

Request for Proposal

RFP Number	CMD/KIIFB/CS-03/2019
Name of the work	Leasing of Equipment and Services for Topographic survey using Drone Aerial Survey, GNSS and Total station for Corridor studies along the supplied corridor in connection with the coastal highway project in Kerala funded by KIIFB.
Last date and Time of submission	08.03.2019, 5.00 pm
Designation and Address of the Tender Inviting Authority /Quotation to be addressed to	The Director Centre for Management Development Thycaud, Thiruvananthapuram, Kerala PIN- 695014 Email: cmdappraisal@gmail.com
Validity of Bid	30 days from the last date of submission
Commencement of work	Within 7(seven) days of the Letter of Award
Sealed Bid Cover to be superscribed as	"CMD/KIIFB/CS-03/2019" bearing the Name and Full Address of the Bidder on the outside of the cover.

Leasing of Equipment and Services for Topographic survey using Drone Aerial Survey, GNSS and Total station for Corridor studies along the supplied corridor in connection with the coastal highway project in Kerala funded by KIIFB

Agencies/Organisations are requested to provide financial proposals in the format attached for leasing of equipment including crew, maintenance and other required charges to conduct aerial topographic survey, GNSS and total station survey along the supplied corridor in connection with the coastal highway project in Kerala, being funded by KIIFB and providing outputs in the formats as specified.

Details of work to be carried out

Drone (UAS) based engineering grade Aerial Survey is to be carried out along the proposed coastal highway corridor leading to collection of High-Resolution Aerial Imagery of minimum 2 cm GSD by Drone which can be processed using stereo photogrammetry techniques. Corridor width vary from **30m to 75m** on either side of the proposed alignment. As an output of the survey, generation of dense point cloud and 2cm orthophoto from the drone images for the collection of the details of all existing assets including picking up of natural and manmade features covering the entire corridor. Supplementary survey may also be needed to carry out using GNSS/Total Station instruments wherever drone data is insufficient for exact topographic/feature extraction.

Low Altitude Aerial Mapping

Vendor should be able to supply survey grade "Unmanned Aerial Vehicle (UAV)" along with three trained staff per vehicle for taking high resolution "Down Looking" images from an onboard calibrated camera. All the Photographs should be precisely geo-referenced by GNSS for accurate aerial triangulation process. Necessary accurate Ground Control Points (GCP) also to be collected. Ground Control Points (GCP) to be paint marked with the Point number labelled in the ground. These photographs are to be processed using the 3D stereo photogrammetry technology to produce accurate high-resolution CAD/GIS ready mosaiced orthophotos and dense point cloud. It is required that the relevant routes, areas & features are clearly visible in the output orthophoto after processing.

Data Acquisition/Image Capturing & Processing

Area Coverage: Drone Survey flight lines need to be planned for whole length of the route including ROW (Corridor width **30m to 75m on either side of the alignment**) but not limited to proposed alignment, Important/Major/Minor Bridges, Buildings & Structures, fly overs, under pass, Land, encroachments, connecting roads, etc.

Output/Deliverables required from the survey:

The following are the deliverables required from the survey once it is carried out:

- All the field data including the drone images, Ground Control Points that is needed for orthophoto generation to be delivered.
 - Ground Control Points (GCP) in CSV format to be generated. An image showing the paint marking and the surroundings to be included for all GCPs. Supplementary information such as road name/junction name etc can be part of the CSV file and is needed for in house future activities.
 - Certificate stating the accuracy of the collected Ground Control Points.
 - Permanent control points of 2 nos each at every 5.0 km established along the alignment.
- **2cm, 5cm & 10cm resolution orthophoto mosaic with clear visibility of all features in ECW/TIFF/geoTIFF format (CAD compatible) as these 3 separate resolution images are needed for the in-house requirements of KIIFB.**
- Quality Control Report stating the accuracy of orthophoto mosaic (an absolute accuracy of 5cm is required). Control Points and check points are to be checked and ensured that this is possible.
- **Colourized Dense Point Cloud from the drone photogrammetry processing in LAS and LAZ format. Dense Point Cloud should have a point density of 100 points/Sq. m or more. Point Cloud files to be tiled into decent sizes (max size of say 2GB for LAS files or 250m blocks) for easy handling of the data.**
- Quality Control Report stating the accuracy of dense point cloud to be supplied. Control Points and check points to be checked and ensured that the resultant point cloud has an absolute accuracy of 4cm in planimetry and 5cm in vertical axis.

- **Supplementary survey data from GNSS/Total Station in X, Y, Z Ascii format in the same coordinate system used for drone survey point cloud.**
- Certificate stating the accuracy of supplementary survey.

Quality Control Checks of Dense Point Cloud to be ensured:

- Control Points and check points to be checked and ensured that the resultant point cloud has an absolute accuracy of 4cm in planimetry and 5cm in vertical axis.
- Dense Point Cloud should have a point density of 100 points/Sq. m or more
- Point Cloud to be checked for seamlessness, noise from waterbodies, birds etc.
- Colourized point cloud to be supplied for feature identification

Quality Control Checks of Orthophoto:

- Control Points and check points to be checked and ensured that the resultant orthophotos meets an absolute accuracy of 5cm.
- Process Check - Ortho rectification process is done using correct Triangulation parameter & elevation model
- Seamline editing should be done to minimize the temporal tone effect & feature angle defects.
- Orthophoto should be radiometrically (contrast colour) and geometrically corrected to enable adjacent image tiles to be displayed simultaneously without obvious distinctions between them.
- Orthophoto must be free from fog, haze, dust, and smoke
- Orthophoto should be free from smear, wrap, hot spots and stretch area.
- Orthophoto should be clear, free from blurring and should be sharp in detail.
- Important Major features including the existing main road, Important/Major/Minor Bridges, Buildings & Structures, fly overs, under pass, Land, encroachments, connecting roads, free from distortions.

Post Processing Requirements

- The post processing of the projects may also be conducted for select projects for corridor mapping in AutoCAD (.dwg) format, which is easily importable to GIS software, road design software or BIM compatible solutions etc. The RoW of the road may vary from 8m to 24m.
- All the typical topographic features over the ground surface, as required for designing and modelling the proposed road development project, shall be captured and represented in the topographic post processed map of the area, falling within the extent of survey, as listed below:
- Chainage marking on the map at 25m interval. Longitudinal sections at 25m interval and Cross sections at every 25 m interval in the existing road with levels marked every 5m from the centreline
- Detailed information of road structure i.e. marking of edges of carriageway, centreline and shoulders, edge of RoW
- Marking of fencing or compound walls provided, if any
- Edge of buildings and type of buildings e.g., schools, hospitals, bank, post office, petrol pumps, houses, apartments, hotels & resorts, all religious buildings & structures like temples, mosques, churches & offertory boxes, flag posts, martyrs' memorials, grave yards/ cemetery etc
- Details of minor & major roads crossings - 200 m periphery
- Inventory of culverts, minor & major bridges

Aerial Photogrammetry and video quality requirements

- i. Drone image output should be compatible with the KIIFB in house drone processing software
- ii. High Resolution digital camera capable of collecting GPS and glonass Geo-tagged 4K quality video and high-resolution image fitted on 3-axis gimble (pitch, roll, yaw) to be used for stable and clear data acquisition quality.

- iii. Very low altitude flight height of about 20-100m as per requirement should be used for clear details capture. Height and angle of recording can be raised for special locations.
- iv. Video in MP4 format.
- v. Raw video should be of 4K resolution with geo tagging.
- vi. Should be clear and sharp in detail.
- vii. No inconsistencies should be there in tone and density between adjacent video tiles.
- viii. GSD of 2.5 cm/pixel will be given.
- ix. High resolution Ortho to be given which will be sharable on web share links.

FORMAT OF FINANCIAL BID

Form No. 1- Details of the Agency	
Name of Agency	
Address of Agency, Contact Number and Email ID	
Firm Registration Number (CIN)	
GST Registration Details	
PAN Card Number of the firm	

Form No. 2 – Fee Details			
<u>No.</u>	<u>Particulars</u>	<u>Unit</u>	<u>Rate</u>
1	Drone survey including staff and helpers (3 Nos/Drone) for the same	Per Month	
2	Image processing for the drone survey output	Per km	
3	Marking Ground Control Points (GCP) for the drone survey and fixing the geo coordinates for it with 5 mm Accuracy	Nos	
4	Providing and fixing bench mark on concrete block of size 15x15x45 cm in M20 mix and fixing the geo-coordinates for the same.	Nos	
5	Post Processing of data as per specifications mentioned	Per km	

Note:

1. The length mentioned, and fee payable shall be based on single workorder to the agency.
2. The date of delivery shall be calculated from the date of individual work order (D) and includes the period of mobilisation as required.
3. In the event that the deliverable is delayed, compensation shall be levied at the rate of 0.5% per day, subject to a maximum of 10% of the fee payable.
4. The fee shall be quoted **excluding GST** as applicable
5. The agency is responsible for arranging all statutory or necessary permissions / licenses for all surveys including drone & Lidar for successful completion of the survey.
6. The work orders shall be provided in batches for surveys to be conducted anywhere in Kerala.