Role of Geospatial Technology in Road Infrastructure Management

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By
Raj Mallela
Managing Director, SATRA

rajm@satragroup.in
Outline

• Company Background
• Focus Areas
• Role of Geospatial in Roads/Highways
  – Trends in Road Sector
  – Usage of Geospatial Technology
Our Group Companies

Started in 2008 in India

SECTORS
- Highways
- Bridges
- Mining
- Power
- PPP
- Rail
- Urban
- Water
- Environment
- Social
- Information Technology
- Government & Institution

Our Group
- SATRA Infrastructure Management Services Pvt Ltd, India
- SATRA Agri Tech Pvt Ltd, India
- SATRA Greenagro Infrastructure Pvt Ltd, India
- HIMS Ltd, New Zealand
- SATRA Infrastructure Zambia Ltd, Zambia

Our Presence
SATRA - Company Background

Proving both Services and Solutions

Parent Companies from New Zealand – Data Collection Limited and HIMS Limited

Providing consulting services in

- Engineering (Roads / Highways)
- IT
- Asset Management
- GIS

Unparalleled experience in Asset Management
Our Solutions

ROMDAS – Geospatial Data Collection Equipment used in over 70 Countries

HIMS – GIS based Road Asset Management System used in over 15 Countries

PROMAN – Web based comprehensive Project/Contract Management System

NODEM – Optimised Decision Making System used in New Zealand and Australia

S-BIND – Web based end to end solution for monitoring and managing Contracts

safeT – Web and Mobile based Grievance Registration and Redressal Solution
Road Management System ~ 3,60,000 km

- **Serbia**: 2008-09, 20,000 km
- **MORTH/NHAI**: Ongoing, 100,000 km
- **Gujarat**: 2003-06, 70,000 km
- **Karnataka**: 2015-16, 60,000 km
- **Zambia**: 2008-09, 41,000 km
- **Cambodia**: 2003-05, 12,000 km
- **China**: 2007, 1,200 km; 2008, 3,000 km
- **Papua New Guinea**: 2004-05 & 2012-13, 2,000 Bridges & 12,000 km roads
- **Sri Lanka**: 2006, 10,000 km; 2014-15, 12,000 km
- **Mozambique**: 2011-16, 30,000 km
- **Samoa**: 2001-02, 1,000 km

**Funding Sources**
- World Bank
- Asian Development Bank
- European Union
Network Level Data Collection ~ 2,85,000 km
## Typical Engineering Projects

<table>
<thead>
<tr>
<th>Project Description</th>
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<tbody>
<tr>
<td>DPR for Construction of New Bridge Parallel to Mahatma Gandhi Setu, Bihar, India</td>
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<tr>
<td>DPR for VCIC Connecting Roads, India (415 km)</td>
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<tr>
<td>Detailed Engineering Design and Tender Document Preparation, Zambia (600 km)</td>
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<tr>
<td>Construction Supervision Item Rate Contracts, KSHIP, Karnataka, India</td>
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</tbody>
</table>
Digital India Land Records Modernization Programme, Madhya Pradesh, India

Assists GoMP to maintain and update records, maps, survey and settlement operations in a hassle-free single window system

Creation of Land Records in the State of MP over 300,000 sq km area, covering all 51 Districts

GCN - Employed 250 DGPS Receivers and established over 300,000 GCPs

Ortho-rectified High Resolution Satellite Images (HRSI) used for preparation of Land Parcel Maps
GIS based National Address Database, Zambia

Helps Zambia Information and Communications Technology Authority (ZICTA) to implement ICT Act, Postal Services Act and Electronic and Communications Transactions (ECT) Act of Zambia

GIS based application provides a common platform to City Council, Utility departments, Postal department and other communication departments
GIS based Materials Database, Zambia

Material Database to keep updated information on the natural sources of road construction materials throughout the country

The Material Data bank will capture
- Location of Borrow area, Sand and Quarries
- Material test results
Dholera Special Investment Region (DSIR) is the first investment region to be implemented under Delhi-Mumbai Industrial Corridor (DMIC) project

A new Greenfield industrial hub located about 100 km south of Ahmedabad in Gujarat

Total city area – 580 sqkm; initial activation area – 22.5 km
Role of Geospatial in Roads/Highways
Use of Geospatial Technology in Road Sector

- Network Planning and Alignment Selections
- Engineering Design
- Road Construction
- Operation & Maintenance (Road Asset Maintenance and Management)
Recent Trends in Road Sector

• Moving from Linear Chainage to Spatial Referencing

• Real time information
  – Project progress
  – Complaints and Grievances

• Use of Latest Geospatial technologies
  – Mobile Mapping Systems (similar to Google Street view)
  – HR Satellite / Ariel Images
  – LiDAR
  – Unmanned Aerial Vehicles (UAVs)/Drones
GIS based RAMS for National Highways
Pilot Study - Geospatial Technologies

- Conducted a pilot study on usage of various Geospatial technologies in Asset Management over 100 km of Hyderabad – Vijayawada section
  - Conventional System
  - MMS
  - Mobile LiDAR
  - UAV
NHAI Signed MOU in January 2016

NHAI signs MoU with ISRO and NECTAR for use of spatial technology for monitoring national highways

NHAI has signed Memorandum of Understanding with National Remote Sensing Centre (NRSC) under Indian Space Research Organization (ISRO) and North East Centre for Technology Application and Research (NECTAR) for use of spatial technology for monitoring and managing national highways.

The use of satellite data and geospatial technology will be useful in providing inputs in highway and infrastructure projects for preparation of DPR (Detailed Project Report), prefeasibility status in new alignment, upgrade/road widening, monitoring of road segments under construction and Road Asset Management System.

ALSO READ
Isro signs MoU with Russian space agency for use of outer
## Usage of Geospatial Technologies

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Technology</th>
<th>Applications</th>
</tr>
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</table>
| 1.     | High Resolution Satellite Images (HRSI) and Aerial Images | • Strategic Planning and Feasibility studies  
• Network Analysis and Bypasses Alignments  
• Hydrological Studies  
• Land use pattern  
• Environmental Impact Assessment (EIA)  
• Forest/Wildlife Clearance Proposals  
• RoW selection, Land Acquisition and Encroachments Monitoring  
• Periodic Monitoring of Construction Progress |
| 2.     | LiDAR and Terrestrial Scanners                  | • Infrastructure Assets planning  
• Asset Mapping and Inventory  
• Condition Monitoring  
• DEM and Topographic Data |
## Usage of Geospatial Technologies

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| 3.     | Unmanned Aerial Vehicles (UAVs)/Drones | • Corridor Infrastructure Planning  
         |           | • Asset Inventory and Monitoring  
         |           | • Operation and Maintenance Supervision  
         |           | • Periodic Monitoring of Construction Progress |
| 4.     | Differential Global Positioning System (DGPS) receivers | • Geo-tagging of Infrastructure Assets  
         |           | • Geographical co-ordinates of Road Alignment  
         |           | • Topographic Data for Detailed Design |
| 5.     | Geographical Information System (GIS) Applications | • GIS based Road Network Maps  
         |           | • Spatial Analysis  
         |           | • Road Information System (RIS) and Other Map based Analysis |
Thank You!

Contact us: info@satragroup.in