

**RETURN BIDS TO:**  
**RETOURNER LES SOUMISSIONS À:**  
**Bid Receiving - PWGSC / Réception des  
soumissions - TPSGC**  
**11 Laurier St./ 11 rue, Laurier**  
**Place du Portage, Phase III**  
**Core 0A1 / Noyau 0A1**  
**Gatineau, Québec K1A 0S5**  
**Bid Fax: (819) 997-9776**

**REQUEST FOR PROPOSAL  
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government  
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

|   |  |
|---|--|
| <b>Title - Sujet</b><br>Robotic Station with GNSS receiver  |  |
| <b>Solicitation No. - N° de l'invitation</b><br>W8474-136458/A  | <b>Date</b><br>2013-01-16                    |
| <b>Client Reference No. - N° de référence du client</b><br>W8474-136458   |  |
| <b>GETS Reference No. - N° de référence de SEAG</b><br>PW-\$\$PV-938-61951  |  |
| <b>File No. - N° de dossier</b><br>pv938.W8474-136458   | <b>CCC No./N° CCC - FMS No./N° VME</b>       |
| <b>Solicitation Closes - L'invitation prend fin</b><br><b>at - à 02:00 PM</b><br><b>on - le 2013-02-26</b>  |  |
| <b>Time Zone</b><br><b>Fuseau horaire</b><br>Eastern Standard Time<br>EST   |  |
| <b>F.O.B. - F.A.B.</b><br><b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>   |  |
| <b>Address Enquiries to: - Adresser toutes questions à:</b><br>Roy, Paul  | <b>Buyer Id - Id de l'acheteur</b><br>pv938  |
| <b>Telephone No. - N° de téléphone</b><br>(819) 956-6919 ( )  | <b>FAX No. - N° de FAX</b><br>(819) 956-3814 |
| <b>Destination - of Goods, Services, and Construction:</b><br><b>Destination - des biens, services et construction:</b><br><br>Specified Herein<br>Précisé dans les présentes |  |

**Instructions: See Herein**

**Instructions: Voir aux présentes**

**Vendor/Firm Name and Address**  
**Raison sociale et adresse du  
fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**  
Scientific, Medical and Photographic Division / Division de  
l'équipement scientifique, des produits photographiques et  
pharmaceutiques  
11 Laurier St./ 11 rue, Laurier  
6B1, Place du Portage  
Gatineau, Québec K1A 0S5

|  |  |
|--|--|
| <b>Delivery Required - Livraison exigée</b><br>See Herein  | <b>Delivery Offered - Livraison proposée</b> |
| <b>Vendor/Firm Name and Address</b><br><b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>   |  |
| <b>Telephone No. - N° de téléphone</b><br><b>Facsimile No. - N° de télécopieur</b>   |  |
| <b>Name and title of person authorized to sign on behalf of Vendor/Firm</b><br><b>(type or print)</b><br><b>Nom et titre de la personne autorisée à signer au nom du fournisseur/<br/>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b> |  |
| <b>Signature</b>   | <b>Date</b>                                  |

| Destination Code -<br>Code destinataire | Destination Address -<br>Adresse de la destination  | Invoice Code - Code<br>bur.-comptable | Invoice Address -<br>Adresse de facturation   |
|---|---|---------------------------------------|---|
| D - 1                                   | DND<br>MAPPING AND CHARTING ESTABLISHMENT<br>615 BOOTH STREET<br>OTTAWA ON. K1A 0E9<br>CANADA<br>ATT: PIERRE SIMARD | W8474                                 | DEPARTMENT OF NATIONAL DEFENCE<br>101 COLONEL BY DRIVE<br>ATT: I. Matta DES Proc 4-4-2-3<br>OTTAWA<br>Ontario<br>K1A0K2<br>Canada |



| Item Article | Description                                   | Dest. Code Dest. | Inv. Code Fact. | Qty Qté | U. of I. U. de D. | Destination | Unit Price/Prix unitaire FOB/FAM | Plant/Usine  | Delivery Req. Livraison Req. | Del. Offered Liv. offerte |
|--------------|---|------------------|-----------------|---------|-------------------|-------------|----------------------------------|--------------|------------------------------|---------------------------|
| 1            | Robotic Station with GNSS receiver            | D-1              | W8474           | 4       | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |
| 2            | GNSS Receiver +Antenna with RTK radio         | D-1              | W8474           | 10      | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |
| 3            | GNSS Static base station receiver +Choke      | D-1              | W8474           | 4       | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |
| 4            | ETS/GNSS handheld controller +data console    | D-1              | W8474           | 10      | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |
| 5            | copies of ETS/GNSS field/Office data software | D-1              | W8474           | 4       | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |
| 6            | Training (package for 10 days Minimum)        | D-1              | W8474           | 1       | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |
| 7            | Warranty ( 1 Yr + option of 4 years)          | D-1              | W8474           | 1       | Each              | \$          | XXXXXXXXXXXX                     | XXXXXXXXXXXX | See Herein                   |                           |

## TABLE OF CONTENTS

### PART 1 - GENERAL INFORMATION

1. Security Requirement
2. Requirement
3. Debriefings

### PART 2 - BIDDER INSTRUCTIONS

1. Standard Instructions, Clauses and Conditions
2. Submission of Bids
3. Enquiries - Bid Solicitation
4. Applicable Laws

### PART 3 - BID PREPARATION INSTRUCTIONS

1. Bid Preparation Instructions

### PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

1. Evaluation Procedures
2. Mandatory Technical Criteria
3. Basis of Selection

### PART 5 - CERTIFICATIONS

1. Code of Conduct Certifications - Certifications Required Precedent to Contract Award
2. Certifications Required with the Bid

### PART 6 - RESULTING CONTRACT CLAUSES

1. Security Requirement
2. Requirement
3. Standard Clauses and Conditions
4. Term of Contract
5. Shipping Instructions - Delivery at Destination
6. Authorities
7. Payment
8. Invoicing Instructions
9. Certifications
10. Applicable Laws
11. SACC Manual Clauses
12. Priority of Documents

#### List of Annexes:

- |         |                         |
|---------|-------------------------|
| Annex A | Mandatory Specification |
| Annex B | Pricing Basis           |

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## **PART 1 - GENERAL INFORMATION**

### **1. Security Requirement**

There is no security requirement associated with the requirement.

### **2. Requirement**

The Department of National Defense (DND) has a requirement for the procurement of Survey Equipment as Real Time Kinematic (RTK) Rover kits each with their respective ancillary equipment and GPS system that are based on the Global Navigation Satellite System (GNSS) in support of Canadian forces domestic and International operations. In accordance with the mandatory specifications detailed at Annex "A".

#### **2.1 Optional Requirements**

##### **2.1.1 Extended warranty**

The Bidder grants to Canada the irrevocable option to purchase four (4) one (1) year periods of extended warranty, under the same terms and conditions of part 09 of the 2010A General Conditions - Goods Medium Complexity and the prices stated in Annex B of the Contract. Exercise of this option shall be by written notice from Canada. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise this option at any time after award of a contract and before the expiry date of the original 1 year warranty period.

### **3. Debriefings**

After contract award, bidders may request a debriefing on the results of the bid solicitation. Bidders should make the request to the Contracting Authority within 15 working days of receipt of notification that their bid was unsuccessful. The debriefing may be provided in writing, by telephone.

## **PART 2 - BIDDER INSTRUCTIONS**

### **1. Standard Instructions, Clauses and Conditions**

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual (<http://sacc.pwgsc.gc.ca/sacc/index-e.jsp>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The 2003 (2012-11-19) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

### **2. Submission of Bids**

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated on page 1 of the bid solicitation.

### 3. Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than ten (10) calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that the Bidder do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

### 4. Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the province of Ontario.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the bidders.

## PART 3 - BID PREPARATION INSTRUCTIONS

### 1. Bid Preparation Instructions

Canada requests that bidders provide their bid in separately bound sections as follows:

**Section I: Technical Bid ( two (2) hard copies), consisting of technical brochures/literature to verify compliancy and test data, if applicable.**

**Section II: Financial Bid ( one (1) hard copy)**

**Section III: Certifications (one (1) hard copy)**

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of their bid.

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation.

April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process Policy on Green Procurement (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, bidders are encouraged to:

- 1) use paper containing fiber certified as originating from a sustainably-managed forest and/or containing minimum 30% recycled content; and

- 2) use an environmentally-preferable format including black and white printing instead of color printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

**Section I: Technical Bid**

In their technical bid, bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

The following applies to the Requirement and bidders must provide the following information in the bid where applicable:

**1.1 Delivery**

Delivery is required by April 30, 2013.

Although it is expected that the equipment be delivered within this time frame, the earliest date that can be achieved is : \_\_\_\_\_ (State your best delivery possible)

**1.2 Service Support**

Purchase of the equipment must include:

1. On site technical support for the system. This support must be available during normal business hours, Monday to Friday between 08:00 to 16:00. Response time for on site technical support must not exceed 48 hours following request. Any repairs must be completed within 30 days following request.
2. Technical phone support, support via the Internet must also be included with the purchase. Response for service queries must be within 24 hours or less.
3. If a repaired unit cannot be repaired within five (5) days, a replacement unit must be provided at no additional cost.

Also, provide the following with your bid:

- a) Location of available service facilities (after sales service and repair). List the service facilities closest to the destination.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
- b) Locations of available replacement parts for consumables to major components.  
 \_\_\_\_\_  
 \_\_\_\_\_

**1.3 Contacts**

Bidders are requested to provide the following: Information pertaining to Article 6.3 Contractor Representatives under Part 6, Resulting Contract Clauses

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## 1.4 SACC Manual Clauses

B1000T Condition of Material (2007-11-30)

### Section II: Financial Bid

The bidder must quote a firm price all inclusive Delivery Duty Paid (DDP), Ottawa, Ontario, Incoterms 2000, the Goods and Services Tax (GST) and/or the Harmonized Sales Tax (HST) extra, as applicable. Freight charges to destination and all applicable Customs duties and Excise taxes must be included.

## PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

### 1. Evaluation Procedures

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

#### 1.1 Technical Evaluation

All proposals submitted shall be completed in full and provide all of the information requested in the Request for Proposal (RFP) detailed in Annex A to enable a full and complete evaluation. If the requirement is not addressed in the bidder's proposal, the proposal will be considered incomplete or non-responsive and will be rejected. The onus is on the bidder to provide all the information necessary to ensure a complete and accurate assessment.

##### 1.1.2 Mandatory Technical Criteria

See "Annex A"

### 1.2 Financial evaluation

A0220T Evaluation of Price 2007-05-25

### 2. Basis of Selection

A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price including the optional requirement will be recommended for award of a contract.



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## PART 5 - CERTIFICATIONS

Compliance with the certifications bidders provide to Canada is subject to verification by Canada during the bid evaluation period (before award of a contract) and after award of a contract. The Contracting Authority will have the right to ask for additional information to verify the bidders' compliance with the certifications before award of a contract. The bid will be declared non-responsive if any certification made by the Bidder is untrue, whether made knowingly or unknowingly. Failure to comply with the certifications or to comply with the request of the Contracting Authority for additional information will also render the bid non-responsive.

### 1. Code of Conduct Certifications - Certifications Required Precedent to Contract Award

**1.1** Bidders should provide, with their bids or promptly thereafter, a complete list of names of all individuals who are currently directors of the Bidder. If such a list has not been received by the time the evaluation of bids is completed, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Bidders must submit the list of directors before contract award, failure to provide such a list within the required time frame will render the bid non-responsive.

The Contracting Authority may, at any time, request that a Bidder provide properly completed and Signed Consent Forms (Consent to a Criminal Record Verification form - PWGSC-TPSGC 229) for any or all individuals named in the aforementioned list within a specified delay. Failure to provide such Consent Forms within the delay will result in the bid being declared non-responsive.

### 2. Certifications Required with the Bid

Bidders must provide the required certifications, as part of their bid. Canada will declare a bid non-responsive if the required certifications are not completed and submitted as requested.

#### 2.1 Federal Contractors Program for Employment Equity \$200,000 or more

1. The Federal Contractors Program for Employment Equity (FCP-EE) requires that some suppliers bidding for federal government contracts, valued at \$200,000 or more (including all applicable taxes), make a formal commitment to implement employment equity. This is a condition precedent to contract award. If the Bidder is subject to the FCP-EE, evidence of its commitment must be provided before the award of the Contract.

Suppliers who have been declared ineligible contractors by Human Resources and Social Development Canada (HRSDC) are no longer eligible to receive government contracts over the threshold for solicitation of bids as set out in the Government Contract Regulations. Suppliers may be declared ineligible contractors either as a result of a finding of non-compliance by HRSDC, or following their voluntary withdrawal from the FCP-EE for a reason other than the reduction of their workforce to less than 100 employees. Any bid from ineligible contractors will be declared non-responsive.

2. the Bidder does not fall within the exceptions enumerated in 3.(a) or (b) below, or does not have a valid certificate number confirming its adherence to the FCP-EE, the Bidder must fax (819-953-8768) a copy of the signed form LAB 1168, Certificate of Commitment to Implement Employment Equity to the Labour Branch of HRSDC.

3. The Bidder certifies its status with the FCP-EE, as follows:

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### The Bidder

- (a)  is not subject to the FCP-EE, having a workforce of less than 100 permanent full time, part-time or temporary employees in Canada,
- (b)  is not subject to the FCP-EE, being a regulated employer under the Employment Equity Act, S.C. 1995, c.44;
- (c)  is subject to the requirements of the FCP-EE, having a workforce of 100 or more permanent full time, part-time or temporary employees in Canada, but has not previously obtained a certificate number from HRSDC, (having not bid on requirements of \$200,000 or more), in which case a duly signed certificate of commitment is attached;
- (d)  is subject to the FCP-EE, and has a valid certificate number as follows: \_\_\_\_\_  
(e.g. has not been declared ineligible contractor by HRSDC).

Further information on the FCP-EE is available on the following HRSDC Web site:

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## **PART 6 - RESULTING CONTRACT CLAUSES**

### **1. Security Requirement**

There is no security requirement associated with the requirement.

### **2. Requirement**

The Department of National Defense (DND) has a requirement for the procurement of Survey Equipment as Real Time Kinematic (RTK) Rover kits each with their respective ancillary equipment and GPS system that are based on the Global Navigation Satellite System (GNSS) in support of Canadian forces domestic and International operations. In accordance with the mandatory specifications detailed at Annex "A".

#### **2.1 Optional Requirements**

##### **2.1.1 Extended warranty**

The Contractor grants to Canada the irrevocable option to purchase four (4) one (1) year periods of extended warranty, under the same terms and conditions of part 09 of the 2010A General Conditions - Goods (Medium Complexity) and the prices stated in Annex B of the Contract. Exercise of this option shall be by written notice from Canada. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise this option at any time after award of a contract and before the expiry date of the original 1 year warranty period.

### **3. General Conditions**

2010A (2012-11-19), General Conditions - Goods (Medium Complexity), apply to and form part of the Contract.

The 4001 (2010-08-16) Supplemental General Conditions- Hardware Purchase, Lease and Maintenance, apply to and form part of the Contract.

All clauses and conditions identified in the Contract by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual issued by Public Works and Government Services Canada.

### **4. Term of Contract**

The contract will be in force until all warranty or optional provisions of this agreement are expired.

#### **4.1 Delivery Date**

Delivery must be completed on or before (to be filled in at contract award).

### **5. Shipping Instructions - Delivery at Destination**

The delivery must be Delivery Duty Paid (DDP) Ottawa, Ontario, Incoterms 2000 for shipments from a commercial contractor.

Solicitation No. - N° de l'invitation

W8474-136458/A

Amd. No. - N° de la modif.

File No. - N° du dossier

pv938W8474-136458

Buyer ID - Id de l'acheteur

pv938

CCC No./N° CCC - FMS No/ N° VME

W8474-136458

The Contractor will be responsible for all shipping, costs and risks of transport, transport insurance and customs clearance including payment of customs duties and taxes.

**6. Authorities**

**6.1 Contracting Authority**

The Contracting Authority for the Contract is:

Paul Roy  
Public Works and Government Services Canada  
Acquisitions Branch  
Commercial Consumer Products Directorate  
11 Laurier Street, 6A2, Phase III  
Place du Portage, Hull, Quebec, K1A 0S5  
Telephone: (819) 956-6919  
Facsimile: (819) 956-3814  
E-mail address: paul.roy@tpsgc-pwgsc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

**6.2 Technical Authority (to be filled in only at contract award)**

The Technical Authority named above is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Technical Authority, however the Technical Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

**6.3 Contractor's Representative (to be filled in by the Bidder)**

The telephone number of the person responsible for :

**General enquiries**

**Delivery Follow-up**

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Telephone No. \_\_\_\_\_

Telephone No. \_\_\_\_\_

Facsimile No. \_\_\_\_\_

Facsimile No. \_\_\_\_\_

E-mail address: \_\_\_\_\_

E-mail address: \_\_\_\_\_

**7. Payment**

**7.1 Basis of Payment - Firm Price**

- 1. In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor shall be paid a firm price of \$ to be filled in at contract award, Goods and Services Tax or Harmonize Sales Tax extra, if applicable.
- 2. No increase in the total liability of Canada or in the price of the Work resulting from any design changes, modifications or interpretations of the Specifications, will be authorized or paid to the Contractor unless such design changes, modifications or interpretations have been approved, in writing, by the Contracting Authority prior to their incorporation in the Work.

**8. Invoicing Instructions**

The Contractor must submit invoices in accordance with the information required in section 10 of 2010A General Conditions - Goods (Medium Complexity).

Original copy to consignee with one copy to the **Contracting Authority**.

**9. Certifications**

- 9.1 Compliance with the certifications provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the term of the Contract. If the Contractor does not comply with any certification or it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

**10. Applicable Laws**

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the province of Ontario.

**11. SACC Manual Clauses**

|        |                             |              |
|--------|-----------------------------|--------------|
| A9068C | Government Site Regulations | (2010-01-11) |
| B1501C | Electrical Equipment        | (2006-06-16) |

Solicitation No. - N° de l'invitation

W8474-136458/A

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

pv938

Client Ref. No. - N° de réf. du client

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

W8474-136458

pv938W8474-136458

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## 12. Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) 2010A (2012-11-19) General Conditions - Goods (Medium Complexity);
- (c) Annex A, Mandatory Specifications;
- (d) Annex B, Basis of Payment
- (e) the Contractor's bid dated (insert date of bid) \_\_\_\_\_

**ANNEX A**  
**STATEMENT OF REQUIREMENT**  
**for a Robotic Total Station (Electro-Optical Theodolite)**

The Bidder must provide a proposal that includes hardware, software and training in accordance with the following specifications listed below:

- Section 1: Four (4) Robotic Total Station (Electro-Optical Theodolite) with optional mountable GNSS receiver over trunnion axis.
- Section 2: Ten (10) GNSS Receiver and Antenna Combination Unit with RTK radio and GSM enabled capability.
- Section 3: Four (4) GNSS Static Base Station Receivers with Choke Ring Antennas.
- Section 4: Ten (10) ETS / GNSS handheld controller and data logging consoles.
- Section 5: Four (4) copies of ETS / GNSS field / office data processing software.
- Section 6: Training

**Section 1: Four (4) Robotic Total Station (Electro-Optical Theodolite) with optional mountable GNSS receiver over trunnion axis. The following items must be included in each of those Four (4) units:**

- a. Four (4) ETS internal batteries w/cables and charging unit;
- b. One (1) external battery module w/case, tripod bracket, cables and charging unit;
- c. One (1) bracket to mount optional GNSS Receiver over the trunnion axis;
- d. One (1) bracket containing the radio field controller for the handheld controller (item **Section 4**).
- e. Two (2) Prism Poles (2m) with metal ground tip and bipod stand (capable of mounting item **f.** below.);
- f. Two (2) Prism Pole bracket for Handheld controller;
- g. Two (2) Prism Pole Levelling bubble;
- h. Two (2) 360° Prism with the ability to mount the GNSS Receiver/antenna combination unit (item **section 2**) on top of it;
- i. Two (2) Single Round Prism and holder (centring accuracy 1.0mm & range 3500m);
- j. Two (2) Tribrach w/o plummet, 1" or better torsional stiffness;
- k. ETS Solar Filter for Optical Sight;
- l. Two (2) Single Round Prism and holder (centring accuracy 0.3mm & range 3500m);
- m. Hard, ruggedized cases for the Robotic Total Station and for items **a., b., f., g., and h. above** (items should be combined as much as possible in same case(s) to facilitate ease of transport);
- n. All required cables with one (1) Spare set of cables for external battery module; and
- o. One (1) SD storage card with a capacity of 1Gb

| 1. Hardware Specifications – must meet the following specifications: |                              |   | REFERENCE |
|--|------------------------------|---|-----------|
| 1  | Angular Measurement Accuracy | 1" horizontal accuracy, 0.1" display resolution , 0.5" compensator setting accuracy.<br>The ETS must have a one (1") second horizontal accuracy, a display resolution of one-tenth (0.1") of a second, and a compensator setting accuracy of one-half (0.5") second. The preceding requirements are essential to achieve the accuracies required in the performance of geodetic level surveys. (Annex C). |           |

|   |                                 |   |  |
|---|---------------------------------|---|--|
| 2 | Motorized / Robotic             | <p>Must be Fully Robotic, motorized assembly. The ETS must be able to perform and function remotely by a wireless handheld controller (<b>section 4</b> item) and be capable of traversing in the horizontal and vertical axes by means of an internal electronic motor(s) controlled remotely.</p> <p>The ETS must be a fully robotic, motorized instrument to perform functions that are mandatory during the execution of any survey performed by MCE personnel. Having an instrument that can be setup and operated remotely, reduces human error, drastically increases efficiency, and permits operator multi-tasking. During a CF airfield survey, several prisms and tripods would be setup on key locations, such as the runway buttons. From the PAC, using the SAC as a backsight, the ETS in the robotic function would automatically conduct a series of sets of turned angles on all required prism setups. Based on previous surveys, this function reduces the time required to turn angles by a minimum of 50% over manually turned sets</p> |  |
| 3 | Automatic Target Tracking (ETS) | <p>The ETS must be able to track a moving prism during the execution of a one-person survey. Due to the nature of most survey missions, survey personnel are frequently required to operate survey equipment as a one person unit to ensure that mission objectives and timings are met. This is a fundamental function of a robotic ETS and a requirement of MCE Svy Tp to efficiently perform survey tasks. As such, it is mandatory that the ETS be able to automatically track the prism being carried by the survey team member during survey operations such as OP Canada Goose and OP Nanook Gasgoyne.</p>   |  |
| 4 | Powered Prism Search Mode       | <p>Must be able to automatically search for a prism that is stationary or moving on a pole.</p>   |  |
| 5 | Mountable GNSS receiver on ETS  | <p>Must be able to mount a GNSS receiver over the trunnion axis, on the top of the ETS.</p> <p>The ETS must be able to mount a GNSS antenna over the trunnion axis, on the top of the ETS. This is a critical requirement due to some of the unique nature of certain survey missions. MCE Svy Tp conducts topographic site surveys of the DEW Line. Survey personnel are transported by helicopter to the numerous remote sites. These are localized surveys set up over unknown points. MCE Svy Tp procedures require GNSS collection to occur prior to ETS data collection in order for mission critical timings to be met. Time on the ground is a critical factor to maximize the number of sites accessed by helicopter per day. The equipment must to be able to rapidly determine GNSS positional information, send this information to the handheld controller and then use this information immediately as control points for ETS data collection. All the data (GNSS and ETS) is collected</p>   |  |



|   |   |  |  |
|---|---|--|--|
|   |   | then post processed at a later date for any adjustments required by the mission.   |  |
| 6 | Distance Measurement to Prism                           | <p><i>Single Round Prism &gt;= 3500m.</i><br/> <i>Three Round Prism – Distances &gt;= 5000m.</i></p> <p>The ETS Electronic Distance Measurement (EDM) function must meet the following distance measurement requirements:</p> <ol style="list-style-type: none"> <li>1. Single Round Prism – Distances &gt;= 3500m. This distance requirement must be met for the completion of CF Airfield Surveys. This distance requirement minimizes the number of setups required to collect all required features on an airfield.</li> <li>2. Three Round Prism – Distances &gt;= 5000m. This distance requirement will allow MCE Svy Tp to conduct distance measurements from one end of the runway to the other in one setup. All CF runway ends (“buttons”) are within this distance from either the PAC or SAC monuments.</li> </ol>   |  |
| 7 | Distance Measurement to any surface (Reflectorless)     | <p>Must be able to record a distance of up to 1000m.</p> <p>The ETS EDM must be able to record a distance on a surface of up to 1000m. This is required to acquire remote location distances, such as height of buildings and towers, from a standoff distance. Due to the height of some of these airfield obstructions, the ETS operator must setup his instrument up to 1000m away from its base to effectively pinpoint the top of the object being measured.</p>  |  |
| 8 | Accompanying Handheld Controller / Data Logging console | <p>Must be from the same manufacturer as GNSS RTK Receiver / antenna (see <b>Section 2</b>). The ETS must be able to be operated by <b>Section 4</b> item and be able to perform all of the functions listed. (see <b>Section 4</b> item for specs)</p> <p>The ETS handheld controller/data logging console <u>must be from the same manufacturer as the GNSS Basestation and GNSS RTK Rover Receivers</u> (section 4 item ) to ensure seamless interoperability. It is imperative that one (1) handheld controller be used to control both the ETS and the GNSS receivers. This removes redundant survey equipment and vastly improves operational efficiency. When MCE Svy Tp deploys on a mission, it is critical that one handheld controller/data logging console be interchangeable from an ETS function to a GNSS survey function within the same electronic data file project. The handheld controller must meet the same requirements detailed in section 4. In addition, this unit must be seamless in the operation of the robotic controls for the ETS and likewise incorporate the total station radio communication module to facilitate this.</p> |  |
| 9 | Laser Plummet   | Must be onboard the ETS unit.  |  |

|    |                                |  |  |
|----|--------------------------------|--|--|
|    |                                | The ETS must have a laser plummet onboard to ensure a speedy setup time. This has been proven to increase setup times of the ETS by over 50% on previous survey tasks.   |  |
| 10 | Onboard Software Licences      | ETS must have onboard licences for functions listed in <b>Section 4</b> (Handheld Remote Controller) and be able to perform those listed functions without the use of the handheld remote controller.  |  |
| 11 | ETS onboard interface          | Must have a <b>Face 1 and Face 2</b> interface to operate and perform ETS functions.   |  |
| 12 | ETS onboard Camera             | Must have an onboard digital camera (min 5 Mp) to capture and store digital images of surveyed features. This greatly assists comprehension of and reduces human error when processing the field data.   |  |
| 13 | Temperature Range -operating   | -15° C to greater than +40° C.<br><br>The ETS must be able to operate from less than -15° C to greater than +40° C. This range encompasses the majority (> 95%) of all temperatures of survey missions conducted in the past five (5) years.   |  |
| 14 | Dust / Water Protection rating | <i>Dust / Water Protection rating must be <b>IP55</b></i> (Ingress Protection Rating) or higher. This rating is an industry standard which ensures the ETS is able to perform in dusty conditions and in an unscheduled medium rainstorm. Normal surveying conditions.   |  |
| 15 | Humidity                       | <b>Non-condensing 95%</b> - The ETS must be able to perform in humid conditions. A non-condensing humidity rating of 95% ensures that the instrument will function in conditions that were present in any of the survey missions conducted in the last five (5) years.   |  |
| 16 | Internal Flash Memory          | Min of 1 Gb.<br><br>The ETS must have a minimum internal storage memory of one (1) Gb. This is required as a backup storage for both ETS and GNSS data files and settings. If the external flash card is full or becomes corrupt, it is mission critical that a backup system is in place to ensure the completion of the survey task. |  |
| 17 | Removable Flash Memory         | min 1 Gb – must be able to read/write to a storage card with more than 4Gb available storage space   |  |
| 18 | Bluetooth® (integrated)        | Must be onboard & enabled.<br><br>The ETS must have Bluetooth® enabled onboard. This is required for communication between the handheld controller/data logging console and the ETS.   |  |
| 19 | USB and SD Card Interface      | Must be onboard & enabled.<br><br>The ETS must have a USB interface to enable firmware updates and future capabilities. The ETS must have an   |  |

|    |                                 |   |  |
|----|---------------------------------|---|--|
|    |                                 | SD Card interface. The SD external memory card is an industry standard, is more readily available for local purchase in remote areas and is cost effective over the previous Compact Flash (CF) memory cards.   |  |
| 20 | Power-supply Battery charger    | 110-220V AC<br>Must be able to perform Charge and discharge cycles to refresh old cells . Must have an Intelligent trickle charging mode to ensure that batteries are fully charged and remain that way will connected.   |  |
| 21 | Internal Battery type           | Must be Removable Li-Ion – air cargo shippable  |  |
| 22 | Internal Battery Charging Time  | Less than 4 hrs for full charge.  |  |
| 23 | Internal Battery Operating Time | The ETS must be able to operate for a minimum time of five (5) hours using normal functions and up to eight (8) hours without EDM or Robotic functions.   |  |
| 24 | External Battery type           | Removable Li-Ion preferred – must be able to be shippable by air<br><i>If not air shippable</i> , must have a of a cable (3metre min) that would connect to unit to a 12V battery power supply  |  |
| 25 | External Battery Operating Time | The ETS must be able to operate for a minimum of ten (10) hours using both external and internal battery packs. MCE Svy Tp operates with a standard ten (10) hour work day while on a survey mission and it is imperative that the equipment will function to that level. |  |

**NOTE:Compatibility with GNSS Receivers:**

The ETS **must be from the same manufacturer** as the GNSS Basestation and GNSS RTK Rover Receivers (section 2 item). This is a mission critical requirement to maintain data integrity, to reduce the amount of kit required on deployment and to reduce human error in the processing of field collected data. During the both the planning and operational phases of the survey mission, MCE Svy Tp current procedures demand the same electronic project file be used for both the ETS and GNSS. This has been proven over several survey missions to greatly increase the success of processing and troubleshooting field collected data. Having a common manufacturer of both types of equipment removes redundant survey equipment and vastly improves operational efficiency and training.

**Section 2: Ten (10) GNSS Receiver and Antenna Combination Unit with RTK radio and GSM enabled capability. The following items must be included in each of those ten (10) units:**

- a. RTK radio modem module;
- b. GSM cellular module;
- c. Four (4) internal batteries w/ cables and charging unit;
- d. One (1) external battery w/ case, tripod bracket, cables and charger;
- e. One (1) RTK Prism Pole (2m) with metal ground tip and bipod stand;
- f. One (1) RTK Prism Pole bracket for Handheld controller;
- g. One (1) RTK Prism Pole Levelling bubble;
- h. One (1) RTK Pole 360° Prism with the ability to mount the GNSS Receiver/antenna combination unit on top of it;
- i. Hard, ruggedized cases for the GNSS Receiver and Antenna Combination Unit and for items **b, c, d, e, f, h, and n1&2**. (items **b, c, d, e, f, h** should be combined as much as possible in same case(s) to facilitate ease of transport. Items **n1&2** should be combined as well);
- j. One (1) cable (Min 8 metres with connectors) from GNSS receiver to Pacific Crest Radio modem;
- k. One (1) cable (Min 2 metres with connectors) from GNSS receiver to external battery module;
- l. All required cables;
- m. One (1) SD storage card with a capacity of 1Gb; and
- n. The following hardware components in addition to above (in total; not for each unit):
  - (1) Two (2) Laser Plummet; and
  - (2) Two (2) Tribrachs, non optical plummet, torsional stiffness 1 sec

| 2. Hardware Specifications – must meet the following specifications: |                                 | REFERENCE   |
|--|---------------------------------|---|
| 1  | Satellite signals tracking      | <p>Must be able to track the following GNSS signals:</p> <p>1) GPS: L1, L2, L2C, L5 (C/A, P, C Code);</p> <p>2) GLONASS: L1, L2 (C/A, P narrow Code);</p> <p>3) SBAS: WAAS, EGNOS, GAGAN, MSAS</p> <p>The GNSS receiver must be capable of being upgraded in the future to receive the following: 4) <u>Galileo</u>: E1, E5a, E5b</p> <p>The GNSS unit must be able to track the above satellite signals as they are an operational requirement due to the unique survey mission locations. MCE Svy Tp conducts operations North of 80° Latitude in which using solely GPS signals decreases the overall accuracy of the survey. GLONASS satellite signals offer another constellation that, when combined with GPS, provides a better framework for the survey work being conducted. Other operational locations make use of Satellite Based Augmentation Systems (SBAS) to improve regional accuracies.(see Annex D):</p> |
| 2  | Simultaneous Tracked Satellites | <p>Must be able to track satellites on min of 2 different frequencies.</p> <p>The GNSS Rover must be able to simultaneously track satellites on a minimum of two (2) different frequencies. This is an operational requirement in order to achieve geodetic grade accuracies on surveyed points.</p>  |
| 3  | Accuracy of                     | Achievable accuracies must be equal or better than:   |

|    |   |   |  |
|----|---|---|--|
|    | GNSS<br>Measurements<br>Rapid Static<br>Mode Horizontal<br>Rapid Static<br>Mode Vertical                    | 5 mm +/- 0.5 ppm (RMS)<br>10 mm +/- 0.5 ppm (RMS)   |  |
| 4  | Accuracy of<br>GNSS<br>Measurements<br>Lengthy Static<br>Mode Horizontal<br>Lengthy Static<br>Mode Vertical | Achievable accuracies must be equal or better than:<br><br>3 mm +/- 0.5 ppm (RMS)<br>6 mm +/- 0.5 ppm (RMS)   |  |
| 5  | Accuracy of<br>GNSS<br>Measurements<br>Lengthy Static<br>Mode Horizontal<br>Lengthy Static<br>Mode Vertical | Achievable accuracies must be equal or better than:<br><br>10 mm +/- 1 ppm (RMS)<br>20 mm +/- 1 ppm (RMS)   |  |
| 6  | Accuracy of<br>GNSS<br>Measurements<br>RTK Mode<br>Horizontal<br>RTK Mode<br>Vertical                       | Achievable accuracies must be equal or better than:<br>10 mm +/- 1 ppm (RMS)<br>20 mm +/- 1 ppm (RMS)   |  |
| 7  | Re-Acquisition<br>Time of Satellites  | Must re-acquire satellite signals in one (1) second or less.<br><br>This must be <i>one(1) second or less</i> due to the requirement for Svy Section to conduct Kinematic surveys. As these operations are conducted at speeds up to 80 km/hr, a very rapid reacquisition time of the GNSS signal is required in order not to incur loss of positional data or a retracement of the affected area.                            |  |
| 8  | Unit physical<br>structure  | Must be a combined GNSS Receiver and Antenna in one unit.   |  |
| 9  | Reliability of the<br>On the Fly GNSS<br>Initialization   | Must meet or exceed the 4 sigma (99.99%) reliability of the initialization.<br><br>This must meet or exceed the 4 sigma (99.99%) reliability of the initialization. This is an industry standard and a Svy Tp requirement due to the unique remote areas that operations are conducted. Reliability of the equipment to acquire a signal is a must and would prevent critical changes to the execution of any survey mission. |  |
| 10 | On the Fly GNSS<br>Time for<br>Initialization   | Initialisation must be less than 10 seconds.<br>This is a normal industry expectation for this technology under favourable GNSS survey conditions.  |  |
| 11 | Operating   | Must be -40°C to +65°,  |  |

|    |                                      |  |  |
|----|--------------------------------------|--|--|
|    | Temperature Range                    | this is compliant with High and Low temp testing standards : ISO9022-10-08, ISO9022-11, MIL STD 810F-502.4.2 MIL STD 810F-501.4.2  |  |
| 12 | Humidity                             | Must be 100% protection – compliant with ISO9022-13-06, ISO9022-12-04 and MIL STD 810F – 507.4.1   |  |
| 13 | Water and Dust                       | Must have a rating of <b>IP67</b> according IEC60529 and MIL STD 810F – 506.4-I, MIL STD 810F – 510.4-I and MIL STD 810F – 512.4-I   |  |
| 14 | Vibration                            | must withstand strong vibrations incurred on cross country vehicle movement compliant with ISO9022-36-08 and MIL STD 810F-514.5-Cat.24   |  |
| 15 | Water Submersion                     | Must operate after a temporary submersion of the GNSS receiver/antenna up to 1 m. A normal industry standard.  |  |
| 16 | Drop onto hard surface               | Must withstand a drop of one (1) metre.<br><br>A normal industry standard and a practical height of a soldier dropping the equipment by mistake.   |  |
| 17 | Shock to Antenna (Functional)        | Must withstand a functional shock compliant with MIL STD 810F-516.5.1.<br>Required for cross country vehicle mounted kinematic surveys conducted by MCE Svy Tp.  |  |
| 18 | RTK Pole Fall over ( 2m topple over) | Withstands topple over from a 2 m survey pole onto hard surfaces   |  |
| 19 | RTK Baseline or 'On the Fly' Range   | Due to the unique remote areas that Svy Tp conducts operations, the signal from the GNSS Base station to the RTK Rover must be in excess of 40 Km. This is a requirement for the ongoing 1 CAD OP CANADA GOOSE airfield obstruction surveys that gather tower and obstruction data at ranges greater than 40 km surrounding the airfields.   |  |
| 20 | Receiver Weight                      | Under 2 kg for the receiver alone, less than 4 kg for the RTK Rover setup including RTK Pole, Batteries, Hand Held Controller and bracket. These are general guidelines as a member of the Svy Tp is expected to work, at a rapid pace, ten (10) hours a day carrying this equipment.  |  |
| 21 | Removable Flash Memory Type          | SD Card with a minimum 1 Gb capacity. Must also be able to read/write to a storage card with more than 4Gb available storage spaceMCE Svy Tp collects data at a rate of one (1) second intervals (1Hz up to 20Hz or twenty (20) times a second) when conducting kinematic or aerial surveying operations. The file size is significantly larger than data collected once every fifteen (15) seconds; a standard industry data collection rate. |  |
| 22 | Recorded Data Types                  | The GNSS receiver must record the data in the following formats: a. Manufacturers Proprietary GNSS Raw Format ; and b. RINEX file format This allows for   |  |

|    |                                  |  |  |
|----|----------------------------------|--|--|
|    |                                  | interchangeability of data with CF Engr units and Allied forces.   |  |
| 23 | Data Recording Rate              | Must have a data recording rate of up to 20 Hz. This is required for Kinematic Surveys as well as aerial surveys; both conducted by Svy Tp as part of their mandate to the CF airfield surveys and aerial surveys  |  |
| 24 | Port Types                       | Must have the following ports for the effective field to office (and vice versa) operation of a survey mission data management. a. One (1) serial LEMO; b. One (1) USB; and c. One (1) Bluetooth® port   |  |
| 25 | Radio Modem Data Link            | Must have a Fully integrated and sealed transmit and receive radio with a bandwidth between 390 - 470 MHz ( Std Freq range for GNSS Radio Modems) and cleared by CF Signals Corp as non interfering with air traffic control when conducting survey operations on CF or civilian airfields. Capable of connecting to an external Pacific Crest Radio modem - This is equipment already in use by MCE Svy Tp and is integral to the success of any RTK survey mission   |  |
| 26 | Cellular Modem Data Link         | Must have a Fully integrated and sealed 3G GSM phone modem. This is a must as this is the most effective means of transmitting GNSS Basestation data to the Rover(s) in an urban or non- line of sight ( with cellular coverage) environment. Every survey mission that has been conducted in these areas has encountered loss of signal reception resulting in loss of time ranging from several minutes upwards of an hour for one(1) GNSS RTK Point. During the aerial survey mission for CFB Farnham, QC and St Bruno Ranges, QC in took upwards of eight (8) hours to capture thirteen (13) points. This would have been accomplished in under two (2) hours, including driving, using the GSM phone modem connected to a cellular network. |  |
| 27 | Receiver Communication Protocols | Must have the following GNSS Receiver communication Protocols: a.) Manufacturer Proprietary formats b.) CMR and CMR+ c.) RTCM 2.1, 2.3, 3.0 & 3.1 d.) NMEA Output standard 0183 version 2.2. The GNSS receiver must support the real time data transmission formats: CMR and CMR+. It must support RTCM 2.1, 2.3, 3.0 & 3.1 and NMEA Output standard 0183 version 2.2. These are essential for communication between the receiver and the GNSS Antenna.  |  |
| 28 | Power-supply Battery charger     | 110-220V AC - (North American / European) Must be able to perform Charge and discharge cycles to refresh old cells . Must have an Intelligent trickle charging mode to ensure that batteries are fully charged and remain that way will connected.   |  |
| 29 | Internal Battery type            | Must be Removable Li-Ion. Be able to be shipped by Air Cargo. Li-Ion due to the rapid charge time, flexibility in charging methods, as well its ability to hold its charge longer.   |  |

|           |   |  |  |
|-----------|---|--|--|
| <b>30</b> | Internal Battery Charging Time  | Must have a charging time Less than 4 hrs for full charge.   |  |
| <b>31</b> | Internal Battery Operating Time<br>RTK GSM survey mode (transmit)             | Must have an operating time in the RTK GSM survey mode (transmit) of a minimum of five (5) hours   |  |
| <b>32</b> | Internal Battery Operating Time<br>RTK Radio Modem survey mode (transmitting) | Must have an operating time in the RTK Radio Modem survey mode (transmitting) of a minimum of eight (8) hours  |  |
| <b>33</b> | Internal Battery Operating Time<br>RTK Rover survey mode (receiving only)     | Must have an operating time in the RTK Rover survey mode (receiving only) of a minimum of ten (10) hours   |  |
| <b>34</b> | Internal Battery Operating Time<br>standalone GNSS static collection          | Must have an operating time in the standalone GNSS static collection mode of a minimum of ten (10) hours   |  |
| <b>35</b> | External Battery type   | Removable Li-Ion preferred - must be able to be shippable by air. If not air shippable, must have a cable (3metre min) that would connect to unit to a 12V battery power supply  |  |
| <b>36</b> | External Battery Operating Time   | The GNSS Receiver batteries must be able to operate in any of the transmitting modes for a minimum of ten (10) hours using both external and internal battery packs. MCE Svy Tp operates with a standard ten (10) hour work day while on a survey mission and it is required that the equipment will function to that level. |  |



**Section 3: Four (4) GNSS Static Base Station Receivers with Choke Ring Antennas. The following items must be included in each of those four (4) units:**

- a. GNSS Geodetic grade receiver with port to connect to external Pacific Crest Radio modem;
- b. One (1) Dorne Margolin/ JPL Design Choke Ring GNSS Antenna;
- c. Four (4) internal batteries w/ cables and charging unit;
- d. One (1) external battery module w/ case, tripod bracket, cables and charging unit;
- e. One (1) Tribrach w/o plummet, 1" or better torsional stiffness and case;
- f. Two (2) cables (min 8 metres with connectors) from GNSS receiver to Pacific Crest Radio modem;
- g. Two (2) cables ( min 2 metres with connectors) from GNSS receiver to external battery module;
- h. Hard, ruggedized cases for items **a.**, **b.**, **c.**, **d.**, and **e.** (items should be combined as much as possible in same case(s) to facilitate ease of transport);
- i. All required cables; and
- j. One (1) SD storage card with a capacity of 1Gb.

| <b>3. Hardware Specifications – must meet the following specifications:</b> |   |   | <b>REFERENCE</b> |
|---|---|---|------------------|
| <b>1</b>  | GNSS Receiver<br>Satellite signals<br>tracking              | <p>The GNSS Base Station receiver must have the following satellite signals as they are an operational requirement due to the unique survey mission locations.</p> <ol style="list-style-type: none"> <li>1) GPS: L1, L2, L5 (C/A, P, C Code);</li> <li>2) GLONASS: L1, L2 (C/A, P narrow Code);</li> <li>3) SBAS: WAAS, EGNOS, GAGAN, MSAS</li> <li>4) The following satellite signals would enhance the strength of the GNSS survey network when conducting operations overseas. The GNSS receiver must be capable of being upgraded in the future to receive the following: Galileo: E1, E5a, E5b.</li> </ol> <p>MCE Svy Tp conducts operations North of 80° Latitude in which solely using GPS signals decreases the overall accuracy of the survey. GLONASS satellite signals offer another constellation that when combined with GPS, provides a better framework for the survey work being conducted. Other operational locations make use of Satellite Based Augmentation Systems (SBAS) to improve regional accuracies.(see Annex D)</p> |                  |
| <b>2</b>  | Choke Ring<br>GNSS Antenna<br>Satellite signals<br>tracking | <p>This antenna must be able to track the following satellite signals:</p> <ol style="list-style-type: none"> <li>a. GPS: L1, L2, L5</li> <li>b. GLONASS: L1, L2</li> <li>c. Galileo : Constellation of satellites</li> </ol> <p>There is a requirement to have two (2) choke-ring antenna; one for each GNSS Base Station Receiver. This specialized setup is required as it is specifically designed to establish and update Special Purpose 3D geodetic monuments (PACs and SACs) located on all CF Airfields and for use on TAGGS missions.</p>   |                  |
| <b>3</b>  | Choke Ring<br>GNSS Antenna<br>Design                        | Must be a Dorne Margolin, JPL design  |                  |

|    |   |   |  |
|----|---|---|--|
| 4  | GNSS Receiver # of channels   | Must have a Minimum 120   |  |
| 5  | Simultaneous Tracked Satellites   | Must be able to track up to 60 satellites simultaneously on minimum of 2 different frequencies.<br><br>The GNSS Base Station receiver must be able to simultaneously track satellites on a minimum of two (2) different frequencies. This is an operational requirement in order to achieve geodetic grade accuracies on surveyed points. |  |
| 6  | Accuracy of GNSS Measurements<br>Rapid Static Mode Horizontal<br>Rapid Static Mode Vertical     | Post Processed accuracies must be Equal to or better than<br>5 mm +/- 0.5 ppm (RMS)<br>10 mm +/- 0.5 ppm (RMS)  |  |
| 7  | Accuracy of GNSS Measurements<br>Lengthy Static Mode Horizontal<br>Lengthy Static Mode Vertical | Post Processed accuracies must be Equal to or better than<br>3 mm +/- 0.5 ppm (RMS)<br>6 mm +/- 0.5 ppm (RMS)   |  |
| 8  | Re-Acquisition Time of Satellites   | Must re-acquire satellite signals in one (1) second or less.  |  |
| 9  | Operating Temperature Range   | -40°C to +65°, this is compliant with High and Low temp testing standards : ISO9022-10-08, ISO9022-11, MIL STD 810F-502.4.2 MIL STD 810F-501.4.2  |  |
| 10 | Humidity  | 100% protection, compliant with ISO9022-13-06, ISO9022-12-04 and MIL STD 810F - 507.4-I   |  |
| 11 | Water and Dust  | Must have a rating of <b>IP67</b> according IEC60529 and MIL STD 810F - 506.4-I, MIL STD 810F - 510.4-I and MIL STD 810F - 512.4-I  |  |
| 12 | Vibration   | must withstand strong vibrations incurred on cross country vehicle movement compliant with ISO9022-36-08 and MIL STD 810F-514.5-Cat.24  |  |
| 13 | Drop onto hard surface  | Must withstand a drop of one (1) metre. A normal industry standard and a practical height of a soldier dropping the equipment by mistake.   |  |
| 14 | Shock to Antenna (Functional)   | Must withstand a functional shock compliant with MIL STD 810F-516.5.1.<br>Required for cross country vehicle mounted kinematic surveys conducted by MCE Svy Tp  |  |
| 15 | Data Display Screen   | Must provide a full status of operating functions, configuration and indicator settings   |  |
| 16 | Water Submersion  | Must operate after a temporary submersion of the GNSS receiver/antenna up to 1 m. A normal industry standard.   |  |
| 17 | Removable   | Must be SD Card.  |  |

|    |                                  |  |  |
|----|----------------------------------|--|--|
|    | Flash Memory Type                | SD Card Minimum 1 Gb capacity. MCE Svy Tp collects data at a rate of one (1) second intervals (1Hz up to 20Hz or twenty (20) times a second) when conducting kinematic or aerial surveying operations. The file size is significantly larger than data collected once every fifteen (15) seconds.            |  |
| 18 | Removable Flash Memory           | Must be SD Card with a minimum 1 Gb capacity. Must also be able to read/write to a storage card with more than 4Gb available storage space   |  |
| 19 | Recorded Data Types              | The GNSS receiver must record the data in the following formats:<br>a. Manufacturers Proprietary GNSS Raw Format ;<br>and<br>b. RINEX file format<br>This allows for interchangeability of data with CF Engr units and Allied forces.  |  |
| 20 | Data Recording Rate              | Must have a data recording rate of up to 20 Hz. This is required for Kinematic Surveys as well as aerial surveys; both conducted by Svy Tp as part of their mandate to the CF airfield surveys and aerial surveys  |  |
| 21 | Simultaneous data links          | Must have 2 real-time output interfaces via independent ports  |  |
| 22 | Port Types                       | Must have the following ports for the effective field to office (and vice versa) operation of a survey mission data management.<br>a. 1 x PPS output;<br>b. 1 x Event input;<br>c. 1 x Bluetooth® port v 2.00 + EDR, class 2 (integrated),<br>d. 1 x USB; and<br>e. Min of (2) x serial RS232 LEMO Interface |  |
| 23 | Radio Modem Data Link            | Must have a fully integrated and sealed transmit and receive radio with a bandwidth between 390 – 470 MHz. Must also be capable of connecting to an external Pacific Crest Radio modem. - This is equipment already in use by MCE Svy Tp and is integral to the success of any RTK survey mission.           |  |
| 24 | LED status indicator light       | Must have the following indicator lights:<br>a. Bluetooth®,<br>b. RTK Status,<br>c. data logging,<br>d. power status   |  |
| 25 | Receiver Communication Protocols | Must have the following GNSS Receiver communication Protocols:<br>a.) Manufacturer Proprietary formats<br>b.) CMR and CMR+<br>c.) RTCM 2.1, 2.3, 3.0 & 3.1<br>d.) NMEA Output standard 0183 version 2.2.   |  |

|    |   |   |  |
|----|---|---|--|
|    |   | The GNSS receiver must support the real time data transmission formats: CMR and CMR+. It must support RTCM 2.1, 2.3, 3.0 & 3.1 and NMEA Output standard 0183 version 2.2. These are essential for communication between the receiver and the GNSS Antenna.  |  |
| 26 | Power-supply Battery charger                                      | 110-220V AC – (North American / European)<br>Must be able to perform Charge and discharge cycles to refresh old cells. Must have an Intelligent trickle charging mode to ensure that batteries are fully charged and remain that way will connected.  |  |
| 27 | Internal Battery type   | Must be Removable Li-Ion.<br>Be able to be shipped by Air Cargo. <u>Li-Ion</u> due to the rapid charge time, flexibility in charging methods, as well its ability to hold its charge longer.  |  |
| 28 | Internal Battery Charging   | Must be able to charge batteries internally   |  |
| 29 | Internal Battery Operating Time standalone GNSS static collection | Must be equal to or greater than ten (10) hours   |  |
| 30 | External Battery type   | Removable Li-Ion preferred – must be able to be shippable by air<br><i>If not air shippable</i> , must have a of a cable (3metre min) that would connect to unit to a 12V battery power supply  |  |
| 31 | External Battery Operating Time                                   | The GNSS Receiver batteries must be able to operate in any of the transmitting modes for a minimum of ten (10) hours using both external and internal battery packs.<br>MCE Svy Tp operates with a standard ten (10) hour work day while on a survey mission and it is required that the equipment will function to that level. |  |

**Section 4: Ten (10) ETS / GNSS handheld controller and data logging Consoles. The following items must be included in each of those ten (10) units:**

- A. Two (2) internal batteries w/ cables and charging unit;
- B. Docking station with both charging and computer interface cables (if available, just cables if not);
- C. Hand Strap;
- D. 12v DC vehicle charger;
- E. Two (2) Stylus;
- F. One (1) package of anti-glare film/foils for screen.
- G. One (1) SD storage card with a capacity of 1Gb

| 4. Hardware Specifications – must meet the following specifications: |                                |   | REFERENCE |
|--|--------------------------------|---|-----------|
| 1  | Compatibility                  | The controller <b>MUST</b> be from the same manufacturer as the ETS and GNSS in order to function properly and conduct efficient survey missions.   |           |
| 2  | Operating System               | Windows Pocket PC or Windows CE 6.0 or higher.<br><br>The handheld controller must have a Windows based operating system, such as Windows CE or Windows Mobile (latest versions). MCE Svy Tp's field and office software operates on a Windows platform; both Windows CE and Mobile have been proven to seamlessly function on existing and previous handheld controllers. These operating systems are fully compliant with existing MCE Svy Tp office software used on all surveys.  |           |
| 3  | Onboard Software (Third Party) | The handheld controller must have the following onboard third party software: <ul style="list-style-type: none"> <li>a. Internet Explorer Mobile;</li> <li>b. File Explorer;</li> <li>c. Word Mobile;</li> <li>d. Microsoft Windows Media™ Player;</li> <li>e. Generic Camera Software;</li> </ul>  |           |
| 4  | Onboard Software               | Onboard Software(s) – The manufacturer's handheld controller must have software that performs the following functions: <ul style="list-style-type: none"> <li>a.) <u>General Usage Functions</u> – <ul style="list-style-type: none"> <li>i. Must support both GNSS and ETS control functions</li> <li>ii. must have a Field to Office Data Transfer</li> <li>iii. must allow Data Import ASCII, DXF Project Files</li> <li>iv. must allow Data Export : RAW, DXF, ASCII (Customized)</li> <li>v. must perform Full management of the projects coordinate system</li> <li>vi. must permits a DXF file as a background image.</li> <li>vii. must have a Map View functionality</li> <li>viii. must have a user defined screen setup for functionality</li> </ul> </li> <li>b.) <u>Survey Package Functions-</u></li> </ul> |           |

- i. must have a Thematic point, line and area coding with a predefined pick list or manually entered data
- ii. must have Feature Logging – manual and auto, both with the quality of control results, logging by time, distance and “stop and go” surveying.
- iii. ETS must be able to measure offset points
- iv. must perform Hidden point measurement ( with the use of an external EDM)
- v. must Measure, compute and adjust traverses including survey observations
- vi. must Measure multiple rounds of angles and distances
- vii. must Measure hidden point – inaccessible point
- c.) Stakeout function
  - i. must perform Staking of points and DTMs
  - ii. must Navigate to a point using various methods such as North, known point, to and from total station
  - iii. must have a Quality control function – checking of coordinate differences before storing
  - iv. must perform Automatic selection of next closest point to stake
  - v. must perform Graphical selection of a point from the background map display
  - vi. must perform editing heights and offset heights of points
  - vii. must have an audible beeping when approaching a point
- d.) Coordinate Geometry (COGO) Function:
  - i. Must have the following computation methods: Inverse, Traverse (distance and bearing), Intersections, Line and Arc Calculations, Line and Arc Segmentations, Shift, Rotate and Scale blocks of points, Area Division
  - ii. must have a graphical selection of points from map view
  - iii. must be able to plot view of computed COGO calculation
  - iv. must have a comprehensive reporting / cut sheets
- e.) Coordinate Systems Function:
  - i. must use a rigorous computation of one, two and Classic 3D coordinate transformation systems
  - ii. must be able to perform Grid Coordinate calculations for fast field calibrations
  - iii. must be able to perform Residual computation, viewing and flagging
- f.) ETS Setup Functions:
  - i. must perform the following setup methods – Set Orientation, Known Backsight, Multiple Backsights, Height Transfer, Resection

|   |                     |  |  |
|---|---------------------|--|--|
|   |                     | <ul style="list-style-type: none"> <li>ii. must be able to recalculate and adjust ETS setups with a subsequently measured target points at later date</li> <li>iii. must be able to plot Setup results onscreen</li> </ul> <p>g.) <u>Reference Line Functions:</u></p> <ul style="list-style-type: none"> <li>i. must be able to perform Staking of linear and area objects: Lines, arcs, areas and simple alignments</li> <li>ii. must be able to perform Staking of slopes relative to lines and arcs</li> <li>iii. must be able to display quality control results of coordinate differences before storing</li> </ul> <p>h.) <u>Volume Calculations Functions:</u></p> <ul style="list-style-type: none"> <li>i. must be able to Measure and compute surfaces and calculate volumes</li> <li>ii. must be able to Utilize various methods to compute boundaries</li> <li>iii. must be able to Export to DXF the measured surfaces</li> </ul> <p>j.) <u>Reporting Function:</u></p> <ul style="list-style-type: none"> <li>i. must have a Customizable reporting package based on function performed.</li> </ul> |  |
| 5 | Display Screen      | <p>Must have the following:</p> <ul style="list-style-type: none"> <li>a. Colour;</li> <li>b. touch screen (on screen functions operable by touch);</li> <li>c. sunlight readable</li> <li>d. LED backlit.</li> <li>e. TFT type of Screen (Resolution must be a minimum of 640 by 480 pixels.)</li> </ul> <p>The controller must have a colour, touch screen that is readable in the sunlight as well as having an LED backlight for dawn/dusk conditions. All of these features are in use with MCE Svy Tp existing equipment.</p>  |  |
| 6 | Onboard Camera      | <p>The controller must have an onboard camera. A camera with a minimum of 2 MP would be a minimum resolution to accurately accomplish this mandated requirement.</p> <p>Having an onboard camera removes the requirement for the operator to carry a camera in addition to the survey equipment. The operator is required to document with photos each monument and type of feature in the execution of the survey mission.</p>  |  |
| 7 | Controller Keyboard | <p>Must be a <b>QWERTY Keyboard only</b>.</p> <p>The controller must have a QWERTY keyboard. All MCE Svy Tp personnel are fully trained and very proficient on QWERTY keyboards on existing survey equipment. Switching to an Alpha/Numeric keyboard is counter-intuitive, would lead to additional human errors and a drastic increase in time on position. On average,</p>   |  |

|           |                                |   |  |
|-----------|--------------------------------|---|--|
|           |                                | an airfield survey collects between 3000-5000 pts that require keyboard input.  |  |
| <b>8</b>  | Processor and RAM              | <p>Must have a min of 500 MHz onboard processor</p> <p>This requirement is based on failures (crashes) that have occurred on numerous missions with current and previous survey handheld equipment operating with inferior processor speed. There was not enough processor speed to perform the required, multiple, simultaneous software functions in a timely fashion. This resulted in a numerous system failures that prevented some survey missions from meeting critical timings. Increasing RAM alone will not solve this issue.</p>                     |  |
| <b>9</b>  | Onboard RAM                    | <p>Must have a min of 512 Mb of DDR SDRAM</p> <p>The requirement for 512 Mb of DDR SDRAM is based on failures (crashes) that have occurred on numerous missions with current and previous equipment containing 256 Mb of onboard RAM. There was not enough onboard RAM to perform the required software functions resulting in a system failure that prevented some survey missions from meeting critical timings.</p>  |  |
| <b>10</b> | Status LEDs                    | Must indicate Battery and Bluetooth status  |  |
| <b>11</b> | Temperature Range -operating   | Must be within -30°C to +60°  |  |
| <b>12</b> | Dust / Water Protection rating | Must have a rating of <b>IP67</b> (Ingress Protection Rating).  |  |
| <b>13</b> | Humidity                       | Must be able to withstand 100% non-condensing ( IAW MIL-STD-810F, Method 507.4-1)   |  |
| <b>14</b> | Drop – functional              | <p>Must withstand a drop of one (1) metre [ MIL-STD-810F, Method 514.5 – Cat24 ].</p> <p>A normal industry standard and a practical height of a soldier dropping the equipment by mistake.</p>  |  |
| <b>15</b> | Internal Flash Memory          | <p>Must have a min of 1 Gb internal storage memory</p> <p>The controller must have a minimum internal storage memory of one (1) Gb. This is required as a backup storage for both ETS and GNSS project files, field collected data, and settings. If the external SD memory card is full or becomes corrupt, it is mission critical that a backup system is in place to ensure the completion of the survey task. This function facilitates the transfer of a field data project onto an external storage card for transfer to another handheld controller.</p> |  |
| <b>16</b> | Removable Flash Memory         | min 1 Gb – must be able to read/write to a storage card with more than 4Gb available storage space  |  |
| <b>17</b> | External Memory                | The controller must have the ability to store data externally to an SD card through an internally mounted SD Card Slot/Reader. The SD external memory card is an industry standard, is more readily available for local purchase in remote areas and is cost effective  |  |



|    |                               |  |  |
|----|-------------------------------|--|--|
|    |                               | over the previous Compact Flash (CF) memory cards. All MCE Svy Tp laptops have an internal SD card reader which is used as part of the standard operating procedures and mission workflows.  |  |
| 18 | Wireless connectivity         | <p>Must have wireless LAN 801.12 b/n.</p> <p>The handheld controller must have a wireless LAN 801.12 b/n to send and receive files remotely. Having the ability to upload/download survey data and project files through a Wi-Fi hotspot, such as a GSM phone, allows the Survey Commander to send/receive project updates to/from the roving survey units without requiring them to return to a base location. It is not uncommon for roving units to be upwards of 40-50 km away from the base station. This function would negate needless return trips to the base setup location.</p> |  |
| 19 | Serial Connector              | Must have LEMO serial interface  |  |
| 20 | Bluetooth® (integrated)       | Must have onboard integrated Bluetooth® 2.0 or higher  |  |
| 21 | Removable Storage Interface   | <p>Must have the following storage interfaces</p> <ol style="list-style-type: none"> <li>USB,</li> <li>SD Card, and</li> <li>CF Card</li> </ol>  |  |
| 22 | Power-supply battery charger: | <p>Must be in the range of 100-240v AC</p> <p>Must be able to perform Charge and discharge cycles to refresh old cells. Must have an Intelligent trickle charging mode to ensure that batteries are fully charged and remain that way will connected.</p>  |  |
| 23 | Vehicle DC power              | Must be able to be charged or operated by 12V DC   |  |
| 24 | Battery type                  | <p>Must be Removable Li-Ion.</p> <p>Be able to be shipped by Air Cargo. <u>Li-Ion Preferred</u> due to the rapid charge time, flexibility in charging methods, as well its ability to hold its charge longer</p>   |  |
| 25 | Battery Charging Time         | <p>must be able to fully charge Under four (4) hours</p> <p>This requirement based on several iterations of previous handheld controllers and this charge timing is adapted into MCE Svy Tp field equipment procedures.</p>  |  |
| 26 | Battery Operating Time        | The handheld controller battery must be able to operate for a minimum of ten (10) hours under normal conditions . MCE Svy Tp operates with a standard ten (10) hour work day while on a survey mission and it is imperative that the equipment will function to that level.  |  |

**Section 5: Four (4) licenses of ETS / GNSS field / office data processing software.**

5.1 The proposal must support the following tasks for each licensed copy:

| <b>5. Software Specifications – must meet the following specifications:</b> |                                      |  | <b>REFERENCE</b> |
|---|--------------------------------------|--|------------------|
| <b>1</b>  | <b>Project Management of Data</b>    | This is an all encompassing software module that must have a management function for:<br>1) all ETS, GNSS and digital levelling project data;<br>2) coordinate systems;<br>3) equipment specifications required by software<br>4) report templates; and feature codelists  |                  |
| <b>2</b>  | <b>ETS / GNSS Raw Data Import</b>    | through cable or wireless interface with the controller and PC Computer/laptop; the software must be able to:<br><br>i. Import raw field data from the ETS;<br>ii. Import raw field data from GNSS receivers;<br>iii. Import raw field data from digital levels;<br>Import raw field data from GNSS reference stations via the Internet; |                  |
| <b>3</b>  | <b>ASCII Files Import and Export</b> | through cable or wireless interface with the controller and PC Computer/laptop; must be able to:<br><br>i. Import & Export coordinate lists as user-defined ASCII files;<br><br>Import & Export feature codelists as user-defined ASCII files;   |                  |
| <b>4</b>  | <b>Export to CAD or GIS Software</b> | through cable or wireless interface with the controller and PC Computer/laptop; must be able to:<br><br>i. Export data to a GIS ( shapefiles);<br>ii. Export data to CAD software (DWG & DXF);   |                  |
| <b>5</b>  | <b>Codelists</b>                     | Must be able to generate feature codelists with groups, codes and attributes through a codelist management software function   |                  |
| <b>6</b>  | <b>Functional Tools</b>              | through cable or wireless interface with the controller and PC Computer/laptop; must have software components/modules that perform data exchange functions, data formatting and uploading of data into the software  |                  |
| <b>7</b>  | <b>GNSS Data Processing</b>          | must have the following software functions:<br><br>a. A graphical interface for baseline selection and processing commands;  |                  |

|    |   |   |  |
|----|---|---|--|
|    |   | <ul style="list-style-type: none"> <li>b. An automatic or manual selection of baselines;</li> <li>c. A definition of the processing sequence;</li> <li>d. Single or multi-baseline batch processing;</li> <li>e. Processing parameters. Automatic screening, cycle-slip fixing and outlier detection;</li> <li>f. A graphical display of the processing results with the ability to inspect and analyze results;</li> <li>g. Graphically plot residuals;</li> <li>h. Generate HTML reports</li> <li>i. RINEX Import: Import of data in RINEX format.</li> <li>j. Must be able to process all of the following simultaneously or separately: <ul style="list-style-type: none"> <li>i. L1 data processing: process GPS L1 single frequency data;</li> <li>ii. L1 / L2 data processing: process GPS dual frequency data;</li> <li>iii. GLONASS data processing: process GLONASS data; and</li> </ul> </li> </ul> <p>RINEX format : process RINEX GNSS Data.</p> |  |
| 8  | <b>ETS Data Processing</b>              | <p>The software must be able to perform the following:</p> <ul style="list-style-type: none"> <li>a. Re-calculate ETS setups to update station coordinates and orientations;</li> <li>b. Define ETS setups and traverses and process with user preferred parameters; and</li> <li>c. Define and re-calculate Sets of Angles.</li> </ul> <p>Displays all results in report format.</p>   |  |
| 9  | <b>Level Data Processing</b>            | <p>The software must be able to perform the following:</p> <ul style="list-style-type: none"> <li>a. Display collected with digital levels in the electronic level booking sheet / file;</li> <li>b. Ability to select parameters and processing of the level lines.</li> <li>c. Store the results for further use in Network Adjustments or for export; and</li> <li>d. Rigorous algorithms for 1D adjustment of level networks.</li> </ul> <p>Generation of HTML reports;</p>   |  |
| 10 | <b>Mission Critical Data Processing</b> | <p>The software must be able to perform the following:</p>  |  |

|  |   |
|--|---|
|  | <p>a. Geodesy:</p> <p>(1) must be able to support numerous transformations, ellipsoids and projections, as well as user defined geoid models and coordinate systems, which are based on a grid of correction values; and</p> <p>(2) must be able to determination of transformation parameters with different transformation types.</p> <p>b. COGO:</p> <p>(1) must perform computation of coordinates of points using inverse, traverse, intersection, line and arc calculations and area divisions; and</p> <p>(2) must be able to select points graphically and create HTML-based reports.</p> <p>c. Adjustment of measurements:</p> <p>(1) must be able to obtain the best possible set of consistent coordinates using a combination of all measurements in a least-squares network adjustment and to check that the measurements fit with the known coordinates; and</p> <p>(2) must be able to detect blunders and outliers through extensive statistical testing.</p> <p>d. Surface Creation and Calculations</p> <p>(1) Must be able to assign measured points of surfaces and calculate Digital Terrain Models;</p> <p>(2) Must be able to create an automatic or manually defined boundary;</p> <p>(3) Must be able to introduce breaklines to automatically update the model;</p> <p>(4) Must display graphically the surface in a 2D or 3D view;.</p> <p>Must be able to calculate of volumes above reference heights or between surfaces.</p> |
|--|---|

- 5.2 The proposal must include the following software components for **each** licensed copy ( 4 total):
- 5.3 The supplier must provide at least one (1) license for every required software module.
- 5.4 The supplier must provide the software modules on CD or DVD.
- 5.5 The supplier must provide both hard and soft copy (PDF or MS Word on a CD or DVD) of software module user manuals.

## 6. Training

The training must take place at Mapping and Charting Establishment, 615 Booth Street, Ottawa, Ontario or a site to be determined by MCE Svy Tp within the NCR from Monday to Friday between 0700 and 1500 hrs Eastern Time and have a minimum length of ten (10) days.

Training must be provided within two (2) months of receipt of all equipment.

### 6.1 **Training for Two (2) Robotic Total Station (Electro-Optical Theodolite) with optional mountable GNSS receiver over trunnion axis.**

- 6.1.1 Presentation on the overall features and functions of the equipment;
- 6.1.2 All Operational functions of the Robotic ETS with and without the GNSS receiver;
- 6.1.3 Field to Office procedures relating to ETS data collection and upload to ETS/GNSS Office software;
- 6.1.4 ETS mounted GNSS receiver data collection and upload to ETS/GNSS Office software;
- 6.1.5 ETS Network Design;
- 6.1.6 Tutorial on the Field requirements for the import of project data;
- 6.1.7 Tutorial on the Field requirements for the export of project data;
- 6.1.8 Tutorial on the Field requirements for post-processing of ETS field collected data
- 6.1.9 Tutorial on the Field requirements for the least square adjustment feature of field collected data.

### 6.2 **Training for Ten (10) GNSS Receiver and Antenna Combination Unit with RTK radio and GSM enabled capability.**

- 6.2.1 Presentation on the overall features and functions of the equipment;
- 6.2.2 All Operational functions of the GNSS receiver / antenna;
- 6.2.3 Field to Office procedures GNSS static data collection and upload to GNSS Office software;
- 6.2.4 Field to Office procedures Kinematic data collection and upload to GNSS Office software;
- 6.2.5 Field to Office procedures RTK data collection and upload to GNSS Office software;
- 6.2.6 GNSS Network Design;
- 6.2.7 Supervised field & office exercise project to reflecting Paras 6.2.1 to 6.2.6

### 6.3 **Two (2) GNSS Static Base Station Receivers with Choke Ring Antennas.**

- 6.3.1 Presentation on the overall features and functions of the equipment;
- 6.3.2 All Operational functions of the GNSS receiver and choke ring antenna;
- 6.3.3 Field to Office procedures GNSS static data collection and upload to GNSS Office software;
- 6.3.4 GNSS Network Design;

### 6.4 **Ten (10) ETS / GNSS handheld controller and data logging consoles.**

- 6.4.1 Presentation on the overall features and functions of the equipment;
- 6.4.2 All handheld controller operational functions of the Robotic ETS and GNSS receiver;
- 6.4.3 Field to Office procedures ETS data collection and upload to ETS/GNSS Office software;
- 6.4.4 GNSS data collection and upload to ETS/GNSS Office software;
- 6.4.5 Tutorial on the Field requirements for the import and the export of project data;
- 6.4.6 Tutorial on the Field requirements for post-processing of ETS field collected data;
- 6.4.7 Tutorial on the Field requirements for the least square adjustment feature of field collected data.

**6.5 Four (4) copies of ETS / GNSS field / office data processing software.**

- 6.5.1 Tutorial on topics and subcomponents for equipment/software in Section 4.
- 6.5.2 Tutorial on the import of project data for equipment/software in Section 4.
- 6.5.3 Tutorial on the export of project data to equipment/software in Section 4.
- 6.5.4 Tutorial on post-processing of ETS field collected data
- 6.5.5 Tutorial on post-processing of GNSS field collected data (static, RTK and Kinematic)
- 6.5.6 Tutorial on the least square adjustment feature of field collected data.

**ANNEX B****Pricing Basis optional requirement****1. Pricing Basis optional Extended Warranty periods**

The Contractor grants to Canada the irrevocable option to purchase four (4) one (1) year periods of extended warranty, under the same terms and conditions of part 09 of the 2010A General Conditions - Goods (Medium Complexity) and the prices stated in Annex B of the Contract. Exercise of this option shall be by written notice from Canada. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise this option at any time after award of a contract and before the expiry date of the original 1 year warranty period

**Bidder's must fill in the prices for the following items, Goods and Services Tax or Harmonize Sales Tax extra, if applicable.**

|                        | <b>Description</b>         | <b>Period</b>                            | <b>Price per year</b> |
|------------------------|----------------------------|--|-----------------------|
| <b>Optional year 1</b> | Optional Extended Warranty | <i>to be filled in at contract award</i> |                       |
| <b>Optional year 2</b> | Optional Extended Warranty | <i>to be filled in at contract award</i> |                       |
| <b>Optional year 3</b> | Optional Extended Warranty | <i>to be filled in at contract award</i> |                       |
| <b>Optional year 4</b> | Optional Extended Warranty | <i>to be filled in at contract award</i> |                       |