TERMS OF REFERENCE
for
2 UNITS GLOBAL NAVIGATION SATELLITE SYSTEM
(GNSS Base and Rover Survey Equipment and Required Accessories for Data Processing and Operation Maintenance)

A. Overview

One of the components of the Optimization Project is to conduct Hydrographic Surveys on identified river basins. In accordance to this, the acquisition of a Differential Global Positioning System (DGPS) will provide greater accuracy and efficiency on procuring the necessary data on the field. A DGPS is an enhancement to Global Positioning System that provides improved location accuracy, from the 15-meter nominal GPS accuracy to about 10 cm in case of the best implementations.
DGPS uses a network of fixed, ground-based reference stations to broadcast the difference between the positions indicated by the GPS satellite systems and the known fixed positions. These stations broadcast the difference between the measured satellite pseudoranges and actual (internally computed) pseudoranges, and receiver stations may correct their pseudoranges by the same amount. The digital correction signal is typically broadcast locally over ground-based transmitters of shorter range.

B. Approved Budget for the Contract

The Approved Budget for the said item is Five Million Three Hundred Fifty Thousand Pesos (PhP 5,350,000.00).

C. Qualifications of Bidder

The complete requirements for a prospective bidder to qualify may be referred to in Section II Instructions to Bidders; the Bid Data Sheet; and the Checklist of Eligibility and Technical Requirements of the Bidding Documents. Specific mentions herewith are the following:

1. Prospective bidders who are not manufacturers or producers and acting merely as suppliers, distributors and the like of the goods and services that is subject of this bidding must be duly authorized by the manufacturer or producer of the goods and services and must be able to show valid proof of such authorization during the opening of bids (See manufacturer's certificate form);

2. Prospective bidders shall have the technical and financial capability as well as qualified technical personnel necessary to deliver the goods and services required for the project, if awarded the contract.

D. Period and Place of Delivery

The winning bidder shall supply, deliver and test the equipment within forty-five (45) calendar days commencing from the date of receipt of the Notice to Proceed (NTP**)**. Delivery will be at 2nd floor, Planning and Project Management Office, PAGASA WFFC Bldg., BIR Rd., Diliman, Quezon City

E. Bid Proposal Contents

The prospective bidder is expected to comply and respond accordingly to the specific instructions and submit all the documentary requirements under the Checklist of Eligibility, Technical and Financial Requirements. The submission of the requirements must be properly arranged in order and with label, using only the prescribe forms.

The prospective bidder shall respond paragraph by paragraph and shall clearly indicate compliance to all the required specifications (*Please see Section VII. Compliance Matrix*) and shall specify the number of days or schedules within which to complete the delivery of all the goods required (*Please see Section VI Schedule of Requirements*).

It is likewise expected that the prospective bidders shall include in its submission the following documents:

1. The original descriptive literatures and unaltered brochures of all equipment/materials to be supplied.

2. Engineering Drawings and Diagrams submit detailed methodology of installation of the equipment with their corresponding system and network diagrams; and

3. List: The list of equipment to be supplied and breakdown of their corresponding prices using the required bidding forms (Please refer to Financial Component).

These details will enable the **PAGASA-Bids and Awards Committee** to fully evaluate and determine the bidder's compliance with the requirements of the project.

On the other hand, should there be any material and/or activities needed which were not specified or mentioned herein but are necessary to complete the project, the winning bidder shall immediately inform the end-user of the project for immediate action.

F. Technical Specifications

I. Base Station

1. Minimum 440 Channels
2. AdvanceMaxwell 6 GNSS Chipsets
3. Everest
4. Satellite Signals tracked simultaneously:
   a. GPS: L1 C/A, 12C, L2E, L5

b. GLONASS: L1 C/A and unencrypted P code,
L2 C/A and unencrypted P code, L3 CDMA
c. Galileo: L1 CBOC, E5A, E5B, and E5AltBOC
d. Beudiu (Compass): B1, B2

5. Centerpoint RTX
6. QZSS, WAAS, EGNOS, GAGAN
7. Positioning Rates: 1 Hz, 2Hz, 5Hz, 10Hz and 20Hz
8. Core Differential GNSS Positioning
   a. Horizontal = 0.25m to 1ppm RMS
   b. Vertical = 0.50m to 1 ppm RMS
   c. SBAS differential positioning Accuracy = typically <5m 3DRMS
9. Static GNSS Surveying
   High Accuracy Static
   a. Horizontal = 3mm + 0.1ppm RMS
   b. Vertical = 3.5mm + 0.4ppm RMS
   Static and Fast Static
   a. Horizontal = 3.5mm + 0.5ppm RMS
   b. Vertical = 5mm + 0.5ppm RMS
10. Real Time Kinematic Surveying
    Single Baseline < 30km
    a. Horizontal = 8mm + 1 ppm RMS
    b. Vertical = 15mm + 1ppm RMS
    Network RTK
    a. Horizontal = 8mm + 0.5 ppm RMS
    b. Vertical = 15mm + 0.5 ppm RMS
11. RTK Start-up time for specified precisions:
    2 to 8 seconds
12. Centerpoint RTX
    a. Horizontal = 4 cm
    b. Vertical = 9 cm
13. xFill
    a. Horizontal = RTK + 10mm/min RRMS
    b. Vertical = RTK + 20mm/min RMS
14. Physical
    a. Keyboard and Display: Vacuum Fluorescent display 16 characters by 2 rows. Dimmable on/off key for one-button startup
    b. Dimensions (LxWxD): 24cm x 12cm x 5cm
    c. Weight: 1.65kg receiver with internal battery and radio
15. Environmental
    a. Operating: -40C to +65C
    b. Storage: -40C to 80C
    c. Humidity: MIL-STD 810F, Method 507.4
    d. Waterproof: IP67 for submersion to depth of 1m, dust proof
    e. Pole Drop: Designed to survive a 1m pole drop onto hard surface
16. Electrical
    a. Internal: Integrated internal battery 7.2V, 7800mA-hr, Lithium-ion
    b. External: Power Input on 7-pin 0-shell Lemo connector is optimized for

lead acid batteries with a cut-off threshold if 11.5V
c. Power consumption: 8.0W in base mode with internal transmit radio

17. Operation Time on Internal Battery
    a. Base Station 450 MHz systems: Approximately 11 hours; varies with temperature
    b. Transmit Power: 2 W
18. Input/Output Formats
    a. Correction Formats: CMR, CMR+, CMRx, RTCM 2.1, RTCM 2.2, RTCM 2.3, RTCM 3.0, RTCM 3.1
    b. Observables: RT17, RT27, RTCM 3.x
    c. Position/Status I/O: NMEA-0183 v2.3, GSOF
19. Communication and Data Storage
    a. Lemo (Serial): 7-pin OS Lemo, Serial 1, 3 wire Rs232, Ethernet, Blutooth, 52mb Capacity

II. Rover

1. Advance Maxwell 6 GNSS Chipsets
2. 360 GNSS Tracking
3. Minimum 440 Channels
4. Satellite signals tracked simultaneously
   a. GPS: L1 C/A, L1C, 12C, L2E, L5
   b. GLONASS: L1 C/A, L5, L1P, L2C/A, L2P, L3
   c. SBAS: 11C/A, L5 (for SBAS satellites that support L5)
   d. Galilleo: E1, E5a, E5B
   e. Beudiu (Compass): B1, B2
5. QZSS, WAAS, EGNOS, GAGAN
6. Positioning Rates: 1Hz, 2Hz, 5Hz, 10Hz and 20Hz
7. Code Differential GNSS Positioning
   a. Horizontal = 0.25m to 1ppm RMS
   b. Vertical = 0.5m to 1ppm RMS
   c. SBAS differential positioning accuracy = typically <5m 3DRMS
8. Static GNSS Surveying
   High Accuracy Static
   a. Horizontal = 3mm + 0.1 ppm RMS
   b. Vertical = 3.5mm + 0.4 ppm RMS
   Static and Fast Static
   a. Horizontal = 3mm + 0.5 ppm RMS
   b. Vertical = 5mm + 0.5 ppm RMS
9. Real Time Kinematic Surveying
   Single Baseline < 30km
   a. Horizontal = 8mm + 1 ppm RMS
   b. Vertical = 15mm + 1ppm RMS
   Network RTK
   a. Horizontal = 8mm + 0.5 ppm RMS
   b. Vertical = 15mm + 0.5 ppm RMS
   c. RTK start-up time for specified precisions = 2 to 8 seconds

10. Physical
    a. Dimensions = 11.9cm x 13.6cm
    b. Weight = 1.12kg with internal battery, internal radio and antenna
    c. Operating Temperature: -40C to 65C
    d. Humidity: 100% condensing
    e. Ingress protection: IP 67 dustproof, protected from temporary immersion to depth of 1m
    f. Designed to survive a 2m pole drop onto concrete

11. Operation Time on Internal Battery
    a. Rechargeable removable 7.4V, 3.7 Ah Lithium-ion smart battery with LED Status indicators
    b. 450 MHZ receive only option; 5.5 hours

12. Radio Modem
    a. Frequency range of 403Mhz to 473 Mhz
    b. Transmit Power: 2W
    c. Range: 3-5km typical/10km Optional

13. Cellular Capable

14. Wifi capable

15. Data storage: 4gb internal memory; over three years of raw observables (1.4MB/day), based on recording every 15 seconds from average of 14 satellites

16. Data Formats: CMR+, CMRx, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCm 3.1 inputs and outputs 24 NMEA outputs, GSOF, RT17 and RT27 outputs, supports BINEX and smoothed carrier

17. WEBUI: offer simple configuration, operation, status and data transfer accessible via wifi, serial, usb and bluetooth

18. Capable of performing compensated Topo

III. Controller

1. Environmental specifications: IP68

2. Processor: at least Intel Pentium Processor

3. Memory: 8GB RAM (min)

4. Storage: 64 GB (min)

5. Operating System: Windows 10 Pro

6. Compatible with MS Office, browsers and 3rd party apps
7. Expansion: SDXC card up to 2 TB (min)
8. Batteries: at least 3100 mAh with charge LED indicator
9. Battery Life: 5 hours
10. Unit must be capable of hotswappable for continous work
11. Display: 7 in 1280 x 800 landscape, 16:10 multi-point capacitive, 650+ nits sunlight readable
12. Keyboard: Full QWERTY keypad with backlight, numeric key block
13. USB: at least USB 3.1 gen 1
14. Camera: dual camera: rear camera 8MP autofocus with flash
    Fron Camera: 2MP fixed-focus
15. GPS/Compass/Accelerometer: Integrated GNSS, 3-axis accelerometer, magnetic sensor, proximity sensor
16. The unit should have a pre-installed field software capable of Stakeout, volume, area computation
17. The unit must manage large project file, complex imagery, point clouds and other 3D data
18. Physical specifications
    a. at least 30x20.9x7.1 cm
    b. Weight: 1.42 kg (max
    c. Housing: at least Glass fibre reinforced resin with integrated drop bumpers

IV. Post Processing Software

1. Same Brand of the unit supplied
2. Licensed
3. contains a library with parameter and projected coordinate systems
4. contains a library with WGS84 Datum transformations
5. contains a library with Ellipsoids
6. contains a library with Geoid models
7. provides a tool to create and edit coordinate systems, datum transformations,

ellipsoids and geoid models

8. must be able to directly connect to the controller in order to upload and download files

9. must be able to automatically recognized and import the following file formats by field software and must be able to export file formats

10. Should be able to post-process static and kinematic

11. Should be able to clear the processing results

12. Should be able to store and display processing residuals

V. Miscellaneous

- User's manual, range pole with bipod, tripod, data download cables, connection cables, hard case

Notes:

I. All parts and accessories should be compatible with existing GNSS Unit

II. Technical Support: phone access and site visit (must bring tools for fixing simple defects) – 24/7 Access

III. Supplier will conduct training (3-day training for the operation and features of the instrument for 25 participants). All expenses for this activity shall be shouldered by the supplier.

IV. Delivery Period: Within thirty (30) calendar days from receipt of purchase order

G. <u>Warranties / After Sales Support</u>

1. The winning bidder warrants that it shall strictly conform to all the Terms and Condition of the Contract, including this Terms of Reference (TOR).
2. All workmanship, materials and equipment shall be warranted by the supplier for a period of **one (1) year** commencing from the date of acceptance. The warranty shall include:
   - Technical assistance when summoned to by the end-user regarding the delivery items.
   - Immediate replacement of the defective item/s, in any case of malfunctions during the warranty period.
3. While the equipment is undergoing repair, a spare unit shall be made available to PAGASA to maintain the continuous operation of the system. Repair of the defective materials or equipment shall be permitted provided that the repaired item meets original specifications.

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