

NHAI to Transit Towards Predictive Asset Management for Strengthening Operations and Maintenance of National Highways

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In order to develop efficient and high-quality National Highway infrastructure, National Highway Authority of India (NHAI) is undertaking a significant shift in National Highway Operations and Maintenance (O&M) through the adoption of predictive asset management. The progressive transition from conventional maintenance practices to predictive maintenance framework underlines NHAI's dual focus on building National Highways at scale, while ensuring maintenance of highways to the highest standards. Predictive maintenance will help to identify deterioration early and enable timely intervention, to keep National Highways in optimal condition.

The transition is anchored on three strategic pillars. The first pillar of this transition is large-scale asset condition monitoring. NHAI has deployed Network Survey Vehicles (NSVs) across the National Highway network under O&M to collect pavement condition data such as roughness, rutting, cracking and structural distress. Also, Drone Analytics Monitoring Systems (DAMS) are being used to create digital inventories of National Highway assets, monitor structures and identify encroachments, while Falling Weight Deflectometer (FWD) testing assesses the structural health of pavements and detects weakening sections before visible failures emerge. To further strengthen data capture, NHAI has initiated the rollout of AI-powered Dashcam Analytics Services (DAS) across operational National Highways sections, enabling automated detection of a wide range of shortcomings from potholes and damaged crash barriers to faulty lighting and drainage issues.

The second pillar is the creation of a centralized asset intelligence ecosystem. Data generated through NSVs, drones, dashcams and FWD surveys is being integrated into a single ecosystem, creating one source of asset condition across the National Highway network. This allows data to support multiple use cases and stakeholders across the O&M ecosystem, enabling NHAI to move beyond fragmented inspections and develop a continuously updated digital view of National Highway asset health.

The third pillar is predictive monitoring and risk-based decision-making. By combining historical condition data, inspection records and ongoing asset monitoring, NHAI will be able to identify trends early, prioritize vulnerable stretches and intervene before the shortcomings become critical.

Underpinning these pillars is proactive intervention and performance management enabled through standardized maintenance manuals, improved maintenance contracts and robust ecosystem support.

The initiative will provide an advanced and data-driven approach to Operations and Maintenance of the National Highway network. Through the integration of advanced monitoring technologies, artificial intelligence, data analytics and performance-driven maintenance systems, NHAI aims to enhance National Highway longevity, optimize maintenance and deliver world class travel experience to National Highway users across the country.

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