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The population of the Pune has been growing rapidly, between 2001 and 2011; the city grew by 12.6%, increasing from 2.5 million to 3.5 million. The decadal growth rate of Pune for the last 10 years has been at least 12.5% and it's estimated that population in 2019 is 7.1264 Million. There has been an unprecedented increase in the traffic volume over recent years. The number of motor vehicles registered in the Pune has reached to 36.27 lakh, from 33.37 lakh the previous year (2016-2017). Currently, the road network in the Pune is one of the main options to serve the growing needs of the transportation from the public and private sectors. Other modes, such as metro are in the process of development. Therefore, maintaining roads in the Pune at a high level of service is greatly needed.



Fig 1. Map showing road network of Pune City

A. Objectives and Contributions

The primary goal of Road Asset Management is to think, plan and act on the basis of long-term decisions aiming at optimizing maintenance while keeping costs at a minimum and contributing to other political objectives while modernizing the network.

- 1 Efficient Road Data Collection
 - Data driven decision at an affordable cost. Start collecting standard IRI and PCI with your Smartphone today.
- 2 Asset Tracking and Monitoring
 - Advanced Reporting
 - Predictive Maintenance
- 3 Data Driven paving and Maintenance decisions at affordable cost.
 - RAMs is generally to optimize the economic benefits by minimizing the sum of maintenance cost and road user cost
- 4 Municipal authorities for planning budgetary requirement based on Scientific and rational analysis of present road condition
- 5 Perfect and very easy to Prepare Estimate, Planning, Programming.

II. ASSET OF ROAD

A. Road Inventory data-

- 1 Name of Road
- 2 Road ID
- 3 Width of MVL
- 4 Width of footpath
- 5 Type of footpath
- 6 No. Of Lane
- 7 Type of carriageway
- 8 Type of median
- 9 Type of shoulder
- 10 Condition of footpath, Road Marking
- 11 Roughness of Road
- 12 +10 More

B. Structure Inventory data-

Bridge, Culvert, Flyover, Underpass, Grade separator, ROB, RUB, Skyway etc.

- | | |
|----------------------------|-----------------------|
| 1 Object ID | 15.Parapet Type |
| 2 Road Name | 16. Parapet thickness |
| 3 Bridge Name | 17.wearing coat type |
| 4 Bridge Type | 18.Pier top thickness |
| 5 Name of crossing Element | 19.Pier bottom tk. |

- | | |
|---------------------------|--------------------|
| 6 Construction Year | 20.Pier height |
| 7 Number of span | 21.Foundation type |
| 8 Span width | 22.Bed protection |
| 9 Clear road way width | 23.Vt. Clearance |
| 10 Wing wall | 24.Flow direction |
| 11 Road width | 25.HFL |
| 12 Total length of Bridge | 26.Low water level |
| 13 Sub structure Type | |
| 14 Slab thickness | |

C. Under Ground Utility Data

This Data collected by manually by survey team in filled in TAB to connected to RAMs App. Like Road Nome, Location, pipe type, Pipe Dimension etc.



D. Traffic data collection

The most important point measurement is the vehicle volume count. Data can be collected manually or automatically. In manual method, the observer will stand at the point of interest and count the vehicles with the help of hand tallies. Normally, data will be collected for short interval of 5 minutes or 15 minutes etc. and for each type of vehicles like cars, two wheelers, three wheelers, LCV, HCV, multi axle trucks, non-motorized traffic like bullock cart, hand cart etc. From the flow data, flow and headway can be derived. Modern methods include the use of inductive loop detector, video camera, and many other technologies. These methods help to collect accurate information for long duration. In video cameras, data is collected from the field for 72 hrs, and is then analyzed in the lab for obtaining results.



Fig.2 Traffic counting

III. ROAD ASSET MANAGEMENT (RAM) OFFERS A SOLUTION

Road Asset Management provides decision makers with the necessary tools for efficient and sustainable management of roads. The process goes through the following steps:

- Establish a complete inventory of all road networks with all its elements
- Provide a clear picture of the current condition/performance of the road network
- Estimate the value of the asset
- Predict future demand of traffic and service needs
- Estimate maintenance needs and costs
- Prioritise objectives related to the desired quality and performance of the road network
- Set up funding scenarios for the regular and timely maintenance and upgrade of the road asset
- Define a strategy (RAM Plan)
- Implement the RAM Plan

A. Potential benefits from implementing an asset management system

The many benefits and expected outcomes available to a road administration upon implementation of an asset management system can be placed into the following categories:

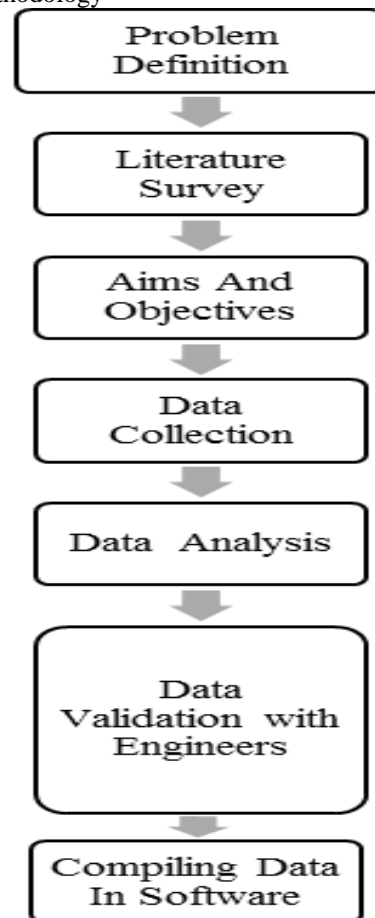
- Communications (both internal and external to the administration).
- Asset inventory, condition and level of use.
- Road network performance.
- Asset management tools.
- Budget process.
- Staff development.

IV. PROBLEM STATEMENT AND METHODOLOGY

A. Problem Statement

The road authorities in the Pune are in smart city project the challenge of maintaining the road network at its highest level of service while investing the minimum amount of money. To achieve this requires searching for and adopting efficient and cost effective road maintenance approaches. One such approach is the PBC to help to enhance the innovation and technologies related to road maintenance methods, reduction in cost, and substantial shift of risk from client to contractor, and increased overall satisfaction of the road users.

B. Methodology



V. PROCESS OF ROAD ASSET MANAGEMENT

Infrastructure is ageing due to use and time. It requires maintenance, renewal and modernisation,

which depend on specific needs and life time of each part of the asset. An inventory stating the condition of each asset, values and maintenance needs are the basics for an effective management, for political decision making and for transparency towards the community.

A. Full inventory

An inventory of roads is a prerequisite for improving the quality of the network in an efficient way. It should contain all the roads elements including historical data on construction and use. It should also be updated regularly. Visually the condition of many roads may superficially be satisfactory. However, only in a few Member States political decisions on investment and network management are accompanied by any sort of quality survey data. Management system has to fit to the infrastructure which is managed. For example, in the case of urban roads, elements related to the management of public transport services, energy, water and telecommunication have to be taken into consideration. This might not be relevant for motorways. Nevertheless, the RAM strategic approach applies in all cases. The table hereunder displays different elements of the road infrastructure that are considered in the establishment of the inventory

B. Evaluate/calculate the asset

In order to make right decisions in prioritising investments, authorities need to estimate the value and condition of their road asset. When they do so, they often discover that roads are their biggest asset in infrastructure.

Course values may significantly differ from one place to the other due to:

- Price Level (Different Costs of Labour, Raw Material)
- Density of Population (Ground, Noise Avoidance)
- Environmental Aspects
- Topography (Tunnels, Bridges)
- Technical Characteristics (Number of Lanes, Equipment,)
- Method of calculation (depreciation, replacement value.)

C. Data of Pavement Condition and Maintenance Treatment in Pune

This topic discusses the details of the data concerning pavement condition and various road maintenance treatments applied in the Pune city under smart city. The road authorities Municipalities and Department of Transport regularly collect the pavement data with the help of third party consultants. The Pune Municipal Corporation (PMC) data is used as a case study in this project. PMC includes in excess of 2400 km of greater Pune city's roads. The approximate asset value of PMC would be over 5700 crores, making it among the most valuable assets owned by Pune Municipal Corporation (PMC). The residents of Pune including workers, students and visitors use the PMC, whether as pedestrians; on bicycles or motorcycles; in buses, taxis, or cars; or as truck drivers. The mobility and safety of over 3.5 million people residents of Pune depend on proper maintenance and rehabilitation of the PMC. This section presents information about the pavement data collection equipment and methodology, total road survey is 1700km as our survey vehicle minimum range is 4m.

In the Pune, the art equipment including IRSM are used to assess the structural and functional conditions of the pavement. From the IRSM testing: roughness (ride), rut depth, surface macro texture and surface distress results were collected and layer modulus and remaining structural life were calculated and reported. Also Motion study the current axle loading was determined for evaluating remaining life



Fig 2. IRSM



Fig 3 IRSM output

VI. CONCLUSION

This project describes the process and Implement the RAM Plan. Detailed explanation of Road Asset Management. The primary goal of Road Asset Management is to think, plan and act on the basis of long-term decisions aiming at optimizing maintenance while keeping costs at a minimum and contributing to other political objectives while modernizing the network. The many benefits and expected outcomes available to a road administration upon implementation of an asset management system. This system very efficient for budget provision of city

REFERENCES

- [1] G. Bonin & S. Polizzotti, G. Loprencipe, N. Folino & C. Oliviero Rossi, B.B. Teltayev "Development of a road asset management system in Kazakhstan"
- [2] Transport Infrastructure and Systems Dell'Acqua & Wegman (Eds) (2017) Taylor & Francis Group, London, ISBN 978-1-138-03009-1
- [3] M I Pinard, G Rohde* and R Frank "The Use of Road Management Systems for Optimal Road Asset Management" 4th International Conference on Managing Pavements (1998)
- [4] Russell Kenley, Toby Harfield, Juliana Bedggood "Road Asset Management: the role of location in mitigating extreme flood maintenance" 4th International Conference on Building Resilience, (2014)
- [5] Robert Geddes and Kingstone Gongera "Economic Growth through Effective Road Asset Management" International conference road and research (2004)
- [6] Beverly T. Kuhn, Debbie Jasek, Jodi Carson, LuAnn Theiss, Praput Songchitruksa, Judy Perkins, Yonggao Yang, and Judith Mwakalong "RESEARCH ON ASSET MANAGEMENT FOR SAFETY AND OPERATIONS" Texas Transportation Institute (2011)
- [7] Vanier, D. J. "Why industry needs asset management tools" Journal of Computing in Civil Engineering, v. 15, no. 1, Jan. 2001, pp. 35-43
- [8] Payal Dubey "Development of Traffic Sign Asset Management System in Indian Context "International Journal of Innovative Research in Science, Engineering and Technology Vol. 6, Issue 12, December 2017
- [9] Juliet Mian "A Risk-based framework for geotechnical asset management" Highways Agency Phase 2 Report Issue 1 | November 2010
- [10] Gerardo W. Flintsch, J. W. Bryant "Asset Management Data Collection for Supporting Decision Processes" federal highway transportation (2009)
- [11] A Behnam and R Kenley "Location definition for road asset management systems: case of Sarawak Public Works Department IOP Conf. Series: Materials Science and Engineering 512 (2019).