



भारतीय राष्ट्रीय राजमार्ग प्राधिकरण

(सड़क परिवहन और राजमार्ग मंत्रालय, भारत सरकार)

National Highways Authority of India

(Ministry of Road Transport and Highways, Government of India)

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NHAI/ Policy Guidelines/ Miscellaneous/ 2025

Policy Circular No. 18.107/2025 dated 05th September, 2025

{Decision taken on E-Office File No. NHAI/IT/SmartMonitoring/IIT-K-PilotProject/2022 (Comp. No. 158387)}

(In supersession of earlier Policy Circular No. 18.98 dated 1st October 2024)

Sub: Recording of High-resolution Imagery from a Drone of the Project Highway during the Development, Construction and O&M period and implementation of Drone Analytics Monitoring System (DAMS) -reg.

With the objective to bring Transparency, Uniformity and use of the latest Technology, High-resolution Imagery through Drones of the entire ROW, Capturing the progress of the Projects, Road Condition, Road Furniture etc. has been made mandatory.

2. Scope of High-resolution Imagery:

All Projects starting from the issuance of the Appointed Date till completion of Construction Drone Surveys shall be carried out. In addition, Projects under O&M shall also be covered. Periodicity for Projects under implementation shall be 'monthly' and for Projects under O&M shall be 'six-monthly'. Further, to have continuous monitoring of the Project since inception, the PDs shall ensure to undertake a Drone Survey at the time of declaration of the Appointed Date so that the ground position of the Project is recorded. In addition, a provision is available in Data Lake whereby the Project Directors (PDs)/ Regional Officers (ROs) can raise a schedule to undertake need-based Drone Surveys as and when required on the Project through the empanelled Drone Service Providers (DSPs). The Standard Protocol Procedure (SOP) for raising the Work Order is available in the Data Lake.

3. Role of Drone Service Providers (DSP):

NHAI has empanelled zone-wise Drone Service Providers (DSP) for conducting Drone Surveys of the Project Highway during the Development, Construction and O&M period. Drone Survey shall be carried out only through empanelled DSPs. The DSP shall conduct a Survey in conformity with the revised SOP as approved per km. Rates.

4. Revised SOP for High-resolution Imagery through Drones:

Capturing of High-resolution Imagery through Drones shall be as per the revised Standard Operating Procedure (SOP) (Annexure-I.)

5. Work Orders and Execution Schedules:

To ensure uniform time-bound execution, the System generated work Orders for three months along with schedules to DSP for Drone Survey on all eligible Projects shall be issued from the Data Lake with a copy to the concerned PD and the RO. The Drone Survey should be conducted and completed preferably in the last week of every month such that its results can be used to prepare the MPR in the subsequent month. These work Orders will be issued

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to the concerned DSPs systematically on or before the 15th of the month. The System-generated scheduling of the Drone Survey shall take care of the gap of three months between the NSV and Drone Survey respectively. The tentative six-monthly schedule for O&M Projects is enclosed in **Annexure-II**. In addition to the prescribed schedules, need-based Drone Surveys on any Project can be directly raised, by PDs/ ROs, on the Data Lake between the 1st and 10th of any given month using the 'Drone Scheduling by PIU' Module.

6. Quality Check:

The data set collected through the Drone Survey shall have to pass through System-generated Quality Check (QC) to verify/ confirm that the output is in conformity to the revised SOP. This Assessment Prima Facie includes Key Parameters such as Drone Speed, Camera Angle, Coverage, Overlap Percentages and Image Quality. The result of QC will be available on the Data Lake for DSP reference. In case the QC results indicate a "Failed" status, the corrected imagery needs to be reloaded by the DSP. The payment to the DSP for the Drone Survey shall be done by the concerned PIUs through the payment processing module on Data Lake subject to the data being uploaded as well as compliance with the revised SOP.

7. Use of AI/ML for Drone Analytics:

NHAI has empanelled two (02) Technology Service Providers (TSP) for the Drone Analytics Monitoring System (DAMS) to enable remote tracking and monitoring of NHAI Projects. In this system the High-resolution Imagery collected through Drone shall be reconstructed and analysed to identify change detection on various Key Parameters using Artificial Intelligence/ Machine Learning algorithms and demonstrate the output on a dashboard four suites viz. (i) Under Construction (ii) O&M (iii) Plantation and (iv) Road Safety covering inter-alia but not limited to hindrances, encumbrances/ encroachments, progress of Project, Mobilization of Plant & Equipment, Mobilization at Camp Sites, rectification of maintenance defaults etc. List of approved parameters for AI/ML-based analytics is enclosed (**Annexure-III**). The DAMS will enable NHAI to optimize the utilization of Drone data collected providing dynamic updates and generating actionable insights through Reports and Dashboards. The Project-wise outcome of the analysed data will be made available on the Data Lake Portal to the respective Stakeholders.

8. Role of Team Leader of Independent Engineer (IE)/ Authority Engineer (AE):

Drone Survey of the Project Highway shall be carried out in the presence of the Team Leader of the Independent Engineer (IE)/ Authority Engineer (AE)/ Authorized Representative of the Authority. The IE/ AE/ SC shall ensure that the Quality of Drone data is not distorted/ tampered with. Further, AE/IE shall also have to validate/ confirm the execution of work/deliverables of TSP. The outcome of DAMS shall mandatorily be examined by AE/ IE/ SC concerned to provide their comments for its correctness/ acceptability preferably within three days of data being made available on the Data Lake or before freezing the MPR of the concerned month. Changes, if any, on the analytics are to be recorded on the relevant TSP's Portal. The approved outcome of this analysis shall be incorporated by the AE/IE/SC in the Monthly Progress Report (MPR) under the relevant section on MPR.

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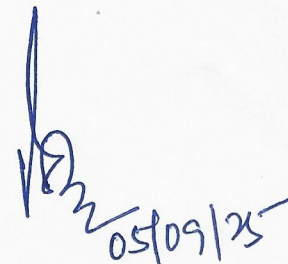
9. PD/RO shall have to cross-check the analysed data during their monthly physical inspections and highlight in DAMS/Data Lake itself their comments, if any or discrepancies between the analysed drone data on IE/ AE/ SC comments and ground reality.

10. As the above Drone Survey/ Analytical Reports coupled with MPR of AE/IE will be a permanent record on Data Lake and facilitate NHAI to use as evidence during Dispute Resolution before Arbitral Tribunals/ Courts etc, the Drone recording shall be carried out carefully and correctly without distortions/ tampering by all Parties concerned.

11. The Contract Agreement on EPC Model (Refer Clause 11.16 of DCA) and the Concession Agreement on HAM & Toll modes (Refer Clause 12.4.3 and 13.6 of MCA) provide for video recording of the Project Highway during the Construction Period. As such, the amount spent on Drone Survey shall be charged to Contractor/ Concessionaire to the extent covered in the Agreement. In Contracts where no such provision exists or cases where provision from the Concession/ Contract has been de-scoped, the amount spent on recording using a drone shall be borne by the NHAI. Power for approval of expenses on this activity is delegated to PDs who can charge this expenditure to the concerned Project.

12. This issue with the approval of Competent Authority.

Encl.: As stated above.



(CS. Sanjay Kumar Patel)
I/c Chief General Manager (Coord.)

To:

All Officers of NHAI HQ/ ROs/ PIUs/ CMUs/ Site Offices

Copy to:

1. Hindi Division for translation in Hindi.
2. Library for hosting the circular on library site.
3. Web Admin for circulation.

Copy also for necessary action to:

1. Data Lake Team - Program Manager
2. Empanelled Drone Service Provider (DSP).
3. Empanelled Technical Service Provider (TSP)

Revised Standard Operating Procedure (SOP) for recording drone videography imagery

Parameters	Revised SOP								
Drone Speed	5m/sec (18km/hr.) or less								
Drone Height	<p>Height at which drone will be flown will depend on ROW. Indicative heights are given below:</p> <table border="1"> <thead> <tr> <th>ROW (meter)</th><th>Maximum Drone Height calculated as above Ground Level (meter)</th></tr> </thead> <tbody> <tr> <td>40-70</td><td>60</td></tr> <tr> <td>70-100</td><td>80</td></tr> <tr> <td>100-130</td><td>95</td></tr> </tbody> </table> <p>Since drone height greater than 95 meter is not suitable for analytics, in case of sections (clovers, roundabouts etc.) where ROW is greater than 130m, the drone service provider will operate separately with multiple laps to cover both sides of RoW without exceeding the height limits and the DSP will be paid accordingly.</p>	ROW (meter)	Maximum Drone Height calculated as above Ground Level (meter)	40-70	60	70-100	80	100-130	95
ROW (meter)	Maximum Drone Height calculated as above Ground Level (meter)								
40-70	60								
70-100	80								
100-130	95								
Camera Sensors	RGB Sensor, Minimum 12 MP or better. Sensor has to be same for a single inspection.								
Recording Type	Images (JPEG)								
Recording Angle	90 degrees, Nadir unless specified otherwise								
Flight Pattern	Single lap with Right of Way in Centre								
Overlap in images expected	Minimum 85% (Front and Side)								
Geotagged Data	All data to be submitted as a single folder which includes individual sub-folders or sequential geo-tagged images as exported from drone.								
Flight logs	All flight logs from litchi or the app being used by the DSP to be submitted in a separate folder whether in .csv or txt formats, whichever is available in the application in use								
Miscellaneous	<ul style="list-style-type: none"> Minimum satellite lock should be 12 satellites or more while flying No custom settings in RGB sensor The image, width and height ratio should be uniform for all images Drone should be ideally flown using terrain follow mode or equivalent. All way side amenities, site camps, casting yards, borrow areas, toll plazas, O&M centre etc and nearby roads used for transportation of earth should be covered. 								
Submission of data/Deliverables	<ul style="list-style-type: none"> Geo-tagged Photos and log <p>Both are to be uploaded on NHAI Data Lake portal under login of DSP. All images to be in one folder, filenames should be sequential. All data is to be uploaded on NHAI Data Lake portal. Only when all data is submitted finally online will the data be considered submitted. In addition, the raw data i.e. Geo-tagged Photos and log shall also be submitted in Hard Disk/ USB to the respective PIUs.</p>								
System driven QC	The online system quality check of the drone data set uploaded will be checked to confirm that the output is as per the SOP. The payment of DSP will be released subject to compliance with SOP.								

Tentative six monthly schedule for O&M projects

Six Monthly cycle for Drone Survey for Projects under O&M*			
Region	State	1 st	2 nd
		Jan - Jun	Jul - Dec
East	Bihar	Feb	Aug
East	Chhattisgarh	Feb	Aug
East	Jharkhand	Feb	Aug
East	Orissa	Feb	Aug
East	West Bengal	Feb	Aug
Central	Madhya Pradesh	April	October
NE	Arunachal Pradesh	Jan	Jul
NE	Assam	Jan	Jul
NE	Manipur	Jan	Jul
NE	Meghalaya	Jan	Jul
NE	Mizoram	Jan	Jul
NE	Nagaland	Jan	Jul
NE	Sikkim	Jan	Jul
NE	Tripura	Jan	Jul
North	Chandigarh	Feb	Aug
North	Delhi	May	November
North	Haryana	May	November
North	Himachal	Feb	Aug
North	Jammu And Kashmir	Feb	Aug
North	Punjab	May	November
North	Uttar Pradesh	April	October
North	Uttarakhand	Feb	Aug
South	Andhra Pradesh	Jan	Jul
South	Telangana	Jan	Jul
South	Karnataka	April	October
South	Kerala	Jan	Jul
South	Pondicherry	Jan	Jul
South	Tamil Nadu	April	October
West	Goa	Feb	Aug
West	Gujarat	May	November
West	Maharashtra	April	October
West	Rajasthan	May	November

Note (*)

Above is the tentative six monthly schedule of drone survey for O&M projects taking care of gap of three months between NSV and drone survey respectively, load distribution and relevance of Road Safety and Plantation Analytics. Keeping in view that the 1st survey shall be conducted at the time of completion certificate (CC) of a construction project OR at the time of issue of LoA to an O&M agency, the first time survey month shall be reckoned accordingly in place of the month shown against the respective State in the above table.

For example:

If the project belongs to a Bihar State, where defined survey months as per above table are February and August. However, the CC or LoA to O&M agency is issued in the month of December, then the:-

- The drone survey conducted in the month of December, (when CC or LoA to O&M agency was issued), shall be treated as 1st survey in lieu of scheduled month survey of February and
- 2nd survey shall be conducted in August i.e. the next state-wise schedule as per schedule mentioned in the table above.
- Thereafter, the schedule of drone survey for O&M project in next year shall be as per the table above.

Annexure-III

List of approved parameters for AI/ML based analytics is enclosed

Under Construction	Operations & Maintenance	Road Safety	Plantation
1. Bridges 2. Intersection 3. Median Opening 4. Culverts 5. Encroachment 6. Flyover 7. Rail Over Bridges 8. Toll Booth 9. Bus/Truck Bays 10. Median Trees 11. Avenue Trees 12. Wearing Course 13. Base Course 14. Earth Work 15. Construction Not Started 16. Structure progress 17. Change detection	1. Potholes 2. Edge Drops 3. Crack 4. Raveling 5. Rain Cut Embankments 6. Authorized/Unauthorized Median Opening 7. Intersection/ Crossroads 8. Temporary/ Permanent Encroachments 9. Missing Lane Markings (lane, Inner edge, outer edge, kerb painting) 10. Missing/ Damaged Boundary Wall 11. Drain (Open, covered, blocked/unclean) 12. Missing Dissipation Basin 13. Monsoon features to be added?	1. Vehicle under Pass (VUP) 2. Crossroads 3. Exit/Entry 4. Bridges 5. Grade Separated Intersection 6. Culverts 7. ROB/RUB 8. Authorized/ Unauthorized Median opening 9. Intersection/Crossroads 10. Temporary/Permanent Encroachments 11. Missing Lane Markings (lane, Inner edge, outer edge, kerb painting) 12. Crash Barriers (LHS, RHS, Median) 13. Crash Barriers End Treatment/Transition 14. Entry/Exit of Highway (Chevron Marking, Arrow Marking, Shoulder Mounted Sign, Road Separator) 15. Drain (Open, covered, blocked/unclean) 16. Missing/ Unaligned Median Drain 17. Missing Dissipation Basin 18. Missing/Damaged Boundary Wall	1. Name 2. Alignment 3. Canopy Elevation 4. Road Elevation 5. Type 6. Tree Height 7. Longitude 8. Latitude 9. Length 10. Central Latitude 11. Central Longitude 12. Probable Number of Trees 13. VARI (Vegetation Index Ratio)