Foundation for Innovation and Technology Transfer
(FITT)

REF: FT/2023/053/49
Date: 3rd April, 2024

Notice Inviting Quotation

Technical Specifications for Survey at Guwahati

S. No.	Instrument Specification	*Values
1	Scope of Work	Detailed Topography Survey using UAV Drones and providing stitched dem
2	Area of Work	Central Guwahati lumsum 200 sq km. (A map will be provided).
3	Type of Work	*110 sq km: LiDAR Survey. * 90 sq km: Photogrammetry Survey. * Can be changed onsite.
4	Contract Period	60 days
5	Legal compliance for execution project	The vendor should possess the requisite UIN and RPC License issued by DGCA for UAV drone operations and will get the necessary clearance from local government authorities at the time of requirement/execution.
6	Data acquisition	UAV LiDAR & Photogrammetry.
7	Data processing	Orthomosaic/ DEM/ Point cloud
8	Deliverables:	a. RGB data (for both LiDAR and Photogrammetry) b. LiDAR c. Photogrammetry d. Individual DEMs e. Merged DEMs f. Orthomosaic (.tiff & .ecw format with minimum 5cm GSD) g. Raw Data & Point cloud (.laz/.las format with a minimum point density of 250 points)
	Accuracy / Data density	3 cm XY accuracy, 10 cm in Z Axis/ 250 Points per meter sq.
9	Fundamental Spatial Accuracy Requirements	The fundamental spatial accuracy of the survey must conform to the following standards: Fundamental Vertical Accuracy (FVA) <= +/- 10 cm. 95% confidence interval (1.96 x RMSE) Fundamental Horizontal Accuracy (FHA) <= +/- 3 cm. 95% confidence interval

		(1.96 x RMSE)
10	Delivery form	12 TB Hard Drive Synology NAS Drive (Final Delivery). On the Company's cloud (for immediate updation of survey work on daily basis).
11	Survey mode	LiDAR Scan: UAV Drone with Triple Return LiDAR & 26 MP 1" CMOS Sensor equipped with RTK base setup and capable of absolute accuracy of 3cm @ 100m flight altitude. Photogrammetry: UAV Drone setup with Photogrammetric camera having minimum 45 MP full frame CMOS sensor equipped with RTK positioning to maintain absolute accuracy of 3cm (horizontal) and 5cm (vertical)
12	● The bidder should be registered under the relevant firms/societies/companies Companies Act of the Indian Govt, 1956 or should have owned office in India. (Individual Consultant should have a minimum of valid trade license issued by appropriate Govt. authority and should have owned office in India) ● The bidder should be registered as a consultant under any governmental engineering department of India involved in flood or drainage management project. ● The bidder should have a minimum experience of 5 years in topographical. ● Five years experience in a company with MSME & DPIIT certificates. ● Bidder should have experience in similar work with any governmental institute or department for drainage/flood management projects, an educational institute for research purposes with a completion letter should be submitted for such works. (Work means terrain survey with Drone based LiDAR Scanning survey in Urban area/ city in India). Minimum order value should be around 20-30%. On-going work will be assessed on the basis of performance (work should be in between period of last 24 months from tender publish date). ● Bidder should have at least two UIN number and Two RPC certified pilot from DGCA under their own name. ● Bidder should have a Cloud based Geo-spatial data Visualization platform with multiple type of data visualization, data analysis and data layers superimpose. Platform should be compatible as per Geo-spatial policy of India. ● Bidder should provide work methodology and timeline elaborated with detailed planning of equipment and manpower deployment. ● The technical proposal will be examined on the basis of responsiveness to the Evaluation Methodology, the Scope of work and other details as mentioned herein the document. Technical evaluation marking statement of bidder is prepared based on the Evaluation Methodology & their submitted compliance to all the terms and conditions of the tender will be prepared	
13	● AOI planning submission for DGPS points and UAV flying mission planning. ● DGPS based Primary ground control points (Static observation) & Secondary control point (RTK observation) ● UAV flight planning for LiDAR & RGB data acquisition ● UAV LiDAR data specs & quality: ● Minimum point density 180 points per m sq. ● Triple return LIDAR sensor input ● Colourised point cloud ● RTK enabled UAV for LiDAR data georeferencing ● 3 Axis gimbal on LiDAR sensor ● LiDAR sensor should be integrated with 24MP RGB camera ● UAV RGB data specs ● 45 MP photogrammetric camera with full frame CMOS sensor	

	● Overlap 75 front : 80 side overlap ● Minimum GSD of 5 cm ● Data processing : Orthomosaic (Seamless with no colour difference), DEM (Resolution under 20 cm) & Point cloud (Minimum point density of 250 ppm) ● Data Delivery: NAS compatible HDD & cloud-based Visualisation platform for 3 months (No cost)

Additional requirements

1	Horizontal Datum	The World Geodetic Datum 84 (WGS-84).
2	Map Projection	The coordinate system for all deliverables is Universal Transverse Mercator (UTM).
3	Vertical Datum	Ellipsoid: All deliverables specified below as ellipsoidal will be in terms of the WGS-84 reference frame. The source of the ellipsoidal height control shall be explained in the "Post-Survey Spatial Accuracy Report".
4	Geoid Model	EGM 2008 shall be used to derive Orthometric heights from ellipsoidal data.
5	Survey Control	All raw survey control data used or derived from this contract will be supplied to the client to ensure independent Quality Assurance (QA) of the survey operations and for possible use in other surveys requiring these. It is, therefore, essential that all primary ground stations are permanently marked in accordance with the Survey of India standards.
		The primary ground control and check point surveys must be referenced to the survey of India's local vertical datum specified above, comprising Survey of India Benchmarks or derived from processing of Static GNSS data using Precise Point positioning (PPP) to derive positional accuracy within 4-5 cm. Survey to establish new primary control shall use techniques to achieve a minimum standard of Survey of India for Densification of geodetic survey or equivalent in international standards. This will be mentioned the Project Plan and Project Report submitted to client. Any systematic bias in elevation data will be corrected and must be reported to client.
7	LiDAR Sensor Specifications	The sensor must be capable of: • Absolute Accuracy : Horizontal: 5cm, Vertical : 10cm. • Max.range, reflectivity > 80% : 450m • Max.range, reflectivity > 10% : 90m • Detecting a minimum of 3 returns • Minimum Scan rate: 240 000 pts/sec (first or strongest return), 480 000 pts/sec (dual return), 720 000 pts/sec (triple return). • Positioning: Dual-frequency GNSS GPS, GLONASS, BeiDou, Galileo, sampling frequency 5 Hz • Built in 26MP, 30fps RGB camera

8	Photogrammetric Sensor Specifications	The sensor must be capable of: • Absolute Accuracy : Horizontal: 3cm, Vertical : 5cm • Effective Pixels : 45MP • Sensor size: 35.9mm x 24mm (Full frame) • FOV : 60 Degree – 70 Degree
9	UAV Drone	UAV drone should support payloads for LiDAR scanner and Photogrammetric camera as per specifications mentioned above and should have the following minimum capabilities: • RTK positioning accuracy: 1 cm + 1ppm (Horizontal), 1.5cm + 1ppm (Vertical)
10	Collection Requirements	The survey design must plan on: A scan angle not exceeding 60o Total FOV (+/- 30o from nadir) • LiDAR Flight line overlap must be 10% or greater, as required to ensure there are no data gaps between the usable portions of the swaths.
		LiDAR Data Voids (with void areas more than and equal to 4 x NPS2), measured using 1st-returns only within a single swath are not acceptable, except: where caused by water bodies where caused by areas of low near infra-red (NIR) reflectivity where appropriately filled-in by another swath The spatial distribution of geometrically usable points is expected to be uniform and free from clustering. To ensure consistent data densities throughout the project area. Environmental conditions for data capture are: Cloud and fog free between the aircraft and the ground. Flights would not be undertaken during periods of heavy smoke, haze, and rain. Every effort shall be made to avoid breaks within individual flight lines. Where breaks within a flight line are necessary, the entire flight line composed of the resulting segments shall meet all the requirements set forth in these specifications

The bidder must own/lease (as indicated against each item) the following instrument/ machine/ software/ manpower, as a minimum, to be eligible to bid:

S.No	Item	Nos	Own / Lease	Documents
1	Aerial LiDAR scanner with a range of 100 m or above and a Pulse Repetition Rate (PRR) of 300 kHz or better along with Inertial Measurement Unit (IMU), Aerial GPS and other associated control units	1	Own/ Lease	1. Invoice Copy/Bill of Entry 2. Import Documentation – or similar ownership documents 3. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page
2	Aerial Imagery Camera with a minimum resolution of 45 MP or better	1	Own/ Lease	1. Invoice Copy/ Bill of Entry 2. Import Documentation – or similar ownership documents. 3. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page

3	UAV Drone Aircraft (excluding Drones & Unmanned Aerial Vehicles) / Helicopter	1	Own/ Lease	1. Ownership documents/ Lease Copy 2. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page 3. UIN issued by DGCA 4. NSOP copy of Aircraft operator
5	RTK Ground Station for UAV	1	Own	1. Ownership documents/ Lease Copy 2. Data Sheet of equipment specifying meeting of technical requirements along with equipment manufacturer web page
6	RPC License	2	Own	Must be issued by DGCA
4	LiDAR Trajectory Pre-Processing Software compatible to scanner	1	Own/ Lease	Invoice Copy
5	Terrascan / Terrasolid/ Point Tool/or similar Post-Processing Software	1	Own/ Lease	Invoice Copy
6	Photogrammetry Feature Extraction Software Leica photogrammetry suite or Bentley micro station or similar	1	Own/ Lease	Invoice Copy
7	Cloud Platform	1	Own/ Lease	The company should have a Geospatial cloud platform for data visualization and analytics

Bidder's Technical Manpower strength:

Manpower	Minimum Number	Credential (Form 7 to be duly filled and submitted by the bidder)
Team Leader	1	i. Graduate in Civil Engineering/ M Sc Geomatics/ M Sc Geology/Surveying and Mapping with a minimum of 5 years experience in terrain survey works using aerial LiDAR scanner/Photogrammetry
Surveyor	2	i. Graduate in Civil Engineering/ M Sc Geomatics/ M Sc Geology/Surveying and Mapping with a minimum of 3 years ' experience in terrain survey works using aerial LiDAR scanner/Photogrammetry.
UAV Pilot	2	The pilot should have RPC issued by DGCA

`Compliance Sheet

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UAV Pilot	2	• The pilot should have RPC issued by DGCA	

Submission Requirements:-

Interested companies or individuals should submit their proposals by 06 Dec 2023. Proposals should include:

- Trainer profiles highlighting qualifications, experience, and expertise in AI training.
- Details of previous similar training engagements, especially with B.Tech students.
- Proposed approach and methodology for conducting online AI training and practical project classes, including the breakdown of theory and lab hours.
- Cost breakdown, including fees for the training sessions and any additional expenses.

Evaluation Criteria:-

Proposals will be evaluated based on:

- Qualifications, expertise, and experience of the trainers.
- Feasibility and effectiveness of the proposed training approach.
- Alignment with the project's objectives and requirements.
- Cost-effectiveness and value for the proposed training services.
- Previous delivery by company for similar projects earlier.

Terms & Conditions Details

Preparation of Bids: The offer/bid should be submitted in two bid systems (i.e.) Technical bid and financial bid. The technical bid should consist of all technical details along with commercial terms and conditions. Financial bid should indicate item wise price for the items mentioned in the technical bid

Opening of the tender: The bid will be opened by a committee duly constituted for this purpose. The technical bid will be opened first and it will be examined by a technical committee (as per specification and requirement). The financial offer/bid will be opened only for the offer/bid which technically meets all requirements as per the specification.

Acceptance/ Rejection of bids: The Committee reserves the right to reject any or all offers without assigning any reason.

Two separate sealed envelopes to be submitted for technical and financial bid (clearly labell ed as "technical bid" and "financial bid") respectively.

Last date of submitting the bids will be 15th April, 2024 before 5:00 pm to :

Dr. Manabendra Saharia
Department of Civil Engineering
Indian Institute of Technology Delhi
Block V-224, IIT Delhi, New Delhi, India 110016
Office: +91-011-26591260
Email: **msaharia@iitd.ac.in**

Please quote prices for FOB New Delhi, inclusive of all taxes and duties.

Quote should be in Indian Rupees for agents of Indian manufacturers, or in foreign currency, for agents of foreign manufacturers, and needs to be valid for at least three months.

Attach all the technical literature and a list of similar installations done in India.

If the quote is being submitted by a representative of the manufacturer, a valid agency-ship or dealership certificate authorizing the agent to quote to IIT Delhi on behalf of the manufacturers should be enclosed. The principal and the vendor, both, are not allowed to quote for the same product.

Complete set of manuals for the operation of the equipment should be given.

Authorized dealer for the OEM must attach a Certificate of Authorization.

Please specify all of your terms and conditions clearly, including delivery period.

Authorized dealer for the OEM must attach a Certificate of Authorization.

Mode of payment for purchases in foreign currency through wire transfer on delivery. Only bank charges within India are payable by FITT, IIT Delhi, all bank charges outside India are the responsibility of the seller. For purchases in INR, payment is on delivery.