AWARDS SCHEME FOR EXEMPLARY IMPLEMENTATION OF e-GOVERNANCE INITIATIVES

III.   NAME OF CATEGORY- 'INNOVATIVE USE OF TECHNOLOGY IN e-GOVERNANCE'

1.   Coverage – Geographical and Demographic :-

(i)   Comprehensiveness of reach of delivery centers

> e-MARG is an Enterprise e-Governance G2B, G2G, G2C solution and the users are MPRRDA officials, Civil Contractors, Banks & Citizens, spread across the state. It provides restricted access via internet as per the access policy. For accessing the application, user requires high speed internet connection with computer having browser. It is accessed from all the 56 Project Implementation Units (PIU) under 51 districts of the M.P. covering around 55,000 villages/ around 23,000 Panchayats & all the rural roads from National Highways to village roads covered under Core-Network. e-MARG is being utilized for maintenance of around 57,000 Km of roads.

(ii)   Number of delivery centers

> e-MARG is a web-based system accessible from anywhere/ anytime.

(iii)   Geographical

(a) National level – Number of State covered

(b) State/UT level- Number of District covered | 51 |

(c) District level- Number of Blocks covered | 313 |

Please give specific details:-

This application is being used in all districts through 56 PIU's

(iv)   Demographic spread (percentage of population covered)

Directly / Indirectly entire population of the state is covered & benefited.

2. **Situation Before the Initiative** (Bottlenecks, Challenges, constraints etc with specific details as to what triggered the Organization to conceptualize this project #):

The pre-project situation is stated as:

- Road management & Packaging for road maintenance was not based on spatial aspects.
- Contractors had to submit the bill manually on monthly basis.
- Monitoring of maintenance require road wise details and condition of maintenance before making payments to the contractors, as every individual road has different rate and period for payment ,depending on its completion date.
- Processing & release of payment against the bills were based on inspection reports submitted by MPRRDA staff which used to take enormous time causing time lag between payment & submission of bills.
- Maintenance of huge road network amounting to 57000 km length with about 37500 km roads in 5 year guarantee period and 19500 km roads completed guarantee period, across the state. It will further increase to around 73,000 Km in next few years. Thus it is difficult to monitor maintenance of this network with existing manual process.
- Less transparency in existing system. Multiple disputes regarding maintenance condition and payment between contractor and PIU staff are found.
- Multiple Bank accounts of the contractor used to create problems of account settlement
- No centralized accounting system. Each PIU used to maintain their accounts separately manually.
- Paper Inspection reports submitted without photographs.
- No status tracking system for contractors / staff.
- Traversing / computation of distance/ area was not possible with expected level of accuracy.
- Overlaying with other spatial layers & linkage with attribute parameters for decision making was not available.
- Head of the Office & other executives were not having holistic view of the maintenance road network for verification.
- Due to non-availability of rational & scientific tool, policy framing, planning & decision making were fully dependent on the inputs from field Officers.
- Public grievance redressal was inefficient

3. **Scope of Services/ Activities Covered** (Relevance of choice of application for client/ agency, Extent of e-enablement in terms of number of services, Extent to which step in each service have been ICT- enabled #)

> Following services/ activities are covered & ICT enabled:
>
> - Creation of database of all Contractors (1100)
> - Computerization of Road Maintenance packages & interface with GIS with integration other layers (village/ Panchayat locations, railway, major water bodies, forest etc.)
> - Integration of attribute data (Census, Core Network (CN-I), PMGSY road progress (PR-I) data, contractor database).
> - Distance/ area computation & zoom/ pan on the screen.
> - Display of profiles (road/villages)
> - Submission of Inspection reports by inspecting officers.
> - Uploading of Geo-tagged photographs using Mobil Smart phones.
> - Bill generation, submission, processing, approval & payment using Digital Signature
> - Query & search with map/report outputs.
> - SMS/ E-mail alerts/ notification on relevant stages
> - Architecture change of existing GIS to Service oriented Architecture (SOA)
> - Enterprise Administration for managing users on the basis of roles/ access scope.
> - Audit trails
> - Security of data as per Map Restriction policy of GoI.
> - Regular Backup & creation of DR Site for e-MARG
>
> Project snapshots can be seen in **Annexure-I**.

4. **Strategy Adopted**

   (i) The details of base line study done,

   > Monitoring of maintenance require road-wise details and condition of maintenance before making payments to the contractors, as every individual road has different rate and period for payment ,depending on its completion date. Moreover, spread of operation is entire state covered which makes difficult to monitor.
   >
   > Considering present & future requirements, it was envisaged that ICT-based system with Digital Signature, GIS, Mobile, SMS technology components can resolve the issues related to maintenance of roads.

(ii) Problems identified

- Proposed technology driven system is not available for implementation and to be evolved. MPRRDA lack competency in ICT technology-based development and thus risky. Moreover, system should be low-cost and fit into the Government framework.

- In view of e-Payment, secure transaction is of biggest concern.

- Voucher / scroll/ inspection reports are documents of importance and thus record keeping for future for auditing / compliant resolving is must.
- Awareness & training to Contractors / Bank/ MPRRDA staff.

  In view of the above, National Informatics Centre (NIC) M.P. was entrusted to offer a technology solution.

(iii) Roll out/Implementation model,

- Every user has to fill information in the New User Form of e-MARG available on Geo-portal (https://gismp.nic.in). User-id/password is created and confirmation is sent through SMS/Email.
- Approving authorities (Assistant Engineers & General Managers) has to register their Digital Signature.
- Users (Contractors, staff, Bank) are offered role/ access rights as decided by Administrator after verification of their credentials.
- Training / workshops are conducted for staff / contractors.
- System is deployed in NIC IDC Centre and well supported by SAN infrastructure & planned (DR) Disaster Recovery. It is managed by qualified manpower ensuring the user data & application security. Salted MD-5 encryption has been used for accessing the application.
- Project management team is constituted for continuous support. In addition, presence of trained manpower of NIC at the Districts ensures the required support for long term sustenance of the project is ensured.

(iv) Communication and dissemination strategy and approach used.):

- User having Browser-based machine with Internet connection can communicate by browsing the Geo-portal https://gismp.nic.in.

- Smartphone Mobile devices having GPRS/Wi-fi connectivity can be

used to upload the Geo-tagged photographs by citizens/ MPRRDA staff.

- Integration of SMS/Email facility keeps all the users updated with respect to any status change through alerts/notifications.

- e-MARG has been demonstrated in various state/ district level training workshops to create awareness amongst the State/District officials/ Contractors.

- News in local Daily News Papers/ media coverage/ Web portal helped create awareness amongst Citizens.

- Users can communicate with the Management team by sending E-mail / making a Mobile call.

5. Technology Platform used-

(i) Description

The platform for development / deployment is:

- ArcGIS Server
- Open Web Technology (J2EE & Adobe Flex)
- Open Source Apache JBOSS Web server
- Enterprise Geodatabase
- Secured Hash Algorithm 2 (SHA 2) SSL compliant
- Secured Hash Algorithm 2 (SHA 2) Signing tools
- Token services for consuming web services.
- High-end Rack mounted Servers with Windows Server 2008 support by SAN
- Open Source Eclipse IDE Development platform

(ii) Interoperability

- Spatial data offered through OGC compliant services.

- Data Formats / database & front-end as per e-Gov. standard ensuring interoperability.

- Development environment is Open Source and platform independent

(iii) Security concerns

- The application is SSL (SHA 2) compliant by using Digital signature obtained from NICCA, GoI.

- Token Services are used to consume the web services. These web services are shared using tokens only.

- System is deployed in NIC IDC Centre and well supported by SAN infrastructure & planned (DR) Disaster Recovery. It is managed by qualified manpower ensuring the user data & application security.

- Salted MD-5 encryption has been used for accessing the application.

(iv) Any issue with the technology used

No issues.

(v) Service level Agreements(SLAs) (Give details about presence of SLA, whether documented, whether referred etc. #).

Continues review-based system development.

6. **Demonstrate innovative use of ICT for development** (Give details about use of new and emerging technology, innovative usage of ICT for process change to improve quality of the life/ organizational effectiveness, relevance of technology to provide the service #)

In view of the constraints stated above, National Informatics Centre (NIC) M.P. was entrusted to offer an solution which is a fusion of new & emerging technologies like Cryptography (Digital Signature & SSL), GIS & Remote Sensing, Mobile, Open Web technology, SMTP & SMS technology. It may be noted that there is no e-Governance case study/ architecture at present available for this sector.

Technology components that are used in the development & deployment of e-MARG are briefly described below :

- **Open Web technology (OWT)**

Based on e-Governance Standards, OWT has been utilized for entire development and deployment. Development is carried on J2EE & Flex Technology and deployed on JBOSS Application Server. It's a license free low-cost solution which is scalable & replicable.

- **GIS & Remote Sensing**

  e-MARG is well supported by a GIS-based Decision Support System which helps in decision making on Block/District-wise spread of maintenance roads, categorization of roads on the basis of readiness for maintenance, effective packaging based on proximity, monitoring & evaluation. Broad features are :

  - Thematic Maps (Sector-wise)

  - Display of Road/ Habitation Profile

  - Computation of distance / Area

  - Query Shell

  - Table of Contents

  - Scale-based display of Labels

  - Smartphone Mobile Interface

  - Google/ HRSI Interface

- **Cryptography (SHA 2-based cryptographic Digital Signature for SSL & Signing)**

  e-MARG is deployed on Secure Socket Layer (SSL) to ensure secure transactions. SSL has been configured for the application server based on the Digital Signature obtained from NIC Certifying Authority.

  The cryptography technology has been innovatively used to facilitate Digital Signing of the Scroll by Approving Authorities for releasing the payment by the Bank.

  Digital Signing is approved as per IT Act 2000 and ensures authentication & Non-repudiation. Software has been designed & developed to handle de-duplication, manipulation in the scroll, revocation of Digital Signature by Certifying Authority.

  Approving authority approves the bill based on Performance Index obtained in the Inspection Report. Voucher / Scroll generated, digitally signed and submitted for final payment by the Bank.

  Bank officer verifies the digitally signed scroll and payment is credited directly to contractor's Bank A/c.

Thus it ensures authenticated and secure electronic approvals.

Payment Process flow can be seen in **Annexure – II.**

- **Mobile Technology**

Photo Upload: Geo-tagged photos of various categories (Information Board, shoulders, Bridge, chain-age-wise road) can be uploaded.

Feedback / Public Grievances / Public Auditing: Citizens can upload Geo-tagged Photos of the location along with other details for redressal.

- **SMTP & SMS technology**

SMTP / SMS Gateway has been integrated with the application to send Email/ SMS alerts/ notifications of various stages.

7. **Citizen Centricity** (Give specific details on the following#)
   (i) Impact on effort, time and cost incurred by user,

   > It has benefited citizens/ villagers. Villages are benefited from each road properly maintained and it also helps organization to manage better with scarce resources. Its active use is expected to make decision making more effective, free from **corrupting influences**, in view of its inherent capacity to make the process of decision making rational and transparent.

   (ii) Feedback/grievance redressal mechanism,

   - Contractors dispute/ grievances redressal in regard to payment is part of the e-MARG.
   - Citizens can upload Geo-tagged Photos of Roads showing condition of roads and handled through the module developed in e-MARG.
   - In addition, feedback/ grievances can be communicated by sending email/letters.

   (iii) Audit Trails,

   - Audit trail available.

   (iv) Interactive platform for service delivery,

   - e-MARG supports interactive sessions.

   (v) Stakeholder consultation

   Regular discussions are conducted with Contractors/ Bank / MPRRDA Staff for continues improvement. Suggestions are reviewed and incorporated into

the system.

8. **Adaptability and Scalability** (Give details about Local language support, ability to leverage shared Government infrastructure, Standardization of technology used (hardware, software, application etc. #)

- The operation does not require any special training/ skills as it is very simple and user friendly to operate.

- User manual is already prepared & training has been imparted.

- The local language support facility is also provided in e-MARG.

- ArcGIS Server of ESRI is an industry standard Open Geo-spatial Consortium **(**OGC) compliant & scalable.

- Front-end chosen for the development is open source J2EE which is scalable & industry standard platform independent.

- An open ended design concept has been used in the development which makes it scalable in the application domain.

- System is deployed in NIC IDC Centre and well supported by SAN infrastructure & planned (DR) Disaster Recovery.

9. **Adaptability Analysis**

(i) Measures to ensure adaptability and scalability

- Hands-on Training
- Release of User Manual

(ii) Measures to ensure replicability

- Front-end, Database, Spatial data adopts standard ensuring replicability.

(iii) Restrictions, if any, in replication and or scalability

No restriction.

(iv) Risk Analysis

Disaster Recovery Site is already planned to mitigate the risk.

10. **New Models of Service Delivery** (Give details about type of partnership model use, Links to/Supported by Public/Private Organization Links provided to relevant websites etc. #)

- e-MARG is innovative initiative offering new models of service delivery. Contractors are submitting the bills electronically and receiving the payment directly into their account. They are able to track the status also.

- Process is transparent and thus it will reduce the disputes/ grievances.

- Operational for 24 X 7.

- Bank is finding it much easier for processing & disbursement.

- e-MARG is enterprise solution based on SOA. It offers the framework for the Organizations (Govt/ Private) & stakeholders to share & utilize the spatial data (layers) through this architecture in compliance with Government sharing/ restriction policy. This **innovative approach** will arrest the re-creation of spatial data, its redundancy & inconsistency. For example, a Power Distribution company in M.P. intends to create digital power distribution network comprising of substations & feeders. Bifurcation & re-orientation of new feeders requires detailed road network also. With the evolution of e-MARG the company can utilize the road network as a published web service.

11. **Efficiency Enhancement** (Give specific details about the following #)

   (i) Volume of transactions processed

   Presently e-MARG is handling data of 57,000 Km of road and 1100 contractors for monthly bill submission. Every road needs to be inspected (routine/ payment) on regular basis and its record along with Geo-tagged photos are maintained.

   (ii) Coping with transaction volume growth

   In near future, length of Roads under maintenance will increase to 70,000 Km. e-MARG is capable of coping with the volume growth.

   (iii) Time taken to process transactions,

   Earlier, one transaction (Bill Submission to disbursement of Payment) used to take minimum 25 days of time while now it is possible within 2 days.

   (iv) Accuracy of output,

Accurate.

(v) Number of delays in service delivery

Delay has been substantially reduced.

12. **User convenience** (Give specific details about the followings #)
   (i) Service delivery channels (Web, email, SMS etc.)

   Web, email, SMS, Mobile are service delivery channels in e-MARG.

   (ii) Completeness of information provided to the users,

   Complete details can be tracked.

   (iii) Accessibility (Time Window),

   24 X 7 availability.

   (iv) Distance required to travel to Access Points

   Nil. User can perform sitting at home also.

   (v) Facility for online/offline download and online submission of forms,

   Online submissions.

   (vi) status tracking

   Status tracking is available and notified through SMS/ Email.

13. **Sustainability** (Give details about sustainability w.r.t. technology (technology used, user privacy, security of information shared – Digital Encryption etc. #), Organization (hiring trained staff, training etc. #), financial (Scope for revenue generation etc. #)

   - Technology components are industry standards, OGC compliant & from open source community. They are scalable, modular, compatible & platform independent

   - System is deployed in NIC IDC Centre and well supported by SAN infrastructure & planned (DR) Disaster Recovery. It is managed by qualified manpower ensuring the user data & application security, Salted MD-5 encryption has been used for accessing the application.

   - Major cost items are software and hardware which were met through internal resources. Recursive & maintenance cost is negligible.

   - Project management team is constituted for continuous support. In addition, presence of trained manpower of NIC at the District ensures the required support for long term sustenance of the

project.

14. **Result Achieved/ Value Delivered to the beneficiary of the project**-(share the results, matrices, key learning's, feedback and stakeholders statements that show a positive difference is being made etc):

(i) **To organization**

Constraints / Problems identified in point. No. 2 above are resolved.

(ii) **To citizen**

Grievances are received in the form of Geo-tagged photographs and appropriate action is taken by the concerned authority.

(iii) **Other stakeholders**

Contractors

- Bill submission is made easy.

- Need not to visit to submit the bill. Sitting in the Office/ Home, bills can be submitted.

- SMS/ E-mail alerts helps the submission on time

- Bill status can be tracked.

- Dispute can be represented.

- Hassel free payment. Credited Straight in the a/c.

Bank

- Electronic transactions helps to satisfy the customers (MPRRDA/ Contractors)

15. **Extent to which the Objective of the Project is fulfilled**-(benefit to the target audience i.e.G2G, G2C, G2B, G2E or any other, size and category of population/stakeholder benefited etc):

The defined objectives of the project are achieved. It has drastically improved the performance & efficiency of the MPRRDA executives at HQ / PIU. It has given new dimensions for planning, monitoring, evaluation & decision making.

e-MARG is a innovative & versatile product development & has long lasting impact in the field of e-Governance not only for our organization but other Dept./organizations too.

e-MARG has set the baseline for coming Road Maintenance Policy of GoMP and proposed to be adopted & implemented by similar dept. of state/ outside the

state.

The project e-MARG has helped dispel several myths surrounding the use of innovative technologies like GIS & Digital Signature. It has demonstrated that these systems can be made simple, user friendly and can be used efficiently to facilitate a **rational** and **transparent** approach to decentralized planning & decision making. e-MARG has shown that one need not require any special expertise on operational level.

It has been recommended to National Rural Road Development Authority (NRRDA) for its nation-wide replication in view of maintenance of PMGSY Roads.

16. **Comparative Analysis of earlier Vs new system with respect to the BPR, Change Management, Outcome/benefit, change in legal system, rules and regulations**

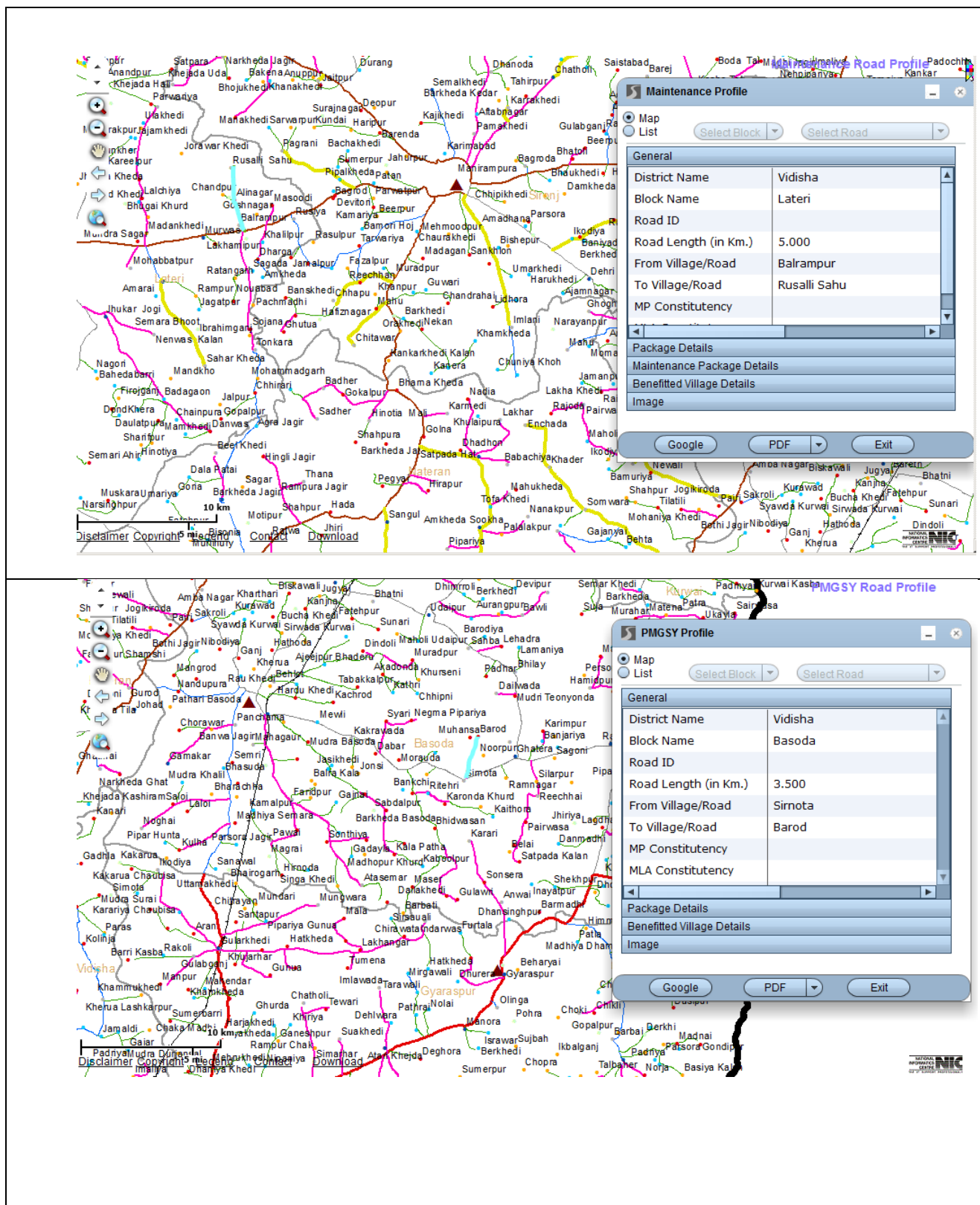| Earlier System	e-MARG system (New)
Bill Generation & submission ▪ Manual preparation & submission of bills on monthly basis by contractors ▪ Bill to be submitted in the PIU on monthly basis. One has to either travel / send by post ▪ Bill to be submitted on working hours only. ▪ Lots of disputes / grievances regarding date of submission/ non-submissions of bills ▪ Rejected bills were not communicated on time to take corrective action. ▪ Bills were not submitted as per monthly schedule **Inspection process** ▪ Road-wise Inspection reports for their packages were not made available to see. ▪ Routine Inspections submitted by sub-ordinate staff of PIU could be verified by site-visit only by GM ▪ Entire Inspection process was paper-based and lack transparency.	▪ Automatic generation of bills. Contractor has to verify and submit. ▪ Bill can be submitted from anywhere. Thus savings in time & money. ▪ Bills can be submitted 27 X 7 (anytime) ▪ Bills submission is system controlled and there is no issue in regard submission/ non-submissions of bills. SMS sent to contractor. ▪ Rejection of bill is communicated instantly. SMS is also sent. ▪ System generates SMS alert / reminder as & when the bill is due for submission. ▪ System facilitates to view the Inspection Reports by Contractors/ ▪ Routine Inspections are attached with current Geo-tagged Photographs which authenticates the Inspection process and can be verified. ▪ Higher Authorities at MPRRDA HQ. ▪ Entire process has become transparent and electronic archival is also created.

Bill Approval Process

- Bill approval and settlement was manual and suffering from human errors & record keeping problem.

- Voucher/Scroll were manually prepared and maintained in files. Searching of these documents was tedious.

- Payments through cheques to the contractors was reason of delay & disputes.

- Bill amount is derived based on the performance in the Inspection Report by the system. Deductions towards Income Tax, Cess etc. also system generated and correct.

- Vouchers/ Scroll are electronically generated. These documents can be searched any time/ any body conveniently

- Scroll is digitally signed and ensure non-repudiation & authentication.

- Payment is directly into the contractor's account. SMS sent.

Monitoring

- There was no rational approach in Packaging of maintenance roads

- Due to manual system effective evaluation & monitoring was not possible leading to huge discrepancies & disputes

- Use of GIS technology provides method of packaging of roads on the basis of spatial proximity

- With the effective use of innovative technologies, system is now transparent enough to provide effective & efficient monitoring.

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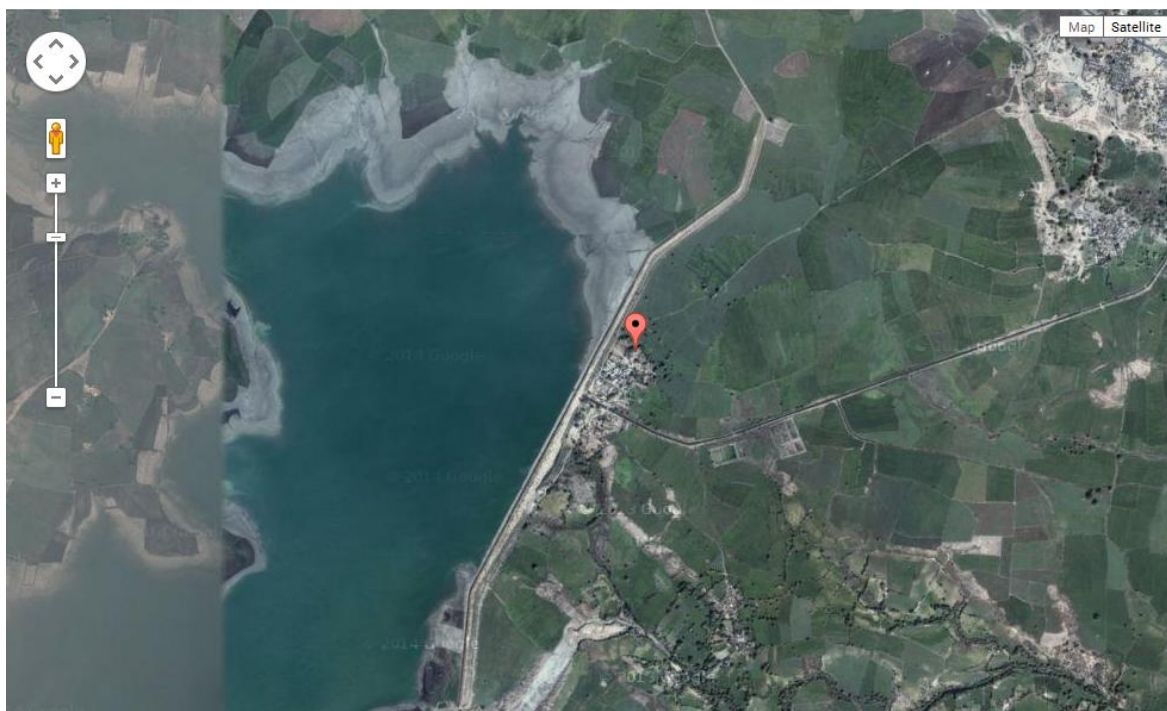17. **Other distinctive features/ accomplishments of the project:**

1.
2.
3.

AWARDS SCHEME FOR EXEMPLARY IMPLEMENTATION OF e-GOVERNANCE INITIATIVES

Annexure I

Pre-5 Maintenance Work Inspection

Activity Inspected	Test Conducted (Select the checkbox to enter inspection details)	
1) Conditions of road in respect of Pot holes/patch repair	Satisfactory	Unsatisfactory
2) Conditions of road in respect of Rain cuts/shoulder repair	Satisfactory	Unsatisfactory
3) Conditions of Jungle clearance on shoulders and side slopes	Satisfactory	Unsatisfactory
4) Conditions of road in respect of C. C. Pavement Maintenance	Satisfactory	Unsatisfactory
5) Conditions of road in respect of C. D. Structure Maintenance	Satisfactory	Unsatisfactory

Overall Grading : ○ Satisfactory ○ Unsatisfactory ● SRI*

* SRI : Satisfation Requires Improvement

Overall Remark : NA.

Constraints if any : NA.

Attach Photographs :

Image Preview

Preview Not Available

◆ Add Image   ✔ Upload   🗑 Clean

* Maximum 2 Geocoded images can be uploaded.
* Images must be in jpeg format.
* Image Sire should be less than 100KB.

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AWARDS SCHEME FOR EXEMPLARY IMPLEMENTATION OF e-GOVERNANCE INITIATIVES

Pre-5 Maintenance Work Payment Inspection   All Fields are compulsory

District	: Sehore	**Inspection Date**	: 08-06-2014
Package No	: MP3516	**Road**	: [L057] - Kannod road TO Harrajkhadi

S. No.	Name of Item/Activity	Performance Index	Marks Obtained
1	Restoration of rain cuts and dressing of berms	10	0.0
2	Marking up of shoulders	20	0.0
3	Maintenance of Bituminous surface road and/or gravel road and/or WBM road including filling pot holes and patch repairs etc.	50	0.0
4	Maintenance of drains	3	0.0
5	Maintenance of culverts and cause ways, Maintenance of guard rails etc.	5	0.0
6	Maintenance of road signs	2	0.0
7	Maintenance of 200m and Killo Meter stones	2	0.0
8	Cutting of branches of trees, shurbs and trimming of grass and weeds etc.	3	0.0
9	White washing parapets of C.D. Works, guard stones & Re-Fixing displaced guard stones.	2	0.0
10	Repair of old joints sealant (CC joints) as in	3	0.0
	Total	**100**	**0.0**

Overall Remark :

[Back] [Reset] [Save Final Copy] [Save Draft Copy]

M.P.Rural Road Development Authority

District : SEHORE
Dated : 02-06-2014

Voucher No : VMP3529/01   Contractor's Firm Name : VK Tiwari Itarsi
Voucher Period : 05-11-2013 to 04-05-2014   Package No : MP3529

S.No.	Road Id	Road Name	Amount
1	L148	Sehore Shyampur Main Road to Niwariya	18330.00
2	L152	NH-12 TO Bairagah Khumar	10554.00
3	L151	NH-12 to Ghat Palasi	64128.00
4	T020	Sarkheda to Rawan Kheda	47130.00

	Total	140142.00
Deductions	Income Tax	2802.00
	L Cess	1404.00
	Others	2802.00
	Net Amount	133134.00

Account Officer   General Manager
All Amount in Rs.

AWARDS SCHEME FOR EXEMPLARY IMPLEMENTATION OF e-GOVERNANCE INITIATIVES

Annexure II: Payment process Flow of e-MARG

Contractor

- Bill Generation
- Bill Submission

General Manager

- View Submitted Bills
- Verify / Reject
- Road-wise Amount sanction as per Inspection (Routine/Payment)
- Approval
- Voucher Generation
- Scroll Generation
- Download Scroll
- Digital Signing of Scroll
- Upload Scroll

Banker

- View Scrolls
- Make Payment