Geographical Information System (GIS) based Road Information System (RIS)

by

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To establish a database of roads and bridges for planning, prioritizing works for upgradation/maintenance.

Information to be available at a Central location and to all simultaneously, instead of collecting from diverse sources when needed.

Quick exchange of map data and facility to view query results on the map to help taking decisions quickly.

To leverage the advances in IT for developing better management solutions for road network.
It is a GIS based system consisting of:

- Spatial Data
- Non-spatial / Attribute data
- Customized tools for
  - Updating data
  - Querying
  - Report Generation
RIS is developed in a phased manner

- Pilot project (1999)
- Digitisation of 175 taluks & capturing spatial data (2000)
- Collection and authentication of non-spatial data (2000)
- Development of customised software for data entry screens & standard query tools for spatial and non-spatial data (2001)
Development of RIS in KPWD ...

- Enhancement of RIS to include Road/Bridge Condition Survey data and corresponding tools for the analysis of data (2003)
- Developing WebRIS to put on the Internet (2006)
- Decentralising data updation to be done at Division level (2007 planned)
Scope of RIS Project

- Data Collection
- Data Capturing
  - Spatial
  - Non spatial
- Data Modeling
- Database Design
- Data Integration
- Customization
  - Data updation tools
  - Security features
  - Query tools
  - Report Generation
Technology used for RIS

- GIS Engine: MicroStation V8 GeoGraphics
- Database: ORACLE 8i
- Developmental Tools: Visual Basic and MicroStation Development Language (MDL)
Statistics about RIS

- Total road length about 1,40,000 km digitised along with digitising administrative boundaries, rivers, streams, tanks and other water bodies.
- Attribute information attached only to PWD road network of about 48,000km.
- Yearwise finance details, work details, condition details, traffic details attached to the road network.
- Rs.90 lakh (approx.) spent for digitisation, database setup, data updation and for spreading RIS upto Circle offices.
Data in RIS

- Road Network Data
- Administrative Boundaries Data
- Cross Drainage / Bridge Data
- Condition Data of Pavement Surface/ Bridge Structure
- Expenditure Data
- Traffic Data
- Village and Population Data
- Soil / Rainfall Information
- Image/ Video Data
Data collection

- Road network data is collected from the field staff.
- Road surface condition data is collected for
  - a) roughness using VMBI- ROMDAS system and
  - b) distress condition by visual observation
- Bridge condition data reported by the field staff
- Expenditure data from Division offices
- Traffic data is collected independently once in a year at permanent count posts on PWD road network.
- CBR value of subgrade soil is tested at every kilometer
- GPS to be used to verify the existing road alignments/ to add new alignments
Using RIS at different Levels

Principal Secretary / Secretary

Chief Engineers

Superintending Engineers

Executive Engineers

- Dynamic Data Updation
- Data Import and Export
- Preparing proposals of works

Overall Review

Review & Planning

Programming
Future planned uses

- Web enabling RIS to provide information to general public
- Decentralization of data updation and utilization
- Building Interface with Accounting software/ e-procurement system
- Evolve into RMMS (Road Maintenance Management System) using results from HDM-IV analysis
BENEFITS OF USING RIS

*Querying & Report generation* customised for department needs.

*Decision making* made easier as customised tools are made available on the desktop.

*System is flexible* and any additional information/layer can be added like LIS (Land Information System).

*Land Acquisition* process for expansion of existing road network or laying of new roads can be made easy by incorporating cadastral data (Land Information System) and integrating the same with the Road Information System.

*Network & Topology Analysis* features of GIS in combination of RIS data can be used to find shortest paths, radial search, generating buffer zones, overlay analysis etc.
Example of RIS use

- Strategic Options Study of State Highways (excluding the roads developed under KSHIP and KRDCL) was done in-house using RIS.

- A node-link map was generated and the links were studied for strategic options mainly based on volume/capacity ratio (considering classified traffic volume).

- Prioritisation using strategic options resulted in selection of about 4000 km out of 13,000 km.

- ARCTS data is to be used for preparing the budget estimate for the forthcoming year.
Screen views of RIS
Customized Data Updation / Entry screens in RIS

Road Information / Details updation screen

Road Details

State: Karnataka
District: Bangalore
Toll: Anekal
Category: SH

MR Link: 1310003
Road ID: ANK3
Road Name: SH 135 SiddeGhat to State Border Road via Hoskote, Anekal

Road Origin: Hessungalankhalli
Road Destination: Sokur
Total Road Length (in Km): 33.00
Link Start Chainage (in Km): 20.00
Link Length (in Km): 33.00

Remarks: 0.6 Km overlapping not considered

Attach  View Information

Add  Edit  Remove

Update

Road 2 of 2
Customised Query tools to Display

- Roads Category Wise
- CD Types
- Villages by Population
- Roads by Surface Types
- Roads by Width of the Road
- Roads by Finance Schemes
- Barchart details for Roads
- International Roughness Index
- Visual Road Condition categorywise
- Traffic Intensity

And many more . . .
# Cross Drainage Conditions Report

**Division:** Bangalore  
**Sub-Division:** Anekal  
**Year:** 1999-2000

## Road Details

<table>
<thead>
<tr>
<th>Road Name</th>
<th>SH 83A Bangalore Anekal Bannerghatta Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Road Length (in km)</td>
<td>48.00</td>
</tr>
<tr>
<td>Road Origin</td>
<td>Kaikere</td>
</tr>
<tr>
<td>Road Destination</td>
<td>Guddanahalli</td>
</tr>
<tr>
<td>Start Chainage (in km)</td>
<td>16.00</td>
</tr>
<tr>
<td>End Chainage (in km)</td>
<td>48.00</td>
</tr>
</tbody>
</table>

## Cross Drainage Conditions

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Location (in km)</th>
<th>Bridge No.</th>
<th>CD Type</th>
<th>Stream Name</th>
<th>Date of Inspection</th>
<th>Date of Next Inspection</th>
<th>Sub Structure</th>
<th>CONDITIONS</th>
<th>Super Structure</th>
<th>Bearing</th>
<th>Amount (Rs. in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.20</td>
<td>17/1</td>
<td>Hume Pipe Culvert</td>
<td>Local Nala</td>
<td>06.05.00</td>
<td>06.11.00</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Not Available</td>
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<td>2</td>
<td>15.60</td>
<td>17/2</td>
<td>RCC Slab Culvert/Bridge</td>
<td>Local Nala</td>
<td>06.05.00</td>
<td>06.11.00</td>
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<td>Good</td>
<td>Good</td>
<td>Not Available</td>
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</tr>
<tr>
<td>3</td>
<td>18.00</td>
<td>19/1</td>
<td>Hume Pipe Culvert</td>
<td>Local Nala</td>
<td>06.05.00</td>
<td>06.11.00</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Not Available</td>
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</tr>
<tr>
<td>4</td>
<td>19.40</td>
<td>20/1</td>
<td>RCC Slab Culvert/Bridge</td>
<td>Local Nala</td>
<td>06.05.00</td>
<td>06.11.00</td>
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<td>Good</td>
<td>Good</td>
<td>Not Available</td>
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</tr>
<tr>
<td>5</td>
<td>20.00</td>
<td>21/1</td>
<td>BS Slab culvert</td>
<td>Local Nala</td>
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<td>06.11.00</td>
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<td>Good</td>
<td>Not Available</td>
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</tr>
<tr>
<td>6</td>
<td>21.90</td>
<td>22/1</td>
<td>BS Slab culvert</td>
<td>Local Nala</td>
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<td>06.11.00</td>
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</tr>
<tr>
<td>7</td>
<td>22.50</td>
<td>23/1</td>
<td>BS Slab culvert</td>
<td>Local Nala</td>
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<td>06.11.00</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Not Available</td>
<td>0.00</td>
</tr>
</tbody>
</table>
DISPLAY ROADS BY FINANCE SCHEMES
DISPLAYING ATTACHED PHOTOS/VIDEOS
Querying on Visual Road Condition (Severity)
Query results – severity condition

Road Severity: [description]
Queried Length: 6.8 Kms. (4.33X)
Selected Parameters:
- Edge Break: Poor
- Cracking: Poor
- Rut Depth: Poor
Dynamic display of information
Thank you