INDIA CHAPTER

IRF INTERNATIONAL ROAD FEDERATION

Global Road Infratech Summit & Expo

05-06 FEBRUARY 2026

Hotel The Ashok | New Delhi | India

GRIS GLOBAL ROAD INFRATECH SUMMIT & EXPO 2026

"Vision Zero India: Integrating Safety, Sustainability and Technology in Infra"

A Technical Audit and Rating Approach in Enhancing Highway Infrastructure

Presented by:

B. Divya

Dr Sai suman Poojari & Mr. Dhiraj Sethi

CUBE HIGHWAYS TECHNOLOGIES Pvt Ltd

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National highways construction pace slows to 29km/day in FY25: Gadkari

mint Premium | NEWS

Deadly roads: Centre fast-tracks highway audits amid rising fatalities

Subhash Narayan | 3 min read | 27 May 2025, 12:57 pm IST

Gurugram traffic audit launched at 22 key junctions to ease jams

The audit, part of a 218-junction study, found lane reductions, wrong signage, and encroachments as major causes of jams and violations.

Need to rate DPRs, contractors for quality construction: Nitin Gadkari

Nitin Gadkari

NHAI To Enhance Project Monitoring with Drone Technology fo Transparency and Efficiency

NHAI has already employed two service providers for its drone analytics monitoring system (DAMS), which allows for the remote tracking and monitoring of projects

BDA mulls IISc audit after social media flags poor roads in NPKL

Uttar Pradesh has become the **first Indian state** to launch an **Artificial Intelligence (AI)** and **Big Data** Analytics based Road Safety Pilot Project, approved by the Ministry of Road Transport and Highways (MoRTH).

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No. RW/NH-33044/15/2021-S&R(P&B)
GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(S&R(P&B) Section)
Transport Bhawan, 01, Parliament Street, New Delhi-110 001

Dated: 16th April, 2021

To,

1. The Chief Secretaries of all the State Governments/ UTs
2. The Principal Secretaries/ Secretaries of all States/ UTs Public Works Department dealing with National Highways, other centrally sponsored schemes.
3. All Engineers-in-Chief and Chief Engineers of Public Works Department of States/ UTs dealing with National Highways, other centrally sponsored schemes.
4. The Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi - 110010.
5. The Managing Director, NHIDCL, PTI Building, New Delhi-110001
6. All CE-ROs, ROs and ELOs of the Ministry

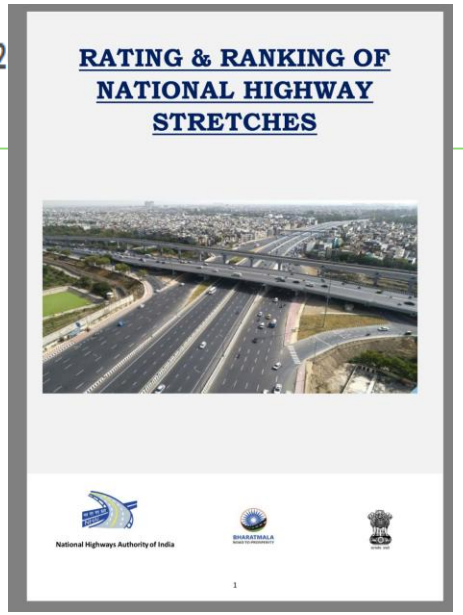
Subject: - Highway Rating Criteria and Methodology with detailed SOP for un-divided carriageway upto 2-lane with paved shoulders on National Highway.

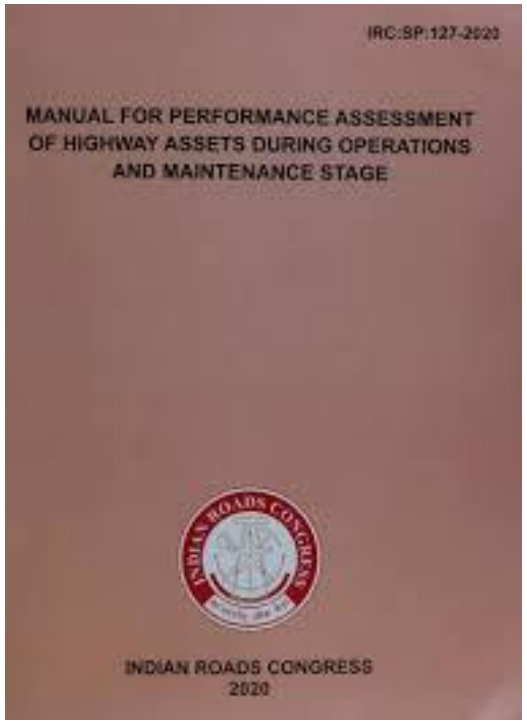
Madam/Sir,

NHAI has prepared Standard Operating Procedure (SOP) for rating of divided carriageway on National Highways (NHs) which has been issued vide its letter no. NHAI/HO/Highway Rating/2020 dt. 07.07.2020. The SOP prepared by NHAI is applicable for all executing agencies of the Ministry. On similar lines the SOP for rating of two lane NHs with undivided carriageway has now been finalized and is enclosed for your reference. The procedure and methodology have been prepared with an overview of the user's perspective/requirement on efficiency, safety and user facilities on un-divided Highways.

2. The basic unit of assessment of completed corridor shall be the Influence Length as defined in SOP. The rating of an entire corridor/project section shall be obtained by adding the weighed individual ratings of each Influence Length of the project/corridor. The ratings with its sub element so obtained can be used to prioritize the allocation of funds for improving different section of projects/corridor/stretch on different element of efficiency, safety and users services. This rating shall also help in performance appraisal of deployed concessionaire/contractor/maintenance agency. Based on Rating (Marks), following classification of the National Highway sections shall be done:

Rating (Marks)	80-100	60-80	40-60	< 40
Classification	Excellent	Very Good	Good	Poor





No.NH-35014/22/2020-H
Government of India
Ministry of Road Transport and Highways
(Highways Section)
Transport Bhawan, 1, Parliament Street, New Delhi-110001.
Dated: 18th June, 2020

OFFICE MEMORANDUM

Subject: Evaluation Criteria for Highway Rating -reg.

National Highways Authority of India (NHAI) has devised corridor rating methodology for project management and accountability along with parameters for performance evaluation of highways section after due consideration of road users perspective in the Indian context. Corridor rating methodology along with parameters for performance evaluation is enclosed (Annexure).

2. The corridor rating will become a diagnostic tool for identification of problems, its solution such as requirement of Bypasses, Realignments, construction of Grade Separators, construction of Culverts, Drainage Infrastructure, user facilities, ATMS, Street Lights and incident Management (Ambulances, Patrol) etc. with the final objective of improvement in completed Corridor from efficiency, safety and users perspective.

3. It has been decided that aforesaid corridor rating methodology of NHAI will be adopted by all the executing agencies of the MoRTH i.e. NHAI, NHIDCL and Road Wing of MoRTH. NHAI, which has already been using this methodology, will facilitate other agencies in using this methodology and give access to their system to other agencies urgently and not later than by 25th June, 2020 positively.

Encl: As above

(Ramandeep Chowdhary)
Deputy Secretary to the Government of India
Telephone No.23718575

To

1. Chairman, NHAI
2. DG(RD) & SS
3. MD, NHIDCL
4. All CEs of MoRTH

Copy to: Sr. PPS to Secretary (RT&H)

Problem statement and solution

Rapid highway expansion and aging infrastructure have made traditional manual inspections unsustainable. Transitioning to integrated digital audit and rating systems is necessary to provide the objective, scalable data needed for efficient maintenance planning.

The Limitations of Conventional Methods

Manual Inspections are Inefficient and Subjective

Traditional methods are labor-intensive and difficult to scale across large highway networks.

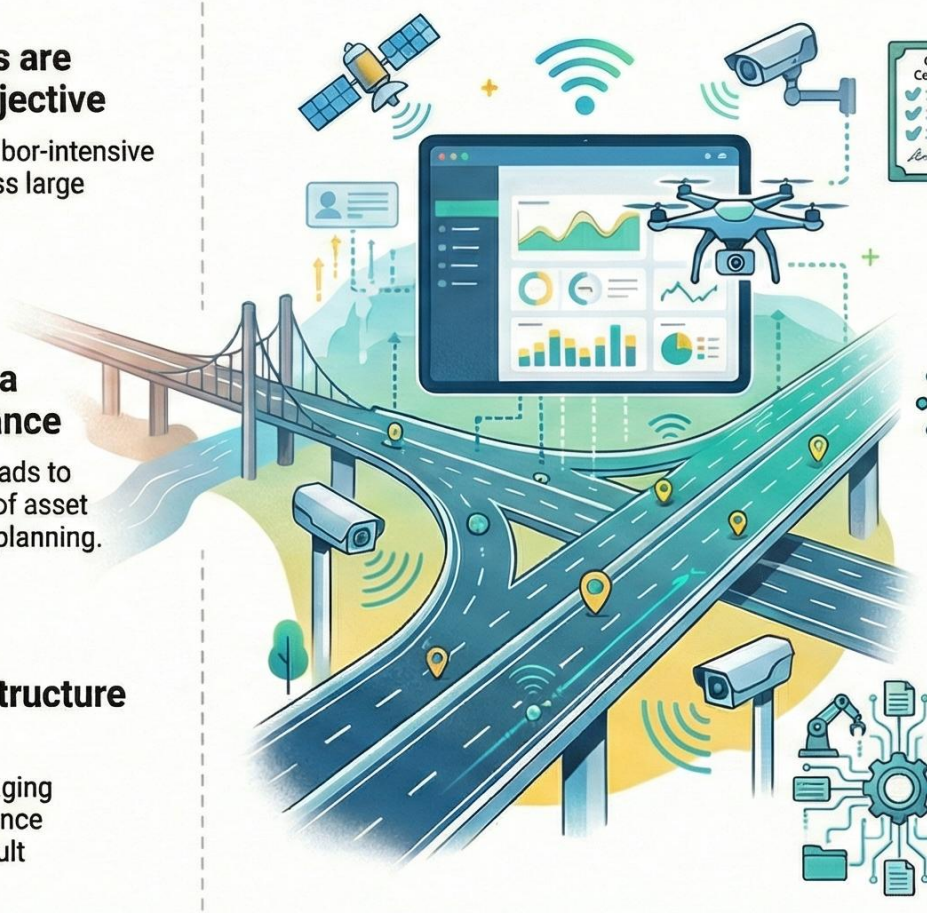
Inconsistent Data Delays Maintenance

Subjective reporting leads to delayed identification of asset deficiencies and poor planning.

Increased Infrastructure Complexity

Rapid expansion and aging assets make performance monitoring more difficult to manage.

The Digital Audit Solution



Standardized Audit Frameworks

Implementation of guidelines like IRC: SP:127-2020 requires technology-driven audit systems.

Integrated Digital Technical Audits

Digital systems enable objective, data-driven monitoring of highway infrastructure health.

Efficiency Through Automation

Technology-driven audits provide the speed and accuracy required for modern highway networks.

Technical Audit and Rating

The Technical Audit and Rating system has been implemented to diligently monitor and assess the condition of our highway assets throughout the Operations and Maintenance (O&M) period.

GEO REFERENCED VIDEO COLLECTION

AI/ML – POWERED ASSET DETECTION

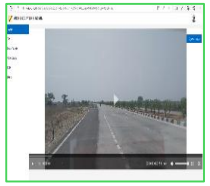
AUTOMATED IMAGE EXTRACTION AND DIGITAL AUDITS

ISSUE IDENTIFICATION AND RECTIFICATION

Process

Step 1

Video Collection through application



Step 2

Auto generated random sampling questionnaire

Step 3

AI/ML video processing and Image extraction

Step 4

Evaluation by Audit team

Step 5

Project site team reverification and discussions

Step 6

Insights, dashboards and reports

Categories and associated divisions

ROADWAYS

Pavement

Embankment

Shoulder

Kerb

Drainage

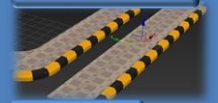
ROAD SIGNAGE & FURNTIURES

Anti glazer

Rumble strips

Hazard marker

Signboards


Footpath

KM stone

Road studs

Pavement marking

Guard rail

Noise barrier

HM stone

Delineator

Highway lighting

Solar blinker

Safety barrier

ADVANCETRAFFIC MANAGEMENT SYSTEM

VIDS

VASD

ECB

PTZ Camera

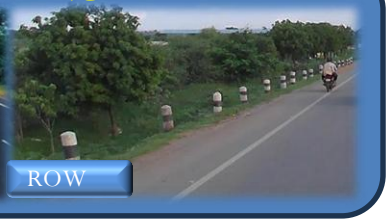
Mobile radio communication tower

VMS

Meteorological data system

LANDSCAPING

Median


ROW

TOLL MANAGEMENT SYSTEM

STRUCTURES

Rigid barrier

Hazard marker

Wearing coat on deck slab

Quadrant pitching

Clearance of vent

Approach settlement

Stagnation of rainwater

Structure numbering

Expansion joint

Drainage spout

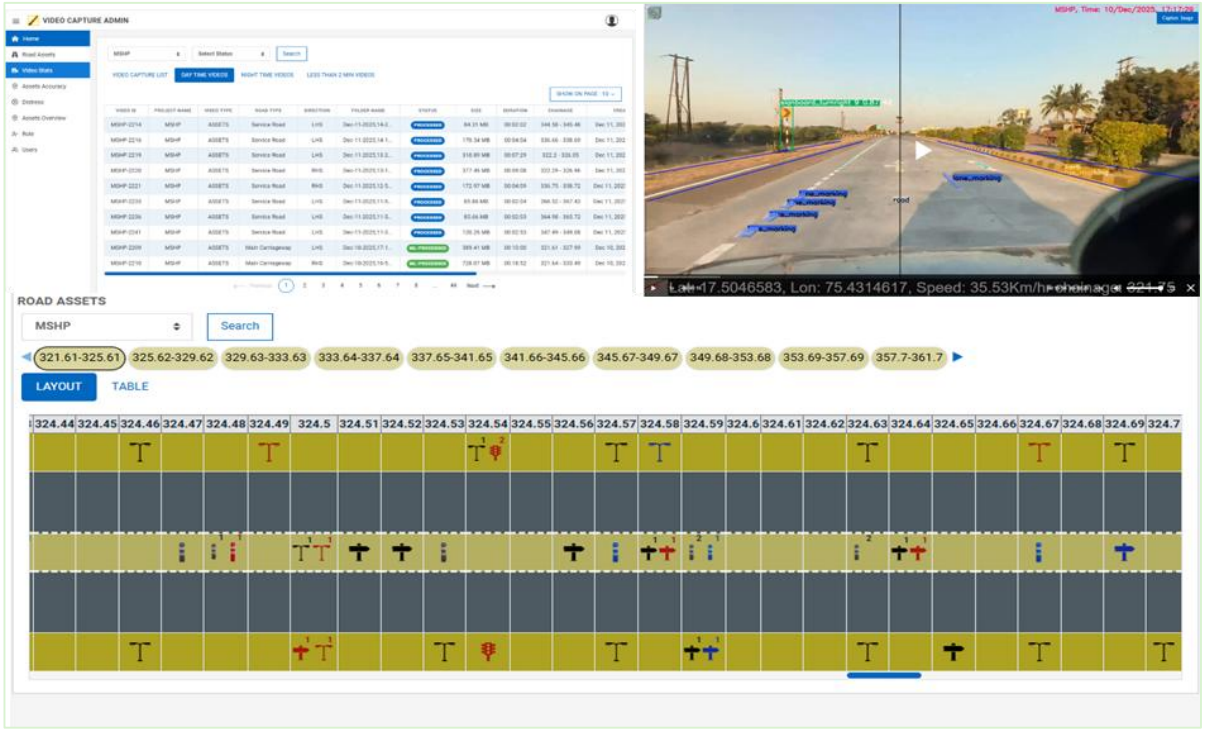
PROJECT FACILITES

Bus Bay

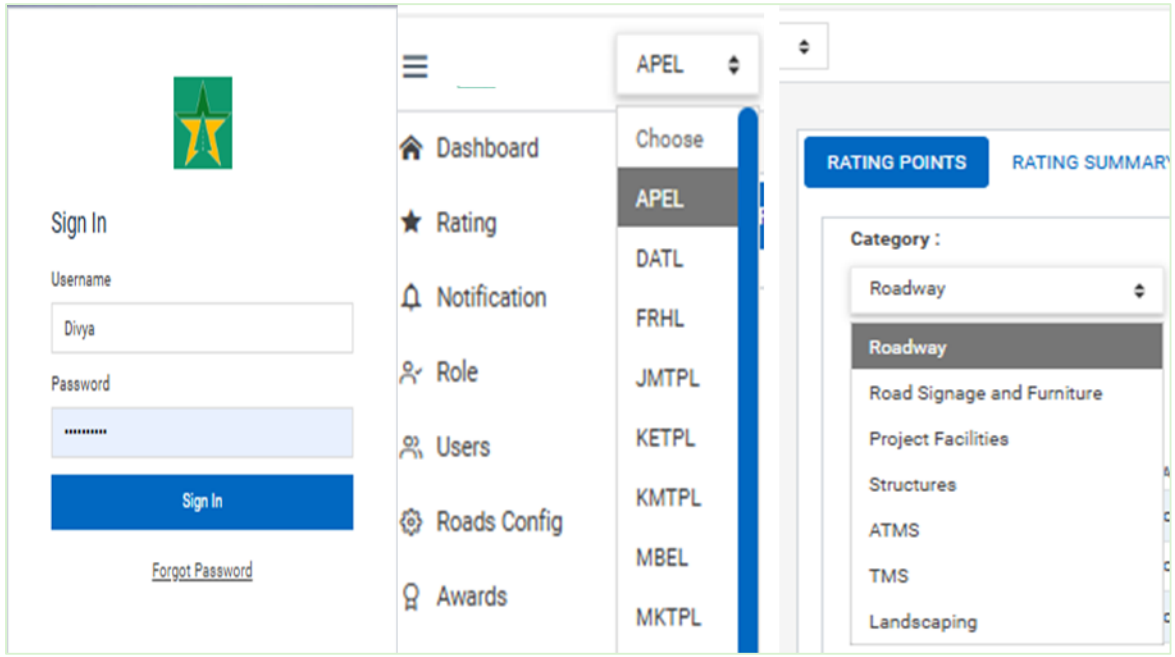
Truck Lay Bye

Toilet Block

Application

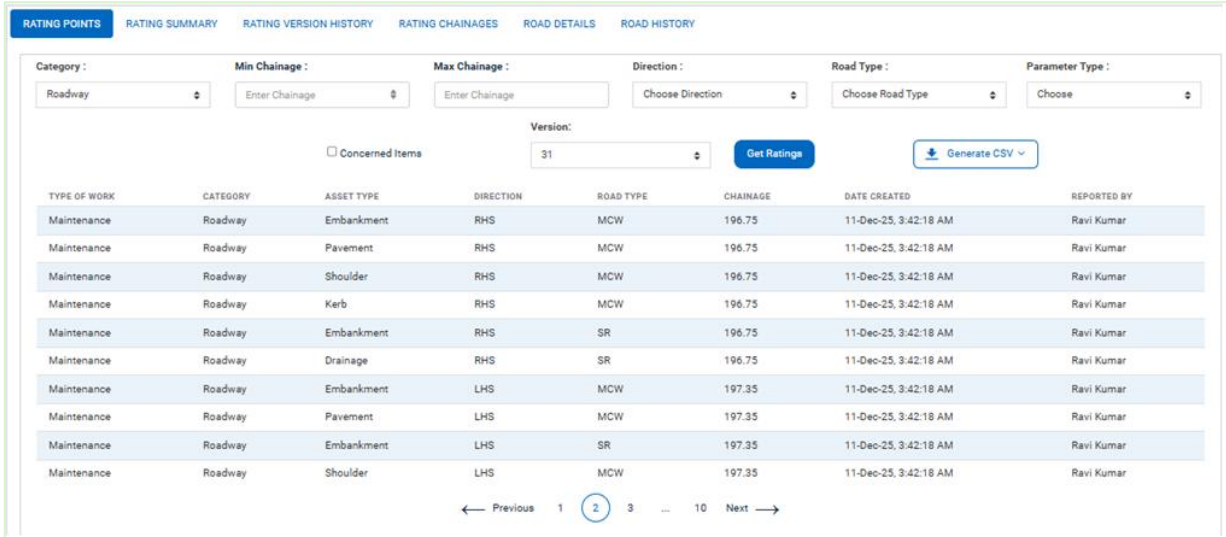


Videocapture application



Rating application

Audit based on extracted images



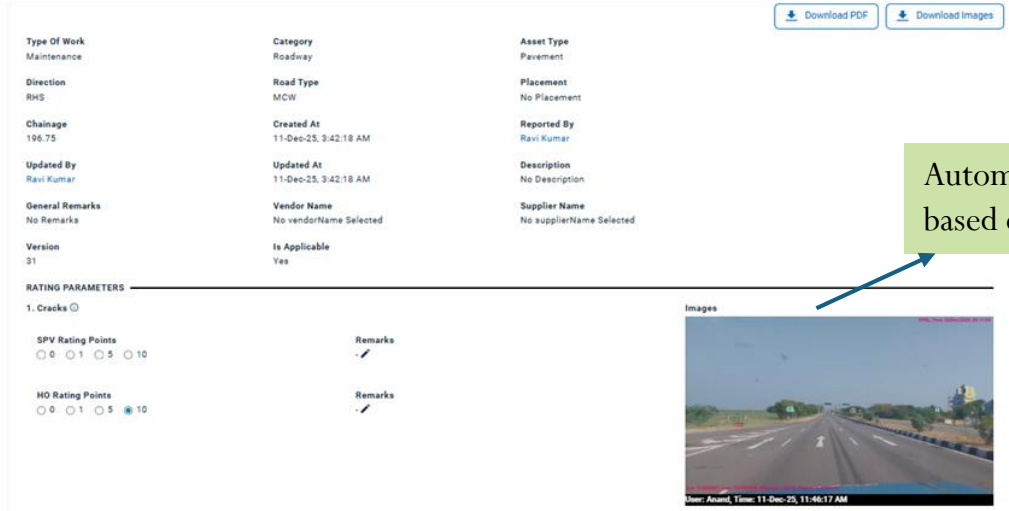
Roadway Category

- Pavement
- Kerb
- Shoulder
- Drainage
- Embankment

Digital Rating

Conventional Rating

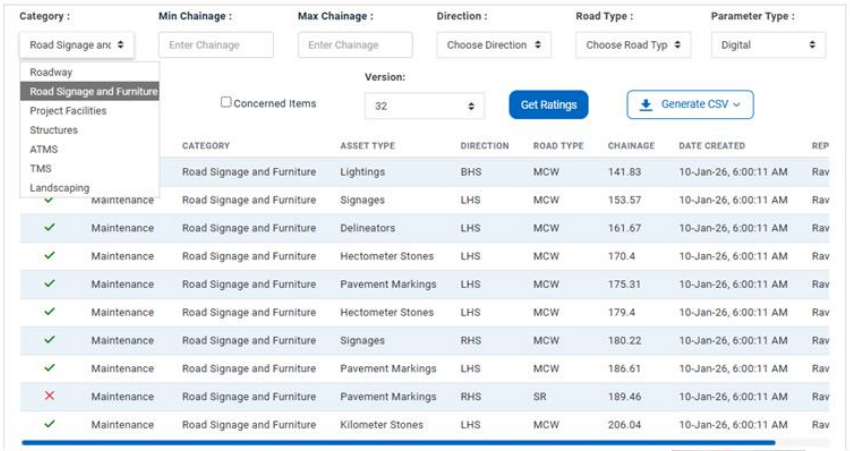
4 point rating scale



Automatic image extracted based on chainage

Auditing through digital images

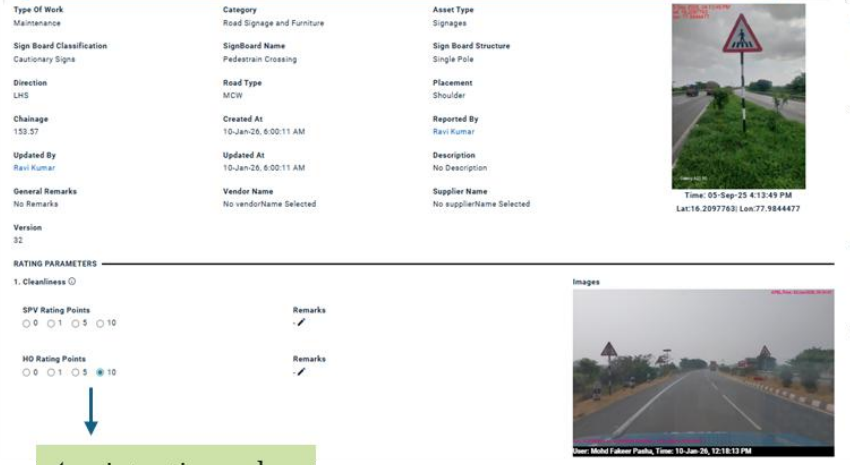
Audit based on extracted images



Road signage and furniture category

- Signboards
- Pavement Marking
- HM & KM stones
- Highway lightings

Digital Method



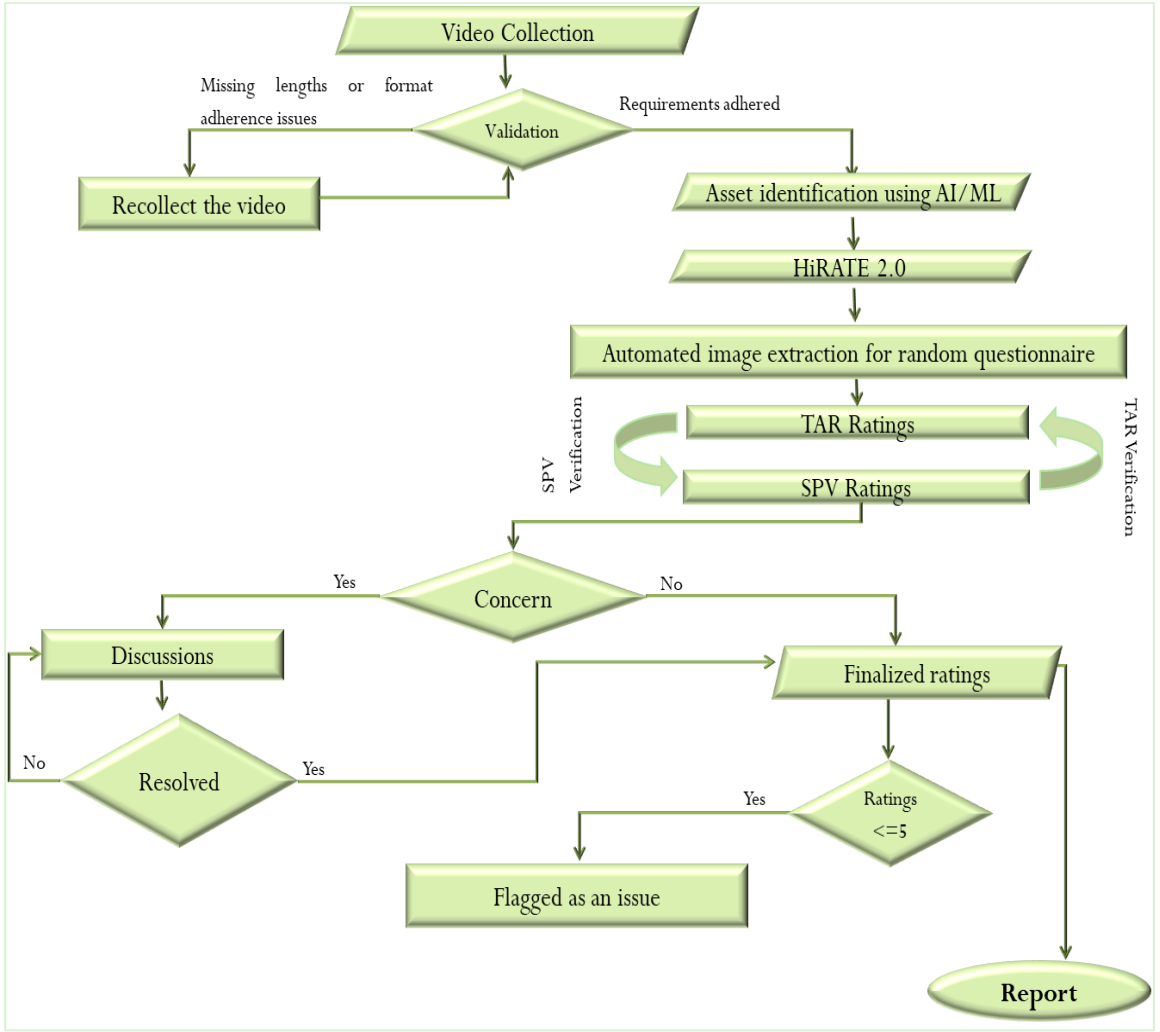
4 point rating scale

Automatic image extracted based on chainage

Night image based on night video for functional condition

Auditing through digital images

Performance and process



Performance Insights through Dashboards

Flow chart showcasing process

Advantages

PRECISION MONITORING & TECHNOLOGY

AI-POWERED DIGITAL AUDITS

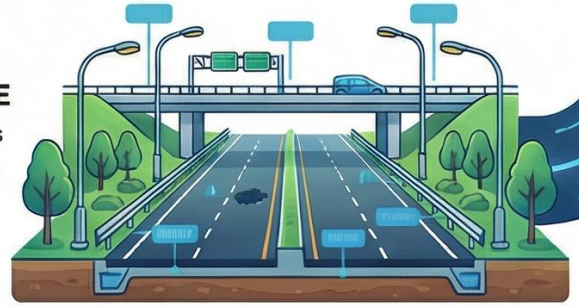
Uses geo-referenced video and AI for accurate, automated asset detection and monitoring.

STANDARDIZED ASSESSMENT (IRC: SP:127-2020)

Established uniform rating methodology ensures consistency and reduces subjectivity in performance evaluations.

END-TO-END ASSET COVERAGE

Evaluates all components including roadways, structures, furniture, and plantation acress the Right of Way.



STRATEGIC GOVERNANCE & OUTCOMES

DATA-DRIVEN MAINTENANCE PLANNING

Generates measurable indicators to support preventive strategies and optimized resource allocation.

COMPETITIVE PERFORMANCE ECOSYSTEM

Encourages stakeholder accountability through evaluation-based recognition and performance-driven environments.

ENHANCED NETWORK RELIABILITY

Continuous monitoring improves safety readiness, serviceability, and long-term infrastructure sustainability.

Conclusion

THE DIGITAL AUDIT WORKFLOW
STRATEGIC OUTCOMES & INTELLIGENCE
AI-Powered Data Collection
Hybrid Evaluation Model
Standardized 4-Point Rating
Based on IRC: SP:127-2020 Methodology
Statistically Driven Random Sampling
Strengthened Governance
Improves transparency and accountability within highway infrastructure management and audit systems.
Actionable Performance Visuals
Generates category-wise ratings, heat maps, and trend-based indicators for performance monitoring
Optimized Resource Utilization
Supports prioritized maintenance planning and preventive intervention through lifecycle-based asset management
Prioritized Planning
Preventive Intervention
Preventive Intervention
Long-Term Sustainability
Ensures infrastructure quality, operational reliability, and efficient lifecycle management.
Enhanced Data Reliability
Reduces subjectivity and improves traceability compared to conventional inspection practices

THANK YOU