

F. No. RW/ G -23012/01/2019-W&A (Part-IV)  
No. Government of India  
Ministry of Road Transport & Highways  
(W&A Section)

Transport Bhawan, 1, Parliament Street New Delhi-110001

Dated: 19<sup>th</sup> October, 2020

To  
The Chairman,  
National Highways Authority of India,  
G-5&6,  
Sector-10, Dwarka,  
New Delhi-110075.

**Subject:** Concept Note on developing Road Asset Management System (RAMS) for the entire National Highways (NHs) Network and integration under ERP system - Referring to the NHAI for setting up Centralized RAMS Unit through NHAI for entire NHs Network - Reg.

Sir,

This is regarding setting up of Centralized Road Asset Management System (RAMS) Unit through NHAI for entire NHs network and for NHs entrusted with all agencies.

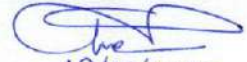
2. Consultancy Services for Technical Assistance to Strengthen Asset Management Capacity of NHAI and MORTH (WBTA-12 Package) was awarded in 2014. Consultants M/s HIMS Ltd, New Zealand in joint venture with SATRA Infrastructure Management Services Pvt Ltd, India was engaged for this purpose. The project was transferred from the Ministry to NHAI in April, 2016 for its implementation. The project commenced in November 2014 and was completed in January 2018.
3. NHAI is requested to establish a dedicated RAMS Unit through NHAI to take over the implementation and continual operation of the RAMS developed through outsourced Contract. It is preferred that RAMS Unit (Cell) be established on full-time basis and as an independent unit. The idea is that RAMS Unit would bring all initiatives related to data collection, data management, and information sharing on National Highways under one umbrella including annual data collection by NH Divisions of State PWDs, NHIDCL, BRO, and their Concessionaries, Contractors and Consultants, etc. The main objective of the proposed RAMS Unit would be to operate, maintain, update and upgrade RAMS system developed for all National Highways in India, irrespective of the agencies with whom such stretches of NHs are entrusted.
4. A concept note prepared in consultation with officials of M/s SATRA Infrastructure Management Services Pvt Ltd. (who in JV with M/s HIMS Ltd, New Zealand had developed the RAMS and executed pilot survey and analysis on 3,000 km length of NHs) is enclosed herewith.
5. NHAI is requested to take up immediate necessary action for setting up of the Centralized RAMS Unit apropos the enclosed Concept Note with the purpose of preservation of periodically collected NSV data, its validation and analysis towards enabling optimization in Planning, prioritization of projects, etc. NHAI may make suitable adaptation / modification in the Concept Note and finalize a TOR under intimation to the Ministry.



6. NHAI is, further, requested to develop a comprehensive SOP for the entire process of data collection / validation, analysis, prioritization of stretches for their development / M&R, budget requirements, etc., which shall be made applicable for the entire NHs network irrespective of the agencies with whom such NHs are entrusted. This may be done immediately within one month of setting up of Centralized RAMS cell on Outsourced basis.
7. This issues with the approval of Secretary (RT&H).

Yours faithfully,

Enclosure: As Above

  
19/10/2020

(Sudip Chaudhury)  
Chief Engineer (Planning)

Copy along with enclosure for information and necessary action to:

1. JS (H)
2. PS to Hon'ble Minister (RT&H)
3. PS to Hon'ble MOS (RT&H)
4. Sr. PPS to Secretary (RT&H)
5. Sr. PPS to DG (RD) & SS
6. NIC-for uploading on Ministry's website under "What's new"

## **Concept Note on developing Road Asset Management System (RAMS) for the entire National Highways (NHs) Network and integration under ERP system - Reg.**

### **1. Background -**

Consultancy Services for Technical Assistance to Strengthen Asset Management Capacity of NHAI and MORTH (WBTA-12 Package) was awarded in 2014. Consultants M/s HIMS Ltd, New Zealand in joint venture with SATRA Infrastructure Management Services Pvt Ltd, India was engaged for this purpose. The project commenced on 3 November 2014 and completed on 31 January 2018. The cost of the assignment was Rs. 16.3 crore.

The specific objectives of the project were:

- Development of sustainable Road Asset Management System (RAMS) for India's National Highways. A single Road Database for NHs supported by analytical tools is envisioned, which shall be used by all agencies of MoRT&H, viz. NHAI, NHIDCL, BRO and State PWDs including MoRT&H itself.
- Development of strategy to institutionalise RAMS in NHAI and MoRT&H to assist in planning, programming and budgeting for road maintenance and upgrading works;

Development of strategy to integrate GIS capabilities within RAMS to form publicly accessible Traveller/Tourist Information System providing road users with information on road conditions and location of hotels and tourist sites etc.

The broad scope of the Project was to establish and implement a RAMS. The specific tasks included the following, which are reproduced from the TOR:

- Review existing RIS and NHIS and identify the reasons why they have not been put to effective use in NHAI/ MoRT&H;
- Upgrading existing hardware and software to provide a RAMS which meets the objectives defined above in terms of information storage and retrieval and address the shortcomings identified above;
- Develop a data collection plan which will allow the RAMS to be fully populated with current data required for planning, programming and budgeting of road works;
- Data collection for road inventory, condition, pavement strength, traffic and other data using automated, semi-automated and manual procedures over 3,000 km of NHs;
- Develop analytical tools which will allow the RAMS data to support the formation of plans and programmes for road network preservation and development;
- Define an institutional framework for the RAMS which will ensure its sustainability and development over the long term;
- Develop a training plan for NHAI and MoRT&H officials who will use and maintain the RAMS and carry out initial training for key staff in NHAI and MoRT&H; and,



- Recommend an appropriate strategy for commercial use of relevant parts of the RAMS as a Traveller/Tourist Information System.

#### Project Outcome -

- RAMS was developed and hosted on NIC server in the month of January 2018, later it was moved to other server on which development of ERP is in progress;
- For this RAMS data was collected for 3,000 km of National highways for consecutive years 2015, 2016 and 2017. The list of National Highways given in table below.
- The collected data was uploaded on RAMS which still exists;
- NHAI was authorized for the collection of data of all NH roads which are completed. For that NHAI had floated tender of 27,000 km length in year 2019. However, the bids were finally not awarded.
- The data presently is also being collected by making mandatory use of NSV in all projects (as per the extant policy, this is to be collected before start of work, before issue of PCOD / COD, after every 6 months after completion of works). Accordingly, AE/ IE is collecting data in every 6 months but it is not being uploaded into RAMS portal launched on NIC server.
- As per outcome of this assignment a RAMS cell was to be developed which will ensure the quality of data and frequency of data. Which will be provided to Consultants and department whenever required to save the time for preparation of DPR and execution of the project.
- The details of NHs stretches where the pilot study under WBTA were collected are as follows: -

Num	Stretch Name	State	NH No (old)	NH No (New)	Survey Length (km)	Entrusted to
1	Pimpalgaon - Baswant - Nasik	Maharashtra	3	60	30	NHAI
2	Indore - Dhule	Madhya Pradesh/ Maharashtra	3	52 & 60	249	NHAI
3	Madurai - Tirunelveli- Pangudi - Kanyakumari	Tamil Nadu	7	44	242	NHAI
4	Tirunelveli - Tuticorin	Tamil Nadu	7A	138	47	NHAI
5	Pune - Sholapur	Maharashtra	9	65	212	NHAI
6	Hyderabad - Vijayawada	Andhra Pradesh	9	65	181	NHAI
7	Haryana Border -Dabwali - Fazilka - Indo/Pak Border	Punjab	10	9 & 7	107	MORTH
8	Pathankot - Mandi	Punjab/Himachal	20	154	207	MORTH

Num	Stretch Name	State	NH No (old)	NH No (New)	Survey Length (km)	Entrusted to
9	Madurai - Tuticorin	Tamil Nadu	45B	38	126	NHAI
10	Rajasthan Border - Vadali - Palanpur (NH-27 )	Gujarat	58	27	160	MORTH
11	Betul - Indore	Madhya Pradesh	59A	47	277	MORTH
12	Nagpur - Sanver - Badchicholi (Mah/MP Border)	Maharashtra	69	47	57	NHAI
13	Badchicholi (Mah/MP Border) - Pandhuma - Multai - Betul	Madhya Pradesh	69	47	117	NHAI
14	Jalandhar - Mandi	Himachal Pradesh	70	3	148	MORTH
15	Jalandhar - Nakodar - Patran -Haryana Border	Punjab	71	703, 52	146	MORTH
16	Beawar - Pali-Pindwara	Rajasthan	14	25, 162	244	NHAI
17	Nimbahera - Dahod	Rajasthan	113	56	265	MORTH
18	Baran - Aklera	Rajasthan	90	752	94	MORTH
19	Baran - Shivpuri - Jhansi	Rajasthan/Madhya Pradesh/Uttar Pradesh	76,25	27	196	NHAI
Length Entrusted to NHAI					1,701	55%
Length Entrusted to MORTH					1,404	45%
Total Length (km)					3,105	

## 2. Purpose of RAMS

Road Asset Management System is a systematic process of managing and maintaining road assets cost-effectively. It combines the engineering principles with sound business practices and economic rationale. It provides tools to facilitate a more organised, logical and flexible approach to decisions for handling both Short-and Long-term planning, programming and budgeting.

The Road Asset Management System is aimed at assisting NHAI, MORTH and other agencies of NHs in the systematic and cost-effective process of maintaining assets. It combines engineering principles with sound business practices and economic rationale. In addition to providing a seamless experience in accessing up to date information on assets, it provides tools to facilitate a more organized and logical approach to both short term and long term planning.

RAMS has GIS capability to provide information to road users on various attributes of road networks such as traffic, roadside amenities and facilities.

RAMS has been developed / upgraded to store all assets inventory and other relevant information. RIS will provide necessary information to other information and management sub systems within RAMS. The following modules have been / are proposed to be developed for RAMS.

- LRMS - Location Reference Management System
- RIS - Road Information System
- PMS - Pavement Management System
- TIS - Traffic Information System
- AIS - Accident Information System
- BIS - Bridge Information System
- EIS - Environmental Information System
- TOIS - Toll Information System
- PIS - Project Information System
- GIS - Geographical Information System
- SAM - System Administration Module

### **3. Output of proposed Assignment**

The output of this proposed assignment is to have a sustainable Road Asset Management System for India's National Highways by having a single Road Database for NHs supported by analytical tools which will be used by both NHAI and MoRT&H. The institutionalization of RAMS will also be developed in this assignment to make RAMS sustainable and for its use in planning, programming and budgeting for road maintenance and upgradation/ improvement works.

The RAMS will have GIS capability providing information to road users on various attributes of road network like traffic, road side amenities and facilities information.

In the past, both NHAI and MORTH have attempted to adopt a modern and computerised road information system and pavement management system. Although, the business processes and technology used to implement it were somewhat acceptable, but a major drawback that saw systems become redundant was the institutionalisation of the systems within NHAI and MORTH. Therefore, this project focuses not only on developing a software

tool that is fit for the purpose, but also places higher emphasis on ensuring its sustainability. The following will be delivered as part of this assignment:

- Road Asset Management System (RAMS);
- Data Collection Framework;
- Institutional Framework;
- Sustainability Framework.

#### **4. Interface with other assignments/contracts**

In development of ERP the software developed in NHAI and MoRT&H, other software were to be integrated (e.g. RAMS, PMIS, BMS, etc.).

#### **5. Need for Centralized RAMS Unit**

It is proposed to establish a dedicated RAMS Unit through NHAI to take over the implementation and continual operation of the RAMS developed under the proposed Contract. Based on the mandate, it is preferred that RAMS Unit (Cell) be established on full-time basis and as an independent unit. RAMS Unit would bring all initiatives related to data collection, data management, and information sharing on National Highways under one umbrella including annual data collection by NH Divisions of State PWDs, NHIDCL, BRO, and their Concessionaries, Contractors and Consultants, etc.

It is desirable to establish a single dedicated cell in NHAI. The stretch-wise data may be collected by Divisions / PIUs, etc., of other organizations such as NHIDCL, State PWDs, BRO, etc., and they may be fed into the RAMS system through the dedicated cell established in NHAI. The Centralized RAMS unit shall do quality assurance checks of data collected and upload the same on the portal/ RAMS system. This may be extensively used for planning, prioritizing nature and types of works to be taken up based on their inter-se prioritizations as per available resources; for this purpose, the NSV data fed into the system duly analyzed through HDM-IV shall be the governing criteria for decision making purpose. Suitable modifications to / adaptations of the model/ software developed and being used in the RAMS portal may also be considered based upon outcome of deliberations between executing agencies and MoRT&H, if considered desirable.



### **6.1. Objective of RAMS Unit**

The main objective of the RAMS Unit is to operate, maintain, update and upgrade RAMS system developed for all National Highways in India, irrespective of the agencies with whom such stretches of NHs are entrusted.

### **6.2. Key Functions of Centralized RAMS Unit**

The primary function of the RAMS Unit is to act as a cohesive office for facilitating planning, programming and budgeting of National Highways in the country and facilitate timely decision making through analysis of data and presenting the same to the MoRT&H and other agencies on regular basis.

The other key functions of the RAMS Unit are:

- To plan, monitor and manage annual data collection of National Highways;
- To process, manage and perform quality assurance of the data collected;
- To load processed data into RAMS;
- To operate RAMS on daily basis;
- To provide or answer daily or ad hoc enquiries;
- To identify potential improvement and up-gradation of projects on PPP/EPC basis or otherwise;
- To prepare annual maintenance needs and related budget for public funded roads;
- To impart training and technology transfer on RAMS operation;
- To provide helpdesk support on RAMS users;
- To manage and monitor external consultants working on RAMS.

### **6.3. Stakeholders**

National Highways are currently entrusted to three different agencies, MoRT&H (through NH divisions of State PWDs, PIUs of MoRT&H), NHAI, NHIDCL and BRO for development and /or maintenance. These three agencies thus become major stakeholders of RAMS.

### **6.4. Centralized RAMS Unit**

As mentioned above, a centralized RAMS Unit is proposed to be established through NHAI for supporting all stakeholders.



Each agency may have one or two liaison officers within the organisation to coordinate with the centralized RAMS Unit. The main function of the liaison units shall be to ascertain regular data flow from the PIUs/ field level units to the centralized RAMS unit.

#### **6.5. Composition of Centralized RAMS Unit**

RAMS Unit is expected to possess significant knowledge in Roads/Highway domain, particularly related to Road Asset Management and IT knowledge. This Unit should also have traffic, highway planning and transport economics knowledge for preparation of maintenance budgets and to monitor Concessionaire/Contractor obligations. Therefore, it is suggested to include multi-disciplinary team for operation, maintenance and training on RAMS system.

The proposed structure of the Centralized RAMS Unit is as follows: -

<b>Sr. No.</b>	<b>Position</b>	<b>No.</b>	<b>Man Month</b>
1	Project Manager	1	36
2	Data Collection Specialist	1	36
3	Maintenance Planning & Network Engineer	1	36
4	Data Management Engineer	1	36
5	GIS Specialist	1	24
6	Bridge Engineer	1	18
7	HDM-IV Expert	1	18
8	IT & Help Desk	1	36

The contract may be initially awarded for a period of 3 years and be extendable by 2 more years depending upon performance. It is tentatively estimated that the cost of the entire assignment including hiring of office spaces, manpower remunerations, all expenses including overheads may be about Rs. 2 to 3 cr annually.

Broad qualifications criteria for the manpower for guidance purpose may be seen in **Annexure 1**

#### **7. Proposed Maintenance Planning Process**

The collection of data shall be through NSV runs as per extant policies. The field units of various agencies shall submit the same to the centralized RAMS unit at NHAI, who will validate and further process data into required format. The processed data will be loaded into RAMS. The maintenance analysis will then be performed by RAMS Unit considering the

overall development and maintenance strategy for National Highways. The preliminary maintenance plan and needs will be sent to the Planning Zone of the Ministry, NHAI and respective field offices; the respective field units of agencies shall verify and validate the program within 7 days. Field offices will submit their observations and comments along with their recommended maintenance program for the National Highways in their jurisdiction. RAMS Unit will collate the feedback from all field offices and rerun or reconsider the preliminary program. The final maintenance plan and needs will be prepared by RAMS Unit for sending to Planning Zone of the MoRT&H HQ and all agencies (viz. NHAI, NHIDCL, BRO and State Governments). The MoRT&H Planning Zone will validate, adjust and finalise the annual maintenance plan for the subsequent financial year.

#### **8. Software Requirement**

There is no requirement of additional software as it is already developed under WBTA-12 in year 2018 and tested for 3,000 km of National Highways data. The software was hosted on NIC server (Cloud server) under [www.rams.morth.gov.in](http://www.rams.morth.gov.in) and sufficient space available for uploading of data.

If there is requirements for any improvement/modification in software, the same can be done under the present contract of MoRT&H with EIT services. The have support for development and maintenance of all software of MoRT&H for the 7 years.

#### **9. Data Collection**

The concept of outsourcing is expected to prevail for collection of data through NSV for all National Highways. The MoRT&H has made mandatory in all the contracts the use of NSV and FWD for the collection of data. By this way most of the National Highways data collection is expected to be covered.

#### **10. Conclusion**

- With latest development software for the RAMS is already developed and hosted on NIC server under url [www.rams.morth.gov.in](http://www.rams.morth.gov.in);
- For enhancement of RAMS software, MoRT&H has already contract with EIT services under which they have to provide development and support for the next 7 years. So the is no expenditure for the enhancement of software;
- All the data is hosted in cloud server, so there is no expenditure to procure any hardware, space of storage may be increased or decreased as per requirement;
- NSV is being used and data is being collected on all National Highways on which works have been taken up / completed twice in a year, but that data

is not being uploaded in RAMS. After considering this there will be very few roads which will require separate initiatives for data collection;

- Centralized RAMS cell (on outsourced basis) may be set up through NHAI, who will validate and further process data into required format. The processed data will be loaded into RAMS and generate list of prioritization of roads and annual budget required for maintenance of roads. If this is established with the help of outsourced agency (viz. proposed Centralized RAMS Cell), the expenditure would be in the range of about Rs. 2 to Rs. 3 Crore annually. The qualification and requirement is given in Annexure-1.
- NHAI may IMMEDIATELY take initiatives to set up the Centralized RAMS cell with suitable adaptation / modification in the approach / TOR under intimation to MoRT&H.
- NHAI may develop a comprehensive SOP for the entire process of data collection / validation, analysis, prioritization of stretches for their development / M&R, budget requirements, etc., which shall be made applicable for the entire NHs network irrespective of the agencies with whom such NHs are entrusted. This may be done immediately within one month of setting up of Centralized RAMS cell on Outsourced basis.
- The system shall be integrated with ERP system being developed by MoRT&H.

## 1. Proposed Centralized Team Composition

The Consultant is expected to designate a team of key technical and professional personnel who between them have at least the following experience:

- (i) Handling of large road databases;
- (ii) Application of location referencing and road/traffic/pavement surveys;
- (iii) Experience in a similar projects and environment.

### 1.1. Proposed Team

Sr. No.	Position	No.	Man Month (for 3 year assignment)
1	Project Manager	1	36
2	Data Collection Specialist	1	36
3	Maintenance Planning & Network Engineer	1	36
4	Data Management Engineer	1	36
5	GIS Specialist	1	24
6	Bridge Engineer	1	18
7	HDM-IV Expert	1	18
8	IT & Help Desk	1	36

### 1.2. Key Qualifications

#### 1.2.1. Project Manager

- i. A graduate in Civil Engineering from a reputed institute, and preferably Masters in Highway / Transport / Pavement / Structures / Management;
- ii. Have minimum 20 years of professional experience in infrastructure sector, preferably in roads and highways;
- iii. Have good knowledge on development and maintenance life cycle of highways;
- iv. Have adequate experience in developing and/or implementing computerised Road Asset Management System or other similar infrastructure related IT systems in India;
- v. Have sound knowledge in data collection, data management and reporting;
- vi. Have good understanding on emerging and advanced technologies for data collection and data management;
- vii. Must have worked on two projects and in similar position or Deputy Team Leader on at least 1 similar project.



#### **1.2.2. Data Collection Specialist**

- i. A graduate in Civil engineering with minimum 15 years of professional experience in roads and highways;
- ii. Have sound knowledge in data collection, data management and reporting;
- iii. Have good understanding of different data collection technologies, including conventional systems and emerging technology such as LiDAR and Unmanned Aerial Vehicles (UAVs);
- iv. Have adequate experience in developing and/or implementing data collection and data management for large road networks;
- v. Have adequate experience in survey planning and coordinating and monitoring of network level data collection;
- vi. Must have worked in similar position on at least 1 similar project.

#### **1.2.3. Maintenance Planning and Network Engineer**

- i. A graduate in Civil engineering with minimum 12 years or diploma holder with 15 years of professional experience in roads and highways;
- ii. Have sound knowledge in maintenance planning and reporting;
- iii. Have good understanding of different methods and techniques used for maintenance need analysis;
- iv. Have adequate experience in preparing data inputs and interpretation of outputs of HDM-4 software;
- v. Have sound knowledge on relevant national and international codes and best practice guidelines in the area of maintenance needs analysis;
- vi. Have adequate experience in preparing road maintenance budgets;
- vii. Have sound knowledge in development and maintenance of highways on Public Private Participation (PPP), EPC, OMT and Hybrid Annuity methods;
- viii. Have good understanding of different methods and techniques employed by MORTH, NHAI and NHIDCL practices for highways development and maintenance;
- ix. Have sound knowledge on Concessionaire / Contractors obligations in managing National Highways in India.

#### **1.2.4. Data Management Engineer**

- i. A graduate in Civil engineering / IT / Computer Science preferably masters in relevant field with minimum 7 years of professional experience;
- ii. Have sound knowledge in data processing, analysis and reporting;
- iii. Have good computer operation skills and hands on experience in MS office or equivalent.

In addition to the above, administration and secretarial support staff may be proposed for the duration of the services.

#### **1.2.5. GIS ENGINEER**

- i. A graduate in any discipline with masters in GIS or Remote Sensing having minimum 7 years of professional experience;
- ii. Have sound knowledge in modern GIS software platform including open source software;
- iii. Have experience in analysis GPS data and preparation of highway base plans;
- iv. Have good experience in operating ESRI ArcGIS software;
- v. Have good computer operation skills and hands on experience in MS office or equivalent.

#### **1.2.6. BRIDGE ENGINEER**

- i. A graduate in Civil Engineering, preferably with masters in the relevant field with minimum 7 years of professional experience;
- ii. Have sound knowledge in data collection, data management and reporting;
- iii. Have good understanding of different data collection technologies including latest industry practices in the relevant sector;
- iv. Have adequate experience in survey planning and coordinating and monitoring of network level data collection;
- v. Have good computer operation skills and hands on experience in MS office or equivalent.

#### **1.2.7. HDM-IV**

- i. A graduate in Civil Engineering or masters in Transport Economics with minimum 7 years of professional experience in roads and highways;
- ii. Have sound knowledge in maintenance planning and reporting;
- iii. Have adequate experience in preparing data inputs and interpretation of outputs of HDM-4 software;
- iv. Have adequate knowledge in HDM-4 deterioration models.

#### **1.2.8. IT AND HELP DESK**

- i. A graduate in IT or Computer Science with minimum 15 years of professional experience in infrastructure sector, preferably in roads and highways;
- ii. Have sound knowledge in maintaining government offices' IT network;
- iii. Have good understanding of software maintenance including installation, registration, user authentication and software security;
- iv. Knowledge of IT infrastructure of MORTH, NHAI and NHIDCL is preferred;
- v. Have sound knowledge in user training and providing software helpdesk;
- vi. Have excellent proven past skills in managing and mentoring junior staff.