# Survey of Pakistan
## Directorate of Photogrammetry & Remote Sensing
## Technical Evaluation for Procurement Digital Photogrammetric Workstation

**Aerial Triangulation................... 02 licences**

| SI# | Specification/Requirement | M/S SETC | M/S CNS | M/S DTA |
|---|---|---|---|---|
| | Software offered | GRIDKNOW VIRTU ZO for Triangulation | GRIDKNOW VIRTU ZO for Triangulation | Inpho MATCH-AT |
| 1. | Support for semi and fully automatic AT without or with POS data (GNSS+ INS integration) | Support for semi and fully automatic AT without or with POS data (GNSS+ INS integration) | Fully supported as per Specifications | Semi and Fully Support with or without POS data available |
| 2. | Provide Image support for digital images (for all Aerial Cameras & Satellite Sensors) | Will Provide Image support for digital images (for all Aerial Cameras & Satellite Sensors) ) - Available | Fully supported as per Specifications | Support for Satellite Imageries and Aerial is available |
| 3. | The program must be able to calculate/ correct shift and drift parameters on the GNSS-data | The program will be able to calculate/ correct shift and drift parameters on the GNSS-data- | Fully supported as per Specifications | Can calculate/ correct shift and drift parameters on the GNSS-data |
| 4. | The program must be able to correct for earth curvature and atmospheric refraction. | The program will be able to correct for earth curvature and atmospheric refraction | Fully supported as per Specifications | Program is capable to apply earth curvature and atmospheric refractions |
| 5. | The program must accommodate tilt, crab and relief in photography to some extent and height anomalies. | The program will accommodate tilt, crab and relief in photography to some extent and height anomalies | Fully supported as per Specifications | Program can accommodate tilt, crab and relief in photography to some extent and height anomalies |

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| 6. | The program must be able to calculate lever arm offsets and bore sight misalignment on the INS/IMU. | The program will be able to calculate lever arm offsets and bore sight misalignment on the INS/IMU ) | Fully supported as per Specifications | Program can calculate lever arm offsets and bore sight misalignment on the INS/IMU. |
| 7. | Support for semi and fully automatic error detection and rectification. | Support for semi and fully automatic error detection and rectification - Available | Fully supported as per Specifications | Semi and fully automatic error detection and rectification function is available |
| 8. | Supports the coordinate and Datum conversion and customization. | Supports the coordinate and Datum conversion and customization - Available | Fully supported as per Specifications | Customize Datum and Coordinate System can be created |
| 9. | The program must be able to measure control and check points in the images from signalized known points on the ground. | The program will measure control and check points in the images from signalized known points on the ground | Fully supported as per Specifications | Able to measure control and check points in the images from signalized known points on the ground. |
| 10. | The program must be able to export to the project format of the photogrammetric module. | The program will be able to export to the project format of the photogrammetric module | Fully supported as per Specifications | Export is supported |

## Modules for Photogrammetric Mapping …………05 licences

| SI# | Specification/Requirement | M/S SETC | M/S CNS | M/S DTA |
|---|---|---|---|---|
| | Software offered | GRIDKNOW VIRTU ZO Base Package for Mapping | VIRTU ZO Base Package for Mapping | Summit Evolution Pro |
| 1. | Photogrammetric software able to do 3D-mapping by itself or have integration towards other packages | Photogrammetric software able to do 3D-mapping by itself or have integration towards other packages | Fully supported as per Specifications | Software supports 3D mapping with other SW and within its own platform |

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| 2. | Support image for 24 bit (8 bit on each band) uncompressed 256 tiled TIF images with full set of internal overviews. | Will Support image for 24 bit (8 bit on each band) uncompressed 256 tiled TIF images with full set of internal overviews | Fully supported as per Specifications | Supports 24 bit (8 bit on each band) uncompressed 256 tiled TIF images with full set of internal overviews. |
| 3. | The software must be able to zoom up to at least 5 times enlargement. | The software will be able to zoom up to at least 5 times enlargement | Fully supported as per Specifications | Software support zoom up to at least 5 times enlargement. |
| 4. | Must be able to produce line maps from stereo satellite images level 2A (geo-referenced from the satellite image supplier). | Will produce line maps from stereo satellite images level 2A (geo-referenced from the satellite image supplier) | Fully supported as per Specifications | Can produce line maps from stereo satellite images level 2A (geo-referenced from the satellite image supplier). |
| 5. | Must be able to carry out additional geo-referencing by use of extra Ground Control Points. | Will able to carry out additional geo-referencing by use of extra Ground Control Points | Fully supported as per Specifications | Additional GCP are supported |
| 8. | Supports the coordinate and Datum conversion and customization. | Will supports the coordinate and Datum conversion and customization | Fully supported as per Specifications | Coordinate and Datum conversion can be customize |
| 9. | The software must be able to change the displayed stereo images to get better visibility e.g. dark shadows or low contrast areas. This correction must not introduce any change the original image on the hard drive. | The software will be able to change the displayed stereo images to get better visibility e.g. dark shadows or low contrast areas. This correction must not introduce any change the original image on the hard drive | Fully supported as per Specifications | Can change the displayed stereo images to get better visibility e.g. dark shadows or low contrast areas. This correction must not introduce any change the original image on the hard drive. |
| 10. | Must support user defined parameters required for creating line maps with support of user defined symbology library | Will support user defined parameters required for creating line maps with support of user defined symbology library. | Fully supported as per Specifications | Can create user-defined parameters required for creating line maps with |

| | | | | support of user defined symbology library. |
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| 11. | Support super imposition of third party vector data for editing with image source. | Will support super imposition of third party vector data for editing with image source | Fully supported as per Specifications | Mostly Satellite Images andl aerial Images are supporte d |
| 12. | Must support at least these formats: shp, dxf, dwg ordgn | Will support at least these formats: shp, dxf, dwg ordgn. | Fully supported as per Specifications | Photogrammetric software can do 3D-mapping by itself or have integration towards other packages |
| 13. | Support all images from all Aerial cameras and Satellite sensor | Support all images from all Aerial cameras and Satellite sensor. | Fully supported as per Specifications | Support available for 24 bit (8 bit on each band) uncompressed 256 tiled TIF images with full set of internal overviews. |

## DTM Generating & Editing Software………… 2 licenses

| SI# | Specification/Requirement | M/S SETC | M/S CNS | M/S DTA |
|---|---|---|---|---|
| | Software offered | VIRTU ZO DTM Generating & Editing Software | VIRTU ZO DTM Software | Inpho MATCH-3DX & Inpho DTMaster Stereo |
| 1. | Must at least support point cloud from all Aerial, Satellite & LIDAR sensors The software must be able to read only selected classes and a given LIDAR pulse return. | Will support point cloud from all Aerial, Satellite & LIDAR sensors The software must be able to read only selected classes and a given LIDAR pulse return. | Fully supported as per Specifications | Support point cloud from all Aerial, Satellite & LIDAR sensors The software must be able to read only selected classes and a given LIDAR pulse return |

| 2. | Full support for Point cloud data editing (LAS-format) and should be equally supportive to edit colorized point clouds. | Will provide full support for Point cloud data editing (LAS-format) and should be equally supportive to edit colorized point clouds. | Fully supported as per Specifications | Full support available for Point cloud data editing (LAS-format) and should be equally supportive to edit colorized point clouds. |
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| 3. | The program must be able to make a Digital Terrain Model (DTM) and extract Contour lines & support edit in 3D. | The program will be able to make a Digital Terrain Model (DTM) and extract Contour lines & support edit in 3D | Fully supported as per Specifications | Program is able to make a Digital Terrain Model (DTM) and extract Contour lines & support edit in 3D. |
| 4. | Can support for automatic extraction of points with a given class. | will support for automatic extraction of points with a given class | Fully supported as per Specifications | Support's automatic extraction of points with a given class. |
| 5. | The software must be able to export DEM to at least these formats: ASCII, GEOTIFF, LAS and xyz grid | The software will be able to export DEM to at least these formats: ASCII, GEOTIFF, LAS and xyz grid | Fully supported as per Specifications | Software is be able to export DEM to at least these formats: ASCII, GEOTIFF, LAS and xyz grid |
| 6. | The software must be able to export contour lines to at least one of these formats: shp, dxf, dwg or dgn. | The software will be able to export contour lines to at least one of these formats: shp, dxf, dwg or dgn | Fully supported as per Specifications | Software is able to export contour lines to at least one of these formats: shp, dxf, dwg or dgn. |
| 7. | Must support user defined parameters for DEM/DTM generation to achieve high accuracy. | Will support user defined parameters for DEM/DTM generation to achieve high accuracy. | Fully supported as per Specifications | Will support user-defined parameters for DEM/DTM generation to achieve high accuracy |

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| 8. | The software must be able to zoom up to some extent for further analysis. | The software must be able to zoom up to some extent for further analysis | Fully supported as per Specifications | software is able to zoom up to some extent for further analysis |
| 9. | Support integration of multi-source elevation data to generate DEM | Support integration of multi-source elevation data to generate DEM | Fully supported as per Specifications | Supported multi-source elevation data to generate DEM |

## Digital Orthophoto Production software …… 2 licenses

| SI# | Specification/Requirement | M/S SETC | M/S CNS | M/S DTA |
|---|---|---|---|---|
| | Software offered | VIRTU ZO Digital Orthoproduction | VIRTU ZO Digital Orthoproduction | Inpho OrthoMaster Inpho OrthoVista |
| 1. | Full support for fully automated, generation and editing of Digital Ortho photo. | Will support for fully automated, generation and editing of Digital Ortho photo -Available. | Fully supported as per Specifications | Supported for fully automated, generation and editing of Digital Ortho photo |
| 2. | Orthophoto software must support to import files of oriented images and DEM from other sources. | Orthophoto software will support to import files of oriented images and DEM from other sources | Fully supported as per Specifications | Orthophoto software supports to import files of oriented images and DEM from other sources. |
| 3. | Must support user defined pixel size for Ortho-rectification. | Will support user defined pixel size for Ortho-rectification - Available. | Fully supported as per Specifications | Supports user defined pixel size for Ortho-rectification |
| 4. | The tiling, of the orthophoto must follow regular pattern of a defined width, height and position. | The tiling, of the orthophoto will follow regular pattern of a defined width, height and position - Available. | Fully supported as per Specifications | Tiling, of the orthophoto follows regular pattern of a defined width, height and position. |

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| 5. | The program must be able to do some color equalization over the whole project in order that orthophoto becomes more homogeneous. | The program will be able to do some color equalization over the whole project in order that orthophoto becomes more homogeneous | Fully supported as per Specifications | Will be able to do some color equalization over the whole project in order that orthophoto becomes more homogeneous |
| 6. | The software must be able to zoom up to at least 5 times enlargement for further analysis. | The software can zoom up to at least 5 times enlargement for further analysis | Fully supported as per Specifications | software can zoom up to at least 5 times enlargement for further analysis |
| 7. | Provide support for various re-sampling algorithms, for example nearest neighbor, bilinear, cubic convolution, B-spline, etc. | Will support for various re-sampling algorithms, for example nearest neighbor, bilinear, cubic convolution, B-spline, etc - Available. | Fully supported as per Specifications | Support's various re-sampling algorithms, for example nearest neighbor, bilinear, cubic convolution, B-spline, etc. |
| 8. | Support all images from all available cameras & sensor | Supports all images from all available cameras & sensor - Available. | Fully supported as per Specifications | Support most of available satellite Images |
| 9. | Must be able to export metadata, as for example seam lines, to at least one of these formats: shp, dxf, dwg or dgn | Can export metadata, as for example seam lines, to at least one of these formats: shp, dxf, dwg or dgn -Available. | Fully supported as per Specifications | Can export metadata, as for example seam lines, to at least one of these formats: shp, dxf, dwg or dgn |

**Workstation-** the recommended Workstation and the minimum hardware that is capable to work reasonable well for the modules specified above. Some of the basic requirements are as below:

| S # | Specification | | M/S SETC | M/S CNS | M/S DTA |
|---|---|---|---|---|---|
| 1 | System | Branded | Lenovo | Dell | Lenovo |
| 2 | Operating System | Windows 10 64-bit or better | Windows 10 64-bit or better | Windows 11 64 Bit | Compliance |

| 3 | Processor | Intel® Xeon® w7-2495X (45 MB cache, 24 cores, 2.5 GHz to 4.8 GHz) | Intel® Xeon® w7-2495X (45 MB cache, 24 cores, 2.5 GHz to 4.8 GHz) | Intel® Xeon® w7-2495X (45 MB cache, 24 cores, 2.5 GHz to 4.8 GHz) | Compliance |
|---|---|---|---|---|---|
| 4 | RAM | 32 GB or more, DDR5 SPR, | 32 GB, DDR5 SPR, 1 DPC, 4800 MHz | 32 GB, DDR5 SPR, 1 DPC, 4800 MHz | 32 GB, DDR5 SPR, 1 DPC, 4800 MHz |
| 5 | Hard Drives | 2x TB or better | M.2 2280, 2 TB, PCIe NVMe Gen4 x4, SSD, Class 40, 3.5-inch, 4 TB, 7200 RPM, SATA, Enterprise HDD | M.2 2280, 2 TB, PCIe NVMe Gen4 x4, SSD, Class 40, 3.5-inch, 4 TB, 7200 RPM, SATA, Enterprise HDD | M.2 2280, 2 TB, PCIe NVMe Gen4 x4, SSD, Class 40, 3.5-inch, 4 TB, 7200 RPM, SATA, Enterprise HDD |
| 6 | Graphic | Integrated graphic card > 4 GB chipset compatible (NVIDIA or equivalent) | NVIDIA® T1000, 8 GB GDDR6 | NVIDIA® T1000, 8 GB GDDR6 | NVIDIA® T1000, 8 GB GDDR6 |
| 7 | Displays | Compatible LED (s) for stereo viewing, screen size 24" or better. Support to graphic display requirement for the quoted software. | **ASUS VG248QE (DVI×1, HDMI×1, DP×1)-**<br>• Type: 3D monitor, LED monitor<br>• Screen size: 24 inches Screen ratio: 16:9 (wide)<br>• Best resolution: 1920×1080<br>• Static contrast: 1000:1<br>• Interface: Video Displayport, DVI-D, HDMI<br>• Refresh rate: 144Hz max<br>• Support NVIDIA 2nd generation 3D technology | ASUS VU279CFE<br>• Eye Care Gaming Monitor<br>• 27 inch, FHD (1920 x 1080), IPS, 100 Hz, IPS,<br>• Adaptive-Sync, USB Type-C port with 15-watt Power Delivery,<br>• Green sustainability, Display Widget Center,<br>• Available in four colors, EyeCare Plus technology | 24" 3D Plura View - Impact Full HD 144Hz B |

| 8 | Stereo Vision | Full support for stereo Mapping compatible to the system | **Stereoscopic Glass-EMST 3D** Contrast: 1000:1<br>▪ LCD refresh rate: 96Hz-144Hz Adaptive<br>▪ Transparency: 38% (+ or - 2%)<br>▪ Receiving distance: about 12m<br>▪ Battery: 90mAH<br>▪ Signal synchronization method: IR<br>▪ Rechargeable battery connector: USB 3.0 micro-B<br>▪ Weight: 56g/1.96oz<br>▪ Size: 6.5inches×6.4inches× 1.6inches;<br>• 16.51cm×16.25cm×4. 064cm<br>▪ Power button: On/off button<br>▪ Battery life: 60h<br>• Emitter: Made of ABS757 synthetic resin, streamlined design of the aircraft head, full 360oC coverage, pure black surface with high gloss UV. | Stereoscopic Glass - EMST 3D | ROG Strix XG259CM Gaming Monitor – 25 inch (24.5 inch viewable) 1920x1080, 240Hz (Above 144Hz), 1ms (GTG), Fast IPS, Extreme Low Motion Blur Sync, USB Type-C, 120% sRGB, G-Sync compatible*, KVM support, tripod socket |
| 9 | Mapping Devices | 3D mapping devices required/ compatible to the | **Hand & Foot Wheels**<br>• The diameter of hand wheel is φ160mm, | | |

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| | | system preferably 3D Mouse | which can be adjusted in the X/Y direction. The aluminum plate is hard-oxidized.<br>• The diameter of the foot plate is φ290mm, the height Z can be adjusted,<br>• the surface is textured rubber pad, and the American 3M adhesive is used.<br>• The size of the foot pedal is 290×210×4mm, and the surface is painted. The normal number of pedal switches is more than 50,000 times. | | |
| | | | **3D Mouse (EMST-02)**<br>• Shell material:<br>• Interface method: USB, can be customized<br>• Rotary encoder parameters:<br>X direction: 180PPR;<br>Y direction: 180PPR;<br>Z direction: 300PPR;<br>- Function array:<br>10 keys<br>• Power supply: Requirements for connecting voltage +5V | 3D Mouse | 3D Mouse (EMST-02) |

| 10 | UPS | Min 3 KVA or equivalent, with dry batteries | Info Rise 3 KVA UPS with 30 Min Back Up | 3 KV a with 30 Min Backup | Compliance |
|---|---|---|---|---|---|
| 11 | Accessories | • Input output support compatible<br>• Power supply and cables<br>• Wireless Key Board, | • Input output support compatible<br>• Power supply and cables<br>• Keyboard & Mouse: 10 keys (basic and composite keys);<br>• Interface board: compatible with built-in microcontroller system<br>- Size: 255mm * 100mm * 50mm | All Included | Compliance |

## General Conditions to follow

| S# | | Specification | M/S SETC | M/S CNS | M/S DTA |
|---|---|---|---|---|---|
| 1. | Licensing | Licence as required mentioned against each function | Perpetual | Licenses as per Tender Requirement | Licenses will be provided as per BOQ of Tender |
| 2. | Installation & Training | 15 days on site training after installation of HW and SWs. | 15 days training by OEM at SoP | Training as per Tender Requirement | Training will be provided as per requirement of BOQ |
| 3. | Documents | Assembly and working Brochures in English (both hard and soft copies) | Brochures & Manuals in English | English | English |
| 4. | Delivery | On site delivery. Bidder will be responsible for custom clearance and follow other prevailing rules, etc. in case of import of any equipment and software as per government policy. | On Site Delivery at SoP Rawalpindi | Delivery at Survey of Pakistan Faizabad. Rawalpindi | Site Delivery at Survey of Pakistan Faizabad |

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| 5. | Warranty | 01 x Year comprehensive onsite warranty and 2x years' service warranty. | 01x Year comprehensive onsite warranty and 2x years' service warranty. | 01xYear comprehensive onsite warranty and 2x Years' service warranty. | Ix year Warranty as per manufacturer standards and 2x years' service warranty |
| 6. | O/M Authorization | | O/M Authorization from Principal Wuhan Gridknow Information Technology Co Ltd is available | **Not Available** | O/M Authorization from Principal DAT EM Systems Europe is available |

## Analysis & Conclusion:

i. **03x firms** M/S Sandhu Engineering &Trading Company, M/S CNS, M/S Digital Technologies Associates have submitted bids

ii. **M/S Sandhu Engineering &Trading Company & M/S CNS** has quoted **Virtu Zo Photogrammetric** software (Chinese brand) alongwith **Lenovo & Dell Workstation** meeting all the required parameters

iii. **M/S Digital Technologies Associates** has quoted **Inpho Phtogrammetric Software package** (German brand) alongwith Dell Workstation meeting all the required parameters

iv. **Both Virtu Zo and Inpho Phtogrammetric Systems are amongst well known software and widely used brands in the world.**

v. **Inpho Phtogrammetric System offered by M/S Digital Technologies Associates is also in use in SoP since 2015**

vi. **M/S CNS has been failed to produce O/M Authorization from the Principal.**

## Recommendation:

1. **2 x bids from M/S Sandhu Engineering &Trading Company, and M/S Digital Technologies Associates are technically qualified.**

   **Hence is recommended for opening its financial proposal and its evaluation.**

2. **The Bid of M/S CNS is rejected, being failed to produce OM Authorization from Principal**

<table>
<tr>
<td align="center"><b>Sd</b><br><b>Junaid Memon</b><br><b>Assistant Director</b><br><b>Member (TEC-II)</b></td>
<td align="center"><b>Sd</b><br><b>Aftab Nazir Ahmad</b><br><b>Deputy Director</b><br><b>Member (TEC-II)</b></td>
<td align="center"><b>Sd</b><br><b>Muhammad Arshad Iqbal</b><br><b>Director</b><br><b>Chairman (TEC-II)</b></td>
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**Technical Evaluation Parameters –Marks/ Score Sheet**

| Sr.# | Name of Firm | Assessment Parameters | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 50 | 10 | 5 | 5 | 10 | 10 | 5 | 5 | 100 |
| | | Technical Compliance | Firm relevance Experience | OEM Certification | OEM Authorization from Principal | After sale Repairing & maintenance Support | Training Support | Financial Worth | Equipment brand | |
| 1 | **M/S Sandhu Engineering &Trading Company (SETC)** | 50 | 06 | 05 (gold) | 5 (full authorization including training certification) | 10 | 8 | 01 | 4 | 89 |
| 2 | **M/S APP IN SNAP** | Technically failed to qualify due to the reasons recorded in detail analysis (paras x to xii) | | | | | | | | |

| 3 | **M/S Public Surveying System** | Technically failed to qualify due to the reasons recorded in detail analysis (paras x to xii) |
|---|---|---|
| 4 | **M/S Wah Industries** | Could not qualify as quoted brand was below specs and without authorization from OEM |

A Firm must secure 80% marks/score with at least 40% in Technical Compliance will qualify for the next process.


Junaid Memon
Assistant Director
Member (TEC-II)

Aftab Nazir Ahmad
Deputy Director
Member (TEC-II)

Muhammad Arshad Iqbal
Director
Chairman (TEC-II)