added
- GIS analysis (both Spatial and attribute) tools required for Master Plan formulation
- On line approval and governance for creation, updating database within the ULB according to the approval procedure

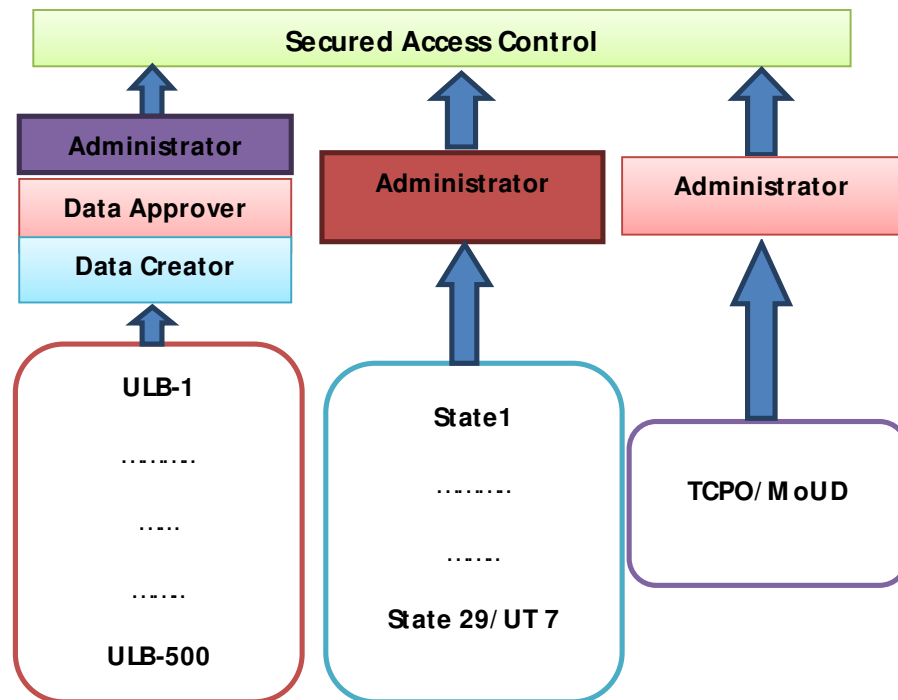
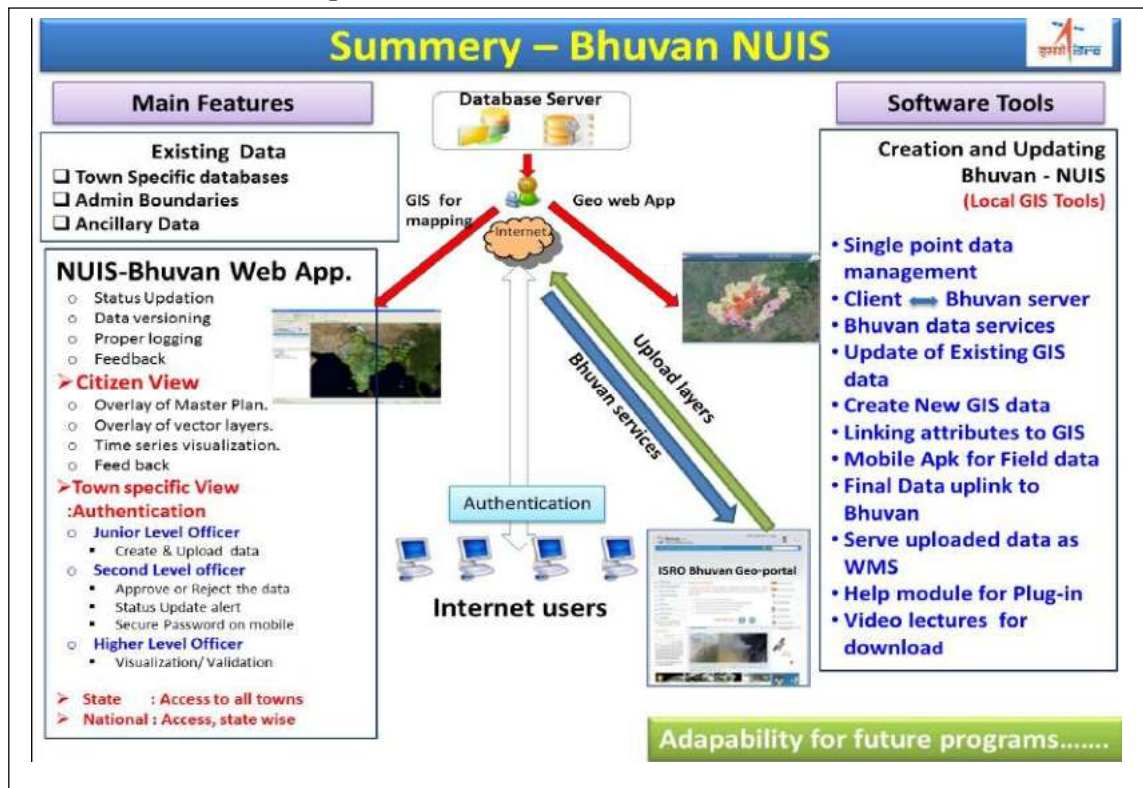
Access control and Management

- Authorised personnel at ULB level can only access the specific city data
- Authorised personnel at State Town Planning Directorate level can view and read the status of cities within the particular state
- Authorised personnel at TCPO/MoUD level can view and read the status of all the cities.

Advantages

- No need of maintaining any spatial computer systems and commercial software for Remote Sensing data processing and GIS analysis. Complete database storage, management including backup at Bhuvan-NUIS server. No cost to ULBs.
- Only desktop system with internet facility can enable GIS database creation, updating and GIS based Master Plan preparation at ULB.
- Avoid the database redundancy, duplicate work in different divisions of State and Central government departments
- Data can be shared with line departments; which would enable updating of database in near real time.
- Enable the investment protection and facilitate cost & time effective revision of Master plans periodically.

Figure 2: Bhuvan-NUIS based architecture for GIS database dissemination to ULBs in compliance to OGC standards



Each city GIS data would be maintained as individual database unit and respective town ULB shall own the responsibility of secured access control and updating data for Master Plan formulation.

3.6.0 Metadata Standards

Meta data describes data characteristics of content, quality, access, format, scale, when, who, where, how data generated and availability of the data. Meta data standard is required to enable the users to be aware of method, accuracy, exchange of data and limitations of the data for the intended purpose.

NSDI ver 2.0 Metadata standards are proposed to be adopted. The following are main Metadata Elements as per OGC compliance standard.

I. Data Identification Information

S. No.	NAME OF THE ELEMENT	FORMAT	WIDTH
1	Name of the Dataset	Text	250
2	Theme	Text	250
3	Keywords	Text	250
4	Access Constraints	Text	250
5	Use Constraints	Text	250
6	Purpose of creating data	Text	250
7	Data Type	Text	128
8	Edition	Text	128
9	Status	Text	250

II. Contact Information

S. No.	NAME OF THE ELEMENT	VALUE	WIDTH
1	Contact Person	Text	250
2	Organisation	Text	250
3	Mailing Address	Text	250
4	City/Locality	Text	250
5	Country	Text	250
6	Contact Telephone	Text	250
7	Contact Fax	Text	250
8	Contact Email	Text	250

III. Geographic Location

S.No	NAME OF THE ELEMENT	VALUE	WIDTH
1	Datum	Text	128

IV. Coverage

S.No	NAME OF THE ELEMENT	VALUE	WIDTH
1	Upper left	Double	128
2	Upper right	Double	128
3	Lower right	Double	128
4	Lower left	Double	128

V. Citation

S.No	NAME OF THE ELEMENT	VALUE	WIDTH
1	Data Prepared by	Text	250
2	Original Source	Text	250
3	Source Date	Text	250
4	Lineage State: City: Area of Interest (sq. km.): Scale:	Text Text Double Text	250

VI. Metadata Stamp

S.No	NAME OF THE ELEMENT	VALUE
1	Metadata Date Stamp	Date (DD/MM/YYYY)

VII. Dataset Topic Category

S.No	NAME OF THE ELEMENT	VALUE	WIDTH
1	Data Identification topic category	Text	250

VIII. Language

S.No	NAME OF THE ELEMENT	VALUE	WIDTH
1	Language ISO 0639-2Bsh	Text	250

IX. Abstract describing the data

S.No	NAME OF THE ELEMENT	VALUE	WIDTH
1	Data Identification abstract	Text	250

4.0.0 MAP SYMBOLOGY

For cartographic representation/visualisation of the GIS database or to generate a hard copy/soft copy maps, appropriate symbols have to be used. In urban applications, it is also important to choose appropriate symbols as a statutory requirement in the States/UTs Town Planning Act. To facilitate uniform symbology across all the cities of different States/UTs, this section provides proposed symbols for the feature data content given in the Tables 6 to 25. However, the symbols can be customised as per the States/UTs Town Planning Act and can be adopted accordingly for representation/visualisation of maps.

5.0.0 INDICATIVE FORMAT FOR URBAN DATA COLLECTION

Master Plan formulation requires a variety of data at different stages of the planning process as a diagnostic tool for the health of the city, assessment of existing conditions in a settlement, spatial variations within the city, time series information, etc. as well as analysis and projections for future requirements in respect of various activities. While primary data collection involves time-consuming surveys, most socio-economic data may be obtained from published or un-published secondary sources. In order to streamline the process and diminish delays in the plan preparation process, a standardized data collection format has been provided as an effort to simplify and speed up the process. Most of data collection can be taken up as a separate research/survey before plan formulation to provide processed data inputs.

This format for urban data collection at town/ward level consists of 25 tables which cover key areas such as demography, physical & locational aspects, physical and social infrastructure, environment, housing and slums, governance, etc. which are vital for study of existing situation and framing of proposals for master plan formulation.

The format is an indicative format. Town planning is a State subject and a great variety of legislations exist which specify requirements for master/development plan formulation, and different State Town Planning Acts may specify different requirements of data to be collected. Further, since the cities vary in size from megalopolitan to Class VI cities, with a great variety of topographic settings, functional specializations, etc., the data requirement for plan formulation cannot be uniform. Therefore, the format may be modified suitably by the State Nodal Agencies as per their requirement depending on size and other characteristics of the urban settlement.

The indicative format for urban data collection is given at Annexure-III. Guidelines to fill the proforma are at Appendix-1.

REFERENCES

1. NNRMS Standards: A National Standard for EO images, Thematic & Cartographic Maps, GIS Databases and Spatial Outputs, July 2005, ISRO: NNRMS: TR: 112: 2005 committee report.
2. NUIS Design & Standards, July 2006, TCPO/MoUD, New Delhi.
3. Urban And Regional Development Plans Formulation And Implementation (URDPFI) Guidelines, January 2015, MoUD, New Delhi.
4. Andhra Pradesh Municipal Development Project (APMDP), Terms of Reference, 2013, Govt. of AP.
5. For more details on AMRUT may visit Mission website <http://amrut.gov.in/>

K-14011/2/2012-UCD(Pt.)
Government of India
Ministry of Urban Development
UCD/LSG Section

Room No.202-C, Nirman Bhawan, New Delhi,
the 13th February, 2015.

Office Memorandum

Sub: Constitution of Committee for Revision of NUIS Guidelines & Design Standards – Reg.

As per the directions of Hon'ble Prime Minister of India Chief Planner, TCPO appointed as Nodal Officer for Ministry of Urban Development for leveraging tools of space technology in efficient governance, held interactions with Department of Space, NRSC and SAC to identify and formulate programmes/ scheme for urban and regional planning and development. Accordingly, Ministry of Urban Development has proposed to develop GIS databases for formulation of master plans for 4041 cities/ towns as per Census 2011 using very high resolution satellite images at 1:5000 scale or higher. The design standards and guidelines of NUIS Phase-I are to be revised accordingly. The same databases can also be used for programmes such as Smart Cities as well as National Urban Renewal Mission.

The Ministry of Urban Development has constituted a Committee for Revision of NUIS Scheme Guidelines and NUIS Design Standards. The terms and conditions and composition of the Committee are as under:

Terms and Conditions

- Review and suggest modifications in the methodologies in database development of NUIS Phase-II, in view of changing technologies and as well as the lessons learnt
- Evaluate /review of NUIS Design and Standards Document
- Review and Modify NUIS Scheme Guidelines, 2006
- The Committee will submit its report in two months from the date of its first meeting.

The composition of the Committee is as under:

1.	Dr. P.G. Diwakar, Deputy Director (Applications), National Remote Sensing Centre, Dept. of Space, Balanagar, Hyderabad – 500625	Chairman
2.	Shri S.V. Singh, Director, GIS & RS, Indian Institute of Survey and Management, Uppal, Hyderabad – 500039	Member
3	Prof. Mahavir, School of Planning & Architecture, 4-A, I.P. Estate, Vikas Marg, New Delhi – 110002.	Member
4	Dr. K. Venugopala Rao, Group Head, Urban Studies & Geo-informatics Division, National Remote Sensing Center (NRSC), ISRO, Dept. of Space, Balanagar, Hyderabad – 500625	Member
5	Dr. Vinod M Bothale, Scientist/ Engineer 'G', Bhuvan, National Remote Sensing Center (NRSC), ISRO, Dept. of Space, Balanagar, Hyderabad – 500625	Member
6	Dr. Rajeev Kumar Jaiswal, Scientist/Engineer, Earth Observation Systems Programme Office/ NNRMS Secretariat, ISRO, Department of Space, Government of India, Antariksh Bhavan, New B.E.L. Road, Bangalore – 560231.	Member
7	Shri B.D. Bharat, Scientist-SE, Indian Institute of Remote Sensing, 4, Kalidas Road, Dehradun – 240 001, Uttarakhand	Member
8	Dr. Vivek Katare, Sr. Scientist, Incharge, Landuse & Urban Studies, M.P Council of Science & Technology, Remote Sensing Application Centre, Vigyan Bhavan, Nehru Nagar, Bhopal – 462 003	Member
9	Shri Iftikhar Ahmed Hakim, Chief Town Planner, Town Planning Organisation, Habitat Complex, NH By-Pass, Bemina (Near SDA), Srinagar, Kashmir – 190017.	Member

10	Smt Anjali Goswami, Director, Town & Country Planning Deptt., Govt. of Assam, Dispur, Post Sachivalaya, Guwahati – 781006, Assam	Member
11	Shri P. Thimma Reddy, Director, Town & Country Planning Deptt., Govt. of Andhra Pradesh, 2nd Floor Mithri Vihar, Ameerpeth, Hyderabad – 500038, Andhra Pradesh	Member
12	Shri S. Surendra, Town & Country Planner, Town & Country Planning Organisation, New Delhi.	Member
13	Mohd. Monis Khan, Town & Country Planner, Town & Country Planning Organisation, New Delhi.	Member-Convener

The Committee may co-opt any other member if required.



(Sunil Kumar Pal)

Under Secretary to Govt. of India

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4. Dr. K. Venugopala Rao, Group Head, Urban Studies & Geo-informatics Division, National Remote Sensing Center (NRSC), ISRO, Dept. of Space, Balanagar, Hyderabad – 500625.
5. Dr. Vinod M Bothale, Scientist/ Engineer 'G', Bhuvan, National Remote Sensing Center (NRSC), ISRO, Dept. of Space, Balanagar, Hyderabad – 500625.
6. Dr. Rajeev Kumar Jaiswal, Scientist/Engineer, Earth Observation Systems Programme Office/ NNRMS Secretariat, ISRO, Department of Space, Government of India, Antariksh Bhavan, New B.E.L. Road, Bangalore – 560231.
7. Shri B.D. Bharat, Scientist-SE, Indian Institute of Remote Sensing, 4, Kalidas Road, Dehradun – 240 001, Uttarakhand.
8. Dr. Vivek Katore, Sr. Scientist, Incharge, Landuse & Urban Studies, M.P Council of Science & Technology, Remote Sensing Application Centre, Vigyan Bhavan, Nehru Nagar, Bhopal – 462 003.
9. Shri Iftikhar Ahmed Hakim, Chief Town Planner, Town Planning Organisation, Habitat Complex, NH By-Pass, Bemina (Near SDA), Srinagar, Kashmir – 190017.
10. Smt Anjali Goswami, Director, Town & Country Planning Deptt., Govt. of Assam, Dispur, Post Sachivalaya, Guwahati – 781006, Assam.
11. Shri P. Thimma Reddy, Director, Town & Country Planning Deptt., Govt. of Andhra Pradesh, 2nd Floor Mithri Vihar, Ameerpeth, Hyderabad – 500038, Andhra Pradesh.
12. Shri S. Surendra, Town & Country Planner, Town & Country Planning Organisation, New Delhi.
13. Mohd. Monis Khan, Town & Country Planner, Town & Country Planning Organisation, New Delhi.

Copy to:

1. Chief Planner, TCPO, New Delhi.
2. PS to JS(UD).
3. PS to Secretary(UD).
4. PS to UDM.



(Sunil Kumar Pal)

Under Secretary to Govt. of India

Telefax:011-23061072

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Dr. P.G. Diwakar
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 dcrsa@nrsc.gov.in

NRSC/RSAA/12/2010

March 24, 2016

Dear Shri Neeraj Mandloi,

Sub: Design & Standards for "Formulation of GIS based Master Plan for AMRUT Cities" Reg.
 Ref: MoUD Office Order No. K/14011/2/2012-UCD (Pt.) dated 13th February, 2015.

A Committee was constituted by Ministry of Urban Development, Government of India for Revision of NUIS Guidelines & Design Standards, vide reference as cited above. The committee met several times and deliberated on the subject in detail, which resulted in generation of a detailed Technical Document. On behalf of the Committee, I am happy to forward the final version of the document "Design & Standards for Formulation of GIS based Master Plan for AMRUT Cities". I would like to personally thank all the Members of the Committee and invited experts for their significant contributions in bringing out this report in its final form. I am sure that this document will play an important role in the realization of AMRUT Mission in the country.

With kind regards,

23.5.16
 P.G. Diwakar
 (P.G. Diwakar)

Yours sincerely,

(P.G. Diwakar)

Chairman of the Committee

✓ Shri Neeraj Mandloi, IAS
 Joint Secretary
 Ministry of Urban Development
 Nirman Bhawan
 C - Wing, Dr. Maulana Azad Road
New Delhi - 110 011.

cc: Shri Munis Khan, Town & Country Planner and Member Secretary of the Committee, TCPO, E-Block, Vikas Bhawan, IP Estate, New Delhi - 110 002.

भारतीय अंतरिक्ष अनुसंधान संगठन



Indian Space Research Organisation

K-14011/2/2012-UCD(Part)
Government of India
Ministry of Urban Development
LSG Section

202C, Nirman Bhawan, New Delhi,
Dated 26th April, 2016.

To,

The Chief Planner,
TCPO, E-Block,
Vikas Bhawan, IP Estate,
New Delhi-110002.
Fax: 011-23379197.

Sub: Design & Standards for "Formulation of GIS-based Master Plans for AMRUT Cities" –
Reg.


Sir,

The undersigned is directed to refer to letter No. 2-11/143/2015/Guidelines/URIS/TCPO dated 8.4.2016 on the subject cited above and to say that the competent authority has approved the final version of the Design & Standards Document.

2. It is, therefore, requested to take necessary action in the matter.

(Encl: As above)

Yours faithfully,


(Sunil Kumar Pal)
Under Secretary to the Govt. of India
Tel: 23061072

DGPS Survey for GPS points for Geo-referencing/ortho-rectification of Satellite Image

ESTABLISHING GEODETIC REFERENCE FRAME FOR ULBS USING GNSS TECHNIQUES

GPS provides accurate and uniform reference frame for the geospatial data. DGPS techniques are required for geo-referencing of high resolution image data which essentially needs positional accuracy that matches the spatial resolution.

The satellite image shall cover the entire ULB area and sufficient no of GCPs shall be planned to geo-referenced the satellite image data as well as to check the accuracy parameters of the corrected image datasets with the aid of check points.

The GCP configuration and density of the GCPs are key parameters to be implemented suitably to achieve high quality data product after for geo-referencing process. Spatial distribution of the GCPs over the study area and type of features that are being selected as GCPs, play an important role in this process.

The DGPS survey procedure involves:

- Establishment of Monumented Reference station
- Data collection and processing procedures
- Upkeep of the reference station for future surveys

A permanent station shall be established which can be used as a reference station for the GPS surveys. A location, preferably in the central part of the ULB area, which is clear to sky without obstructions like tree canopy, high-raised building, HT electrical lines, shall be identified, either on ground or on the top of a building for constructing the reference station.

A cement concrete structure of 2 ft x 2 ft x 2ft shall be made and a brass plate marked with dot and circle shall be embedded on the top of the monument. A survey-grade dual frequency GPS receiver shall be operated with Tripod in static mode at this reference monument for a period of 3 consecutive days with a minimum of 12 hrs per day with 15 sec epoch rate and the 3 days data shall be processed with Single Point Positioning or Precise Point Positioning technique to derive the geodetic coordinates of the reference station in ITRF reference frame.

Establishing reference station coordinates in ITRF reference frame serves multiple benefits to the geospatial data in terms of maintaining uniform reference frame in future updates and also to use other datasets in GIS environment. ITRF reference frame can be implemented in two ways either linking the reference station to a IGS station nearby or processing using Precise Point Positioning technique using IGS data precise ephemeris and clock files. The derived Reference station geodetic coordinate shall be recorded properly and is documented in the records for future use by the ULB authorities.

Each GCP shall be identified with suitable permanent feature which is seen on the ground as well as on the image data. The location where GPS is being operated shall be clear to sky without obstruction to track GPS signals. Geodetic survey grade GPS receivers shall be

employed to collect the data. Base station and rover stations shall be operated at 15 sec epoch rate and observation period of min. 1 hr shall be adopted for base line length of 10 km. Baseline distances of 10 km. - 20 km. shall be observed with minimum of 2 hrs time period.

Survey parameters like Receiver and Antenna make and model no., Antenna height, Observation time session, GDOP value, epoch time, Making of Sketches, filed photographs in all direction shall be documented properly on the field log sheet for every GCP location. Geometric Dilution of Precision (GDOP) shall be monitored and recorded, and should not exceed 2.5 nominally.

Observations shall be made using dual-frequency GPS receivers and L1/L2 geodetic ground plane antennas tripods with bubble levels shall be used to minimize setup errors. Post processing of the data shall be carried out on daily basis using broadcast ephemeris and post-processing software. Validity checks shall be documented with analysis of base line vector solutions and loop closure errors. All the data produced shall pass ambiguity resolved vector solutions and loop closure exceeding one part per million relative positioning accuracy.

GPS antenna shall be mounted on tripod during survey for reference station as well at GCP location during data collection. The GCP location shall be marked with paint to ensure relocation at later data and it shall be post-pointed on the image. A detailed description of the GCP location shall be written in the field log sheet with a neat sketch.

Data quality parameters like cycle slips, no of satellite tracked, observed GDOP values shall be checked soon after the survey to ensure good quality of the data collected at reference station as well as at rover stations before data processing.

Data processing shall be carried out with baseline processing for each session and network adjustment for all the sessions and ensure that loop closure accuracy results shall be better than 1 on 50000 which is the geodetic standard for static surveys. The final adjusted coordinates shall be in Geographic coordinate system and also in WGS-84 coordinate system and UTM projection.

A project report shall be submitted with the details about GCP planning diagram, GPS equipment details and manuals, reference station details and its geodetic coordinate in ITRF latest epoch, data collection parameters, field photographs of all the locations, processing results, GCP network diagram and list of adjusted coordinates.

Formulation of GIS-based Master Plan

INDICATIVE FORMAT FOR URBAN DATA COLLECTION
(Proforma may be modified as per the requirement of State governments)

TABLE 1: PHYSICAL ASPECTS AND LOCATIONAL PARTICULARS

1.1. Name of City/Town											
1.2. Civic Status											
2.3 Name of Tehsil/Mandal/Block											
2.4 Name of District											
2.5 Name of State/UT											

1.6 Area of City/Town

Ward	Area (sq. km.)		
	1991	2001	2011
1			
2			
3			
...			
Total			

Source: _____

Extent as per various authorities may be specified as under:

Area as per Census of India _____

Extent of Local Planning Area _____

Municipal Area _____

Extent as per Urban Development Authority/Planning Authority

Urbanisable Area _____

Controlled Area _____

1.7 Distance from Town

S. No.	Description	Name	Distance (km.)
i	State Head Quarters		
ii	District Headquarters		
iii	Tahsil/Taluk/Mandal Headquarters		
iv	Nearest city (having 1 lakh & above population)		
v	Nearest Railway Station/s		
vi	Nearest Airport/Air strip		
vii	Nearest Port		
viii	Nearest Bus Stand (govt/private)		

Source: _____

1.8 Nearness/Distance of Major River/Canal/coastline from Town

S. No.	River name & distance (km.)	Canal name & distance (km.)	Distance of Big Drains	Distance of major Dams & Reservoirs	Distance from Coast lines	Indicate High/Low Flood Levels (meters)	Indicate high/Low tide Lines (meters)

Source: _____

TABLE 2: DEMOGRAPHIC & BASIC SOCIO-ECONOMIC DATA

Note: Please attach Primary Census Abstract 2011, District Census Handbook (for whichever Census it is available), Housing Tables, Slum Tables and Economic Tables of Census of India. Also any Report by Bureau of Economics and Statistics or any other State Government Report

2.1 Population and Growth Rates

	1961	1971	1981	1991	2001	2011
Total population						
Decadal Growth rate						

Source: _____

2.2 Primary Census Abstract 2011

Ward	Population			Child Pop (0-6)			SC Pop.			ST Pop.			Literates		
	T	M	F	M	F	T	M	F	T	M	F	T	M	F	T
1															
2															
...															
Total															

Source: _____

2.3 Housing Data(For Ward/Town)

Ward	Population 2011	No. of Households	Occupied residential houses	Houseless population
1				
2				
...				
Total				

Source: _____

2.4 Vital Statistics (Townwise) Year: _____

S. No.	Vital Statistics	Male	Female	Total
1	Birth rate (%)			
2	Death Rate (%)			
3	Infant Mortality (%)			
4	Life Expectancy at birth (years)			

Source: _____

2.5 Persons below Poverty Line Year _____

Ward	No. of BPL	
	Families	Population
1		
2		
...		
Total		

Source: _____

Note: Poverty Line defined as: _____

TABLE 3: OCCUPATIONAL CLASSIFICATION

3.1.1 Workforce 2001 – 2011

Ward	Main Workers			Marginal Workers			Other workers			Total Workers			Non-workers		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
1															
2															
...															
Total															

Source: _____

Note: Separate Table can be made for 2001 and 2011

Workforce Participation Rate (WFPR) 2001: _____

Workforce Participation Rate (WFPR) 2011: _____

3.2 Occupational Classification of Main Workers, 2001

	A, B, C									D						E			F			G			H			I			J&K			L to Q		
Ward	Cultivators			Agricultural labourers			Plantation, Livestock, Forestry, Fishing, Hunting & allied activities			HHI			Non HHI			Electricity, Gas and Water Supply			Construction			Wholesale and Retail Trade			Hotels and Restaurants			Transport, Storage and Communications			Financial Intermediation, Real Estate, Renting &					
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
1																																				
2																																				
...																																				
Total																																				

Source: _____

Note: Separate Table can be made for 2001 and 2011

Industrial Categories as per Census 2001

INDUSTRIAL CATEGORIES: A – Agriculture, Hunting and Forestry; B – Fishing; C – Mining and Quarrying; D – Manufacturing ; E – Electricity, Gas and Water Supply; F – Construction; G – Wholesale and Retail Trade; H – Hotels and Restaurants; I – Transport, Storage and Communications; J – Financial Intermediation; K – Real Estate, Renting and Business Activities; L – Public Administration and Defence, Compulsory Social Security; M – Education; N – Health and Social Work; O – Other Community, Social and Personal Service Activities; P – Private Households with Employed Persons; Q – Extra-Territorial Organisations and Bodies.

Industrial Categories as per Census 2011

If data is available in above categories, please provide. If not, then provide in 4 categories for which it is available: cultivators, agricultural workers, household industry and other services.

Table 4: INDUSTRIAL ASPECTS (Town level)

S. No.	Type of Industries	Up to 2005	2006	2007	2008	2009	2010	2011
1	Large							
2	Medium							
3	Small							
4	Household							
5	Hazardous							

Source: _____

Definitions:

(as per ----- Act)

4.1: Industries details **Year:** _____

S. No.	Types of Industries	No. of units	No. of workers	Run by Manual/HP	H.P
1	Large				
2	Medium				
3	Small				
4	House hold				
5	Hazardous				

Source: _____

4.2: TRADITIONAL INDUSTRIES (Year _____)

S. No.	Type of Traditional Industries	No. of units associated with each industry	No. of employees associated with each industry	Raw materials used	Commodities manufactured
1	Handicrafts				
2	Pottery				
...					

Source: _____

- 4.3.** Most important commodities imported
4.4 Most important commodities manufactured
4.5 Most important commodities exported
4.6 Most Important agricultural produce

Note: Please attach Lead Bank Report, DIC Report, and any other industrial report

TABLE 5: LAND USE (in Hectares)

S. No.	Type of Land	1991	2001	2011	Proposed 2021
1	Residential				
2	Commercial				
3	Industrial				
4	Recreational				
5	Public and semipublic				
6	Transportation				
7	Public Utilities				
8	Reclaimed land				
9	Vacant land				
10	Agricultural land				
11	Built Up area (Rural)				
12	Forest				
13	Wastelands				
14	Wetlands				
15	Water bodies				
16	Others				
Present Land use Notified ----- on date -----					

Source: _____

TABLE 6: AVAILABILITY OF DRINKING WATER**6.1 Important sources of drinking water**

Year _____

Ward	No. of Households covered by								
	Tap water		Well	Hand Pump	Tube well	Tanks/ Ponds/Lake	Spring	River/canal	Others
	from treated source	from un-treated source							
1									
2									
...									
Total									

Main source of drinking water _____

Distance from source _____

Treatment Plant (nos & names) _____

Source: _____

6.2 Water Supply Details Year _____

Ward	Quantity of Water Supplied (MLD)	Times/Hours of supply per day	No. of Connections	Per Capita Consumption (LPCD)	Area Covered (sq. km.)	Metering Achieved (%)	Efficiency in collection of charges
1							
2							
...							
Total							

Source: _____

6.3 Supply Infrastructure:

Ward	No of Over Head Tanks/Reservoirs & Capacity	Capacity of WTPs	Treated supply as % of total water supplied

Source: _____

6.3.1 Is there any scheme for recycling of waste water in the town?

Yes	No
-----	----

6.3.2 Is the ground water table receding in the city?

Yes	No
-----	----

If yes, please give present water table

(Please attach any available report of CGWB/State Govt)

6.3.3 Is there any separate water supply line for non-drinking purposes such as industry, parks etc.

If yes, give area covered under the scheme.

6.3.4 Details of ongoing and committed projects under water supply with agency

TABLE 7: ELECTRICITY (Town wise) Year _____

Source of Power	Distance (km.)	Total Electricity Demand (MW)	Total electricity Supply (MW)	Total Consumption (MKWH)

Source: _____

Type	Residential	Commercial	Industrial	Agricultural	Others	Total
No. of Electric Connections						
Electric Consumption (KWH)						

Source: _____

Proposed power projects to be taken up in the city

TABLE 8: POST & TELECOMMUNICATIONS (Town wise) Year _____

No. of telephone Exchanges	
No. of telephone connections (land line)	
No. of Public Telephone booths	
No. of Mobile Connections	
No of Mobile Towers	
No. of Post/telegraph office	
No of Internet Connections	
No. of Wi-fi hotspots	

Source: _____

TABLE 9: EDUCATIONAL FACILITIES Year _____

Type of Institutions	No. of Institutions		No. of Class Rooms		Enrolment		No. of teachers	
Educational Institution	Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
Anganwadi								
Primary								
Middle								
Secondary								
Senior Secondary								
School for Special Needs								
Colleges								
General								
Medical								
Engineering								
Law								
Others								
Vocational Training								
Adult Education program								
Others								

Source: _____

TABLE 10: MEDICAL FACILITIES Year _____**10.1 Number of hospitals, dispensaries, etc., doctors, nurses, paramedical staff and total number of beds available therein**

Type of Hospital	No. of Units		No. of Beds		No. of Doctors		No. of Nurses		No. of Paramedical staff		Patients Treated	
Hospital	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt	Govt	Pvt
Allopathic												
Ayurvedic												
Homeopathic												
Unani												
Family welfare & maternity center												
Others												
Dispensary												
Allopathic												
Ayurvedic												
Unani												
Homeopathic												
Others												
Primary Health Centres												
Nursing Home												

Source: _____

Note: Please follow standard classification if specified by Govt/Local Authority and give data in that format, namely Sub-Centre, PHC, CHC, District Hospital, Super Specialty Hospital, Nursing Home, etc.

10.2 Epidemiological Details (Period from _____ to _____)

Name of Predominant Diseases	No. of persons Affected
Leprosy	
Phylaria	
Tuberculosis	
Cholera	
Dengue	
Chikungunya	
Malaria	
Others (Specify)	

Source: _____

TABLE 11: AVAILABILITY OF SANITARY FACILITIES

What is the major sanitary system in the town: Sewerage/Septic Tank/LCS (please tick)

Does the Town have a sewerage system: _____

If yes, Combined or Separate: _____

Length (km.) _____

Area Covered: _____ sq. km. _____ %

Population covered _____ (nos) _____ %

11.1 Household Sanitary Facilities (Town/Ward wise) Year _____

Ward	Households having following sanitary facility (%)						
	Water Closet			Pit Latrine	Other Latrine	No Latrine within the premises	
	Piped sewer system	Septic tank	Other system			Public latrine	Open
1							
2							
...							
Total							

Source: _____ (Please attach relevant Census Reports)

11.2 Network Details Year _____

	Open surface drains	Covered drains	Underground sewerage	Others
Length in km.				
Area served (sq. km.)				

Source: _____

- 11.3 Estimated quantity of sewage generated (MLD) _____
- 11.4 Quantity treated (MLD) _____
- 11.5 No. of sewage treatment plants (with capacity) _____
- 11.6 Disposal of treated sewage (river, nala, open land) _____
- 11.7 Disposal of untreated sewage (river, nala, open land) _____
- 11.8 Disposal Industrial wastewater (treated/untreated) (river, nala, open land) _____

11.9 Public Toilets

Public toilets (in no.)	
No of Toilets Pay & Use	
Users per toilet daily (in No)	
Average User Charge	
Average yearly expenditure on maintenance (Rs. in Lakh)	

Source: _____

11.10: Major Storm Water Drains

S. No.	Name of the Drain	Wards coverage	Length (km.)	Capacity	Open/Covered
1					
2					
...					
Total					

Source: _____

TABLE 12: SOLID WASTE MANAGEMENT (Ward/Town wise data)

Is there door to door collection system: _____

Is there municipal disposal of waste: _____

12.1 Solid waste generation Year _____

Ward	Average generation (Tons/day)	Average collection (Tons/day)	No. of Houses covered for House to House Collection	Total Area Used for Sanitary Land Fill (sq. km.)	Manpower deployed	No. of Sites used for Land Fill
1						
2						
...						
Total						

Source: _____

12.2 Disposal method of solid waste (Put a tick mark on appropriate column) Year ____

Sanitary land fill	Incinerated	Open dump	Recycled	Burned openly	Others

Source: _____

12.3 Vehicles deployed for Collection and Disposal of Solid waste, Year _____

Type of Vehicles deployed	Trucks/Lorry	Tippers	Dumpers/Placers	Tricycle	Others

Source: _____

12.4 Employees details Year _____

No. of Sanitary supervisors	No. of Health Assistant	No. of Health workers	Others

Source: _____

12.5 Is there any system of segregation of solid waste?

Yes	No
-----	----

If yes, please furnish following details (% age of quantum)

Degradable	Biodegradable	Hospital waste	Others

Source: _____

12.6 Details of ongoing and committed projects under solid waste disposal management

TABLE 13: AVAILABILITY OF RECREATIONAL, CULTURAL, BANKING AND CREDIT FACILITIES

13.1 Community & other Facilities

Year _____

S. No.	Facilities	Numbers
1	Corporation Gardens	
2	Community Hall	
3	Swimming Pool	
4	Corporation Playgrounds	
5	Gymnasia	
6	Corporation Stadium	
7	Cinemas	
8	Open Air Theatres	
9	Zoo	
10	Public libraries	
11	Art Galleries	
12	Museum	
13	Other (specify)	
14	Fire Services	
	No. of Fire stations	
	No. of fire tenders	
	Personnel	
15	Cremation/Burial Ground	
16	Petrol/Gas Station	
17	Hotels and Eating Places	
18	Others	

Source: _____

13.2 Number of banks and credit societies

Year _____

No. of Banks	No of ATMs	Agricultural credit societies	Non-agricultural credit societies

Source: _____

13.3 Details of Self Help Groups (SHG) & NGOs Year _____

	No. of Self Help Group	No. of Members	No. of NGOs	No. of Resident Welfare Associations (RWAs)

Source: _____

TABLE 14: LAW AND ORDER – CRIMES REPORTED (No.)
Year wise for Last Five Years

Type	2012	2011	2010	2009	2008
Theft					
Burglary					
Kidnapping					
Robbery					
Riots					
Murder					
Crimes against women					
Fatal Accidents					
Non-fatal Accidents					
Cyber crimes					

Source: _____

No. of CCTVs installed _____

TABLE 15: HOUSING

15.1 Distribution of House Holds (HHs.), No. of persons and Tenure, Year _____

Tenure Status	Number of	
	HHs	Persons
Owned		
Rental		
Sub-letting		
Rent free		
Squatter without Rent		
Squatter with Rent		
Others		
Total		

Source: _____

Distribution of Persons by living rooms	Number of	
	HHs	Persons
One room		
Two rooms		
Three rooms		
Four rooms		
Five & above		
Total		

Source: _____

15.2 Categories of Houses

Type of Houses	No. of Houses	Age of Building
Pucca with RCC Roof and flooring		
Pucca with Tiles Roof and Kaccha floor		
Semi pucca		
Kaccha		
Others		
Total		

Source: _____

Note: For Housing Data, please attach relevant abstract of Housing Tables

TABLE 16: LAND OWNERSHIP AND COST (Ward wise)

16.1 Land Ownership Pattern

Year _____

Type of ownership		No. of Dwelling Units (DU)	Area covered (sq. km.)	Average cost of DU per sq. mt (Rs.)
Public				
Private	Developers & Promoters			
	Authorized Individuals			
	Unauthorized Individuals			
Others (Specify)				
Total				

Source: _____

16.2 Land Prices (Ward wise), Year _____

Ward	Land Price in Planned Area (Rs./sq. mt.)	Land Price in Unplanned Area (Rs./sq. mt.)	Annual Rent of Dwelling Unit (Rs.)
1			
2			
...			
Total			

Source: _____

TABLE 17: DISASTERS

Are there any structures which have been damaged by disaster during last ten years? Yes/No

If yes, please give following details

(Year _____)

Type of Disaster	Year of disaster	No. of Houses damaged	Persons affected	Property Loss (Rs. Lakhs)	Action Taken
Earthquake					
Floods					
Cyclone					
Landslides					
Tsunami					
Fire					
Others (specify)					

Source: _____

TABLE 18: PUBLIC-PRIVATE-PARTNERSHIP PROJECTS IMPLEMENTED IN THE TOWN (PPP)

Agency	No. of Housing units (area in sq. km.)	Water supply (MLD)	Solid Waste (area covered in sq. km.)	Sewerage (km.)	Roads (km.)	Electricity			Community Development		City Beautification & Park maintenance (Area in sq. km.)	Others
						Generation (MW)	Distribution	Maintenance (Rs.)	Improvement of Slum (Area in sq. km.)	Slums and Squatters resettlement (Area in sq. km.)		
Public												
Private												
PPP												

Source: _____

TABLE 19: SLUMS**19.1 Slum Concentration, Year _____**

	Notified Slum		Non-notified Slum		Squatters		Total land	
	Public	Private	Public	Private	Public	Private	Public	Private
No. of Slum HH units								
Population								
Area covered (sq. km.)								

Source: _____

19.2 Availability of Basic Amenities in Slums Ward wise

Type of Amenity	No. of HHs covered
Water Supply	
Electricity	
Community toilets	
Other (specify)	

Source: _____

Note: Please attach relevant extract of Slum Tables of Census of India with year.

19.3 Houseless Population

Is there any scheme functioning for promotion of housing for houseless population?

Yes	No
-----	----

If yes, please give details as under

Name of Scheme	Dwellings constructed during last five years	Size of the dwelling unit in sq. mt.	Price of house	Mode of payment	No. of households benefited

Source: _____

Note: Please attach relevant extract of Houseless Tables of Census of India with year.

TABLE 20: TRAFFIC & TRANSPORTATION- Time Series Yearly Data

20.1 Registered Vehicles

Type of Vehicles		No. of Vehicles
Heavy vehicles:	Trucks	
	Public	
	Private	
	Buses	
	Public	
Light Vehicles:	Private	
	Two wheeler	
	Car	
	Jeep	
	Three wheeler	
Non-motorized	Omni Buses	
	Taxies/Cabs	
	Cycle	
	Rickshaw	
	Tonga	
	Others	

Source: _____

20.2 Work Trips Undertaken from Residence to Work Place

Type of vehicles	No. of Work Trips per day	Average Time taken for one way trip (in minutes/per day)
Private motorized <ul style="list-style-type: none">• Private cars• Two wheelers• Buses/cabs/mini car		
Sub-Total		
Public Transport <ul style="list-style-type: none">• Trains• Trams/metro• Bus/mini bus		
Sub-Total		
Non-motorised <ul style="list-style-type: none">• Cycle/Rickshaw• Walking• Others		
Sub-Total		
Total		

Source: _____

20.3 Road length and Footpath (in km.)

Surfaced road (km.)	Un-surfaced road (km.)	Total road length (km.)	Foot paths (km.)	Cycle Tracks (km.)

Source: _____

20.4 Railway

Items	No.
No of railway Stations	
Types of rail gauge; viz broad, narrow and meter gauge	
Length of rail network (in km.)	
No of platforms	
No of yards	

Source: _____

20.5 Inland Water ways

Items	No.
No. of major and minor ports	
Length of the coastline (in km.)	
No. of navigable rivers and canals	
Total no. of boats	
Ships	
Oil tankers	
Vessels	
Total tonnage of goods carried by ships/tankers etc	
No. of shipping yards	

Source: _____

20.6 Air

Items	No.
No. of Airports (Domestic & International)	
Traffic volume and passenger data	

Source: _____

TABLE 21: ENVIRONMENT

Does the town have Air Quality Monitoring Station _____

21.1 Air Pollution Concentration ($\mu\text{g}/\text{m}^3$) (Date _____)

Type of pollutant	Area			
	Residential	Industrial	Commercial	Others
SO ₂				
NO				
SPM				
CO				

Source: _____

21.2 Level of Noise Pollution (Db) (Date _____)

Residential	Commercial	Industrial	Silence zone

Source: _____

21.3 Water Pollution (Mg/l) (Date _____)

BOD level	Coliform level	PH value

Source: _____

Please attach any report of Pollution Control Board, etc. if available.

TABLE22: Animal Husbandry details Year _____

S. No.	Description	Number
1	No. of Veterinary Hospital or dispensary or clinic	
2	No. of Dairy outlets & collection centers (Milk Co- Operative Societies) (MILMA)	
3	No. of Dairy Farm	
4	No. of Poultry Farm	
5	No. of Slaughter Houses	
6	No. of Hatcheries	
7	No. of Broiler Farm	
8	Others (Specify)	

Source: _____

Table 23: TRAVEL AND TOURISM Year _____

S. No.	Description	No. of Units
1	Tourism Destination Centers	
2	Tourism Information Centers	
3	Tourism Season	
4	Average No. of Foreign Tourist	
5	Average No. of Domestic Tourist	
6	No. of Star hotels	
7	No. of House boats	
8	No. of Travel Agencies	
9	No. of Tourism Promotion Councils	
10	Other institutions promoting Tourism	

Source: _____

TABLE 24: GOVERNANCE**24.1 Civic Status of the Town:****24.2 Size & Class of the Town:****24.3 Status of Master Plan/Development Plan****Whether town has a statutory Master/Development Plan? Details**

1 st D.P. & Date	Date of latest revision D.P	D.P implementation percentage

Source: _____

24.4 Name & Address (with Phone, Fax & e-mail) of Commissioner/Executive Officer of ULB:

S. No.	Name (with Designation)	Address (with Phone, Fax & e-mail)

Source: _____

24.5 Name & Address (with Phone, Fax & e-mail) of Mayor/Chairperson of ULB:

S. No.	Name (with Designation)	Address (with Phone, Fax & e-mail)

Source: _____

24.6 Total Staff Strength of ULB (in Nos.) :

24.7 Division-wise breakup of Staff Strength:

S. No.	Name of Division	Sanctioned Post	No. of Posts filled	Posts Vacant
1.	Administration			
2.	Education			
3.	Finance			
4.	Engineering			
5.	Agriculture/Horticulture			
6.	Environment/Conservation			
7.	Housing			
8.	Public Health & Utilities			
9.	Social Services			
10.	Transportation			
11.	Security including Fire Services			
12.	Other, if any			

Source: _____

24.8 Is the local body elected?

Yes	No
-----	----

If yes, state the year of last election.

24.9 Functions entrusted to local bodies as per 12th Schedule appended to 74th Constitutional Amendment Act, 1992.**24.10 List of Government Offices****25: Revenue and Receipt of Local Body: Year _____**
(Rs. in Lakh)

Revenue Receipt	
Revenue Expenditure	
Revenue less expenditure	
Resource Mobilization	
Debt service charges	
Revenue and Receipt of Local Body or Department of state Government	
Detailed Revenue Receipt heads	

Source: _____

25.1 Proposed Large Projects

Proposed Capital Projects	Source of Finance	Investment	Project period
Upgradation			
New Infrastructure			
Expansion/Diversification			

Source: _____

Guidelines for Filling the Format

Introduction

The format for collection of town level data consists of 25 tables which cover key areas such as demography, physical & locational aspects, physical and social infrastructure, environment, housing and slums, governance, etc. This data is to be collected by the Nodal Agency at city/town level, in most cases the Urban Local Bodies.

Census Town

As per the Census definition, Towns comprise the following:

- (a) All statutory towns, i.e., all places with a municipality, corporation, cantonment board, or a notified town area committee, etc.
- (b) All other places which satisfy the following criteria:
 - a minimum population of 5,000 ;
 - at least 75% of the male working population engaged in non-agricultural activities; and
 - a density of population of at least 400 persons per sq. km.

The city/town which do not have an urban local body as per (a) above, but satisfy conditions given in (b), are called by Census of India as Census Towns.

Urban Agglomerations

Urban Agglomerations represent a continuous urban spread constituting a town and its adjoining urban outgrowths or two or more physically contiguous towns having a common boundary together with continuous well-recognised urban outgrowths, if any, of such towns. Very often, around a core city or statutory town, there are come up fairly large well recognized railway colonies, university campuses, etc. Even though these places lie outside the precincts of a statutory city or town or within the revenue limits of the village(s) which (are) contiguous to the town, such areas may not be themselves qualify to be treated as towns. But if they form a continuous spread with the town, they are outgrowths of the town and deserve to be treated as urban. Such towns, together with their outgrowths, have been treated as one urban unit called 'Urban Agglomeration'. Thus, an urban agglomeration may constitute:

- (a) A city or a town with continuous outgrowth, the outgrowth being outside the statutory limits but falling within the boundaries of the adjoining village or villages; or
- (b) Two or more adjoining towns with their outgrowths, if any, or
- (c) A city and one or more adjoining towns with or without outgrowths all of which form a continuous spread

Definitions, explanations of the parameters (including abbreviations) used in different Tables of the Proforma are as follows:

TABLE 1: PHYSICAL ASPECTS AND LOCATIONAL PARTICULARS**1.1 Name of City/Town**

Names of the city/town selected under the Scheme

1.2 Civic Status

The civic administration status is a determinant for categorization of a place as urban which is to be indicated using the following abbreviations:

Civic Status	Abbreviation
Municipal Corporation/Corporation	M.Corp.
Municipal Committee/Municipal Town Committee	MC
Municipality	M
Municipal Board	MB
Municipal Council/Town Municipal Council/ City Municipal Council	M CI
Cantonment Board/Cantonment	CB
Notified Area/Notified Area Committee/ Notified Committee/Notified Town Area Committee	NAC
Industrial Notified Area	INA
Town Committee/Town Area Committee	TC
Town Area	TA
Municipal Township	MTS
Township	TS
Town Board	TB
Panchayat Township	PTS
Gram Panchayat/Village Panchayat	GP
Mandal Panchayat	MP
Nagar Panchayat/Town Panchayat	NP
Panchayat	P
Sanitary Board	SB
Special Area	SA
Special Area Development Authority	SADA
Estate Office	EO
Census Town/Non-Municipal Census Town	CT
Non-Municipal/Non-Municipal Area	NM

1.3 Name of the Tehsil/Mandal/Block**1.4 Name of the District**

Name of the district where the city/town is located

1.5 Name of the State

State name

1.6 Area of the City/town

The area figures of statutorily notified towns are given by the civic bodies/municipal committees based on available records.

Area figures are also given in the Census Town Directory/District Census Handbook is the municipal/UA area. However, the Planning Area of the city/town may be much larger. Further, for purposes of planning, urbanisable and controlled areas may have been defined by the development authorities. These are vital, because master plan is to be prepared for the urbanisable area.

1.7 Distance from Town in km.

State Hqs., District Hqs., Tahsil/Taluk/Mandal Hqs., nearest city (having 1 lakh and above population) and nearest Railway Station along with distances

These columns provide details on locational particulars of the town with reference to names of the State Hqs., District Hqs., Tahsil/Taluk/Mandal Hqs., nearest city (having 1 lakh and above population) and nearest Railway Station, indicating their distances in km., from the town. In case the nearest city or the railway station is situated in a state other than the state to which the town belongs, name of the nearest city or nearest railway station alongwith the name of the state may be indicated.

In some north-eastern states, namely, Arunachal Pradesh, Assam and Nagaland where 'Circle' is equivalent to Tahsil, etc., names of Circle Hqs., have to be reported whereas in Manipur and Sikkim, Sub-Division is the equivalent to Tahsil, names of Sub-Division Hqs., have to be indicated. Apart from these in some states, Community Block/Rural Development Block is the equivalent of Tahsil, in both cases Block of Police Station may be indicated as Tahsil.

1.8 Nearness/Distance of Major River/Canal

This column provides details of navigable river/canal passing nearby (within a distance of 10 km.), or through the town.

TABLE 2: DEMOGRAPHIC DATA& BASIC SOCIO-ECONOMIC DATA

2.1 Population and Growth Rates

Population of the City/town in time series from Census of India. This is available in Town Directory published by Census of India. Growth rates may be given or calculated.

2.2 Primary Census Abstract 2011

This information may be derived from PCA and extract from PCA could also be provided for the city/town and if the plan formulation is to be done for planning/urbanisable area, then other administrative units covered. For example, the planning area for a particular city may cover one or more revenue villages, census towns, outgrowths, etc.

2.3 Housing Data

This table covers basic housing data from Housing (H-series) Tables from Census of India.

Number of households: In Census, a household is defined as a group of persons who commonly live together and take their meals from a common kitchen.

Number of occupied residential houses: This Table gives the number of occupied residential houses in respect of each town. A Census house is a building or a part of building having a separate main entrance from the road or common courtyard or staircase etc., used or recognized as a separate unit.

2.4 Vital Statistics

- **Crude Birth Rate:** The Crude Birth Rate (CBR) is defined as the number of live births in a year per 1,000 of the midyear population.
- **Infant Mortality Rate :** Infant Mortality Rate (or IMR) is defined as the number of infant deaths in a year per 1,000 live births during the year
- **Life expectancy at birth** = *Total child births - death of Children at the time of birth.*

2.6 Persons below Poverty line

Households whose total income is below the poverty line as defined by the national/state/local standards. Poverty line is defined by the State Governments and records will be available with State Departments of Economics & Statistics or other sources.

TABLE 3: OCCUPATIONAL CLASSIFICATION

3.1 Workforce 2001-2011 – Definitions as per Census of India

Workers and Non-workers

A ‘worker’ is a person who mainly participates in any economically productive activity either physically or mentally. Work not only involves actual work but effective supervision and direction of work as well.

Total workers

Total workers = Main workers + Marginal workers

Main workers

Main workers were those who had worked for the major part of the year preceding the date of enumeration i.e., those who were engaged in any economically productive activity for 183 days or six months or more during the year.

Marginal workers

Those who worked any time in the year preceding the date of enumeration but did not work for a major part of the year i.e., those who worked for less than 183 days or six months were classified as Marginal workers.

Non-workers

Those who had not worked any time at all during the year preceding the date of enumeration are non-workers. Non-workers include (i) those engaged in household duties at home, (ii) students, (iii) dependents, (iv) retired persons (v) beggars, (vi) inmates of institutions and (vii) other non-workers.

3.2 Occupational Classification of Main Workers

Main workers classified into 9 major categories are given in Census of India B-series tables. This is called the Functional Classification and helps in understanding the functional classification of the city/town. This data may be provided for the Census year for which it is available.

TABLE 4:INDUSTRIAL ASPECTS

Number of units of different type of industrial units (Large, Medium, Small House Hold, Hazardous etc) of the town/ward for the last five years to be furnished.

4.1 Industries – provide latest details for the year available.

4.2 Traditional Industries: details may be provided for the types of traditional industries found in the city/town. Some towns specialize in certain traditional industry, often at household level, for which special provisions are to be made in Master Plan.

4.3 Most important commodities imported

The names of the most important commodities decided in terms of estimated volume of commodities imported are to be indicated.

4.4 Most important commodities manufactured

The names of the most important commodities manufactured are to be indicated. This is decided in terms of the volume of total output of the commodities concerned.

4.5 Most important commodities exported

The names of the most important commodities decided in terms of estimated volume of commodities exported are to be indicated.

4.6 Most important agricultural produce

The region surrounding the city/town may be rich in a particular type of produce, for which markets/mandis, processing industry etc. may be located in the city.

TABLE 5: LAND USE (in Hectares)

The area under different landuses in 1991,2001, 2011 to be furnished. Details regarding landuse classes, etc. is given elsewhere in the Design Standards document. The table may be modified as per requirements.

TABLE 6: AVAILABILITY OF DRINKING WATER

6.1 Important sources of drinking water

Indicate the important sources of drinking water and also indicate the distance in km. from the main source, and number of households covered from different sources. Refer HH-series tables (Tables on Houses, Household Amenities and Assets) from Census of India.

6.2 Water Supply details

Ward wise details of the quantity of water supplied (MLD), No. of Connections, Per Capita Consumption (LPCD), Area Covered (sq. km.), Capacity of WTPs, percentage of treated water recycling, etc. to be furnished.

TABLE 7: ELECTRICITY

The information on electric supply to the town is presented in the form of number of connections under different consumption groups viz., domestic, industrial, commercial, and others which includes electricity for agricultural purpose, proposed projects requiring land in the city/town.

TABLE 8: COMMUNICATIONS & TELECOMMUNICATIONS

Details of number of telephone connections (land line), mobile connections, Post Office etc. to be furnished here.

TABLE 9: EDUCATIONAL FACILITIES

Pre-primary schools have been treated as Anganwadi, Schools upto Class IV have been treated as Primary, schools upto Class VIII as Junior secondary or middle schools, schools upto Class X as Secondary schools and schools or colleges upto XII as Senior secondary schools or at places Intermediate and Junior college.

If there are composite schools like middle schools with primary classes, or secondary schools with middle classes, these have been included in the number of primary and middle schools respectively. For example, if in a town, there are two primary schools and one middle school with primary classes, the number of primary schools in the town will be given as three and that of middle schools as one even though there are only three educational institutions. Same is the case with secondary or senior secondary schools.

Number of vocational training institutions

This includes vocational institutions like Applied Art/Painting College, Pharmacy College, B.Ed. College, Teachers Training Institutions, Govt./recognized polytechnics, Shorthand, Typewriting, Music/Dance Schools, etc.

Number of colleges

The number of different types of colleges offering various courses in the town is to be indicated under following sub-heads:

- (1) General
- (2) Medical
- (3) Engineering
- (4) Law

A general college means Arts, Science and Commerce colleges.

TABLE 7: NUMBER OF ADULT EDUCATION CENTERS

This aspect was first introduced in the Town Directory of 1981 Census keeping in view the Minimum Needs Programme of the Planning Commission. In this column the number of adult education centres conducting regular classes are to be indicated.

TABLE 10: MEDICAL FACILITIES

10.1 Number of hospitals, dispensaries, etc., doctors, nurses, paramedical staff and total number of beds available therein

The particulars of various type of medical institutions in various system of medicines like Allopathic, Ayurvedic, Unani, Homeopaththic etc. and their numbers viz., Hospitals, Dispensaries, Health Centres, Family Planning Centres, Nursing Homes and other medical institutions and the capacity with reference to total beds, doctors, nurses, paramedical staff available is to be given. The data is to be provided for both Govt./Private institutions.

10.2 Epidemiological Details

No. of persons affected by diseases like Leprosy, Phylaria, Tuberculosis, Cholera etc.

TABLE 11: AVAILABILITY OF SANITARY FACILITIES

The sanitation facilities in a city/town could be based on septic tanks or sewerage system or low cost sanitation. Studies have shown that proper sewerage systems cover less than 20% of Indian Cities. Therefore, the correct data has to be filled in here so that planning could be undertaken accordingly.

Sewerage System

Sewerage system implies the network of mains and branches of underground conduits for the conveyance of sewage to the point of disposal. Sewers that carry only household and industrial wastage are called separate sewers; those that carry storm water from roofs, streets and other surfaces are known as storm water drains, while those carrying both sewage and storm water are called combined sewers. However, towns which are not provided with such underground sewerage system normally have open surface drain, covered drains, etc.

11.2 Network Details

The details about the sewerage/drainage network to be provided.

11.3 to 11.8 Details of sewage generation, treatment and disposal

11.9 Public Toilets

11.10 Major Storm Water Drains

TABLE 12: SOLID WASTE MANAGEMENT

There are three major steps involved in the management of solid waste viz. collection, transportation and disposal. Disposal of solid waste is generally done through land filling.

Municipal solid waste includes commercial and residential waste generated by a community

Collection means collection and removal of solid waste from different collection points

Disposal means final disposal of solid waste;

Recycling means the process by which waste is transformed into new products in such a manner that the original products lose their identity;

Land fill: Means disposal of solid waste by spreading it in layers over a lined surface or land, compacting it to the smallest volume and covering it by impervious soil layer at the end of the day or more frequently. A landfill is operated to prevent leachate for contaminating ground water and maintaining ambient air quality;

Incineration: Incineration is a process of controlled combustion for burning of waste and residue, containing material, Carbon dioxide, water vapour, ash and non-combustible end products.

Biodegradable substance means a substance that can be degraded by micro-organisms.

Hospital Waste: Waste generating from the hospitals is called hospital waste

TABLE 13: AVAILABILITY OF RECREATIONAL, CULTURAL, BANKING AND CREDIT FACILITIES

13.1 Community Facilities

The particulars of recreational facilities such as stadia, museum, cinema halls and auditoria/drama/community halls and their number in the town are to be recorded. The availability of cultural facilities in the form of the number of public libraries and reading rooms, if any, available in the town is to be indicated. If fire fighting facility is not available in the town, the name of the nearest place where this facility is available is to be indicated and the distance of the same is given in column.

13.2 Number of banks and credit societies

Banks

Number of banks, commercial as well as co-operative functioning in the town has to be indicated. It gives the number of banks both the head as well as branch offices of banks in each town, which actually transact banking business. The head or branch offices not actually transacting any banking business are not to be taken into account.

Credit Societies

The information on Agricultural Credit Societies and Non-Agricultural Credit Societies are to be furnished.

The agricultural credit societies include service, multipurpose, agricultural produce, marketing cooperative societies, etc. The non-agricultural credit societies include consumer cooperative societies and also credit co-operative societies of certain categories of persons like teachers, postal-workers, etc.

TABLE 14: LAW AND ORDER/CRIMES

TABLE 15: HOUSING

TABLE 16: LAND OWNERSHIP AND COST

16.3 Mortgage to credit ratio for housing (Rs. in Lakh)

Mortgage/loans

Percentage of dwellings purchased during the past year that are covered by mortgage and percentage of dwellings that are covered by non-mortgage.

TABLE 17: DISASTERS**TABLE 18: PUBLIC PRIVATE PARTNERSHIP PROJECTS IMPLEMENTED IN THE TOWN (PPP)****TABLE 19: SLUMS**

All the inhabitants of the areas, which have been notified as slums by the state governments under any legal provisions or even recognized by them, are to be accordingly considered as slum population. Besides areas in cities/towns, which satisfy the usual criteria for declaring an area as slum have also been included.

As per Census of India, the slum areas broadly consist of:-

1. All specified areas notified as 'Slum' by State/Local Government and UT Administration under any Act;
2. All areas recognized as 'Slum' by State/Local Government and UT Administration which may not have been formally notified as slum under any Act;
3. A compact area of at least 300 population or about 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities.

Houseless Population: As per Census of India 2011, households which do not live in buildings or Census houses but live in the open or roadside, pavements, in hume-pipes, under fly-overs and staircases, or in the open in places of worship, mandaps, railway platforms, etc., are to be treated as Houseless households

TABLE 20: TRAFFIC & TRANSPORTATION**20.3 Road length and Footpath (in km.)**

The road length to be shown in these columns pertains to Surfaced i.e., Pucca and Un-surfaced i.e., Kutcha roads and its total road length.

TABLE 21: ENVIRONMENT

Environmental pollutant means any solid, liquid or gaseous substance present in such concentration as may be or tend to be, injurious to environment and environmental pollution means the presence in the environment of any environmental pollutant.

21.1 Air pollution

Air pollution is the excessive concentration of foreign matter in the air, which adversely affects the well being of the individual or cause damage to property. The important air contaminants are SO₂, NO, Suspended Particulate Matter (SPM), CO. Air pollutants are measures in µg/m³.

Sulfur dioxide (SO₂):SO₂ is an irritant colourless gas, which affects the mucous membranes when inhaled. Exposure at low level can cause increased upper respiratory symptoms such as cough, sore throat and affects lung function.

Oxides of Nitrogen (NO): Of the seven oxides of nitrogen known to exist in the ambient air, Nitrogen dioxide is the main oxides affecting human health. Oxides of nitrogen are released in all the types of combustion as they are formed by the oxidation of atmospheric nitrogen at high temperature. Exposure to excessive NO₂ affects the defense mechanism of human body.

Suspended Particulate Matters (SPM): Particulate is a term given to the minute particle of solid or semi solid material dispersed in the atmosphere. SPM presence in the air cause respiratory diseases.

Carbon Monoxide (CO): Carbon monoxide is a colourless, odourless gas with relatively poor solubility in water. CO emission is due to incomplete combustion of fuel of vehicles. CO affects the central nervous system and also responsible for heart attacks and a high mortality rate.

21.2 Noise Pollution: Noise is an unwanted sound without agreeable musical quality. Noise levels are measured in decibels. One decibel is the threshold of hearing.

21.3 Water pollution: Water pollution is any physical or chemical change in water that can adversely affect organisms

Biochemical oxygen demand, or BOD

The amount of organic material that can decompose in the sewage is measured by the biochemical oxygen demand. BOD is the amount of oxygen required by micro-organisms to decompose the organic substances in sewage. Therefore, the more organic material there is in the sewage, the higher the BOD. Dissolved oxygen is an important factor that determines the quality of water in lakes and rivers. The higher the concentration of dissolved oxygen, the better the water quality. BOD level measured in mg/l.

Coliform level: Coliform level is an important index to measure pollution by human waste. Water pollution due to human excreta is caused mainly by the lack of proper municipal sewerage.

pH Value: A number used to express degrees of acidity or alkalinity in solution.

TABLE 22: ANIMAL HUSBANDARY DETAILS

Animal husbandry continues to be an important activity in most Indian cities/towns, most often found in urban villages and peri-urban areas. Details are essential for master plan formulation.

TABLE 23: TRAVEL & TOURISM

Aspects related to travel and tourism closely affect demand for facilities, demand for land and economic activity generated such as hotels, parking, eateries, water demand, electricity demand, etc.

TABLE 24: GOVERNANCE

Civic Status of town: see para 1.2.

Status of Master/Development Plan: Many cities/towns will have at least some kind of pre-existing plan document. The details such as date of sanction of the Ist Plan, plan revision are to be furnished.

Revenue and Receipt of Local Body (Rs. in Lakh)

The actual revenue receipt and revenue expenditure figures of the administrative body governing the town are to be filled. Data is to be presented not only in respect of statutory bodies but also in respect of non-statutory bodies managing the civic administration of the towns if they have separate budgets and accounts of their own pertaining to the town.

City Product

Total product of the city as defined in national accounts procedures. It may either be taken as the total income or value-added (wages plus business surplus plus taxes plus imports), or the total final demand (consumption plus investment plus exports).

City Product = $\frac{\text{GNP}}{\text{number of households in the city}} \times \text{average household income in the city}$ (Total national household income, from national accounts)