सत्यमेव जयते

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)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली - 110 075 ● G-5 & 6, Sector-10, Dwarka, New Delhi-110075
दूरभाष/Phone : 91-11-25074100 / 25074200

भाराराप्रा/ नीति दिशानिर्देश / सूचना प्रौदयोगिकी/ 2026
नीति परिपत्र सं. 6.49 / 2026 दिनांक 20th मई, 2026

{(ई-ऑफिस फाइल सं.NHAI/IT/SmartMonitoring/IIT-K-PilotProject/2022(कम्प्युटर सं.158387 पर लिया गया निर्णय)}

NHAI/ Policy Guidelines/ Information Technology /2026
Policy Circular No. 6.49/ 2026 dated 20th May, 2026

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

विषय: ड्रोन विश्लेषक निगरानी प्रणाली (डीएएमएस) - विकास, निर्माण और ओएंडएम अवधि के दौरान परियोजना राजमार्ग पर डीजीपीएस डेटा के अभिलेख हेतु ग्राउंड कंट्रोल पॉइंट्स स्थापित करना।

Sub: Drone Analytics Monitoring System (DAMS) - Establishing Ground Control Points for recording DGPS data on the project highway during the development, construction and O&M period.

संदर्भ: 1. नीति परिपत्र सं. 18.107/2025 दिनांक 05 सितंबर, 2025
2. नीति परिपत्र सं. 6.40/2025 दिनांक 01 अप्रैल, 2025

Ref. 1. Policy Circular No. 18.107/2025 dated 05th September, 2025
2. Policy Circular No. 6.40/2025 dated 01st April, 2025

ड्रोन सेवा प्रदाताओं (डीएसपी) द्वारा निर्माणाधीन और ओएंडएम चरणों के दौरान राष्ट्रीय राजमार्ग खंडों की हाई - रिज़ॉल्यूशन इमेजिंग की जाती है, जिसका विश्लेषण ड्रोन विश्लेषक निगरानी प्रणाली (डीएएमएस) में एआई / एमएल तकनीकों का उपयोग करके किया जाता है।

The high-resolution imaging of NH Stretches during the under-construction and O&M stages is carried out by Drone Service Providers (DSP) which in turn is analysed using AI/ ML techniques in the Drone Analytics Monitoring System (DAMS).

2. हाई - रिज़ॉल्यूशन इमेजरी और उसके विश्लेषण की स्थानिक और अवस्थिति संबंधी सटीकता में सुधार हेतु, ग्राउंड कंट्रोल पॉइंट्स (जीसीपी) की स्थापना अनिवार्य कर दी गई है। जीसीपी जमीन पर भौतिक चिह्नक होते हैं जिनके निर्देशांक सटीक रूप से ज्ञात होते हैं। प्रसंस्करण पश्चात डेटा को संरेखित और भू - संदर्भित करने हेतु उनका उपयोग हवाई या सेटेलाइट इमेजरी में संदर्भ बिंदुओं के रूप में किया जाता है। जीसीपी को भारतीय सर्वेक्षण (एसओआई) के सतत संचालन संदर्भ स्टेशनों (सीओआरएस) के नेटवर्क का उपयोग करके मान्य किया जाना चाहिए।

Contd.....2/-

To improve the spatial and locational accuracy of high-resolution imagery and its analysis, the establishment of Ground Control Points (GCPs) has been made mandatory. The GCPs are physical markers on the ground with precisely known coordinates. They are used the reference points in aerial or satellite imagery to align and geo-reference the data during post-processing. The GCPs must be validated using the Survey of India (SOI) Continuously Operating Reference Stations (CORS) network.

3. सूचीबद्ध डीएसपी परियोजना के राइट ऑफ वे (आरओडब्ल्यू) के भीतर डीजीपीएस डेटा (अक्षांश, देशांतर और ऊंचाई) रिकॉर्ड करेंगे तथा यह सुनिश्चित करेंगे कि वांछित सटीकता सुनिश्चित करने हेतु कैप्चर की गई ड्रोन इमेजरी में सभी जीसीपी और संदर्भ बिंदु स्पष्ट रूप से दिखाई दे रहे हैं। ये जीसीपी बिंदु पेंटिड मार्करों के रूप में स्थापित किए जाते हैं, जो आमतौर पर बड़े, दृश्यमान प्रतीक जैसे क्रॉस या वृत्त सीधे जमीन पर चित्रित किए जाते हैं। डीएसपी जीसीपी बिंदुओं को चिह्नित करने हेतु पेंटिड मार्करों या चेकर मार्करों, जैसा कि मामले-दर-मामले आधार पर उपयुक्त समझा जाए, का उपयोग कर सकता है।

The empanelled DSPs shall record DGPS data (latitude, longitude, and elevation) within the project right of way (ROW) and ensure that all GCPs and reference points are clearly visible in the captured drone imagery to ensure desired precision. These GCP points are established as painted markers, typically large, visible symbols like crosses or circles painted directly on the ground. The DSP may use painted markers or chequered markers to mark GCP points as deemed fit on case-to-case basis.

4. जीसीपी आयोजित करने हेतु दिशा-निर्देश और ड्रोन सेवा प्रदाताओं (डीएसपी) की भूमिका: डीएसपी द्वारा राष्ट्रीय राजमार्ग परियोजनाओं पर जीसीपी सर्वेक्षण आयोजित करने के लिए दिशा-निर्देश अनुलग्नक-1 के रूप में संलग्न हैं। ओएंडएम परियोजनाओं के मामले में जीसीपी मार्कर कम से कम 12 महीने और निर्माणाधीन परियोजनाओं के मामले में 6 महीने के लिए स्पष्ट रूप से दिखाई देने चाहिए और बरकरार रखे जाने चाहिए, ऐसा न होने पर, डीएसपी द्वारा अपने स्वयं के खर्च पर इसे तैयार किया जाएगा। जीसीपी को पुनः रंगने, टच-अप करने, बनाए रखने या बदलने के लिए डीएसपी उत्तरदायी है और यह सुनिश्चित करे कि जीसीपी निर्धारित अवधि तक बरकरार रहें। स्थापित जीसीपी से संबंधित सभी डीजीपीएस डेटा डीएएमएस प्लेटफॉर्म पर अपलोड किया जाएगा।

Guidelines for conducting GCP and Role of Drone Service Providers (DSPs): The guidelines for conducting GCP surveys on National Highways projects by the DSPs are attached at **Annexure-1**. The GCP markers must remain clearly visible and maintained for at least 12 months in case of O&M projects and 6 months in case of under-construction projects, failing which the same is to be carried out by the DSP at its own cost. It is the DSP's responsibility to repaint, touch-up, maintain or replace the GCPs and ensure the GCPs last the stipulated duration. All DGPS data corresponding to the established GCPs shall be uploaded to the DAMS platform.

5. परियोजना कार्यान्वयन इकाइयों (पीआईयू) की भूमिका: डीएसपी जीसीपी स्थलों की पहचान और उन्हें अंतिम रूप देने के लिए पीआईयू से आवश्यक मदद और समन्वय सहायता ले सकता है। परियोजना निदेशक यह सुनिश्चित करेंगे कि ड्रोन सर्वेक्षण के अतिरिक्त, जीसीपी डेटा संग्रह गतिविधि आईई / एई / प्राधिकरण के प्राधिकृत प्रतिनिधि के टीम लीडर की उपस्थिति में की जानी चाहिए। आईई / एई / एससी यह सुनिश्चित करेगा कि एकत्र किए गए डेटा की गुणवत्ता को विकृत / उससे छेड़छाड़ न की जाए, और उपयुक्त स्थान (विशेषकर निर्माणाधीन परियोजनाओं और / या ग्रीनफील्ड रंरेखण के लिए) परियोजना के आरओडब्ल्यू के भीतर जीसीपी मार्कर स्थापित करने के लिए उपयोग किए जाएं।

Contd.....3/-

Role of Project Implementation Units (PIUs): The DSP may take required assistance and coordination support from the PIU for the identification and finalisation of GCP locations. The Project Directors shall ensure that, in addition to the drone survey, the GCP data collection activity must be carried out in the presence of the Team Leader of the IE/ AE / Authorised Representative of the Authority. The IE/ AE/ SC shall ensure that the quality of data collected is not distorted/ tampered with, and appropriate locations (especially for projects under construction and/or greenfield alignments) within the project ROW are used for establishing GCP markers.

6. प्रौद्योगिकी सेवा प्रदाताओं (टीएसपी) की भूमिका: टीएसपी यह सुनिश्चित करें कि डीएसपी द्वारा प्रस्तुत जीसीपी डेटा भारतीय सर्वेक्षण (एसओआई) सीओआरएस नेटवर्क का उपयोग करके संदर्भित किया गया है। डीएएमएस द्वारा जनित सिस्टम-जनरेटेड गुणवत्ता जांच (क्यूसी) रिपोर्ट में जीसीपी का एक खंड होगा, जिसमें इसके अनुपालन स्थिति सहित डीएसपी द्वारा अधिग्रहित और प्राप्त किए गए जीसीपी बिंदुओं की संख्या का विवरण भी शामिल होगा।

Role of Technology Service Providers (TSPs): The TSPs shall ensure that the GCP data submitted by DSPs are referenced using the Survey of India (SOI) CORS network. The system-generated Quality Check (QC) report generated by DAMS will have a section of GCP, which provides the details of no. of GCP points acquired and maintained by the DSP, along with its compliance status.

7. जीसीपी डेटा संग्रह के लिए भुगतान: नीति परिपत्र दिनांक 01 अप्रैल, 2025 में अनिवार्य निर्देश अनुसार ड्रोन के माध्यम से हाई-रिज़ॉल्यूशन इमेजरी कैप्चर करने और भाराराप्रा परियोजनाओं के लिए जीसीपी मार्कर स्थापित करने से संबंधित सभी बिल केवल डेटा लेक के माध्यम से ही प्राप्त किए जाएंगे। जीसीपी गतिविधियों के लिए भुगतान टीएसपी द्वारा स्वीकार की गई इकाइयों / बिंदुओं की संख्या का उपयोग करके 2X के गुणन कारक सहित वास्तविक आधार पर किया जाएगा। जीसीपी गतिविधियों की स्थापना के साथ ड्रोन सर्वेक्षण के भुगतान के लिए उदाहरणात्मक तंत्र **अनुलग्नक-2** के रूप में संलग्न है। टीएसपी द्वारा जनित क्यूसी रिपोर्ट में उसकी अनुपालन की स्थिति सहित डीएसपी द्वारा अधिग्रहित और प्राप्त किए गए जीसीपी बिंदुओं की वास्तविक संख्या का विवरण भी शामिल होगा। यदि ड्रोन डेटा में जीसीपी पहचान योग्य नहीं हैं, तो उस चक्र के लिए न तो ड्रोन इमेजरी और न ही जीसीपी गतिविधि का भुगतान किया जाएगा।

Payment for GCP data collection: All bills related to capturing high-resolution imagery through drones and establishment of GCP markers for NHAI Projects are only to be received via the Data Lake as mandated in Policy Circular dated 01st April, 2025. The payment for GCP activities shall be made on an actual basis using the number of units/ points accepted by TSP with a multiplication factor of 2X. The illustrative Mechanism for the payment of drone survey with the establishment of GCPs activities is attached at **Annexure-2**. The QC report generated by the TSP will have details of the actual number of GCP points acquired and maintained by the DSP, along with its compliance status. If GCPs are not identifiable in the drone data, neither the drone imagery nor the GCP activity will be paid for that cycle.

Contd.....4/-

8. यह सक्षम प्राधिकारी के अनुमोदन से जारी किया जाता है।
This issues with the approval of Competent Authority.

संलग्नक: यथोपरी।
Encl.: As stated above.

20/05/26

(सीएस. संजय कुमार पटेल/ CS. Sanjay Kumar Patel)
प्रभारी मुख्य महाप्रबंधक(समन्वय) (i/c) Chief General Manager (Coord.)

प्रति/ To:

1. **भाराराप्रा मुख्यालय/आरओ/पीआईयू/सीएमयू/साइट कार्यालयों के सभी अधिकारी।**
All Officers of NHAI HQ/ ROs/ PIUs/ CMUs/ Site Offices.

2. **डेटा लेक टीम - प्रोग्राम प्रबंधक**
Data Lake Team - Program Manager

3. **सूचीबद्ध प्रौद्योगिकी सेवा प्रदाता (टीएसपी)**
Empanelled Technology Service Providers (TSPs)

4. **सूचीबद्ध ड्रोन सेवा प्रदाता (डीएसपी)**
Empanelled Drone Service Providers (DSPs)

प्रतिलिपि/ Copy to:

1. पुस्तकालय की साइट पर प्रकाशन के लिए पुस्तकालय को।
Library for hosting the Circular on Library site.

2. परिचालन के लिए वेब एडमिन को।
Web Admin for Circulation.

3. सचिव, सड़क परिवहन और राजमार्ग मंत्रालय के प्रधान निजी सचिव को सूचनार्थ।
PPS to Secretary, MoRT&H for Kind Information.

Annexure-1

Guidelines for DSPs for conducting GCP surveys on NH Projects

1. Ground Control Points (GCPs) shall be captured using regular drones with highly visible GCPs in drone data or using RTK / PPK drones, which must be validated using the Survey of India CORS network.

2. **GCP Marker:**
   - Markers used for placing on the ground where DGPS will collect data (latitude, longitude, and elevation) must be clearly visible in the captured data.
   - DSP may use of Painted Markers or Chequered Markers or Pre-stressed Concrete Columns to mark GCP points.
   - A "plus sign" (+) is preferred to provide clear, distinct points for accurate targeting in imagery.
   - Painting materials and processes must follow IRC specifications used for lane markings.
   - Selection of GCP Locations
     - GCPs shall be placed on stable, permanent, and clearly visible locations, such as:
       - Paved shoulders and lay-byes
       - Median areas (where safe and permitted)
       - Concrete or asphalt surfaces near infrastructure
     - Each location shall ensure:
       - Clear aerial visibility during drone imaging
       - Clear sky visibility for GNSS signal reception
     - The following locations shall be avoided:
       - Under trees, near buildings, or below overhead structures
       - Near metallic or reflective surfaces causing GNSS multipath
       - On active carriageway without proper safety arrangements
       - On loose soil, embankments, or disturbed construction areas
     - GCP Placement at Critical Features - In addition to interval-based placement, GCPs shall be established at critical features, including but not limited to:
       - Major and minor intersections / junctions;
       - Bridges and flyovers (both-ends and, where feasible, mid-span reference);
       - Culverts and drainage structures;
       - Interchanges, ramps, and grade separators;
       - Toll plazas and service road connections;
       - Sharp horizontal curves and vertical bends;
       - Locations with significant elevation variation (cutting/filling zones)

3. **Ensuring visibility of GCP markers:**
   - A clear and unobstructed image of each GCP marker shall be captured.
   - For each GCP, it may be ensured that the GCP marker shall be captured across consecutive images to ensure proper 3D reconstruction maintaining minimum 80% front overlap in images.
   - Compliance with this requirement is mandatory to ensure proper identification, verification, and accuracy of drone data.
   - DSP shall ensure that all GCPs and reference points remain intact, clearly identifiable on the ground, and distinctly visible in the captured drone imagery, free from shadows, without obstruction or degradation that may affect data accuracy.

4. **DGPS data capturing and its uploading:**
   - The uploaded data shall strictly comply with the prescribed format, accuracy, and quality requirements specified in the Contract Agreement.
   - The horizontal accuracy achieved is 5mm ± 0.5ppm (rms), while the vertical accuracy is maintained at 10mm ± 0.20ppm (rms).
   - The rover must have a minimum observation time of 120 minutes during the survey.
   - The instruments must be capable of operating over a range greater than 15 kilometres.
   - All DGPS data corresponding to the established GCPs shall be uploaded on the DAMS platform.

5. **DSP Responsibilities & Maintenance**
   - GCP markers must remain clearly visible for at least 12 months for O&M projects and 6 months for Under-Construction projects. For example: The GCP for O&M project is taken up in the month of January, the DSP shall mandatory maintain GCP markers at their own cost up-to December and similarly the GCP carried out for UC project in the month of January shall be mandatorily maintained by DSP at their own cost up-to June. **Further, in case any DSP fails to maintain GCP markers within stipulated time period, the QC status will be failed for the month.** The QC report will also have a section of GCP summary which clearly provides the compliance status.
   - The DSP shall ensure continuous visibility and usability of these points in all drone data acquisitions conducted during the validity period, in strict compliance with prescribed quality and accuracy standards.
   - If markers from a previous cycle are still clearly visible beyond the minimum timeframe, a fresh setup will not be required, and no compensation will be provided for those points.
   - Before undertaking drone flights in subsequent months, DSPs shall physically verify all GCP markers along the alignment. This verification shall ensure that each GCP marker is clearly visible and unobstructed in the drone imagery.
   - It is the DSP's responsibility to repaint, touch-up, or replace markers at their own cost if GCP markers become unidentifiable within the stipulated timeframe. If points are being replaced (cases where the location of a previously marked GCP is not visible anymore and a new point is being marked at a new location), the data of the new point will undergo due QC process by the TSP without any additional cost implication.

- The DSPs must coordinate with the TSP before initiating data capture.
- The DSP may take required assistance and coordination support from the PIU and/or AE / IE for identification and finalisation of GCP locations. The involvement of PIU/AE/IE is essential, as they are best positioned to recommend locations that are unlikely to be disturbed due to ongoing construction activities (for UC projects) or any other hindrance (for O&M projects).
- After completion of every consecutive drone flight, TSPs will include details of all GCP markers acquired / maintained with their respective status of utilization. This would enable DSPs to ensure that adequate GCP markers are maintained during the stipulated period of maintenance as well as enable PIU/AE/IE to check inconsistencies if any.

6. **Ensuring quality and number of GCP markers:**
   - For regular drones, the distribution of Ground Control Points (GCPs) varies based on terrain type to ensure accurate survey results. In plain terrain, GCPs should be placed at intervals of 4 GCP per 5 kilometers or less than 5 kilometers. In rolling terrain, the distribution should be 5 GCP per 4 kilometers. For hilly or steep terrain, the spacing is increased to 5 GCP per 2.5 kilometers. In any case, there should be at least minimum 4 GCP points in any continuous stretch of image collected.
   - For projects exceeding 5 km, the number of GCPs shall be determined based on the total project length as stipulated in the Contract Agreement. Where the project length is not an exact multiple of five, the total number of GCPs shall be rounded up to the next highest multiple of five.
   - GCPs shall be distributed uniformly along the project corridor.
   - Adequate representation shall be ensured on both sides of the alignment as well as along the center-line to achieve balanced spatial coverage and improved positional accuracy.
   - For project stretches less than 500 m, a minimum of 4 GCPs shall be established, one at start, one at end and two at least at the intermediate section. For stretches between 500 m and 1 km, minimum 4–5 GCPs shall be ensured irrespective of interval logic.

7. **Payment Mechanism**
   a. Payment for GCP activities shall be made on an actual basis for the number of units/points accepted by NHAI with a multiplication factor provided in the Contract Agreement.
   b. All fresh GCP setups must be pre-approved by NHAI or its representative; unapproved activities will not be compensated.
   c. If approved, GCPs are not identifiable in the drone data, neither the drone imagery nor the GCP activity will be paid for that cycle.
   d. Any fraudulent practices or data tampering will lead to blacklisting and financial penalties.
   e. The existing 'DSP Payment' module of NHAI'S Data Lake is to be perused for raising invoices for GCP related work against submission of Work Order email and QC Report with reference to the 'GCP Summary/GCP Information' section.
   f. Failure to comply with the GCP Work Order within the month of issuance would lead to transfer of Drone Survey as well as GCP Work Orders to another empanelled Agency for next scheduled inspection.

i. If Drone Survey - Completed: QC on DAMS will be passed
ii. If DGPS Survey - Not completed: QC will be not complied and project workorder will be transferred to another empanelled agency for next scheduled inspection.

g. Failure to maintain GCPs for at least 12 months for O&M projects and 6 months for Under-Construction projects would attract penalties. The penalty amount would be auto-deducted from the Drone survey invoices raised by the DSP for months where compliance has not been done basis the following formula:
   i. *Monthly DGPS Penalty = Utilized Points (1st complied Month) × 2 × Zone Rate (Drone Survey) ÷ 6 (for UC projects) OR ÷ 12 (for O&M projects)*

Annexure-2

Illustrative Mechanism for the payment of drone survey with the establishment of GCPs

1. The DSPs have two options to establish GCP markers as under:

Option 1 (Regular Drone): Data must be captured with highly visible GCPs in drone data submitted and corrected with the Survey of India CORS system. The GCPs are physical markers on the ground with precisely known coordinates. They are used as reference points in aerial or satellite imagery to align and geo-reference the data during post-processing.

OR

Option 2 (RTK / PPK Drone): Data may be captured using RTK/PPK Drone, in which case the latitude/longitude of all images must be corrected directly and only verification points will be required to be marked on DAMS Portal. The RTK/PPK values must be further validated using Survey of India CORS network.

2. For Better understand of Drone data collection in relation to the above two option, the following is the process difference

Regular Drone (Non-RTK)	**RTK/PPK Drone**
• Uses standard GPS (autonomous positioning). • Image locations have low positional accuracy (typically 5–15 meters). • Requires Ground Control Points (GCPs) for accurate georeferencing.	• Equipped with high-precision GNSS (RTK/PPK). • Provides centimeter-level positioning for each image.
Work Flow	**Work Flow**
• Fly drone → Capture images • Place and survey multiple GCPs using DGPS • Use GCPs during processing to correct position • Accuracy depends heavily on quality and distribution of GCPs	• Fly drone with GNSS corrections enabled • Each image is geotagged with high accuracy • Minimal or no GCPs required • Use checkpoints only for validation
Suggested Alignments	**Suggested Alignments**
• Highway corridors - Small projects • Areas where GCP placement is easy	Highway corridors -Large-scale mapping • Greenfield / inaccessible areas

3. If GCP markers are established as per:

Option 1: The payment for GCP points shall be made on an actual basis using the number of units/ points accepted by TSP (detailed in QC Report) with multiplication factor of 2X.

Option 2: The payment of control points for RTK/ PPK (including setup of initial base point) shall be per km. based on actual basis accepted by TSP with multiplication factor of 2X.

4. An illustrative example of the payable amount as per both options is shown below:

	Item	Option 1	Option 2
(A)	Project length (km)	45	45
(B)	Rate of drone survey per km (Rs.)	411	411
(C)	GCP points established (Nos.)	40	-
(D)	Multiplication factor of 2X of (B) (Rs.)	822	822
	Payable Amount (Rs.)		
	• For drone survey	18,495 *(A) x (B)*	36,990 *(A) x (D)*
	• For GCP work	32,880 *(C) x (D)*	
(E)	Total Payable Amount (Rs.)	51,375	36,990
(F)	DGPS Deduction per month for Not-Maintained status		

5. The GCP markers must remain clearly visible for at least 12 months for O&M projects and 6 months for Under-Construction projects. The responsibility to check the visibility and usability of GCP markers lies with TSP which shall be duly reported under relevant section of the QC Report.

6. There shall be no payment for maintaining GCP markers.

   a) All Disturbed, damaged, or removed due to traffic movement or affected by road maintenance / construction activities, obstructed due to utility works or temporary installations or found unsuitable due to visibility or safety concerns, shall be reported to respective IE / AE / RE. The affected GCP shall be assessed for visibility in aerial imagery, physical stability, safety of access etc. and if found usable may be retained and documented, however, on the other hand if found unsuitable, the same must be relocated and re-established within close proximity (preferably within 50–100 m) of the original point on a stable, safe, and clearly visible surface under the same ID with revision suffix (e.g., GCP-05R) OR a new ID with cross-reference and be clearly marked and documented ensuring continuity of spatial control and finally resubmitted to the TSPP.

   b) IE / AE / RE may record the locations of GCPs in MPRs after verification during monthly visit to site, including any disturbance/changes by recording reasons. They may also check overall condition of GCP markers which may be communicated to the DSP, so that the GCP markers are properly maintained before each drone survey cycle.

7. In case any DSP fails to maintain GCP markers within the stipulated time period, penalties as defined in Annexure – 1 above shall be applicable, and DSPs would not be able to raise invoices for drone surveys.

****