Design, Development and Implementation
## Of
Web based GIS Application Along with GIS Database
At
Surat Municipal Corporation (SMC)

SGL

Introduction

- Surat Municipal Corporation (SMC) has designed, developed and implemented a Web based GIS application along with GIS database for better governance, improving operational efficiency and ease of interaction with citizens.
- SMC awarded this project to Antrix corporation, GoI and its partner Scanpoint Geomatics Ltd. (SGL)
- Project development duration was 18 months.
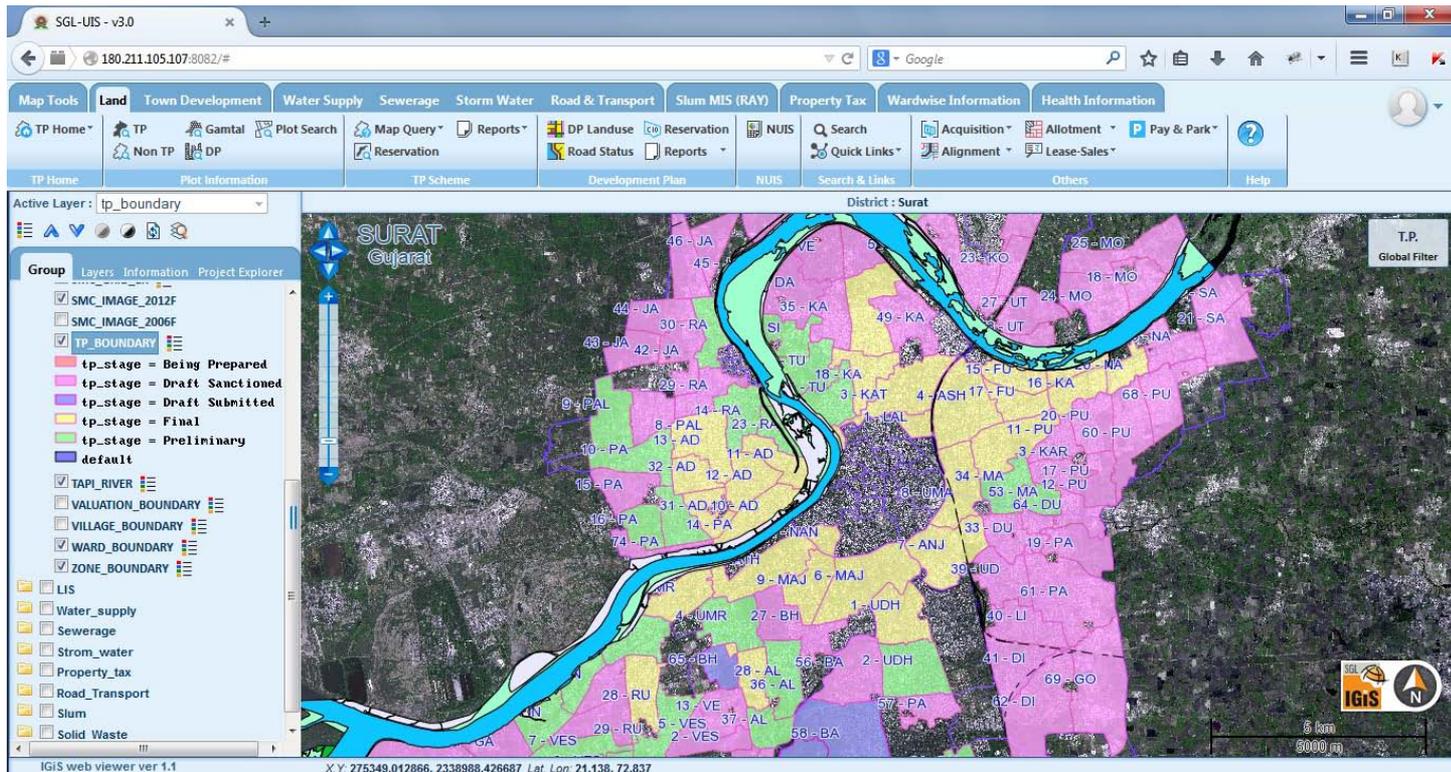
SMC Web GIS – Project Phases

1) **Design of the complete project:** SRS, Data Model, Bas Map creation & survey methodology

2) **Preparation of Geo-corrected Base Map:** SMC Area – 326.51 Sq. Km. Base map creation using 0.6 m Satellite Image in 1:5000 scale and Slum survey using DGPS/Total Station in 1:500 scale.

3) **Data Collection (Primary & Secondary):** Departmental data, Field survey for property verification.

4) **GIS Project Development:** Web GIS Application customization for Public use and SMC departments :
   Departments: Town planning, Town development, Hydraulic, Sewerage and storm water, Road and transport, Bridge, Slum , Property Tax etc...

5) **Testing, Installation & commissioning of GIS Project and Training:** The application was successfully deployed and training was conducted.

6) **Maintenance :** 3 Years of post implementation support to SMC by development agency.

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Standards followed for SMC GIS project implementation

- National Standards for Urban

  - Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

    (Formally known as JNNURM)

  - National urban information system (NUIS)

  - Rajiv aavas yojna (RAY)

- International GIS Standards

  - Open Geospatial Consortium (OGC) standards

    - Web map service (WMS)

    - Web coverage service (WCS)

    - Web features service (WFS)

    - Web processing service (WPS)

    - Catalog service for Web (CSW)

    - Simple Feature Access (SFA- OGC compliance schema for data storage)

    - Styled layer descriptor (SLD)

    - Geographic markup language (GML)

    - Key markup language (KML)

SMC Base Map Creation

SMC Base Map Specification

- Base map prepared for SMC area (326.51 sq km) in 1:5000 scales.

- Slum mapping in 1:500 scale

- **Layer Details**

  - More than 100 layers

    - Town Planning Department   : 36
    - Town Development   : 2
    - Property Tax Department   : 5
    - Road & Transport   : 19
    - Hydraulic Department   : 15
    - Drainage Department   : 7
    - Storm Water Department   : 4
    - Solid Waste Department   : 3
    - Slum Department   : 2
    - Birth Date   : 1

- **Projection Details**

  - Zone 43
  - UTM (Universal Transverse Mercator)
  - WGS84

- **AOI**
  - Upper-Left Lat. Long. – 21.3050 N, 72.6935 E
  - Lower-Right Lat. Long. – 21.0030 N, 73.0032 E

Input for Base Map

- Satellite Images (0.6m quick-bird) of year 2006 and 2012

- DGPS survey for GCP data collection

- DGPS/Total station survey for slum mapping

- Department existing maps: administrative boundary, TP schemes , utilities, Gamtal, village etc in hard copy and digital copy

- Department existing Tabular data: Form B/F, Plot Reservation and attributes of utilities etc.

- SMC existing e-governance applications data

Year - 2006

Year - 2012

GIS Data Model

- The GIS Data model of the application included all the relevant information of various departmental layers , type, attributes and source of the data.

Building Footprints

Landuse / Landcover

Utilities

Road Network

Final Plot

TP Boundary

Admin Boundary

Satellite Image
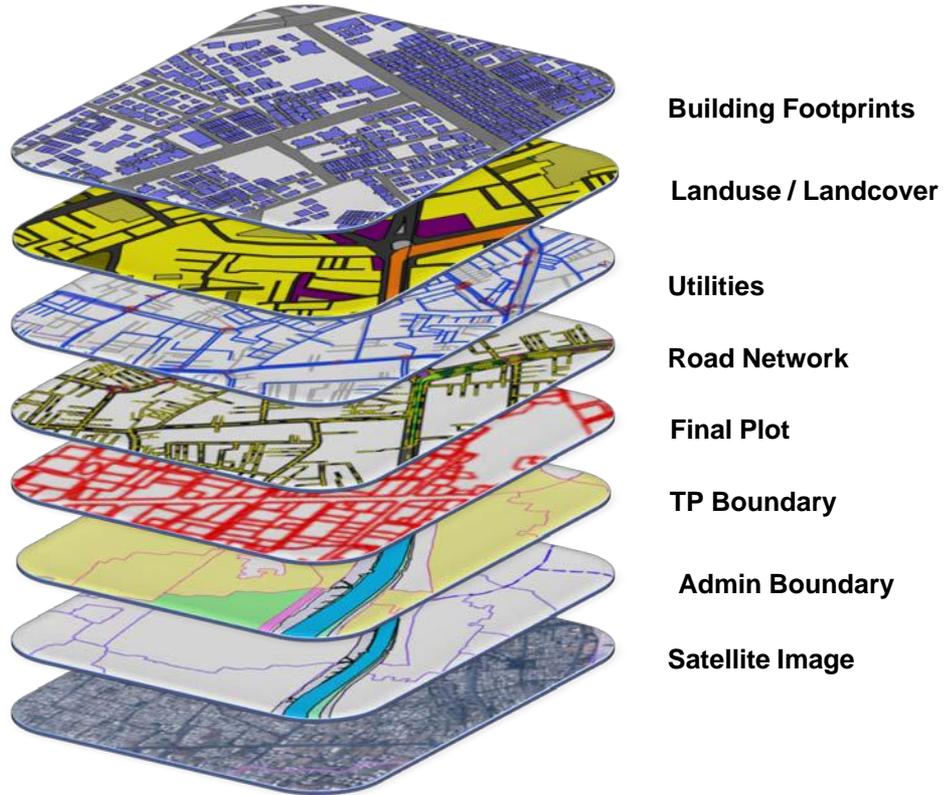
Slum Survey

Slum survey carried out as per RAY Guideline and prepared map in 1:500 scale.

Slum mapping carried out using,

- DGPS/Total station survey
- Integration of Socio-economic data

Slum map includes following details.

- Slum boundary
- Slum household boundary
- attributes details as per RAY
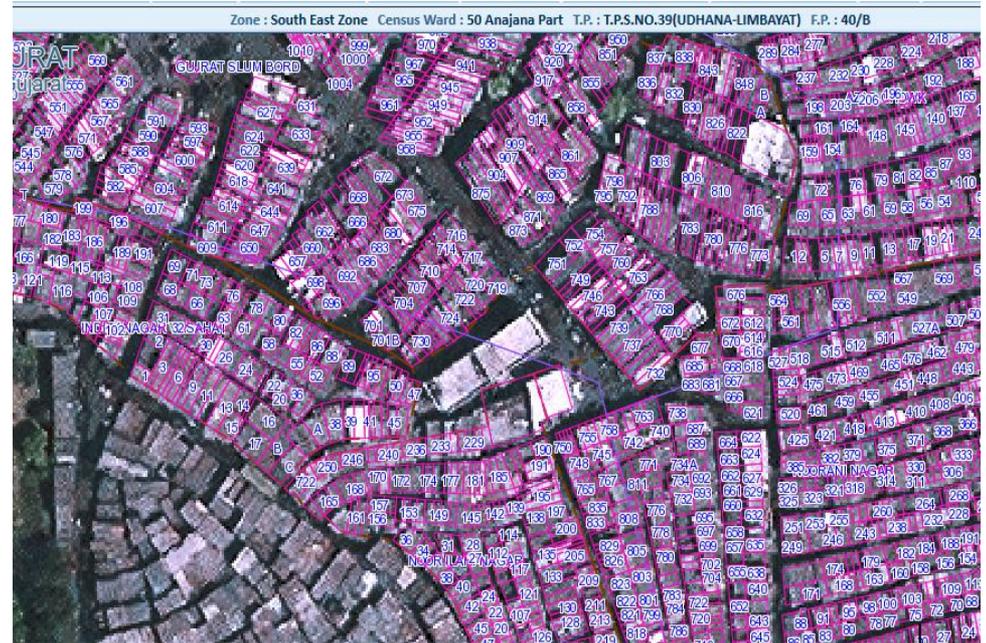
DGPS Survey

GCP points collection using DGPS by taking 72 hrs. observation for each point.

GCP Points for Geo-referencing
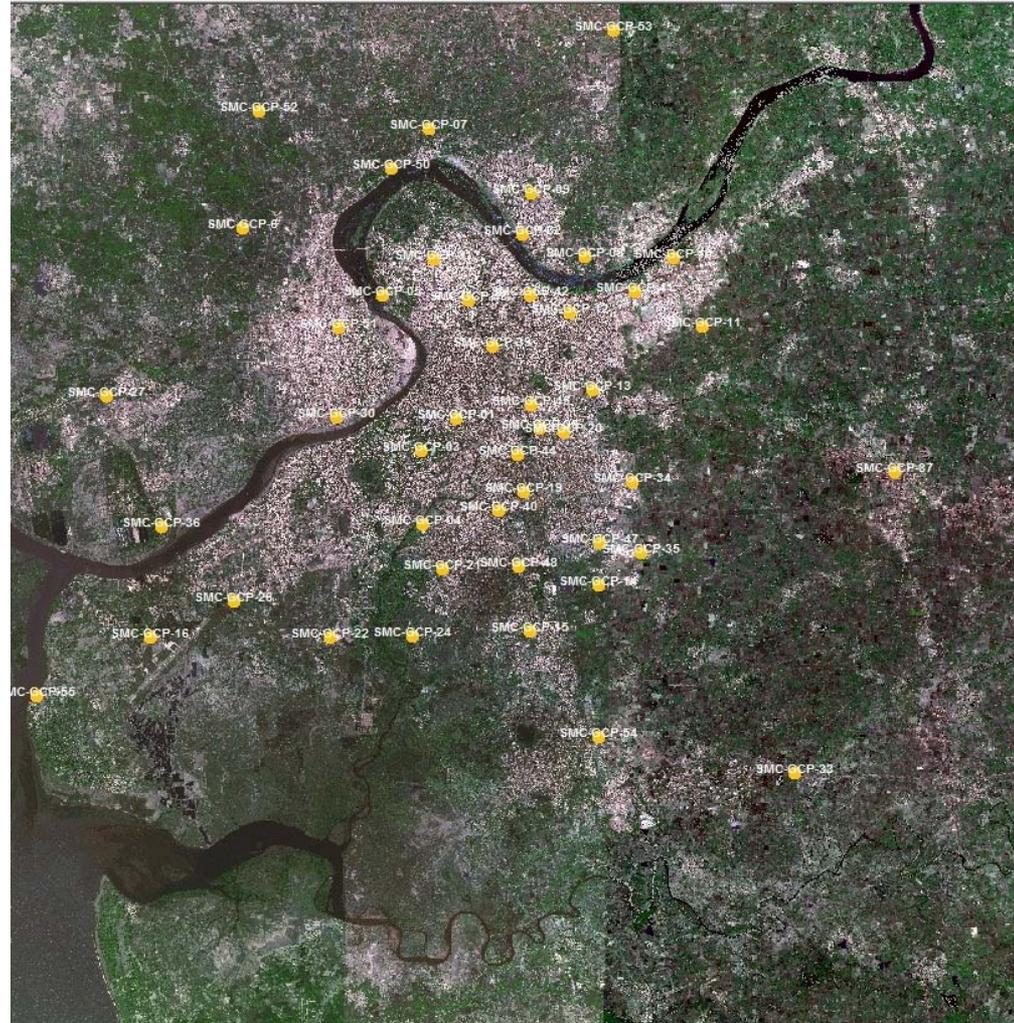
SMC Final Base Map

Geo-referenced Base map contained,

- ✓ Administrative boundary
- ✓ TP scheme data
- ✓ Landuse data
- ✓ Properties
- ✓ Water Supply
- ✓ Sewerage System
- ✓ Storm Water
- ✓ Drainage System,
- ✓ Road Network
- ✓ Electric poles
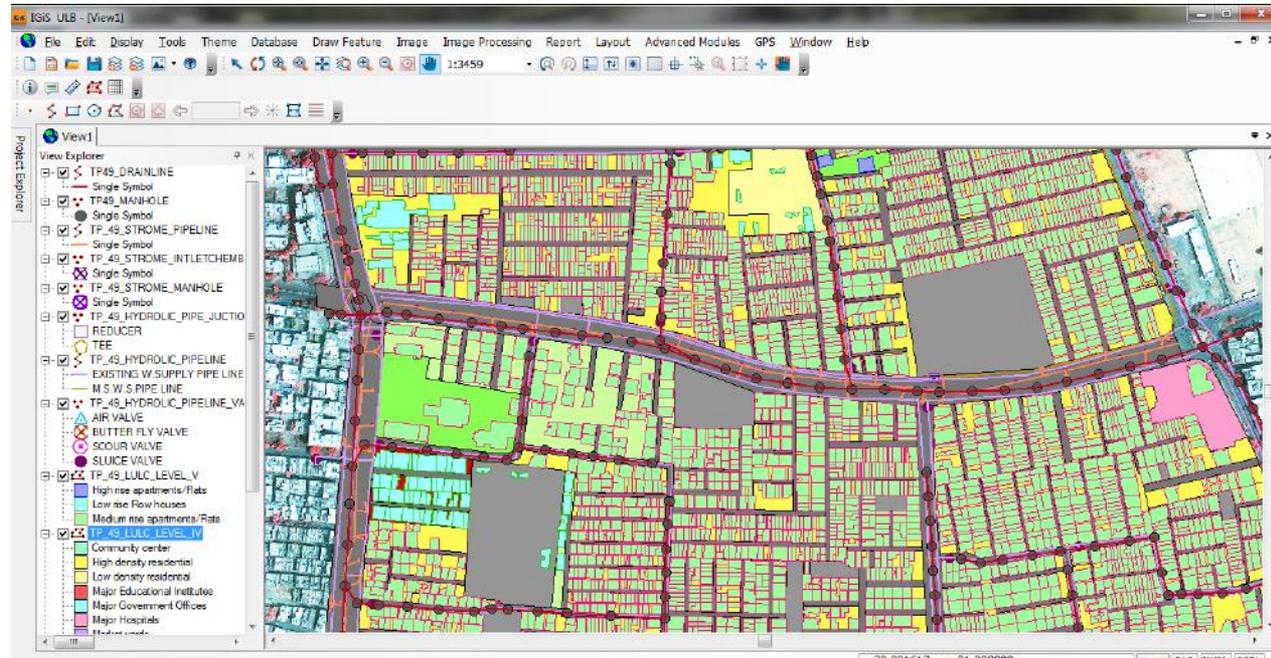
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SMC Web Based GIS Application

Web GIS Application Interface

The SMC Web GIS application is mainly classified in two types of interfaces.

A. Citizen Interface: It consists limited access rights with User Friendly Interface.

- Key features of citizen interface are,
    - Plot Search – by Final Plot, Original Plot and Survey Plot
    - Admin Boundary information
    - Form B/F - Owner information and valuation information
    - Part-print - Plot print with required layers and information
    - Building permission
    - Search – Predefine queries

B. SMC Departmental Interface : It consists various functionalities of different department users of SMC.

- Following are the list of the departments
    - Town planning
    - Building permission
    - Property tax
    - Water supply
    - Sewerage
    - Storm water
    - Road and transportation
    - Bridge
    - Slum

SMC GIS : **Citizen Interface**
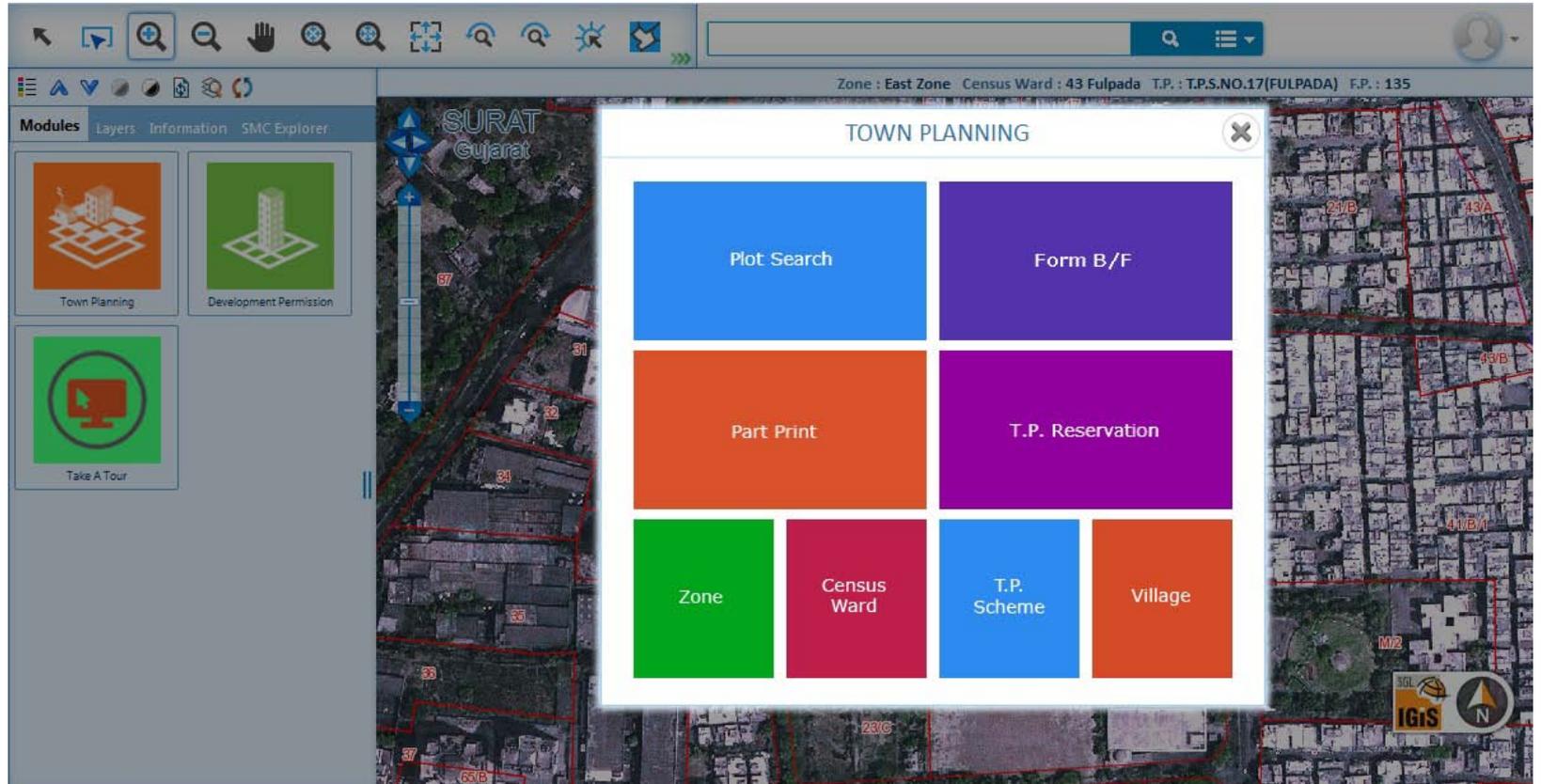
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SMC GIS: **Departmental Interface**

SMC Web GIS Application Modules

Major modules of GIS based software solution for Urban Development are as follows:

- Land Information System
    - Land (Town Planning)
    - Town Development (Building permission)
- Property Tax
- Utility
    - Water Supply
    - Sewerage
    - Storm Water
    - Road and Transportation
- Slum (As per Rajiv Awas Yojana (RAY) guideline)

- Public Health
- Shops and establishment
- Citizen Interface

SMC Web Based GIS Application Real Screens

Land Information System (LIS)

LIS modules includes all the functions and data related to the town planning department.

Key Features.

- ✓ TP and Development Plan details
- ✓ Plot level Information
- ✓ Part-print generation
- ✓ Form B/F report generation
- ✓ Reservation details
- ✓ Landuse details
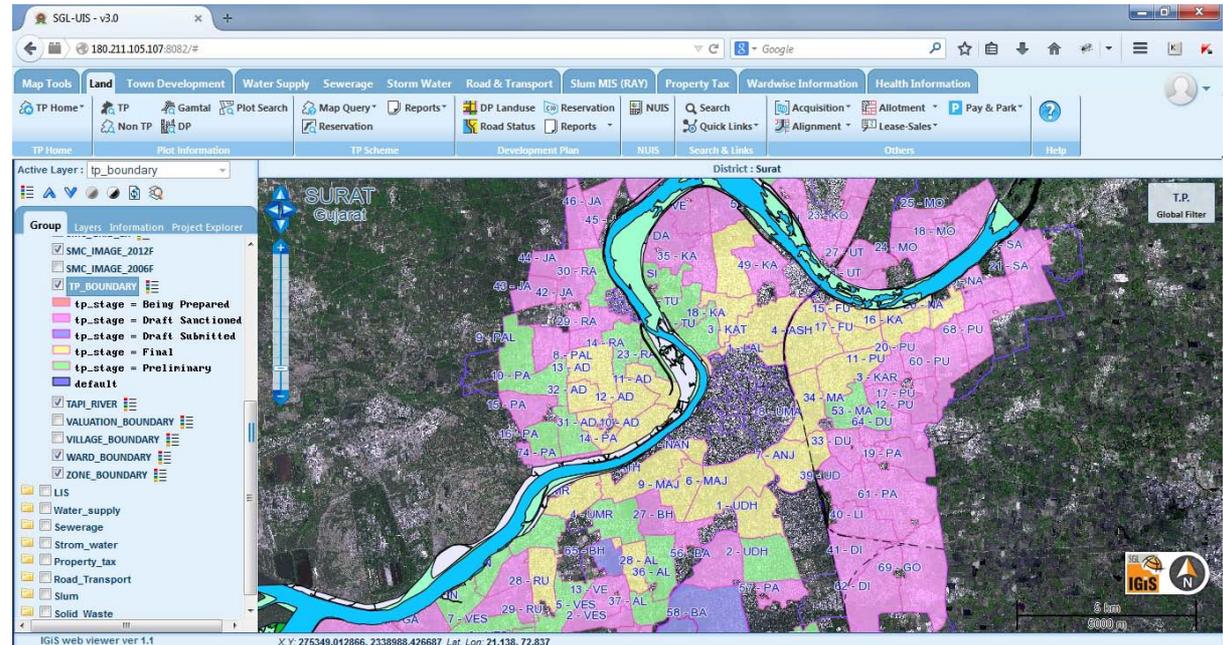
Land Information System (LIS)

Map of Development Plan

Land Information System (LIS)

Part-print report
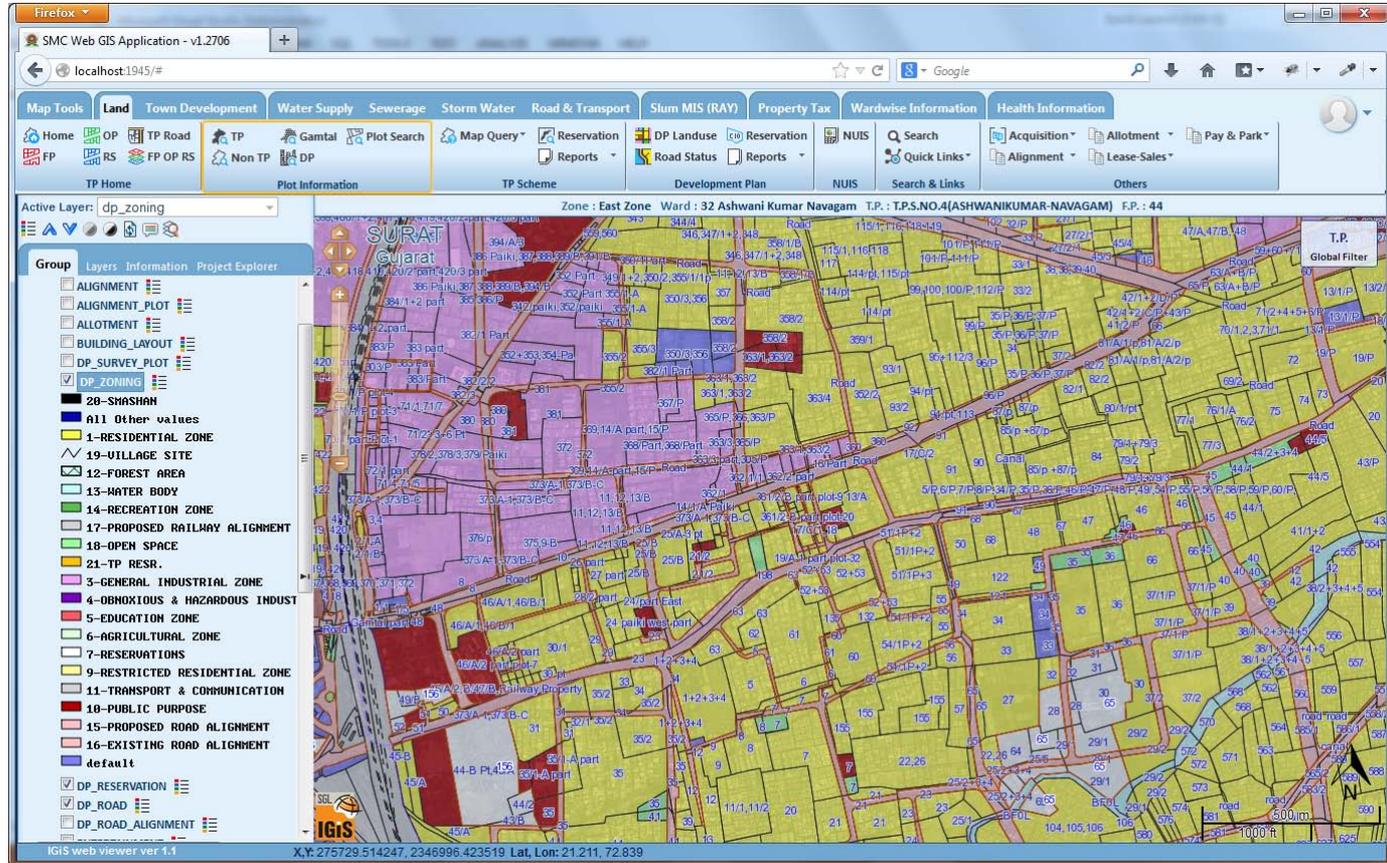
Land Information System (LIS)

Form B/F report

FORM - F
THE GUJARAT TOWN PLANNING & URBAN DEVELOPMENT ACT, 1976
Draft Sanctioned - T.P.S.NO.49(KATARGAM)
(SEE RULE 21 & 35)
REDISTRIBUTION AND VALUATION STATEMENT

Town Development (Building Permission)

GIS data integration with building permission details. It includes the project details, technical details, building details, B.U.C. details.

Property Tax

Property Tax modules includes the Property and Owner details. It facilitated to execute Map queries and generate reports.

Key Features.

- ✓ Property Identification
- ✓ Owner details with Tax information
- ✓ Map query and Report generation through various criteria

Property Tax

Popup shows the property attributes.

Road and Transportation

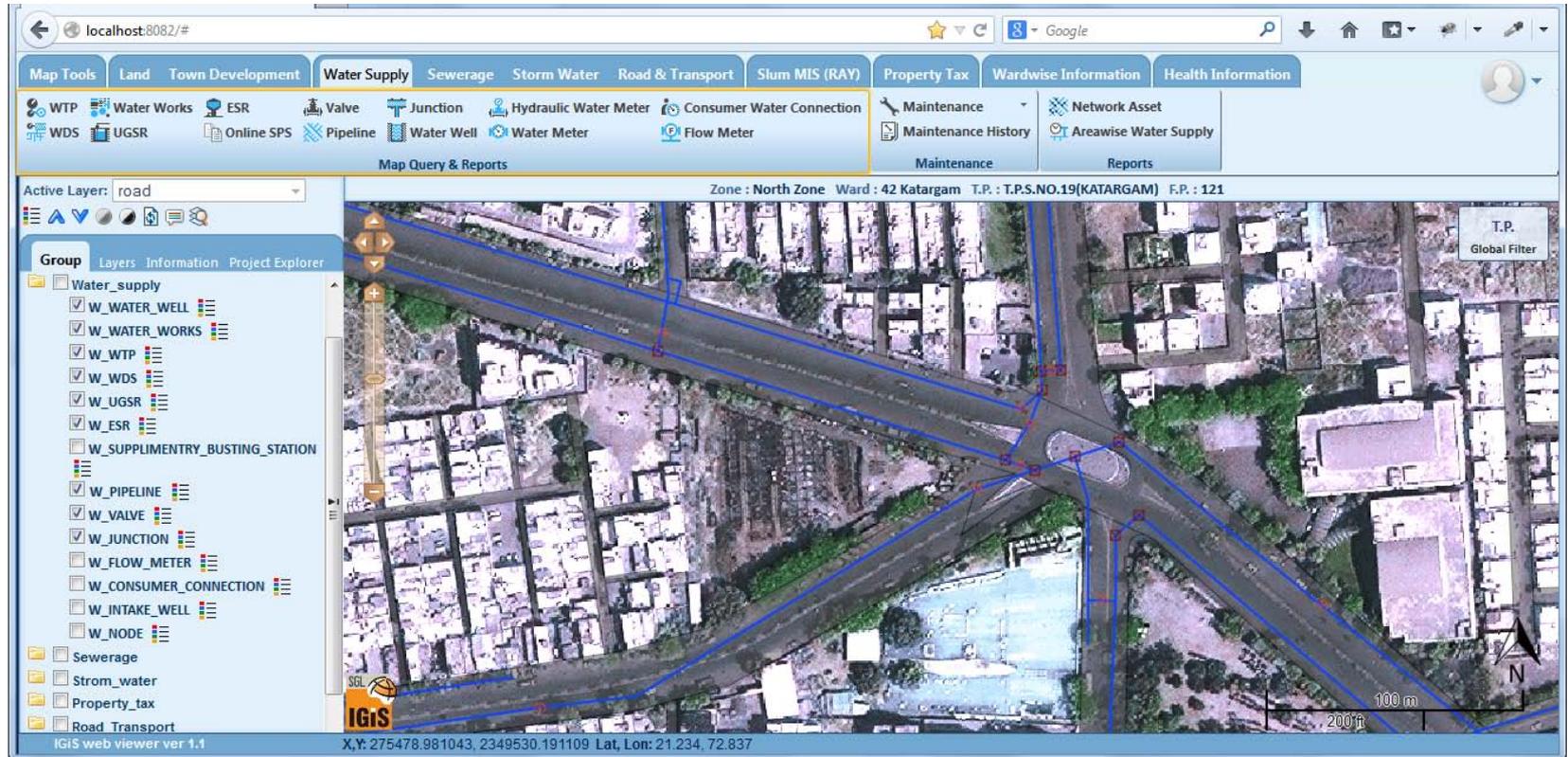Road and transportation module contains the details of road network like road, bridge, traffic island, etc.
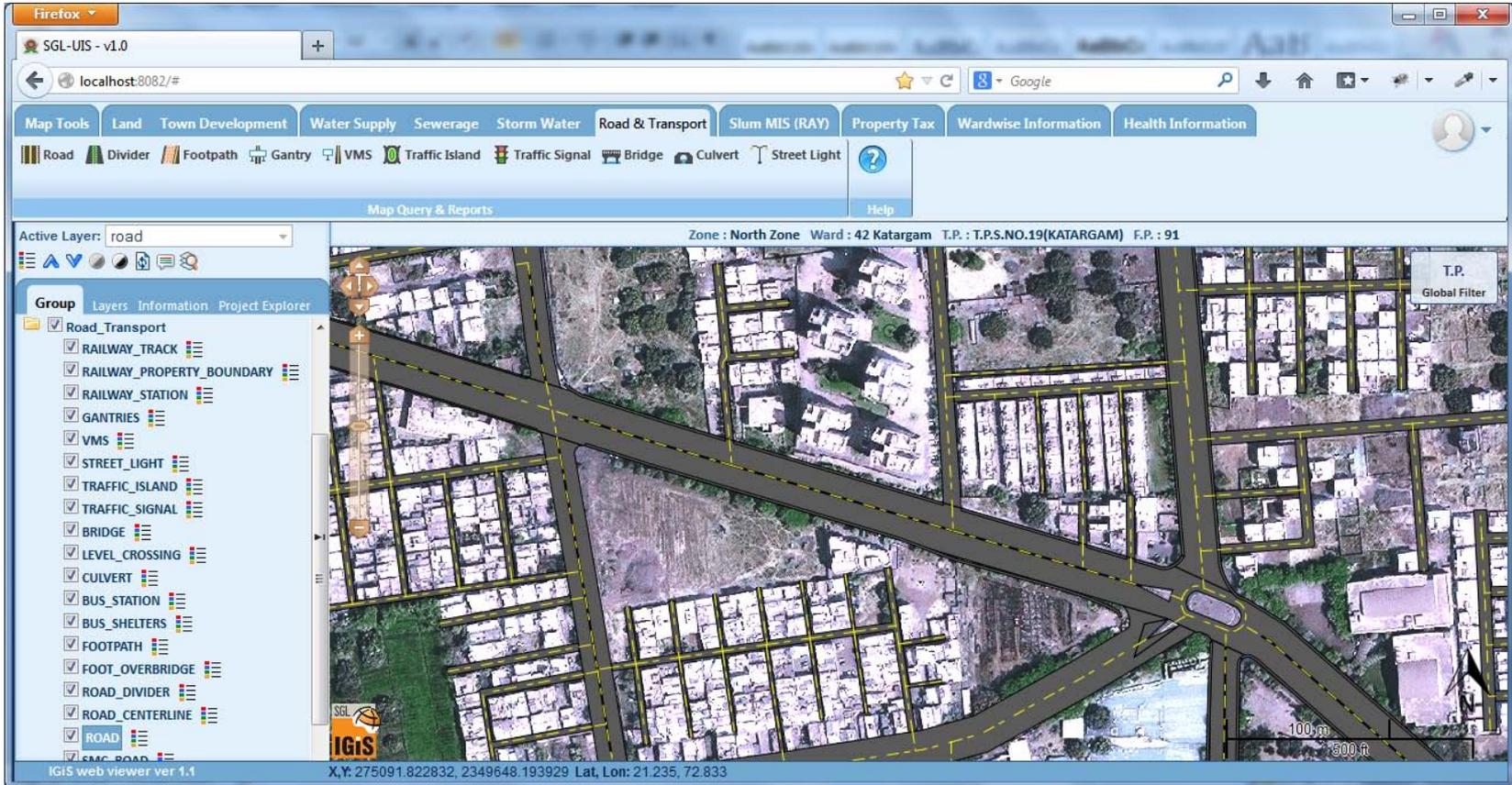
Water Supply

Water supply module contains the details of water network like water treatment plant, pipeline, valve. etc.

Sewerage

Sewerage module contains the details of sewerage network like sewerage pumping station, pipeline, STP, etc.

Storm Water

Storm water module contains the details of storm network like pipeline, manhole, inlet chambers etc.

Slum MIS

Slum MIS module contains the slum maps and socio-economic details. It facilitated to execute map query and generate various reports.

Citizen Interface

The citizen interface provides access to public user of some functionalities defined by SMC from 3rd January -2015.

Key Features

Plot Search

Form B/F Report

Part-print generation

Building permission details

    Project details

    Technical details

    Building details

    COP and parking area

    BUC details

Search

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Citizen centric facility

✓ SMC started to provides Form B/F Reports and Part-print from its Civic Center to citizen

SMC Web GIS Application launch event

SMC Web GIS Application was launched by former **Hon. C.M. of Gujarat Smt. Anandiben Patel** on 3rd January – 2015.

SMC Smart City Centre

Recently added new GIS Services

After successful completion and go-live of the web based GIS application, the department has added new services for public domain to enhance the public facility using implemented GIS system.

1. Health Monitoring : Dynamic Health Heat Map overlay on GIS system of Surat area

2. Building permission information for citizen

3. B.U.C. (Building Usage Certificate) issued details

Future SMC GIS Mobile App
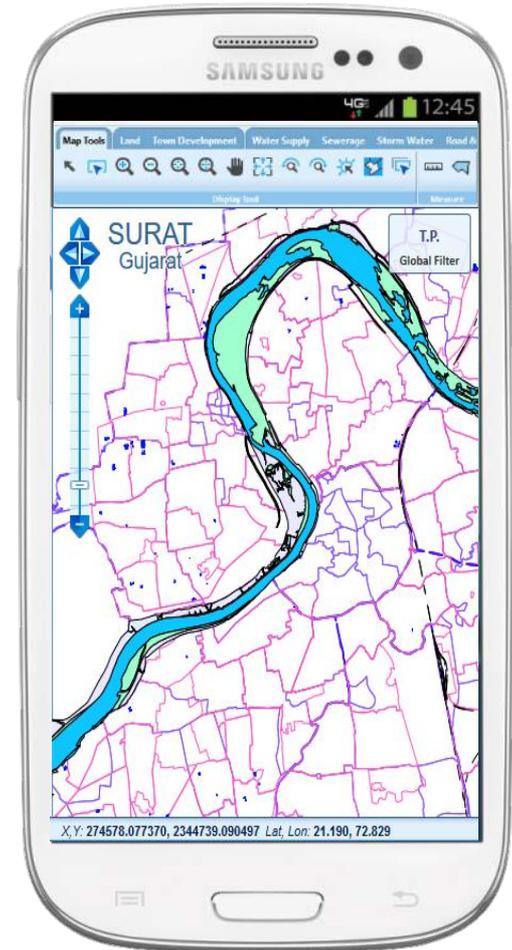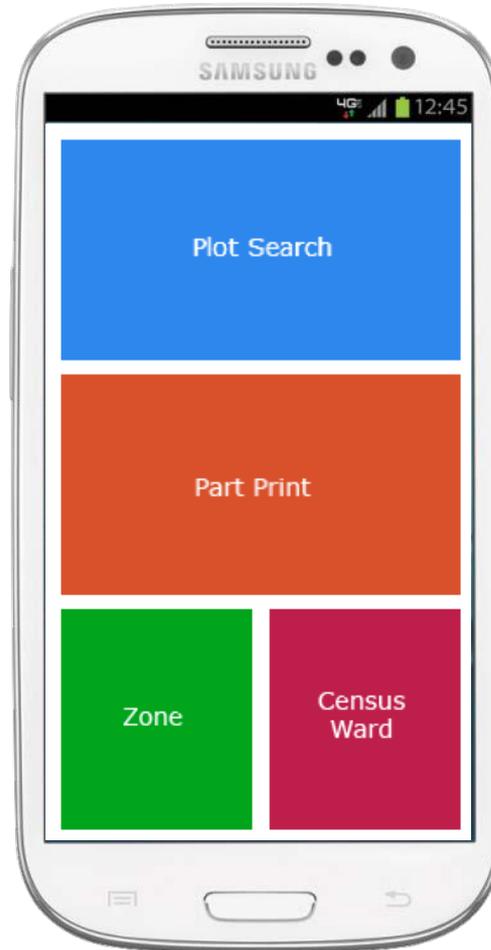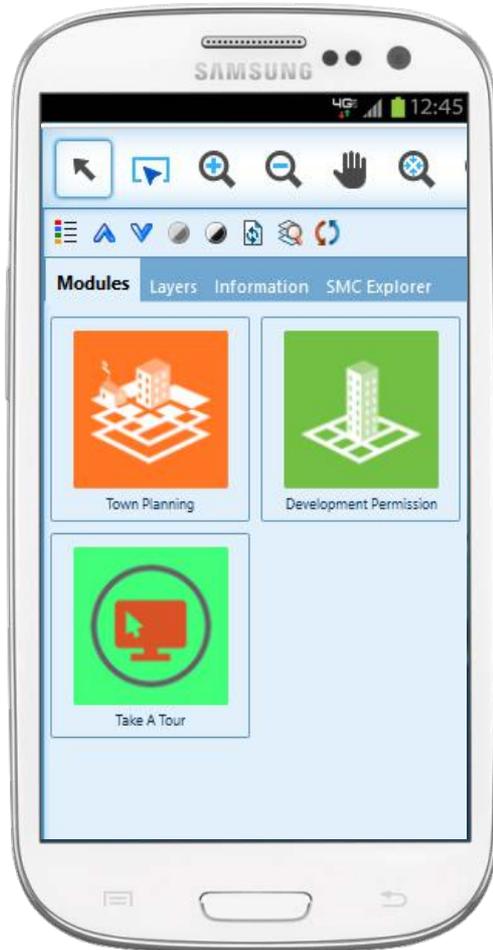
Benefits

1. Paper less Governance

2. Improved Asset Management And Decision Making

3. Improved revenue realization

   - Geographical representation of Tax defaulters

   - All departmental tax details in one geographical entity

4. Efficient Planning and Decision Making

   - Master Plan Creation

   - Urban Sprawl Study

5. Central Repository for all department

6. Grievance Management

Tangible Achievement

✓ Single geo-referenced map for all department.

✓ Centralized GIS system for successful governance

✓ Efficient revenue generation by identifying the un-assessed property using satellite Image

✓ Improves Urban Planning using GIS system

✓ On click Map related information for citizens and departments

✓ Citizen can get authorize plot map information and building permission using internet which saves time and money.

✓ Minimize dependency among the departments using centralized Geo-referenced base map.

✓ GIS map can be access by other external department using OGC web services.

✓ Geo-referenced Map enables monitoring of real time data capturing form ground using GPS/Mobile technology.

Future Plan

✓ Yearly procurement of satellite image and timely updation of property map and other layers.

✓ Implemented GIS system will be integrated with other systems like SCADA.

✓ Integration of SMC mobile apps to support day to day activities of SMC officials.

✓ SMC GIS maps provide through secured service to legal department, bank, insurance agency and other authority.

✓ Implementation of Health mapping and monitoring system through details of vector bone dieses.

✓ New Property ward scheme shall be developed from the property linked base map

✓ Integration of street light pole complaint management system and Energy consumption map.

✓ SMC GIS maps provide through secured service to legal department, bank, insurance agency and other authority.

✓ Implementation of Health mapping and monitoring system through details of vector bone dieses.

✓ Integration of Tree mapping along with attributes detail

Future Plan

- ✓ New Property ward scheme shall be developed from the property linked base map

- ✓ Integration of street light pole complaint management system and Energy consumption map.

- ✓ A recovery status map can be prepared with property details.

- ✓ Vehicle tracking system for Solid Waste Management

- ✓ integrated and highlight the illegal constructions/activities.

- ✓ Highlight the fire incidences on base map.

- ✓ Identify illegal boards and hoardings in city by enforcement team.

- ✓ Water Supply connections to be integrated with property map data.

- ✓ Solid Waste Management system for mapping and track of container pickup.

- ✓ Integration of detailed attribute information of Anudan Society.

- ✓ Integration of Pay & park map with complaint management system.

- ✓ Integration of RTO data of vehicle owners with tenement and cell phone.

- ✓ Prepare inundation GIS map and generate flood alert system.

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SMC GIS developed using Indigenous technology

- SMC Web GIS application has been developed using indigenous technology IGiS (Integrated GIS and Image Processing Software) Developed by ISRO GOI jointly with SGL.

Thank You