

**Technical Specifications of Mapping System with RGB, MSS and Thermal Band****Sensors****1.0 Bidder Eligibility Criteria:**

| I          | Bidder Eligibility Criteria-I<br>(Public Procurement – Preference to Make in India)  | Class I /<br>Class II          | Local<br>Content<br>value     | Reference,<br>Page No.     |
|------------|--|--------------------------------|-------------------------------|----------------------------|
| I          | Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16 <sup>th</sup> September 2020 and other subsequent orders issued therein.   |                                |                               |                            |
| <b>2.0</b> | <b>Bidder Eligibility Criteria-II</b>  | <b>Compliance<br/>(Yes/No)</b> | <b>Reference<br/>Page No.</b> | <b>Remarks, If<br/>any</b> |
| 1          | The bidder/OEM should have supplied at least 3 similar items to IITs, NITs, IISERs, CSIR Labs or other Govt. R&D organizations in the last 5 years, PO copies or installation certificates along with contact details of end user need to be submitted as the proof of supply. IIT Madras reserves its right to verify the claims submitted by the bidder and the feedback from the previous customers will be part of technical evaluation. |                                |                               |                            |
| 2          | The bidder should provide local service engineer to attend service related issues  |                                |                               |                            |
| 3          | Company should be registered in India for last 3 years. Proof of company registration should be enclosed   |                                |                               |                            |
| 4          | The bidder should have 1.5 Cr turnover in any one of the last 3 Financial Year.  |                                |                               |                            |

**3.0 Technical Compliance:**

Technical specifications required for one unit of Mapping System with RGB, MSS and Thermal Band Sensors: -

| S.NO | DESCRIPTION                 | SPECIFICATIONS  | Complied /<br>Not<br>Complied | Reference<br>Page No. |
|------|-----------------------------|---|-------------------------------|-----------------------|
| 1    | <b>Type of System</b>       | Topographic mapping system with <b>mounting with RGB, MSS and Thermal Band Sensors</b>  |                               |                       |
| 2    | QUANTITY of Mapping systems | 1 or 2 depending on integrated sensors or swappable sensors<br>If integrated sensors – 2 Platforms<br>If swappable sensors – 1 Platform |                               |                       |

|    |   |   |  |  |
|----|---|---|--|--|
| 3  | Net Weight (with propellers and RTK module) | Less than 1000 Gram   |  |  |
| 4  | Max Takeoff Weight                          | Less than 1200 Gram   |  |  |
| 5  | Dimensions (Folded)                         | Max Folded (without propellers): 250×100×150 mm (Length×Width×Height)   |  |  |
| 6  | Dimensions (Unfolded)                       | Max Unfolded (without propellers): 350×300×150 mm (Length×Width×Height)   |  |  |
| 7  | Diagonal Length                             | Max 400 mm  |  |  |
| 8  | Max Ascent Speed                            | Min 5 m/s   |  |  |
| 9  | Max Descent Speed                           | Min 5 m/s (Normal Mode)   |  |  |
| 10 | Max Flight Speed (at sea level, no wind)    | 10 or 15 m/s (Normal Mode)  |  |  |
| 11 | Flight Directions                           | Flying forward: flying sideways: flying backwards: should be there  |  |  |
| 12 | Max Wind Speed Resistance                   | minimum 10 m/s  |  |  |
| 13 | Max Flight Time (without wind)              | At least 20 minutes   |  |  |
| 14 | Max Hover Time (without wind)               | At least 20 minutes   |  |  |
| 15 | Minimum Flight Distance (KM)                | 3   |  |  |
| 16 | Max Tilt Angle                              | 30° (Normal Mode)   |  |  |
| 17 | GNSS  | GPS + Galileo + BeiDou + GLONASS (Should be RTK enabled)  |  |  |
| 18 | Hovering Accuracy Range (Vertical)          | Vertical: ±0.2m (Vision Positioning enabled); ±0.8 m (GNSS Positioning enabled); ±0.2 m (D-RTK enabled)             |  |  |
| 19 | Hovering Accuracy Range (Horizontal)        | Better than: Horizontal: ±0.3 m (Vision Positioning enabled); ±0.5 m (HD Positioning enabled); ±0.1 m (RTK enabled) |  |  |
| 20 | Operating Temperature                       | (-5° to 35° C)  |  |  |
| 21 | <b>SENSORS</b>                              |   |  |  |
| 22 | <b>RGB SENSOR</b>                           |   |  |  |
| 23 | Image Sensor                                | 4/3 CMOS  |  |  |
| 24 | Effective Pixels                            | Minimum 20 or more MP   |  |  |
| 25 | ISO Range                                   | 100-6400  |  |  |
| 26 | Shutter speed                               | Electronic shutter: Minimum 8-1/6000 s Mechanical shutter: 8-1/1000 s   |  |  |
| 27 | Min Image Size                              | 5000×3000   |  |  |
| 28 | Photo Shooting Mode                         | Single shot & Timelapse: 20 or more MP  |  |  |
| 29 | Image Format                                | JPEG/DNG (RAW)  |  |  |
| 30 | Video Resolution                            | Min H.250: Min 4 K  |  |  |

|    |   |   |  |  |
|----|---|---|--|--|
| 31 | Max Video Bitrate                       | Min 4K: 130Mbps   |  |  |
| 32 | Supported File System                   | exFAT   |  |  |
| 33 | Video Format (If available)             | MP4 (MPEG-4 AVC/H.264)  |  |  |
| 34 | <b>MULTISPECTRAL SENSORS</b>            |   |  |  |
| 35 | Image Sensor                            | 1/2.8-inch CMOS, effective pixels: 5 MP   |  |  |
| 36 | Aperture                                | Aperture: Minimum f/2.0   |  |  |
| 37 | Multispectral Sensor Range (Indicative) | Green (G): 560 ± 16 nm;   |  |  |
| 38 |   | Red (R): 650 ± 16 nm;   |  |  |
| 39 |   | Red Edge (RE): 730 ± 16 nm;   |  |  |
| 40 |   | Near infrared (NIR): 860 ± 26 nm;   |  |  |
| 41 | Shutter Speed                           | Electronic Shutter: 1/30~1/12800 s  |  |  |
| 42 | Minimum Image Size                      | 2500×1800   |  |  |
| 43 | Image Format                            | TIFF/Geotiff/Jpeg/BMP/GIF   |  |  |
| 44 | Video Format                            | MP4 (MPEG-4 AVC/H.264)  |  |  |
| 45 | Photo Shooting Mode                     | Single shot: 5 MP   |  |  |
| 46 | Video Resolution                        | H.264. FHD: 1920 x 1080@30fps, Video content: NDVI/GNDVI/NDRE                                   |  |  |
| 47 | <b>GIMBAL</b>                           |   |  |  |
| 48 | Stabilization System                    | 3-axis mechanical gimbal (tilt, roll, pan)  |  |  |
| 49 | PAN                                     | Pan: -27° to 27°  |  |  |
| 50 | Controllable Range                      | Tilt: -90° to 35°   |  |  |
| 51 |   | Pan: Uncontrollable   |  |  |
| 52 | Max Control Speed (tilt)                | Minimum 100°/s  |  |  |
| 53 | Angular Vibration Range                 | ±0.005°   |  |  |
| 54 | <b>VIDEO TRANSMISSION</b>               |   |  |  |
| 55 | Live View Quality Remote Controller:    | 1080p/30fps   |  |  |
| 56 | Operating Bands                         | 2.400-2.4835 GHz 5.725-5.850 GHz  |  |  |
| 57 | Video Transmission System               | Image Transmission Industry Edition   |  |  |
| 58 | Max Transmission Distance               | Strong Interference (urban landscapes, residential areas, etc.): 1.5-3 km (FCC/CE/SRRC/MIC)     |  |  |
| 59 | (Obstructed)                            | Medium Interference (suburban landscapes, city parks, etc.): 3-9 km (FCC), 3-6 km (CE/SRRC/MIC) |  |  |
| 60 |   | Weak Interference (remote fields, open farmland, etc.): 9-                                      |  |  |

|    |   |   |  |  |
|----|---|---|--|--|
|    |   | 15 km (FCC), 6-8 km (CE/SRRC/MIC)   |  |  |
| 61 | Max Download Speed                      | 15 MB/s (with DJI RC Pro Industry Edition)  |  |  |
| 62 | Antennas                                | 4 antennas, 2 transmitting and 4 receiving  |  |  |
| 63 | <b>BATTERY</b>                          |   |  |  |
| 64 | Capacity                                | 5000 mAh  |  |  |
| 65 | Standard Voltage & Max Charging Voltage | 15.4 V  |  |  |
| 66 | Battery Type                            | LiPo 4S   |  |  |
| 67 | Chemical System                         | Lithium Cobalt  |  |  |
| 68 | Weight                                  | Max 350 Gram  |  |  |
| 69 | Charging Temperature                    | 5° to 40° C (41° to 104° F)   |  |  |
| 70 | BATTERY CHARGER                         | 240 AC  |  |  |
| 71 | CHARGING HUB                            | Minimum 4 Batteries on Charging Rotation  |  |  |
| 72 | Charging Temperature                    | 5° to 40° C (41° to 104° F)   |  |  |
| 73 | <b>RTK MODULE (Optional)</b>            |   |  |  |
| 74 | Interface                               | USB-C   |  |  |
| 75 | Power                                   | Approximately 1.2 watts   |  |  |
| 76 | RTK Position Accuracy                   | Fixed RTK: Minimum Horizontal: 1 cm + 1 ppm; Vertical: 1.5 cm + 1 ppm   |  |  |
| 77 | <b>GENERAL</b>                          |   |  |  |
| 78 | Launching (Take-off)                    | VTOL  |  |  |
| 79 | Landing                                 | Automatic landing accuracy  |  |  |
| 80 | Preparation time to launch              | <15 minutes   |  |  |
| 82 | Data Link                               | Secure Link, Communication data link complying with International standard and certification.                         |  |  |
| 83 | Transportation Case                     | Hard Carry Case. All up weight including full system should not exceed 15 kg and should be portable by single person. |  |  |
| 84 | <b>GROUND CONTROL STATION</b>           |   |  |  |
| 85 | Type                                    | Ruggedized Notebook/Tab based controller with Flight planning & control software                                      |  |  |
| 86 | Screen Size                             | 6 inch or more  |  |  |

|    |  |   |  |  |
|----|--|---|--|--|
| 87 | Power Backup   | Minimum 1 HR.   |  |  |
| 88 | System Workflow  | The whole system workflow of preparation & planning, integration of payloads and their connectivity with GCS, Survey flight operations must be seamlessly integrated with each other and should not require more than one software in GCS   |  |  |
| 89 | Planning & control software features during flight planning                    | specifying the parameters for data collection (altitude of the survey or required spatial resolution of picture, camera model, side and forward overlap);   |  |  |
| 90 | (These are bare essential features and should not be restricted to these only) | creating a flight task project according to the built up arbitrary polygon or vector; automatic change of a desired track and turning points of the route with any change in the borders of the surveying polygon or axial line route; selection of aerial routes location parallel to the long or short side of the surveying polygon or in arbitrary direction;                                     |  |  |
| 91 | <b>POST PROCESSING SOFTWARE</b>  |   |  |  |
| 92 | Features   | Professional Photogrammetry Software  |  |  |
| 93 |  | Fully automated and intuitive workflow for generation of high-resolution geo-referenced, survey-grade accurate true ortho-mosaics, DSMs/DTMs; Dense point cloud generation and classification, Polygonal model reconstruction and texturing, 2D measurements, 2D vectorization output, Volume measurements, and 4D reconstruction for dynamic scenes. Processing results in widely supported formats. |  |  |

|     |  |   |  |  |
|-----|--|---|--|--|
|     |  | Compatible with Windows/Mac OS X/ Linux.                |  |  |
| 94  | License  | No Opensource Software                                  |  |  |
| 95  |  | 1 No. Permanent License                                 |  |  |
| 96  | <b>SPARE PARTS &amp; CONSUMABLES</b>   |   |  |  |
| 97  | Batteries  | Minimum 4 + Charger                                     |  |  |
| 98  | Spare Parts  | Propellers & attachments                                |  |  |
| 99  | <b>TERMS &amp; CONDITIONS</b>  |   |  |  |
| 100 | Warranty :   |   |  |  |
| 101 | System   | At least for 3 year of warranty to be included          |  |  |
| 102 | Battery  | 6 months (Min 200 charge cycles)                        |  |  |
| 103 | Consumable (Propeller)   | 6 months  |  |  |
| 104 | Technical Support  | At least for 3 year of technical support to be included |  |  |
| 105 | Training   | Yes – 02 days at customer site                          |  |  |
| 106 | AMC  | At least for 3 year of comprehensive AMC to be included |  |  |
|     | <b>Terms and Conditions:</b>   |   |  |  |
| 107 | Necessary training and installation to be provided.  |   |  |  |
|     | <b>General Terms and Conditions:</b>   |   |  |  |
| 1   | The company should be registered with Registrar of companies in Tamil Nadu   |   |  |  |
| 2   | Recognized by nodal agencies such as State Remote Sensing Applications Centre and previous working/supply experience with the Tender inviting organization.    |   |  |  |
| 3   | Should have experience in the photogrammetry high-resolution mapping system supply for minimum 8 years.  |   |  |  |
| 4   | Should have completed minimum 25 photogrammetry mapping projects using similar sensors with the government (central/state) similar to high resolution mapping; |   |  |  |
| 5   | Supporting firm should have staff with minimum qualification of PhD/ Master's Degree from reputed academic institution in geospatial/geoinformatic mapping.    |   |  |  |
| 6   | Should have experience in providing quality training (capacity building) in both drone/UAV and related software operation.                                     |   |  |  |
| 7   | Demonstrated Mapping experience with RGB, TIR and MSS sensors  |   |  |  |
| 8   | Should have SOP approved by DGCA or Airport Authority of India.  |   |  |  |

(Note: It is mandatory for the bidders to provide the compliance statement in tabular column format along with catalogue page number (comply/not comply) for the Above points with document proof as required. Failing which bidders will be technically disqualified)