

Andhra Pradesh Municipal Development Project [APMDP]

TERMS OF REFERENCE Package- VIII

PREPARATION OF GIS BASEMAPS FOR URBAN LOCAL BODIES OF ANDHRA PRADESH

Sl. No.	CONTENTS	PAGE NOS.
1.	Background	3
2.	Objective of the Study	4
3.	General Terms & Conditions	5
4.	Eligibility Criteria	5
5.	Project Area	5
6.	An Outline of the Tasks to Be Carried Out (Scope of the Services)	7
	Task 1: Inception Report	7
	Task 2: Procurement of Satellite Images	8
	Task 3: Establishing Survey Control Points for Georeferencing of Satellite Images	9
	Task 4: Georeferencing and Ortho Rectification of Satellite Images	10
	Task 5: Preparation of Line Map In 2D Form	10
	Task 6: Generation & Overlay of Contours and Spot Heights in 3D	13
	Task 7: Collection of Various Maps & Data from Municipal & Government Agencies	13
	Task 8: Incorporation of Cadastral & Utility Information	14
	Task 9: Field Verification Survey	14
	Task 10: Draft Base Map	14
	Task 11: Quality Check on Data Submission, Data Security Guidelines & Data Verification	15
	Task 12: Final Base Map Incorporating Feedback and Final Report	15
7.	Pilot Study – Standard Operating Procedure (SOP)	15
8.	Schedule for Completion of Tasks	15
9.	Data, Services and Facilities to Be Provided By the Client	16
10.	Final Outputs and Deliverables	16
	10.1. Satellite Data	16
	10.2. DGPS Survey	16
	10.3. Topographical Survey	17
	10.4. Maps For Each Town:	17
	10.5. Reports For Each Town	17
11.	Expertise and Inputs	18
12.	Evaluation by Third Party for Quality Control	18
13.	Composition of Review Committee to Monitor Consultants Work	19
14.	Review of Progress Reports	19
15.	Appraisal of Project	20
16.	Process Flow Chart	21
17.	Annexure-I: List of Towns for which Base Maps to be Prepared	22
18.	Annexure-II: FIELD SURVEY FORMATS FOR DATA COLLECTION	23 to 33
19.	Annexure-II(a): ATTRIBUTES FOR SURVEY AND BASE MAP	34 to 35
20.	Annexure-III: DETAILS OF THE LAYERS FOR BASE MAP	36 to 39

1 BACKGROUND

Andhra Pradesh Government through its Municipal Administration and Urban Development Department (MAUD), with a view to comprehensively address the challenges of urban development will implement the Andhra Pradesh Municipal Development Project (APMDP). The objective is to create economically productive, efficient and equitable urban centers in Andhra Pradesh with increased capacity to reduce urban poverty. This is to be done by significantly improving the financial viability, effectiveness, and efficiency of urban services under the control of participating urban local bodies with a focus on reforms to institutions and practices in addition to investments in municipal services.

Project development objectives are:

The project will support urban sector reforms and improve city management and municipal services with a view to address urban poverty.

The project's specific development objectives are to:

- (a) Improve urban governance and finance through the implementation of an agreed reform agenda at State and Local levels.
- (b) Enhance the capacity of State, Local, and Community groups to manage urban affairs through a demand driven capacity enhancement program; and
- (c) Support the rehabilitation and creation of sustainable urban services with economic and social benefits at community and city-wide levels.

Project components are:

- (a) Legal and Institutional Reform

The main activities under this component will be (i) technical assistance for drafting and implementation of a new Town Planning Act with a view to simplifying the planning process (ii) the preparation of operational manuals, and the preparation of up-to-date base maps of key urban centers and (iii) the development of town plans for selected ULBs;

- (b) Municipal Capacity Enhancement
- (c) Urban Infrastructure Investment

A major concern under the legal and institutional reform component is to ensure appropriate modifications to:

- (a) The statutory mechanisms which guide urban planning;

- (b) The physical and urban development planning process;
- (c) The relevant administrative and procedural frameworks required to operationalizing and implement the urban development plans.

These are required to ensure the effectiveness of urban planning in the context of current and future economic expansion in the State. The conventional procedure of preparing statutory urban development plans is seen to be devoid of effective participation, unconcerned about financing implications and time consuming. A concurrent but separate study seeks to establish the reformed legislation, simplified land use planning procedure and lay down guidelines for town planners of ULBs in preparing the city plans.

One of the time consuming elements of the planning procedure is the preparation of an updated base map. Andhra Pradesh Government has separately initiated development of Integrated Land Information System (ILIS) that will provide parcel level ownership information. In the present exercise the emphasis is on obtaining citywide maps and data that are required for planning purposes. **Through this assignment the APMDP, here after referred to as Client, seeks technical services of competent consultants in preparing Digital Base Maps using high resolution satellite images in GIS along with all the required attribute data integrated to maps.**

As a part of this process, competent consultants would be selected and they will be assigned a package that contains a selected list of cities. For more details on the Packages and the cities under each package, refer to the list enclosed under ANNEXURE-I.

2 OBJECTIVE OF THE STUDY

In the light of the above background, the objective of the assignment is to Prepare Base Maps for Remaining 36 **ULBs** out of **110 ULBS** of State of Andhra Pradesh. These include **25** newly constituted Municipalities/Nagar Panchayat and 11 ULBs falling under Urban Development Authorities of A.P using Geospatial technologies. **The area of the ULB to prepare Base Map includes the present administrative boundary and its vicinity of up to 10% area of administrative boundary (maximum) to include the outgrowth of developments.**

3 GENERAL TERMS & CONDITIONS

- a. The consultant shall return the satellite images, original data, processed data, and maps, Also any other data collected for the project to the client. He shall give an undertaking that he shall not use the above images/ data / maps for any other purpose other than the project.
- b. The consultant should bear all the costs associated with their visit to the client, preparation & submission of their proposal and contract negotiations
- c. The consultant should revert with all pre-bid queries within seven working days of closing of bid by e-mail only.
- d. The consultant should take care of all the required hardware & software licenses required for the execution of the project.
- e. The client is not bound to accept any proposal and reserves the right to annul the selection process at any time prior to contract award, without thereby incurring any liability to the consultant(s).
- f. The client at any time can modify / change/ withhold any of the components of this proposal. However prior notice will be given before awarding the contract.

4 ELIGIBILITY CRITERIA

- a. The consultant must be an **ISO 9001:2008**.The necessary certificates must be provided as proof with the proposal.
- b. The consultant should have executed **at least three similar projects** or **50,000 Map Entities** of the same in a project in **previous 3 years**.
- c. The consultant shall submit the completion certificates of the said project.
- d. The consultant should have a turnover of **Rs.5 crore** per year for the last three financial years.

1 PROJECT AREA

The present Assignment of Package VIII covers 4 ULBs out of 110 ULBS of Rajahmundry and Guntur Regions in State of Andhra Pradesh. The List of ULBs is as follows.

PACKAGE 8						
Sl.No.	ULB NAME	DISTRICT	GRADE	ULB CODE	POPULATION-CENSUS 2011	Areas
1	Nandigama(CRDA)	Krishna	N.P.	1145	44331	28.7

2	Vijayawada(CRDA)	Krishna	M.C.	1073	1034358	59
3	Vuyyuru(CRDA)	Krishna	N.P.	1144	38021	15.1
4	Guntur(CRDA)	Guntur	M.C.	1021	743354	52
					1860064	154.8

2 AN OUTLINE OF THE TASKS TO BE CARRIED OUT

(SCOPE OF THE SERVICES):

The scope of the project involves creation of Base maps in 2D form in GIS environment using high resolution satellite images at 1:1000 scale pertaining to ULBs of A.P, besides geo referencing of cadastral maps, generation of contours at 0.5 meter interval and spot heights. The feature extraction will be from high resolution satellite images, surveying data, and physical site verification. The series of tasks involved in undertaking the project [by the consultant at each of the ULB](#) are given below. The bidders have to note that all the methodologies mentioned here are only for understanding of the process. It is suggested that the bidders, can provide a better alternative if any, to undertake each of the tasks. The client will refer to the suggestions from each of the successful bidders and finalize a procedure for all the packages.

1. Inception Report
2. Procurement of Satellite Images
3. Establishing Survey Control points for Georeferencing of Satellite Images
4. Georeferencing and Ortho Rectification of Satellite Images
5. Preparation of Line Maps in 2D form
6. Generation & Over lay of Contours(1.0 Mt. interval) and spot heights in 3D
7. Collection of Various Maps and Data from Govt./ Mpl. Agencies
8. Incorporation of Cadastral Information
9. Field Verification Survey
10. Preparation of Draft Base Map
11. Quality check on data submission, data security guidelines & data verification
12. Final Base Map Incorporating Feedback and Final Report

The details on the tasks to be carried out by the selected consultant are given below:

Task 1: INCEPTION REPORT

The consultant shall undertake a detailed assessment at each of the ULB under the assigned package. The assessment shall be done for studying the current practices in place for day-to-day operations, related documents used by the department, along with the assessment of various data/ metadata available with the ULB.

After the assessment, the inception report has to be brought out with details on the assessment procedure, data sets available and data gaps identified, personnel available in each department and their GIS skill sets etc.

Additionally the report shall consist of Project plan, mobilization plan with detailed schedule, availability, survey performance field surveys to be conducted and shall conform with or without modification of the methodology and schedule of deliverables included in this proposal. The Proforma for conducting various surveys/ collection of data shall also be given. The consultant shall also provide details of the staff, and their resume who will be assigned for the project. All the staff has to be made available for this project from the date of approval of inception report.

The consultant shall also undertake an assessment of availability of the cloud free Quick bird/Geo eye/World View satellite imagery – pan-sharpened data of 0.61m resolution for each of the ULB. The imagery must not be more than six months old. Where ever the data is not available, an alternative imagery of same or nearest resolution (pan-sharpened) has to be suggested. The assessment shall also bring in the costs associated with the procurement of imagery.

The Inception Reports of all the Consultants shall be presented and discussed before **Review Committee** to arrive at a common and standardized approach to the assignment. The client provides its feedback to the Consultants within **four weeks** from the submission of Inception report. The consultant has to only undertake the project as per the suggested methodology. Any deviation from the set methodology will disqualify the consultants from the project.

TASK 2: PROCUREMENT OF SATELLITE IMAGES

One of the most critical phases of mapping project is acquisition of the satellite image. The consultant shall procure the cloud free latest Very High resolution

satellite PAN sharpened Natural color Composite image with Spatial resolution 0.61m, 16bit Radiometric resolution, with RPCs (orthokit product) in WGS84 datum and UTM projection, for the ULBs as per the package given in the list (Annexure-I). This should also be in line with the details provided by the consultant under the inception report. **The images shall cover the administrative boundary of the ULB with a buffer area of 2 kms around the ULBs current boundary showing outgrowths. The consultant should get the formal approval of the Area of Interest (AOI) of the town before placing the procurement order.**

All the required clearances for obtaining the data have to be taken care by the consultants. To support this process, the client and/or ULB will provide the necessary authorization letters. The procurement process shall be completed within one and half month or 6 weeks, from the issue of authorization letter.

On procurement, the Consultant shall verify the correctness, Image resolution, and Clarity of the imagery. The imagery that does not conform to the correctness must be returned immediately and re procure within two weeks.

Sufficient time is being given for procuring imagery, hence only the acquired imagery must be used for the preparation of base maps. Use of data from alternative online sources such as **Google Earth/ Google Maps is strictly prohibited as this is strictly against the usage policies of the respective services.** The consultant will be solely liable for any legality and any such deviations will lead to disqualification of the consultant.

Consultant needs to incur all the expenditure until the entire process of procurement is completed and upon submission of raw image to the Client the process of reimbursement will be done by the client subjected to clearance of Quality Check in terms of Spatial resolution, radiometric resolutions and Cloud free.

TASK3: ESTABLISHING SURVEY CONTROL POINTS FOR GEOREFERENCING OF SATELLITE IMAGES.

The consultant shall carry out survey necessary for geo-referencing the satellite images (SI) through DGPS receivers set up over temporary monuments. The DGPS survey planning should be done with reference to the Satellite data, the planned DGPS survey points should be marked on the satellite image. The DGPS

survey planning report should be certified by the client. The consultant shall deploy suitably qualified, trained and experienced surveyor(s) for carrying out control survey to provide geo-reference to satellite images. A minimum of **one point per sq km**, well distributed across the contract area should be considered.

The consultant shall prepare and submit a Report on survey control which includes executive summary of the survey, location and extent of the network of Primary Survey and Secondary Survey Control Points established, Field notes on survey control including sketches, details of instruments used for field work, details of software used for processing the observed data, results summarizing the GPS observation data, map showing the network of all the control points and the points used for geo-referencing the satellite images with heights. The coordinates and heights for all the points shall be tabulated in a convenient and conspicuous location on the map and digital data of control points in **dwg** format. The DGPS survey data should be network processed with reference to **IGS stations**. The Quality check report shall be submitted.

TASK 4: GEOREFERENCING AND ORTHO RECTIFICATION OF SATELLITE IMAGES

The satellite Images shall be geo-referenced and ortho-rectified using DGPS points for every 1 sq.km. Geo-referenced and ortho-rectified images form the basis for the accuracy of all products to be derived from the satellite images.

The consultant shall use any suitable image processing software to process the satellite images. All ground positions determined shall be in the common reference system that is **WGS84 Datum and UTM Projection**. Final values shall be in **meter** and **6 places of decimal**.

A Final Report on geo-referencing the satellite images shall be prepared and submitted to the Client. The report shall provide a narrative description of procedures adopted, Results of the preliminary check, constraints faced, Final listing of co-ordinates for all ground control points, Digital copies of all ground control points.

The consultant should submit the quality check report.

TASK 5: PREPARATION OF LINE MAP IN 2D FORM

The extraction of features from satellite image shall include the following:

1. Land Use /Plots

- a. Every plot/Land use shall be assigned Parcel ID which will be used for data integration.
- b. The plot/Land use boundaries shall match with compound walls and the premises boundary line towards the road shall delineate the road area and private land.
- c. Capture all the available Land use in the ULBs and grouped as per the categories provided in the format for Land use.

2. Buildings

- a. Boundary - defined by compound wall, as a closed polygon;
- b. All structures which are independent within the property by their plinth (at ground level)
- c. Any other structures available in the Municipal boundary and in the vicinity of 2 km to capture outgrowths of the municipal limits along need to be captured.

3. Roads system

- a. Lines for right of way of road (RoW)
- b. Centre lines (CL) of roads;
- c. Carriage ways - main and service roads by surface - asphalt, water bound mecadam, cart track
- d. Medians
- e. Traffic islands
- f. Kerb lines
- g. Footpaths
- h. Storm water (road side) drains
- i. Culverts
- j. Bridges
- k. Road over bridges (ROBs)
- l. Road under bridges (RUBs)
- m. Flyovers (Flyover).
- n. Trees by point
- o. Service roads.

4. Railway system

- a. Station, yard, all structures, boundary
- b. Railway land and track (Centre line)
- c. Level crossings

5. **Storm water drainage system**

6. **Electricity system**

- a. Receiving stations
- b. Master unit sub-stations
- c. high tension transmission (HT) lines at the base
- d. Poles for high tension transmission lines (HEP)
- e. Ring main units (RMU)
- f. Transformer centers (TC)

7. **Water supply system**

- a. Ground level reservoirs (GLR), boundary and all structures
- b. Overhead tanks (OHT), boundary and all structures
- c. Pumping stations, boundary and all structures
- d. Manholes.

8. **Underground drainage system**

- a. Pumping stations, boundary and all structures
- b. Sewage treatment plants, boundary and all structures
- c. Man holes.

9. **Telecommunication system**

- a. Street distribution pillars (TelDP), by point symbol to center of pillar(s)
- b. Telephone poles.

10. **Other man-made features**

Man-made features in the contract area extracted from satellite images and mapped shall include:

- a. Anicuts
- b. Canals
- c. Dams
- d. Tanks

To achieve desired standard of accuracy, proper **grid (500 mts x 500 mts)** and projection shall be designed for the entire town. This is essential for proper representation of graphical data and location related unique IDs for each property, which shall form part of GIS for the spatial analysis. In the case of digitization, the data is checked for dimensional accuracy, completeness, displacement, edge

matching, symbology and layering. All undershoots / overshoots, dangling vertices shall be removed in the process. The method to be adopted for digitization shall conform to the standards prescribed by Survey of India. The accuracy standards for the final base map shall be as below:

1. Maximum allowed Root Mean Square (RMS) error : **1 pixels**
2. Location accuracy in GIS : **50 cm**

The consultant is responsible for achieving 100% accuracy for correcting true/valid omissions and corrections identified by the client. The consultant should ensure completeness, correctness and consistency of data content and quality. The consultant should submit the Quality check report for each layer.

TASK 6: GENERATION & OVERLAY OF CONTOURS AND SPOT HEIGHTS IN 3D

In the present context, the scope of work shall include **generation of Contours using a height mesh of 20m apart of 0.5 meter interval and picking up spot heights using total station and survey software. Permanent bench marks** are to be established at every 2 Kms interval for future reference and taking a digital picture that will be linked with GIS. The contours are to be interpolated and superimposed on to the Base Map. The survey is to be initiated at **local SOI / R&B/ Irrigation bench mark** which has been connected to **GTS bench mark of SOI to establish the elevation**. It will be basis for all subsequent measurement. The heights should be with reference to the **Mean sea Level**. The Planimetric coordinates (X, Y) should in WGS84 Datum and UTM projection.

The consultant should collect sufficient leveling observing points to ensure that the contours are atleast 1m height accuracy. The final contours should be of cartographic quality. Along with final contours, the observation points should also be submitted in shape file format.

Bench mark should be established at interval of 2Kms. The pillar shall be made of cement concrete of grade M-15(1:2:4), rectangular in shape and size of 800 mm x 100 mm x 100 mm. A rod of 20 mm diameter and 800mm long of mild steel shall be provided at the center of pillar to mark location and each pillar shall be painted to mark its number.

TASK 7: COLLECTION OF VARIOUS MAPS & DATA FROM MUNICIPAL & GOVERNMENT AGENCIES

Simultaneously with **Task-1**, the Consultant shall collect maps and secondary data from various authorities. A set of such maps that will form a part of the spatial database is illustrated below:

- (a) Master Plan / General Town Planning Schemes showing proposed land use zoning, transport network and sites designated for various public purposes.
- (b) Maps showing administrative boundaries of ULB jurisdiction, administrative and electoral wards, area/ block units used by census.
- (c) Base Map/ Revenue Maps showing Cadastral Boundaries.
- (d) Maps/ Engineering drawings of utilities like water supply, sewerage, storm, water drainage, solid waste disposal, roads and street lights along with the data available with ULB/ any other concerned Department.
- (e) Data regarding services like Fire Protection, Cremation and Burial Grounds, Slaughter Houses, Cattle Ponds, Parks, Gardens and Swimming Pools etc. In case such data is missing, this will form a part of the field survey/ verification.
- (f) Location of State and Central Government offices, railways and highways, all roads along with centerlines, post and telegraph offices, police stations, primary & high schools, colleges, universities, primary health centers, hospitals, banks, theatres etc. also need to be located on the maps through field verification.
- (g) Existing land use categories like residential including slums, industrial, commercial and healthcare, educational, sports and recreation facilities.
- (h) Property boundaries along with slum boundaries (Notified and Non- Notified). In case such data is missing, this will form a part of the field survey/ verification.
- (i) All features should be collected along with the necessary attributes that will be later used for annotation.
- (j) Preparation of survey proformae for each of the layers to be generated.

TASK 8: INCORPORATION OF CADASTRAL INFORMATION

After collection of map mentioned in Task No.7, all maps have to be scanned as raster images and the vectorisation of scanned raster images shall be done with label symbology and annotation with unique Ids. Vectored map shall be geo referenced with satellite image using sufficient numbers of GCPs before incorporating the cadastral and utility information.

TASK 9: FIELD VERIFICATION SURVEY

The Consultants have to carry out the field surveys to verify the proof/ check plots of maps marked for incomplete features with reference to the ground, collect the information on features, especially man-made ones, available on satellite images, collection of names for important land marks, roads/ streets/ lanes/ by-lanes, areas, etc. check the accuracy of some points on the ground randomly to meet the accuracy standards. The surveyors for field verification shall go round, street by street, to verify the features that are marked on proof plots. The Consultant should use Hand Held devices for Data Collection and update data into server using GPS and GPRS technology to avoid cumbersome data entry and subsequent mistakes generated by data entry.

- The agency has to deploy sufficient number of Hand Held Devices and shall engage sufficient manpower for data collection and ensure that the information pertaining to a single Parcel Id is collected at the source.
- The agency has to collect necessary data (non-spatial) of each parcel such as number of structures in the parcel, number of floors, Category of building, usage of building, multi-storied name, etc. using hand-held devices.
- After collecting the data it has to be upload the same to server for each parcel.
- The agency has to prepare GIS layer for all parcels in the Urban Local Body using Satellite images thus acquired for the purpose.
- Developing GIS based system by integrating spatial and non-spatial data using GPS,GPRS and web service which should be operable both online as well as offline.
- The agency should hand over the Data server and the application created for this purpose and also the source code of application created.
- **Mapping of Utilities:** The physical features like electric poles, street lights, water points, bore wells, transformers, manholes etc will be marked to their respective positions by hand held device.

TASK 10: DRAFT BASE MAP

The Draft Base Map along with a report on various gaps identified shall be consolidated and prepared. The draft map should be made available in soft copy (formats to be finalized during workshop. Preference would be for a platform/software independent geo-database file). Hard copy maps in duplicate at 1:1000, 1:5000 & 1:10000 scale to be submitted.

TASK 11: QUALITY CHECK ON DATA SUBMISSION, DATA SECURITY GUIDELINES & DATA VERIFICATION

Checking of mapping works shall be carried out internally by the consultants for the tasks and outputs at each of the stages and before submission of the deliverables to the client for examination and approval. Reports from the internal QA & QC team must be submitted.

On delivery of submissions, the quality checks will be done by the client / ULB in accordance with the specifications and necessary corrections/ feedback will be provided to the consultant within 6 weeks of receipt of delivery from the consultants. In the course of examination of a submission from the consultant, the client, if found necessary, shall call for the methodology adopted in arriving at a result or output in any of the tasks. The consultant shall, on such request, provide detail documentation of procedure, make available to the client for the queries in any of the tasks.

TASK 12: FINAL BASE MAP INCORPORATING FEEDBACK AND FINAL REPORT

The Final Base Map duly incorporating the corrections/feedback suggested by the ULB/ Client / Review Committee along with Final report shall be submitted within 4 weeks of receipt of feedback.

3 SCHEDULE FOR COMPLETION OF TASKS

The assignment is to be completed in **36 weeks**. The detail timeline for different activities is given below...

Sl. No.	Task	Activities	Elapsed Weeks
1.	Report on Task1	Procurement of Satellite Images	By Client
2.	Report on Task2	Inception Report & Collection of Various Maps & Data from Municipal & Government Agencies	1 month
3.	Report on Task3	Establishing Survey Control Points for Georeferencing of Satellite Images	2 Month
4.	Report on Task4	Georeferencing and Ortho Rectification of Satellite Images	
5.	Report on Task5	Preparation of Line Map In 2D Form	

6.	Report on Task6	Generation & Overlay of Contours and Spot Heights in 3D	
7.	Report on Task8	Incorporation of Cadastral & Utility Information	
8.	Report on Task9	Field Verification Survey	4 Month
9.	Report on Task10	Draft Base Map	6 Month
10.	Report on Task11	Quality Check on Data Submission, Data Security Guidelines & Data Verification	7 Month
11.	Report on Task12	Final Base Map Incorporating Feedback and Final Report	9 Month

4 **DATA, SERVICES AND FACILITIES TO BE PROVIDED BY THE CLIENT**

The consultant shall be primarily responsible for procuring the Satellite Images, collecting various documents and data from ULB and other Government departments. The Convener (Director Town and Country Planning , Hyderabad) of Review Committee shall assist the consultant in seeking access to documents and data, organizing interviews with concerned officials, conducting surveys and studies etc. The Convener provides 'Letters of Introduction' and shall assist in establishing contact with other State Government departments and planning agencies.

The Client may provide suitable office space free of rent for the project period at the ULB/ at one of the office in a Region.

The client will not provide any hardware, software licensing required by the consultant. All such items are to be arranged by the consultant at their own cost.

The Client will attach one town Planning staff (in the cadre of Town Planning Supervisor) from each ULB with the Consultant for effective coordination.

5 **FINAL OUTPUTS AND DELIVERABLES**

The desired outputs and deliverables under this project are given below:

10.1. Satellite Data

1. Geo-referenced Satellite images in TIFF and geo-TIFF format along with GCPs
2. Ortho photos generated from satellite imagery.

10.2. DGPS Survey

1. The raw and processed data of the DGPS survey with a photograph of each GCP with monument (permanent structure).
2. A neat sketch of each DGPS point showing the location on A4 size drawing.
3. Contour maps of 1 meter interval at 1:1000 scale.

10.3. Topographical Survey

The following details shall be submitted on completion of the survey

1. All original field books
2. All the survey details in AutoCAD format on a CD / DVD and 2 draft prints of the same

10.4. Maps for each Town

1. Digital Base Map of all thematic layers including building/plot on 1:5000 and 1:10,000 scale in GIS and CAD format (for preparation of GTP Scheme/Master Plan) – 5 sets in soft and hard copy.
2. Digital Base Map on 1:1000 and 1:5000 scale for the ULB area and its vicinity of up to 10% area of administrative boundary in GIS format (.gdb,.mxd, .shp) & other major GIS formats and CAD format (DXF/DWG) which shall contain locality, ward, block, slum and municipal boundaries, foot prints of each building, roads, nalas, canals, railway lines, bridges, water bodies duly incorporating cadastral information with contour information at 1.0 meter interval.– 5 sets in soft & hard copy
3. Macro level Existing Land Use Map to a scale of 1:1000, 1:5000 and 1:10,000 – 5 sets in soft and hard copy
4. Ward wise check prints on 1:1000 scale – 5 sets in hard copy (on A0 paper)
5. Ward wise Final Base Map on 1:5000 scale – 5 sets in hard copy (Multi colour Plotted maps on A0 paper)
6. Base Map on 1:10000 scale 5 sets in hard copy (Multi colour Plotted maps on A0 paper)

10.5. Reports for each Town

1. Inception Report along with the detailed methodology and work schedule – 5 sets and soft copy

2. Project Progress Report (to be submitted for every 15days after submission of Inception report and also after completion of each sub task) – 5 sets and soft copy
3. Detailed Project Report at the end of the Project – 5 sets in hard and soft copy

6 **EXPERTISE AND INPUTS**

The professional requirements of personnel to be provided by **each consultant** for the Task are given in the following table detailing type of expertise, required skills and experience. The criteria are desirable and not restrictive. The consultant needs to provide the CVs of its proposed team in the prescribed format.

Sl. No.	Key Position	No. of Persons	Area of Specific Expertise desired	Minimum Qualifications and professional experience desired	Man months Required after commencement of work
1	Project Manager / Team Leader (POC to Client)	1	Undertaking Preparation of GIS Base Maps as Team Leader	Masters in Urban Planning with 7 years experience or B.Tech (civil)/ M.Sc/ M.C.A with 10 years experience and track record of undertaking minimum similar two such tasks as Team Leader	8 months
2	Urban Planner	5	Experience in Preparation of Base Maps/Master Plans	Masters in Urban Planning with 5 years experience in the similar field	8 months
3	Remote Sensing Expert	5	Experience in interpreting high resolution satellite images, Ortho photo generation, Planimetric data generating for city planning purposes.	Masters in Remote Sensing / Bachelors in Civil Engg with 5 years experience in the similar field	8 months
4	GIS Expert	5	Experience in developing and maintaining GIS for city planning and urban management purposes.	Masters in GIS / Bachelors in Civil Engg with 5 years experience in the similar field	8 months

This team of key professionals shall be adequately supported by junior professionals in requisite disciplines including GIS and IT. The work experience proof of the employees and Form -16 should be submitted to ensure genuine experience.

7 EVALUATION BY TECHNICAL COMMITTEE FOR QUALITY CONTROL

To ensure quality of the work done by consultant shall be entrusted for conducting third party check on the deliverables to a Technical committee constituted for this purpose. The payment recommendation will be taken up based on the recommendations of technical committee. The recommendations of the Technical committee will be put to review committee for further suggestions and recommendations.

8 COMPOSITION OF REVIEW COMMITTEE TO MONITOR CONSULTANTS WORK

For guiding the consultants and supervising the progress of the study, a Review Committee will be constituted.

The Composition of the Review Committee shall be

- (a) The Regional Director of Municipal Administration or his nominee - Chairman
- (b) The Regional Deputy Director of Town and Country Planning – Convener
- (c) Commissioner, One TP Staff and One Engineering Staff of the ULBs.
- (d) DTCPO, concerned District.
- (e) The Project Director, APMDP or his nominee.
- (f) Assistant Engineer, Nagar Panchayat.
- (g) Any other Members Eminent Professors of Reputed Universities.

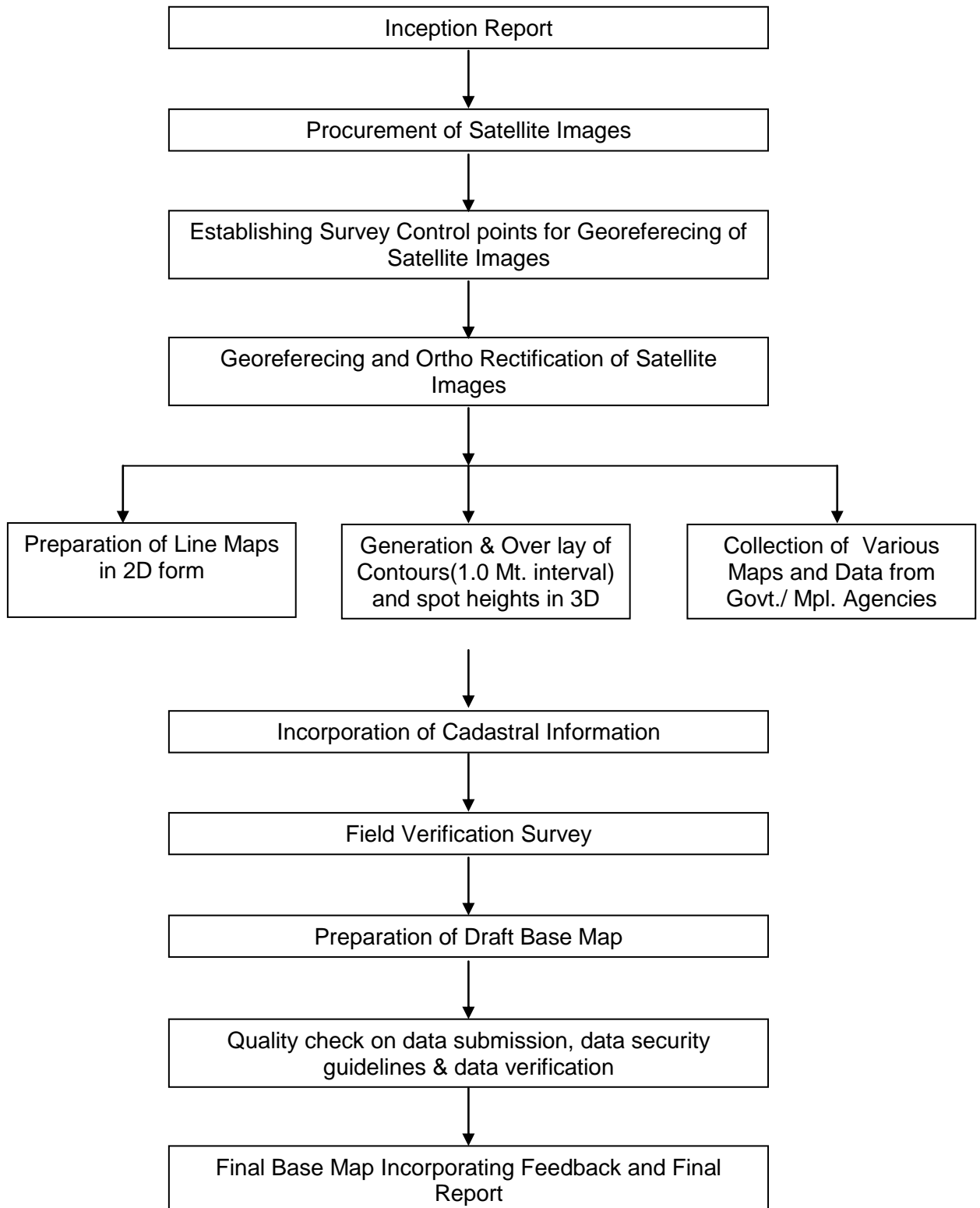
9 REVIEW OF PROGRESS REPORTS

Progress report on each task shall be submitted to the Review Committee and the Member Secretary shall organize a presentation by the consultants to the Committee **on fortnightly basis and also after completion of each sub task**. The Review Committee shall, as far as possible, within four weeks of such presentation communicate its feedback to the Consultants. Since multiple consultants are expected to work on the same assignment for a number of groups of ULBs, presentation in a common workshop is proposed as a forum to ensure compatibility and common standards of outputs across the ULBs. Such presentations, apart from the written report, are of critical significance.

10 APPRAISAL OF PROJECT

The final GIS Base Maps along with reports will be appraised by the Member Secretary of the Review Committee upon receiving the quality check report and recommendations submitted by technical committee before placing it for approval of the Review Committee (RC).

PROCESS FLOW CHART



Annexure-I

PACKAGE 4						
Sl.No.	ULB NAME	DISTRICT	GRADE	ULB CODE	POPULATION-CENSUS 2011	Areas
1	Nandigama(CRDA)	Krishna	N.P.	1145	44331	28.7
2	Vijayawada(CRDA)	Krishna	M.C.	1073	1034358	59
3	Vuyyuru(CRDA)	Krishna	N.P.	1144	38021	15.1
4	Guntur(CRDA)	Guntur	M.C.	1021	743354	52
					1860064	154.8

Source: Census of India-2011

NOTE:

1. The Area of Interest (AOI) restricted to the present administrative boundary.
2. The Areas indicated above may vary and actual area will be taken at the time of preparation of Base Maps.

ANNEXURE II: FIELD SURVEY FORMATS FOR DATA COLLECTION

Field Survey Format for Data Collection of LAND USE/Plots

Date of Survey	<input type="text"/>
Sheet ID	<input type="text"/>
Parcel ID	<input type="text"/>
Road ID*	<input type="text"/>
Ward No	<input type="text"/>
Locality /Colony Name	<input type="text"/>
Road Name	<input type="text"/>
Land Use*	<input type="text"/>
Landuse Details	<input type="text"/>
Remarks (If any)	<input type="text"/>

Signature of the Surveyor

Signature of Team Leader

***Land Use** - Residential - 01 ; Commercial - 02; Industrial – 03; Private Vacant Plot – 04; Agriculture Land – 05; Mix (Resd + Com)– 06; Mix (Resd + Ind) – 07; Mix (Com + Ind) – 08; Educational – 09; Religious – 10; Recreational¹ – 11; Garden/Park – 12;Historical Monuments – 13; Parking Space– 14; Bus Stand/Taxi Stand/Auto Stand – 15; Water Bodies - 16; Dense Tree Area – 17;Health Services² – 18; Community Toilet – 19; Basic Infrastructure³ – 20; electric Sub Station – 21; Market – 22; Hawkers Zone –23; Forest – 24; Any other – 25; State Govt. Properties⁴(Building/Plot) – 26; Central Govt. Properties⁵ (Building/Vacant Land) – 27;Water Bodies (Ponds/Lake/Reservoir etc.) – 28; Green Belt – 29; Municipal Asset (Building/Vacant Land) – 30; Landfill site – 31;Hawkers Zone – 32; Railway Properties (Buildings)

1 **Recreational:** Theatre, Club, Health Centre, Swimming Pool, Stadium and Play Ground

2 **Health Services** - Include Govt. Hospitals/Private Hospitals/Diagnostic Centres/ Clinic, Nursing Homes in one parcel

3 **Basic Infrastructure** - Includes Over head Tanks, Landfill sites, Water/Drainage/Sewerage Pumping Stations, Water Treatment Plant

4**State Government Properties** - Includes all type of State Government Properties (Quarter and Offices)

5 **Central Government Properties** - Include all type of State Government Properties (Quarter and Offices)

Field Survey Format for Data Collection of Buildings

Date of Survey	<input type="text"/>
Sheet ID	<input type="text"/>
Structure ID:	<input type="text"/>
Road ID*	<input type="text"/>
Ward No	<input type="text"/>
Locality /Colony Name	<input type="text"/>
Road Name	<input type="text"/>
Door No./House No.	<input type="text"/>
Number of Floors	<input type="text"/>
Type of Construction	<input type="text"/>
Usage	<input type="text"/>
If NR	<input type="text"/>
Year Of Construction	<input type="text"/>
Remarks (If any)	<input type="text"/>

Signature of the Surveyor

Signature of Team Leader

Type of Construction – Pucca Building with RCC/RBC) /–Stone roof – 01; Pucca building with asbestos/corrugated sheet roof – 02; others – 03.

Usage: Residential-01; Non Residential-02; Government-03; Muncipal-04; Heritage Structure-05; Religious-06, Others-07.

Non Residential: Shop-01; Shopping Complex-02; Office-03; Bank-04; ATM-05; Hospitals/Nursing homes-06, Clinic/dispensaries-07; Educational Institutes-08 Hostels-09; Gyms-10; Star Hotels-11; Bar/Pubs/Restaurants-12; Other Hotels-13; Godown-14; Petrol Bunk-15; Structure with Hoarding /Tower-16; Industry(F/M/W)-17; Multi Group Theatres-18; theatres/other Entertainment-19; function Halls AC/Non AC- 20; Others-21.

Field Survey Format for Data Collection of Road

Date of Survey	<input type="text"/>			
Sheet ID	<input type="text"/>			
Road ID*	<input type="text"/>			
Road Name	<input type="text"/>			
Road Type	<input type="text"/>			
Construction Material	Concrete	<input type="text"/>	WBM	<input type="text"/>
	Asphalt	<input type="text"/>	Any Other	<input type="text"/>
Carriage width in mts	<input type="text"/>			
Maintained By	Municipal body	<input type="text"/>	R&B Dept	<input type="text"/>
	NHAI	<input type="text"/>	Other	<input type="text"/>
Foot Path Status	Yes	<input type="text"/>	No	<input type="text"/>
Footh path width(incase Yes in Meters)	<input type="text"/>			
Foot Path Construction material	Shabad	<input type="text"/>	Concrete	<input type="text"/>
	Tiles	<input type="text"/>	Other stone	<input type="text"/>
Remarks (If any)	<input type="text"/>			

Signature of the Surveyor

Signature of Team Leader

* **Road ID** – Road ID will change in case of junction of Roads/ Change in construction material/ change in width of carriage way/ROW/ change in footpath status/change in maintenance agency

Road Type - Principal Main Road – 01; Main Road – 02; Other Private Street1 – 03; Other Public Street2 – 04; National Highway – 05; State Highway- 06; District Road – 07.

1Private Street: means any street, road, lane, gully, alley, passage or square which is not a public street, and includes any passage securing access to four or more premises belonging to the same or different owners, but does not include a passage provided in effecting a partition of any masonry building amongst joint owners where such passage is less than two metres and fifty cm wide;

2Public Street: means any street, road, lane, gully, alley, passage, pathway, square or courtyard, whether a thoroughfare or not, over which the public have a right of way.

** **Maintained By:** R&B Dept.; NHAI – National Highway Authority of India

Field Survey Format for Hoarding

Date of Survey	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sheet ID	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Hoarding ID	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Ward Number	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Road ID	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Owned By	<input type="text"/>			
Locality Name	<input type="text"/>			
Road side	<input type="text"/>	On Building	<input type="text"/>	
Hording Category *	<input type="text"/>	<input type="text"/>		
Hording Size	Small	<input type="text"/>	Medium	<input type="text"/>
			Big	<input type="text"/>
Hording Status	Authorised	<input type="text"/>	Un Authorised	<input type="text"/>
Remarks (If any)	<input type="text"/>			

Signature of the Surveyor

Signature of Team Leader

***Hoarding Category:**

Neon / Glow / Electric Display / Backlit Non-Hoarding type - 01; Slides – 02;; Illuminated Bus Shelters – 03; Bus Shelters advertisements with printed advertisements – 04; Banners – 05; Flags – 06; Pole Panels – 07; Shop Shutter – 08; Closed Circuit TV – 09; Short Films – 10; Medians Printed advertisement - 11; Traffic and Parking Stand – 12; Tree Guards – 13; Others – 14.

****Hoarding size**

Not Required for Hoarding Category no. 07 to 13.

Small - Area Less than 10 sq ft; Medium- Area 10 to 20 sq ft; Big - Area more than 20 sq ft;

Field Survey Format for Garbage Collection Points

Date of Survey

Sheet ID

Point ID

Ward Number

Road ID

Locality Name

Garbage Type Domestic Kitchen Mixed

Biomedical Construction

Status Temporary Permanent

Collection point Transfer Point

Coverage area No of houses /Colonies

Remarks (If any)

Signature of the Surveyor

Signature of Team Leader

Field Survey Format for Street Light

Date of Survey

Sheet ID

SL ID

Ward Number

Road ID

Locality Name

Pole Type Iron Other

Concrete

Street Light Type HP MV/ Sodium Tube Light Others

CFL High Mast

Source of Energy Electricity Others

Solar

Remarks (If any)

Signature of the Surveyor

Signature of Team Leader

Field Survey Format for Bridges/Flyover

Date of Survey

Sheet ID

Bridge ID

Ward Number

Road ID

Locality Name

Bridge Type*

Width (Meters)

Length (Meters)

Construction Material	Iron	<input type="checkbox"/>	Masonry	<input type="checkbox"/>
	Concrete	<input type="checkbox"/>	Any Other	<input type="checkbox"/>

Construction Year

Remarks (If any)

Signature of the Surveyor

Signature of Team Leader

* **Bridge Type:** Culvert – 01; Road Over Bridge – 02; Road Bridge Constructed Over Railway Line – 03; Bridge Across River or Nala – 04; Under Pass – 05; Foot Over Bridge – 06.

Field Survey Format for Data Collection of Water Supply Network

Date of Survey

Sheet ID

Water Supply ID

Ward Number

Road ID

Road Name

Locality Name

Distance from road(Mts)

Construction Material	PSC	<input type="text"/>	DI	<input type="text"/>	HDPE	<input type="text"/>
	MS	<input type="text"/>	RCC	<input type="text"/>	Others	<input type="text"/>
	GI	<input type="text"/>	AC	<input type="text"/>		
	CI	<input type="text"/>	PVC	<input type="text"/>		
	Distribution	<input type="text"/>	Pumping	<input type="text"/>		
	Construction Material Service	<input type="text"/>	Raw water main	<input type="text"/>		

Pipe Dia in Mts

Remarks (If any)

Signature of the Surveyor

Signature of Team Leader

#Construction Material: PSC- Pre-Stressed Concrete,- DI- ductile Iron ,MS- Mild Steel, RCC – Reinforced Cement Concrete; GI – Galvanized Iron; CI – Cast Iron; PVC - Polyvinyl chloride (Plastic Pipe), HDPE- High Density Poly ethylene .

Field Survey Format for Data Collection of Drainage Network

Date of Survey

Sheet ID

Drainage ID

Ward Number

Road ID

Road Name

Locality Name

Distance from road(Mts)

Depth of Drainage (in Mts)

Construction Type
 Box Open channel

Network Line Type
 Pumping Main line

Service

Remarks (If any)

Signature of the Surveyor

Signature of Team Leader

Field Survey Format for Data Collection of Sewerage Network

Date of Survey

Sheet ID

Sewerage Network ID

Ward Number

Road ID

Road Name

Locality Name

Distance from road(Mts)

Depth of Drainage (in Mts)

Pipe Dia (in mm)

Construction Material	RCC	<input type="text"/>	CI	<input type="text"/>
	SWG	<input type="text"/>	PVC	<input type="text"/>
	GI	<input type="text"/>	Others	<input type="text"/>
	AC	<input type="text"/>		

Network Line Type	Pumping	<input type="text"/>	Sewer	<input type="text"/>
	Service	<input type="text"/>		

Remarks (If any)

Signature of the Surveyor

Signature of Team Leader

#Construction Material: RCC – Reinforced Cement Concrete; SWG- Stone Ware Glazed, GI – Galvanized Iron; CI – Cast Iron; PVC Polyvinyl chloride (Plastic Pipe).

Field Survey Format for Other Basic Infrastructure

Date of Survey	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sheet ID	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Ward Number	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Road ID	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Road Name	<input type="text"/>			
Locality Name	<input type="text"/>			
Other basic Infrastructure *	<input type="text"/>	<input type="text"/>		
Description if any	<input type="text"/>			
Capacity **	<input type="text"/>			
Status	Working	<input type="text"/>	Not Working	<input type="text"/>
Remarks (If any)	<input type="text"/>			

Signature of the Surveyor

Signature of Team Leader

***Other Basic Infrastructure:** Telephone/Cell Phone Tower – 01; Electric Substation of 33 KVa or more – 02; Water Treatment Plant – 03; Drainage Pumping Station – 04; Water pumping Stations – 05; Over head Tanks – 06; Sewerage Treatment Plant – 07; Telephone Exchange – 08; Slaughter House – 09; Community toilet – 10; Fire Stations – 11; Tube Well – 12; Hand Pump – 13; Bus shelters – 14; Water Supply Valves – 16; Sluice Valve – 17; Hydrant – 18; Vent Shaft – 19; Sewerage Pumping Station – 20; Man Hole – 21

**** Capacity:** Should be filled only for Electric Substation of 33 KVa or more – 01; Water Treatment Plant – 02; Drainage Pumping Station – 03; Water pumping Stations – 04; Over head Tanks – 05; Sewerage Treatment Plant – 06. Sewerage Pumping Stations – 20.

ANNEXURE II (a)

ATTRIBUTES FOR SURVEY AND BASE MAP

Finalization of layer wise base map with the following attributes:

i) Building, Plots/Vacant Lands

During the survey, a Unique ID should be marked for each building / plots and the data is to be collected as per the format given in Annexure II. Consultant will propose the methodology for generation of Unique ID structure for map features and GIS database in their technical proposal.

ii) Roads

All types of roads / streets within the AOI will be surveyed and incorporated in the base map as per the format given in Annexure II. It includes National Highway, State Highway, District Roads, Principal Main Road, Main Road, Street (Public and Private). Consultant every road needs to be given a unique ID and the consultant will propose the methodology for its generation in their technical proposal.

iii) Drainage and Sewerage Network

Drainage and sewerage network within the AOI is to be marked and incorporated in the Base map with support of ULB staff as per the format given in Annexure II. Manholes are also to be covered and marked with Drainage/Sewerage network.

iv) Water Supply Network

The water supply network is to be marked and incorporated on to the base map with support of ULB staff as per the format given in Annexure II.

v) Slum Boundaries

Each slum area is to be marked and digitized by image interpretation along with individual building footprints. Survey and the data for each slum available with client or concerned ULB should be integrated in GIS. The data on each individual dwelling unit is available for all slum areas in each ULB. The consultant will take the help of the data to update the base map and data collection as per the format given in Annexure II. The data collected and supplied is to be reconciled before linking in GIS environment.

vi) Street Lights

Street light within the AOI is to be surveyed and incorporated on to the base map. The field survey data collection format is given in the Annexure II.

vii) Hoardings

All the hoardings by the side of road, building and land (public/private) are to be surveyed and data collected as per the format given in Annexure II.

viii) Bridges/ Flyovers

The data for bridges/flyover is to be collected as per the format given in Annexure II and incorporated in the base map.

ix) Garbage Collection Centers

The data for garbage collection centers is to be collected as per the format given in Annexure II and incorporated in base map.

ix) Environmental Data Integration

The consultant needs to create contour maps from the environmental point source data Supplied Consultant by the client for following:

- Air Quality
- Trees
- Water Quality
- Soil
- Noise
- Health

x) Other Features

Other features which are listed in the layer list provided at Annexure III, like traffic squares, water bodies, etc., are to be updated at the time of survey and incorporated in the base map with database. Important landmarks should also be taken correctly on the plots with proper information for the final base map. For other layers, for which format is not given, the data should be collected as specified in Table – Details of Layer for Base Map.

ANNEXURE III: DETAILS OF THE LAYERS FOR BASE MAP

SI.No	Layer Name	Vector Representation	Data Source	Attribute Data	Remarks
1	Municipal Boundary	Polygon	Field Survey	ID ,ULB Name	Provided by concerned ULB
2	AOI boundary	Polygon	Field Survey	ULB Name	The Area of Interest (Aoi) is the present administrative area of the ULB plus the vicinity area of atleast 5 KM radial distance out side the ULB
3	Ward Boundary	Polygon	Field Survey	ID, Ward No, Zone No and Ward Name	Provided by concerned ULB
4	Zone Boundary	Polygon	Field Survey	ID, Zone No and Zone Name	Provided by concerned ULB
5	Tax Zone	Polygon	Field Survey	ID, Tax Zone No and Tax Zone Name	Provided by concerned ULB
6	Industrial Zone	Polygon	Field Survey	ID ,Locality	Provided by concerned ULB
7	Colony boundary	Polygon	Field Survey	ID, Ward No, Name	
8	Slum boundary	Polygon	Image & Field Survey	ID, Slum No, Locality	Provided by concerned ULB
9	Land Use/Plots	Polygon	Image & Field Survey	Parcel ID, Ward No, Locality/Colony Name, Road ID, Road Name, Land use, Land Use, Details, Construction Type, Remarks	Unique ID for each Land Use/Plots
10	Buildings	Polygon	Image & Field Survey	Parcel ID, Ward No, Locality/Colony Name, Road ID, Road Name, Land use, Land Use, Details, Construction Type, Remarks	Unique ID for each buildings/Plots
11	Streams/Drainage/ Canal	Double line	Image & Field Survey	ID, Type of water bodies	Canal, Drainage, River and Streams
12	Over Head Tanks	Polygon	Image & Field Survey	ID, Ward No., Locality, Road ID, Capacity, Status	
13	Landfill Site	Polygon	Image & Field Survey	ID, Road ID, Ward No, Locality	
14	DGPS Points	Point	Field Survey	ID, Latitude, Longitude, Height	
15	Sewerage Network/Drainage Network	Line	Field Survey	Sewerage Network ID, Road Name Locality Name, Construction Material	It should be marked in the field with the

SI.No	Layer Name	Vector Representation	Data Source	Attribute Data	Remarks
16	Manholes	Point	Field Survey	ID, Road ID, Ward No., Locality	help of ULB Staff of Water supply & Sewerage Department
17	Water Supply Network	line	Field Survey	Water Supply Network ID, Road Name, Locality Name, Distance From road in Misconstruction material, Remarks, Network Line type	
18	Vent Shaft	Point	Field Survey	ID, Road ID, Size, Ward No, Locality, Description, Status	
19	Hoardings	Point	Field Survey	ID, Road ID, Ward No.,Owned By, Locality Name, Hoarding Category, Hoarding Size, Location Status (Road Side/ On Building) (Authorized/Unauthorized),	
20	Drainage Pumping Station	point	Field Survey	ID, Road ID, Capacity, Ward, Locality, Description	
21	Water treatment plant	point	Field Survey	ID, Road ID, Capacity, Ward, Locality, Description	Pumping Station, and Treatment Plant data can be collected from concerned ULB
22	Fire Stations	Point	Field Survey	ID, Road ID, Capacity,	
23	Garbage Collection Points - Secondary	point	Field Survey	ID, Road ID, Ward, Locality, Garbage Type, Status, Coverage Area (No. of Houses/ Colonies)	Garbage Collection Points and Transfer Points
24	Slaughter House	point	Field Survey	ID, Road ID, Ward No, Locality	
25	Street Light	point	Field Survey	ID, Road ID, Ward No, Locality, Pole Type, SL Type, Source of Energy	
26	Bridges / Flyover	Line	Image & Field Survey	ID, Road ID, Ward No, Locality, Bridge type, Length, Width, Construction Material, Construction Year	Culverts, Fly over, all type of bridges
27	Parks/Garden	Polygon	Image & Field Survey	ID, Road ID, Ward No, Locality, Type, Name	Park, Garden, Zoological Park, Botanical Park
28	Tube Well	Point	Field Survey	ID, Road ID, Ward No, Locality, Description, Status	

SI.No	Layer Name	Vector Representation	Data Source	Attribute Data	Remarks
29	Hand Pump	Point	Field Survey	ID, Road ID, Ward No, Locality, Description, Status	
30	Community Toilet	Point	Field Survey	ID, Road ID, Ward No, Locality, Description, Status	
31	Cell Phone Tower	Point	Field Survey	ID, Road ID, Ward No, Locality, Road, Description, Status	
32	Water Pumping Stations	Point	Field Survey	ID, Road ID, Ward No, Locality, Description, Status	
33	Traffic Square	Point	Image & Field Survey	ID, Road ID, Name	
34	Railway	Line	Field Survey	ID, Type	Broad Gauge/Meter Gauge/.
35	Contours	Line	Field Survey	ID, Height	Generated at 1.0 metre interval
36	Power Supply Network	Line	Field Survey	ID, Type (11KVa/33 Kva)	
37	Electric Transformers	Point	Image & Field Survey	ID, Road_ID, Ward No., Location	
38	Landmarks	Point	Image & Field Survey	ID, Road ID, Ward, Locality, Type, Name, Description, Status	Major Hospitals, Govt. Buildings, Historical Monuments, Post Office, Police Stations, Major Industries, and Commercial Places, Electric Substations of 33 KVa or more, Telephone Exchange, etc. At least one Landmark should be marked at every 500 mts.

SI.No	Layer Name	Vector Representation	Data Source	Attribute Data	Remarks
39	Road Network	Line	Image & Field Survey	Road ID, Type, Road Median (Yes/No); Construction Material, Name, Carriage Way width, ROW width, Maintained By, Footpath Status, Footpath Width, Footpath material	
40	Carriage Way	Double Line	Image & Limited Field Survey	ID, Road ID, Width	
41	Footpath	Line	Image & Field Survey	ID, Type, Road ID, Construction Material, Width	
42	Sewage Treatment Plant and Sewage Pumping Station	Point	Field Survey	ID, Road ID, Type (STP/SPS) Capacity, Ward, Locality	
43	Trees	Point	Field Survey	ID, Ward No., Locality, Road ID, Parcel ID, Description	
44	Bus Shelters	Point	Field Survey	ID, Ward No., Locality, Road ID, Description	
45	Cadastral Map/Town Survey Maps	Polygon	Image, Top sheet & Field survey	ID, Khasra No.	

ANNEXURE IV: Cost Component

TENTATIVE ESTIMATE FOR GIS BASEMAP PREPARATION OF ULB'S PACKAGE WISE					
Sl. No.	Item Description	Units	Price per Unit [In Rupees]	Package/ Unit	Total (In Rs.)
1	Inception Report	Per SqKm			
2	Establishing Survey Control points for Georeferencing of Satellite Images	Per SqKm			
3	Georeferencing and Ortho Rectification of Satellite Images	Per SqKm			
4	Preparation of Line Maps in 2D form	Per SqKm			
5	Generation & Over lay of Contours(1.0 Mt. interval) and spot heights in 3D	Per SqKm			
6	Collection of Various Maps and Data from Govt./ Mpl. Agencies	Per SqKm			
7	Incorporation of Cadastral Information	Per SqKm			
8	Field Verification Survey	Per SqKm			
9	Preparation of Draft Base Map/check plots	Per SqKm			
10	Quality check on data submission, data security guidelines & data verification	Per SqKm			
11	Final Base Map Incorporating Feedback and Final Report	Per SqKm			
	Grand Total (in Crores)				
	Total Area (in Sq.Kms)				
	Cost per Sq.Kms				