Project: Jamaica-Winhall STP 2904(1)
Advertised Date: 5/30/2018

GNSS CONSTRUCTION INSPECTION EQUIPMENT

XX. DESCRIPTION. This work shall consist of furnishing, configuring, installing, maintaining, and removing Global Navigation Satellite System (GNSS) units as needed for use by the Engineer and their inspection staff, including building the required surface models and downloading them into the Contractor provided data collectors, and the training of the Engineer and their representatives on the use of the GNSS units provided.

XX. EQUIPMENT. Each GNSS Construction Inspection Unit shall include all necessary components, communication devices, integrated antennae and receiver and cables, data collectors, operating manuals, attachments, and fastening hardware to meet the minimum requirements described below.

(a) GNSS units provided for a single Contract shall be the same model and manufacturer; and shall include, and be licensed to operate, the same version of GNSS planning software, and data collection software to be utilized by the Engineer and their representatives for data collection. All software provided (including firmware) shall be the most current available from the manufacturer at the time of delivery of the GNSS units. GNSS units shall not be more than two (2) years old from the date of manufacturing to the time of delivery. To verify the age of the GNSS units, the Contractor shall provide a dated copy of the manufacturer's receipt(s) for the purchase, lease, or rental of the units.

(b) GNSS units shall include both standard USB cable and Bluetooth wireless technology for data transfer between the GNSS units and the data collectors.

(c) GNSS units shall be equipped, at a minimum, to receive Global Positioning System (GPS) and GLONASS data.

(d) GNSS units shall be equipped to receive, and be capable of utilizing, Real Time Kinematics (RTK) correctional data (current version of RTCM format) through internet protocol provided from the VT Continuously Operating Reference System (VT CORS) Network. This shall include all necessary communication devices, repeaters, and systems, data service plans, and communications to meet the minimum required accuracy and not exceed two (2) second latency at the rover. Whichever communication method is utilized by the Contractor to broadcast the VT CORS RTK correctional data, the Contractor shall ensure that the RTK data shall be available at all locations across the entire Contract site during all hours of construction and inspection operations.

(e) GNSS units shall include either an integrated or modular communication device capable of receiving RTK correctional data to satisfy the requirement of using VT CORS RTK corrections.

(f) GNSS Units shall be capable of collecting dual frequency GPS data.

(g) Minimum Required Kinematic Accuracy relative to primary project control (CORS):

(1) Horizontal: 0.033 ft + 1.0 ppm

(2) Vertical: 0.065 ft + 1.0 ppm

(h) Necessary hardware and software shall be included (including communication drivers) to connect the GNSS units to an Agency-provided PC and communicate/exchange positional data with that Agency PC.

(i) GNSS units shall have an internal, or modular, rechargeable battery system capable of operating through all active working hours (may include interchangeable batteries), including the battery charger.

(j) GNSS Units shall include a hard or soft shell carry case, and all appropriate operation manuals.

(k) GNSS rover units shall include one (1) fixed height rover rod of 6.56 feet in length, one attachable bipod which is compatible with the rover rod, and one Topo shoe.

(l) A GNSS unit set up to operate as a base station shall include all necessary additional cables, hardware, fasteners, or accessories necessary to install it in a fixed semi-permanent location, will not be considered as a rover unit, and therefore will not require a rover, a bi-pod, or a Topo shoe.

XX. CONSTRUCTION REQUIREMENTS. The Contractor shall furnish, configure, install, maintain, and remove the GNSS units, and provide the Engineer and/or their representatives with the training on the operation of the GNSS units. The Contractor shall ensure all GNSS units are fully operational and training has been provided before construction begins.

All projects shall utilize the VT CORS as the spatial reference network from which RTK corrections are derived. The Contractor shall choose which communication technique and devices will be used which will insure the consistent and reliable delivery of RTK correctional data from VT CORS to the GNSS units. When geographic locations or lack of reliable communications network prohibits the use of the VT CORS directly, the Engineer may approve the use of a Survey Grade GNSS Inspection unit as a base station in place of the VT CORS, which will be paid for separately.

The Contractor shall semi-permanently mount the base station in a stable and secure location where it shall not be disturbed by construction activities nor be easily damaged by vandalism, and where it shall be capable of providing radio signal coverage over the entire Contract area. If the base station cannot broadcast a signal that covers the entire site, the Contractor shall provide adequate repeater radios or other communications at such frequency and locations such that a minimum 90% signal strength is maintained throughout the length of the project site. A GNSS unit installed as a base station for inspection operations shall only be moved with the approval of the Engineer.

The GNSS units shall be maintained and remain in service until either:

(a) a maximum of one week after the Engineer requests its removal in writing, or

(b) the State relinquishes the Engineer's Field Office.

The Contractor shall maintain all GNSS units and software in good working condition and shall provide replacement due to breakdown, damage, or theft within two (2) working days. The Contractor shall retain ownership of all supplied GNSS units at the end of the Contract.

The Contractor shall build the required surface models and download them into the provided data collectors to facilitate construction inspection by the Engineer.

Following the award of the Contract, the Agency will make available the following electronic data files. The files that will be made available were originally created with the computer software applications MicroStation® (CADD software) and InRoads® (civil engineering software). The data files will be in the native formats and other software formats as described below. The Contractor will perform any and all necessary conversion of the files for the selected grade control equipment.

(a) CAD Files.

(1) InRoads® DTM files representing the design surfaces.

(2) InRoads® ALG files containing horizontal and vertical geometry.

(3) MicroStation® alignment design file.

(4) MicroStation® cross section design files.

(5) MicroStation® ROW design file.

(6) MicroStation® Existing Ground topography design file.

(b) Machine Control Surface Model Files.

(1) LandXML (ASCII format).

(c) Alignment Data Files.

(1) Alignment Geometry Report (ASCII Report format).

(2) LandXML (ASCII format).

The Contractor is notified that VTrans utilizes the US Survey Foot as a basis for all engineering work. Particular care shall be taken to ensure that the US Survey Foot is utilized in any and all conversion/evaluation of the files provided. This includes any required conversion from MicroStation® DGN to AutoCAD® DWG; as well as from Bentley InRoads® to other engineering formats. The XML files shall also be checked to ensure that the US Survey Foot is utilized.

Information shown on the Plans governs over the provided electronic data. The electronic information is not to be considered a representation of actual conditions to be encountered during construction. Providing the Contractor this information does not relieve the Contractor from the

responsibility of making an investigation of conditions to be encountered, including but not limited to site visits, and basing any bid on information obtained from these investigations and their professional interpretations and judgment.

The Contractor assumes all risk of error if the information is used for any purposes for which the information was not intended.

Any assumptions the Contractor makes from this electronic information is at their risk.

XX. TRAINING REQUIREMENTS.

(a) For all Construction Grade GNSS units, the Engineer and/or their representatives shall be provided with a minimum of two separate 8 hour minimum training sessions on the use and operation of the GNSS units during the first month of the Contract. One of the two classes shall occur within one week of delivery of GNSS units to the site. The second of the two classes shall occur at the request of the Engineer. If a Contract has multiple years of work, an additional 8 hour minimum training shall be provided at the request of the Engineer.

(b) All training shall be performed by a manufacturer-verified trainer who is approved by the Engineer. The training shall occur at the Engineer's Field Office or at a location agreed to by the Engineer.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (GNSS Construction Inspection Equipment) to be measured for payment will be the number of each GNSS Inspection unit provided and operational in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (GNSS Construction Inspection Equipment) will be paid for at the Contract unit price per each. Payment will be full compensation for furnishing all equipment, support, and maintenance as specified and required, and for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work.

The unit price bid shall include the costs of all labor, materials, and equipment necessary to satisfactorily complete the work, including required training and maintenance.

Partial payments will be made as follows:

(a) The first payment of 50 percent of the Contract unit price for Special Provision (GNSS Construction Inspection Equipment) or 5 percent of the adjusted Contract price, whichever is less, will be made with the first biweekly estimate as determined by the Engineer pending progress on other Contract items.

(b) The second payment of 40 percent of the Contract unit price for Special Provision (GNSS Construction Inspection Equipment) or 5 percent of the adjusted Contract price, whichever is less, will be made on the first estimate following the completion of 50 percent of the Contract.

(c) Payment of any remaining amount of the Contract unit price bid for Special Provision (GNSS Construction Inspection Equipment) will be made after the Contract Substantial Completion Date as determined by the Engineer.

Payment will be made under:

Pay Item	Pay Unit
900.620 Special Provisions (GNSS Construction Inspection Equipment)	Each