GOVERNMENT OF SAMOA

SAMOA SECOND INFRASTRUCTURE AND ASSET MANAGEMENT PROJECT (SIAM II)

COMPONENT 5.01: LAND ADMINISTRATION & SURVEY

TECHNICAL SPECIFICATIONS
for
GPS & ANCILLARY EQUIPMENT

TECHNICAL ASSISTANCE REPORT NO. 4

SUBMITTED TO

MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

MARCH 2005

Technical Specifications for GPS & Ancillary Equipment

The Samoan Second Infrastructure Asset Management Project (SIAM II), Component 5 'Sustainable Management: - Land Administration and Survey' wishes to purchase three sets of Geodetic GPS receivers, ancillary equipment and software. The GPS equipment will be used to upgrade the Samoan Geodetic Network and may also be used for cadastral surveying and other survey purposes by staff of the Ministry of Natural Resources & Environment.

All equipment must be new, unused, of the most recent or current models and they must incorporate all recent improvements in design.

1.1 GPS Receivers

Three (3) sets GPS receivers, each set to comprise of the following and provide the stated functionality:

1.1.1 Dual Frequency P-code receiver

a. Must support the following measuring modes:
   - Static
   - Fast or Rapid Static
   - Kinematic Stop & Go
   - Kinematic Continuous
   - Real Time Kinematic

b. Horizontal Accuracy:
   - 5mm + 1ppm (rms) (Static & Fast Static)
   - 10mm + 1ppm (rms) (Real Time Kinematic)

c. Vertical Accuracy:
   - 10mm + 1ppm (rms) (Static & Fast Static)
   - 20mm + 2ppm (rms) (Real Time Kinematic)

d. Satellite Tracking:
   - Minimum of 12 channels L1 Carrier Phase, L1 P-code, L1 C/A code
   - Minimum of 12 channels L2 Carrier Phase, L2 P-code.
   - Fully operational during P-code encryption

e. Data collection interval:
   - Selectable 1 to 60 seconds

f. Internal data recording capacity (to internal memory or replaceable memory device, eg PC card):
   - 72 hours L1/L2 - 5 satellites at 15 second recording rate.

g. Power:
   - Nominal 12V DC.
   - Facility for connecting a minimum of two batteries, with automatic swapping between power sources without affecting data recording.

h. Operating Temperature Range:
   - Up to fifty five degrees Celsius

i. User interface to enable:
   - Full operator control of receiver functions.

Field input of file name, antenna height and type, point ID.
Display of battery voltage.
Display of date, time, day number.
Display of files in memory and available memory.
Display of antenna position and PDOP.
Display of satellite health, satellite rise and set times.
Display of satellite elevations, azimuths and signal to noise ratio (signal strength).
Display of satellite tracking data, including the number of continuous measurements made on L1 and L2 for the current session or point.

j. Purpose built backpack or belt mounted pouch for receiver and battery.
k. Rugged, lightweight & waterproof.
l. A three (3) year firmware upgrade agreement must be provided.

1.1.2 Dual Frequency Antenna

a. Geodetic L1/L2 antenna (if a ground plane is required for high precision observations, it must be provided).
b. If a ground plane is required for high precision observations, it should be detachable for lower precision work. (see 1.2.1 below)

1.1.3 Antenna Cables

a. Two (2) antenna cables to be provided for each receiver, one each of the following lengths:

15 metre (minimum)
3-5 metre (approximate).

b. To be professionally made, all joints sealed and caps provided for connectors.

1.1.4 Height of Instrument Measuring Device

a. Appropriate propriety device for the particular antenna provided.

1.1.5 Standard Battery Set and Charging Equipment

a. As specified in manufacturers literature.
b. Standard battery or batteries to be capable of operating the receiver for at least 8 hours.
c. Charger to operate on 240V AC - 50 Hz.
d. Charger must be able to fully charge all batteries overnight.

1.1.6 Heavy Duty Batteries and Charging Equipment

a. One (1) heavy duty battery to be provided with each receiver.
b. Each heavy duty battery to be capable of operating the receiver for at least 12 hours.
c. If standard charging equipment will not charge the heavy duty batteries in a reasonable time, appropriate charging equipment must be provided.
d. Charger to operate on 240V AC - 50 Hz.
e. Charger must be able to fully charge a heavy duty battery overnight.

1.1.7 Tribrach and Adaptor

a. Tribrach with optical plummet and standard 5/8 inch thread.
b. Appropriate adaptor/carrier, with tube bubble, to attach antenna to tribrach.

1.1.8 Spare Power Cable

a. If a cable is required to connect the standard batteries to the receiver, a spare power cable is to be provided.
b. To be professionally made, all joints sealed and caps provided for connectors.

1.1.9 Operator's Manual

a. Full set of original manuals.

1.1.10 Transport Cases

a. Appropriate transport cases to be provided for all equipment in 1.1.1 to 1.1.9 above.
b. To be impact resistant and weatherproof.

1.1.11 Telescopic Tripod

a. Heavy duty wooden (or other suitable non-metallic) telescopic tripod with standard 5/8 inch thread fastening.

1.1.12 Tripod Bag

a. Heavy duty canvas to fit tripod.
b. Reinforced solid base and reinforced opening.
c. Bags to be constructed such that they can be closed to protect the top of the tripod. (suggested that the bag is long enough for a fold over reinforced flap with a strap.)

1.2 Roving Equipment

Two (2) sets of equipment to support fast static and RTK roving operations as follows:

1.2.1 Dual Frequency Antenna

a. In the event that the ground plane required for high precision observations is not detachable (see 1.1.2 above) two (2) L1/L2 antennas must be provided for lower precision work such as fast static and RTK observations.

1.2.2 Kinematic Pole and Bipod Stand

a. Robust adjustable range pole (minimum of 2.5m long) with quick release operation and robust bipod.
b. To be provided with a heavy duty protective bag or container.
c. Reinforced solid base and reinforced opening.
d. Bags to be constructed such that they can be closed to protect the top of the pole . (suggested that the bag is long enough for a fold over reinforced flap with a strap.)

1.3 RTK Functionality

The equipment, radios and software necessary to provide full RTK functionality with a base receiver and two (2) rover receiver capability as follows:

1.3.1 Base Station

a. Base station must be able to serve multiple rovers.

1.3.2 Rover Station

a. Rover station display to indicate when sufficient data has been recorded to determine a position at the required accuracy.

1.3.3 General

a. Capable of “on-the-fly” initialisation.
b. Post process infill (ability to continue logging data when out of radio range, for post processing).

1.3.4 Radios

a. Built in or external radios for the base receiver, built in radios for rover receivers:
   Suitable for use over a 10km range.
   Appropriate frequencies and power outputs for Independent Samoa.
   Complete with all necessary aerials, cables and fittings.
   If required, licensed to operate for one year in Independent Samoa.

1.3.5 Spare Cables

a. If cables are required to connect the radios and aerials, a set of spare cables, with fittings and caps, is to be provided.

1.3.6 Operator’s Manual

a. Full set of original manuals for RTK operation and operation of radios.

1.3.7 Transport Cases

a. Appropriate transport cases to be provided for all equipment in 1.3.4 to 1.3.6 above.
b. To be impact resistant and weatherproof.

1.4 GPS Processing Software

One (1) copy as follows:

a. Appropriate propriety baseline processing software as specified in manufacturer’s literature.
b. Designed to run on an IBM PC compatible computer in the Microsoft Windows XP operating system.
c. Must have full mission planning software to provide full information on, and plots of:
   Satellite visibility
   PDOP & GDOP
   Satellite azimuth & elevation.
d. Automatic data processing of the following measuring modes:
   Static
   Fast or Rapid Static
   Kinematic Stop & Go
   Kinematic Continuous.
e. Facility for operator intervention and variation of processing controls.
f. Output of full statistical data with results to enable analysis of data quality.
g. Capable of exporting processing results and statistical data for input into the Microsearch GeoLab 2001 adjustment software and later versions as appropriate.
h. Capable of importing and exporting RINEX format data.
i. One set of original software on CD.
j. Software protection device if required to operate the software.
k. Full set of software manuals.
l. A three (3) year software upgrade maintenance agreement must be provided.

1.5 Warranty & Maintenance Agreement

Minimum three year warranty and maintenance agreement on all GPS equipment, firmware and software. The warranty to cover parts and labour and to include both firmware and software upgrades during this period.

Tenderers must indicate where maintenance and servicing is to be carried out.

Postage, transport and handling charges for equipment and software, covered by the maintenance agreement, to be paid by the supplier.

Tenderers must indicate if replacement units will be made available, on a loan basis, if break downs occur and the conditions attached to supply of such replacement equipment.

Tenderers must indicate the guaranteed turn around time for repairs.

1.6 Spare Parts

The bidder to warrant that spare parts will be available for a minimum of five (5) years of operation from purchase

1.7 Technical Support

Technical support must be available throughout the service life of the equipment. Tenders should indicate how technical support will be provided.

1.8 Specifications

The bidder is to provide a complete set of the manufacturer's published specifications.

1.9 Extended maintenance agreements

The tenderer is to provide, as an additional item, the cost of an annual Extended Maintenance Agreement to cover GPS equipment, firmware and software upgrades after completion of the initial three year warranty and maintenance agreement period so that the annual costs can be included in the MNRE budget.

1.10 Training

The bidder is to provide, as an additional item, the cost to run a two week training course in receiver operations and data processing in Samoa.

A detailed training plan to be provided.