

**RETURN BIDS TO:**  
**RETOURNER LES SOUMISSIONS À:**  
Réception des soumissions - TPSGC / Bid  
Receiving - PWGSC  
1550, Avenue d'Estimauville  
1550, D'Estimauville Avenue  
Québec  
Québec  
G1J 0C7

**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> Study Metamaterial		
<b>Solicitation No. - N° de l'invitation</b> W7701-145749/C	<b>Date</b> 2014-03-11	
<b>Client Reference No. - N° de référence du client</b> W7701-14-5749		
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$QCN-015-15864		
<b>File No. - N° de dossier</b> QCN-3-36177 (015)	<b>CCC No./N° CCC - FMS No./N° VME</b>	
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2014-03-27</b>		<b>Time Zone</b> <b>Fuseau horaire</b> Heure Avancée de l'Est HAE
<b>F.O.B. - F.A.B.</b> <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> Legendre, Sylvie		<b>Buyer Id - Id de l'acheteur</b> qcn015
<b>Telephone No. - N° de téléphone</b> (418) 649-2860 ( )		<b>FAX No. - N° de FAX</b> (418) 648-2209
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> R & D POUR LA DÉFENSE CANADA - VALCARTIER BATIMENT 53 2459 BOUL. PIE XI NORD QUÉBEC Québec G3J1X5 Canada		

**Instructions: See Herein**

**Instructions: Voir aux présentes**

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

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

**Issuing Office - Bureau de distribution**  
TPSGC/PWGSC  
601-1550, Avenue d'Estimauville  
Québec  
Québec  
G1J 0C7

**This bid solicitation cancels and supersedes previous bid solicitation number W7701-145749/b dated December 30, 2013 with a closing of January 15, 2014 at 2:00 pm.**

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Solicitation No. - N° de l'invitation

W7701-145749/C

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

qcn015

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

W7701-14-5749

File No. - N° du dossier

QCN-3-36177

CCC No./N° CCC - FMS No/ N° VME

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**List of Attachments:**

Attachment 1 Financial Bid Presentation Sheet

Attachment 2 Point Rated Technical Criteria

**List of Annexes:**

Annex A Statement of Work

Annex B Basis of Payment

Annex C DND 626, Task Authorization Form

Annex D Contractor Disclosure of Foreground Information

## PART 1 - GENERAL INFORMATION

### 1. Introduction

The bid solicitation is divided into six parts plus attachments and annexes, as follows:

- Part 1 General Information: provides a general description of the requirement;
- Part 2 Bidder Instructions: provides the instructions, clauses and conditions applicable to the bid solicitation;
- Part 3 Bid Preparation Instructions: provides bidders with instructions on how to prepare their bid;
- Part 4 Evaluation Procedures and Basis of Selection: indicates how the evaluation will be conducted, the evaluation criteria that must be addressed in the bid, and the basis of selection;
- Part 5 Certifications: includes the certifications to be provided;
- Part 6 Resulting Contract Clauses: includes the clauses and conditions that will apply to any resulting contract.

The Annexes include the Statement of Work, the Basis of Payment, Task Authorization Form and Contractor Disclosure of Foreground Information.

### 2. Summary

**(a) Title:** Study of metamaterial optical properties for defence applications

**(b) Objective:**

To provide scientific and technical support for studying metamaterial electromagnetic and optical properties in the optical-to-infrared spectrum for potential military capabilities in the future. These capabilities may include new and enhanced electro-optical sensors optics for surveillance and signature management for enhanced maneuverability.

**(c) Tasks:**

This task authorisation contract include the following tasks:

- Task 1: Low-index anisotropic metamaterials for beam focusing in EO detectors
- Task 2: Study, design, simulation, fabrication, characterization of metamaterials

For each of the above task many sub-tasks are associated.

**(d) Work location:**

The Contractor must conduct the work at his own premises.

**(e) Client department :**

The services will be rendered to Defence Research and Development Canada (DRDC-Valcartier).

**(f) Period of the contract :**

The period of the contract is from the date of the contract to March 31, 2018 inclusive.

**(g) Estimated funding available**

The maximum funding available for the contract resulting from the bid solicitation is \$60,000.00 CAD for the firm portion of the work (Task 1 of the statement of Work at Annex A) and is \$790,000.00 CAD for the portion of the work to be performed on an as and when requested basis using a task authorization (task 2 of the Statement of Work at Annex A) (applicable taxes extra). Bids valued in excess of this amount will be considered non-responsive. This disclosure does not commit Canada to pay the maximum funding available.

**(h) Intellectual property rights**

Any intellectual property rights arising from the performance of the Work under the resulting contract will belong to the Contractor.

**(i) Other information :**

- The requirement is subject to the provisions of the Agreement on Internal Trade (AIT).
- The requirement is limited to Canadian services.

**3. Debriefings**

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days of receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

**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* (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) 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 (2014-03-01) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of 2003, Standard Instructions - Goods or Services - Competitive Requirements, is amended as follows:

Delete: sixty (60) days

Insert: one hundred and twenty (120) days

## 1.1 SACC Manual Clauses

**A7035T** (2007-05-25), List of Proposed Subcontractors

## 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.

Due to the nature of the bid solicitation, bids transmitted by facsimile or email to PWGSC will not be accepted.

## 3. Former Public Servant

Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, offerors must provide the information required below before the issuance of a standing offer.

### Definitions

For the purposes of this clause,

"former public servant" is any former member of a department as defined in the Financial Administration Act R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

a. an individual;

b. an individual who has incorporated;

c. a partnership made of former public servants; or

d. a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the Public Service Superannuation Act (PSSA), R.S., 1985, c. P-36, and any increases paid pursuant to the Supplementary Retirement Benefits Act, R.S., 1985, c. S-24 as it affects the PSSA. It does not include pensions payable pursuant to the Canadian Forces Superannuation Act, R.S., 1985, c. C-17, the Defence Services Pension Continuation Act, 1970, c. D-3, the Royal Canadian Mounted Police Pension Continuation Act, 1970, c. R-10, and the Royal Canadian Mounted Police Superannuation Act, R.S., 1985, c. R-11, the Members of Parliament Retiring Allowances Act, R.S. 1985, c. M-5, and that portion of pension payable to the Canada Pension Plan Act, R.S., 1985, c. C-8.

### Former Public Servant in Receipt of a Pension

As per the above definitions, is the Offeror a FPS in receipt of a pension?

**YES ( ) NO ( )**

If so, the Offeror must provide the following information, for all FPS in receipt of a pension, as applicable:

a.name of former public servant;

b.date of termination of employment or retirement from the Public Service.

By providing this information, Offerors agree that the successful Offeror's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with Contracting Policy Notice: 2012-2 and the Guidelines on the Proactive Disclosure of Contracts.

**Work Force Adjustment Directive**

Is the Offeror a FPS who received a lump sum payment pursuant to the terms of the Work Force Adjustment Directive?

**YES ( ) NO ( )**

If so, the Offeror must provide the following information:

a.name of former public servant;

b.conditions of the lump sum payment incentive;

c.date of termination of employment;

d.amount of lump sum payment;

e.rate of pay on which lump sum payment is based;

f.period of lump sum payment including start date, end date and number of weeks;

g.number and amount (professional fees) of other contracts subject to the restrictions of a work force adjustment program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including Applicable Taxes.

**4. Enquiries - Bid Solicitation**

All enquiries must be submitted in writing to the Contracting Authority no later than five (5) 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.

## 5. Applicable Laws

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

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.

## 6. Maximum Funding

The maximum funding available for the contract resulting from the bid solicitation is \$60,000.00 CAD for the firm portion of the work (Task 1 of the statement of Work at Annex A) and is \$790,000.00 CAD for the portion of the work to be performed on an as and when requested basis using a task authorization (task 2 of the Statement of Work at Annex A) (applicable taxes extra). Bids valued in excess of this amount will be considered non-responsive. This disclosure does not commit Canada to pay the maximum funding available.

# 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 (4 hard copies and 4 soft copies on CD or DVD)

Section II: Financial Bid (1 hard copy)

Section III: Certifications (1 hard copy)

If there is a discrepancy between the wording of the soft copy and the hard copy, the wording of the hard copy will have priority over the wording of the soft 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.

In 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)

(<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, bidders should:



- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour 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 demonstrate their understanding of the requirements contained in the bid solicitation and explain how they will meet these requirements. Bidders should demonstrate their capability and describe their approach in a thorough, concise and clear manner for carrying out the work.

The technical bid should address clearly and in sufficient depth the points that are subject to the evaluation criteria against which the bid will be evaluated. Simply repeating the statement contained in the bid solicitation is not sufficient. In order to facilitate the evaluation of the bid, Canada requests that bidders address and present topics in the order of the evaluation criteria under the same headings. To avoid duplication, bidders may refer to different sections of their bids by identifying the specific paragraph and page number where the subject topic has already been addressed.

### **Section II: Financial Bid**

**1.1** Bidders must submit their financial bid in accordance with the following :

**1.1** For the firm portion of the Work (Task 1 of the Statement of Work in Annex A) :

- (a) A Total Cost to a Limitation of Expenditure, which must not exceed the maximum funding specified in Part 2 at section 6. The total amount of applicable taxes is to be shown separately, if applicable. The information should be provided in accordance with the Financial Bid Presentation Sheet at Attachment 1.
- (b) Prices must be in Canadian funds, Canadian customs duties and excise taxes included, and applicable taxes excluded.

**1.2** For the portion of the Work to be performed on an "as and when requested basis" using a Task Authorization (Task 2 of the Statement of Work in Annex A) :

- (a) A firm all-inclusive hourly rate for each category of resources listed in section B of attachment 1 - Financial Bid Presentation Sheet, for each year of the contract period. The information should be provided in accordance with the Financial Bid Presentation Sheet at Attachment 1.
- (b) Prices must be in Canadian funds, Canadian customs duties and excise taxes included, and applicable taxes excluded.

### **Section III: Certifications**

Bidders must submit the certifications required under Part 5.

## 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

#### 1.1.1 Point Rated Technical Criteria

Refer to **Attachment 2, Point Rated Technical Criteria.**

### 1.2 Financial Evaluation

#### 1.2.1 Mandatory financial Criteria for the firm portion of the Work (Task 1 of the Statement of Work in Annex A) :

The Bidder must submit a Basis of Payment to a Limitation of Expenditure that does not exceed the maximum funding specified in Part 2 at Section 6 for task 1 of the Statement of work (Annex A), FOB Destination (for goods), all applicable customs duty and excise taxes included, but applicable taxes extra.

#### 1.2.2 Mandatory financial Criteria for the portion of the Work to be performed on an "as and when requested basis" using a Task Authorization (Task 2 of the Statement of Work in Annex A) :

The Bidder must submit a firm all-inclusive hourly rate for each category of resources listed in section B of attachment 1 - Financial Bid Presentation Sheet, for each year of the contract period. FOB Destination (for goods), all applicable customs duty and excise taxes included, but applicable.

#### 1.2.3 Evaluation of Price

Total of Limitation of expenditure Price for task 1  
+  
Labour cost associated to Tasks Authorization  
=  
TOTAL PRICE

To establish the cost of labour for Tasks Authorization, it is necessary to determine the efforts available in hours.

Below is an example of the calculation of the number of available hours rising from the available funds multiplied by the percentage of use divided by the lowest rate.

<b>Task 2 (Task Authorizations)</b>	<b>790,000.00 \$</b>		<b>Rate A</b>	<b>Price for A</b>	<b>Rate B</b>	<b>Price for B</b>	
	Estimate of the percentage of use						Estimated Qty. In days
Engineer/scientist (investigator/supervisor)	30%	237 000.00 \$	120.00 \$	237 000.00 \$	130.00 \$	256 750.00 \$	1975
Technician/support staff	30%	237 000.00 \$	100.00 \$	263 333.33 \$	90.00 \$	237 000.00 \$	2633.33
Engineer/scientist (research assistant)	40%	316 000.00 \$	110.00 \$	347 600.00 \$	100.00 \$	316 000.00 \$	3160
				<b>847 933.33 \$</b>		<b>809 750.00 \$</b>	

**Bidders PRICE TASK 1 (Firm)**

A 60 000.00\$

B 60 000.00\$

**CALCULATION OF TOTAL PRICE PER POINT**

Bidders	Price Task 1	Price task 2	TOTAL POINTS	TOTAL PRICE	Computation	Overall Points.	
A	60 000.00 \$	847 933.33 \$	185	907 933.33 \$	907 933.33 /185	4907.75	
B	60 000.00 \$	809 750.00 \$	200	869 750.00 \$	869750 /200	4348.75	Winner

The price for the portion of the Work to be performed using a Task Authorization will be evaluated on the basis of the following approximate percentages of use:

- Engineer/scientist (investigator/supervisor) : 30%
- Technician/support staff : 30%
- Engineer/scientist (research assistant) : 40%

The percentages of use listed in the table are provided solely for the purpose of determining the estimated price for each bid. They represent approximate needs, provided in good faith, and should not be considered as a contractual guarantee.

These rates are provided as an example only and must not be interpreted as an indicator of the experience of the labour categories.

## **2. Basis of Selection**

### **2.1 Basis of Selection - Lowest Evaluated Price Per Point**

1. To be declared responsive, a bid must:

- (a) comply with all the requirements of the bid solicitation;
- (b) obtain the required minimum points for each criterion and for each group of criteria with a pass mark; and
- (c) obtain the required minimum points overall for the technical evaluation criteria which are subject to point rating.

Bids not meeting (a) or (b) or (c) will be declared non-responsive. Neither the responsive bid that receives the highest number of points nor the one that proposed the lowest price will necessarily be accepted. The responsive bid with the lowest evaluated price per point will be recommended for award of a contract. The evaluated price per point will be determined by dividing the evaluated price of the bid by the number of points obtained for the point rated technical evaluation criteria.

In the event that two or more responsive bids have the same lowest evaluated price per point, the responsive bid which obtained the highest number of points overall for the point rated technical evaluation criteria will be recommended for award of a contract.

## PART 5 - CERTIFICATIONS

Bidders must provide the required certifications and documentation to be awarded a contract.

The certifications provided by bidders to Canada are subject to verification by Canada at all times. Canada will declare a bid non-responsive, or will declare a contractor in default, if any certification made by the Bidder is found to be untrue whether during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply with this request will also render the bid non-responsive or will constitute a default under the Contract.

### 1. Mandatory Certifications Required Precedent to Contract Award

#### 1.1 Code of Conduct and Certifications - Related documentation

By submitting a bid, the Bidder certifies that the Bidder and its affiliates are in compliance with the provisions as stated in Section 01 Code of Conduct and Certifications - Bid of Standard Instructions 2003. The related documentation therein required will assist Canada in confirming that the certifications are true.

#### 1.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list ([http://www.labour.gc.ca/eng/standards\\_equity/eq/emp/fcp/list/inelig.shtml](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)) available from [Human Resources and Skills Development Canada \(HRSDC\) - Labour's website](#)

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list at the time of contract award.

### 2. Additional Certifications Precedent to Contract Award

The certifications listed below should be completed and submitted with the bid but may be submitted afterwards. If any of these required certifications is not completed and submitted as requested, the Contracting Authority will so inform the Bidder and provide the Bidder with a time frame within which to meet the requirement. Failure to comply with the request of the Contracting Authority and meet the requirement within that time period will render the bid non-responsive.

#### 2.1 Canadian Content Certification

This procurement is limited to Canadian goods and Canadian services.

The Bidder certifies that:

- ( ) a minimum of 80 percent of the total bid price consist of Canadian goods and Canadian services as defined in paragraph 2 of clause A3050T.

For more information on how to determine the Canadian content for a mix of goods, a mix of services or a mix of goods and services, consult Annex 3.6.(9), Example 2, of the Supply Manual. (<https://buyandsell.gc.ca/policy-and-guidelines/supply-manual/annex/3/6>)

**2.1.1. SACC Manual clause A3050T (2010-01-11) Canadian Content Definition.**

**2.2 Status and Availability of Resources**

The Bidder certifies that, should it be awarded a contract as a result of the bid solicitation, every individual proposed in its bid will be available to perform the Work as required by Canada's representatives and at the time specified in the bid solicitation or agreed to with Canada's representatives. If for reasons beyond its control, the Bidder is unable to provide the services of an individual named in its bid, the Bidder may propose a substitute with similar qualifications and experience. The Bidder must advise the Contracting Authority of the reason for the substitution and provide the name, qualifications and experience of the proposed replacement. For the purposes of this clause, only the following reasons will be considered as beyond the control of the Bidder: death, sickness, maternity and parental leave, retirement, resignation, dismissal for cause or termination of an agreement for default.

If the Bidder has proposed any individual who is not an employee of the Bidder, the Bidder certifies that it has the permission from that individual to propose his/her services in relation to the Work to be performed and to submit his/her résumé to Canada. The Bidder must, upon request from the Contracting Authority, provide a written confirmation, signed by the individual, of the permission given to the Bidder and of his/her availability. Failure to comply with the request may result in the bid being declared non-responsive.

**2.3 Education and Experience**

The Bidder certifies that all the information provided in the résumés and supporting material submitted with its bid, particularly the information pertaining to education, achievements, experience and work history, has been verified by the Bidder to be true and accurate. Furthermore, the Bidder warrants that every individual proposed by the Bidder for the requirement is capable of performing the Work described in the resulting contract.

**2.4 Language Capability**

The Bidder certifies that it has the language capability required to perform the Work, as stipulated in the Statement of Work.

## PART 6 - RESULTING CONTRACT CLAUSES

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

### 1. Statement of Work

The Contractor must perform the Work in accordance with the Statement of Work at Annex A and the Contractor's technical bid entitled \_\_\_\_\_, dated \_\_\_\_\_ (to be completed at Contract Award).

#### 1.1 Task Authorization

The Work or a portion of the Work to be performed under the Contract will be on an "as and when requested basis" using a Task Authorization (TA). The Work described in the TA must be in accordance with the scope of the Contract.

##### 1.1.1 Task Authorization

The administration of the Task Authorization process will be carried out by **The Procurement and Payment group at Defence Research and Development Canada - Valcartier, represented by the DND Procurement Authority**. This process includes monitoring, controlling and reporting on expenditures of the contract with task authorizations to the Contracting Authority.

##### 1.1.2 Task Authorization Process

###### Task Authorization:

A portion of the Work to be performed under the Contract will be on an "as and when requested basis" using a Task Authorization (TA). The Work described in the TA must be in accordance with the scope of the Contract.

###### Task Authorization Process:

1. The DND Procurement Authority will provide the Contractor with a description of the task using the DND 626, Task Authorization Form specified in Annex C.
2. The Task Authorization (TA) will contain the details of the activities to be performed, a description of the deliverables, and a schedule indicating completion dates for the major activities or submission dates for the deliverables. The TA will also include the applicable basis(bases) and methods of payment as specified in the Contract.
3. The Contractor must provide the DND Procurement Authority, **within five (5) calendar days** of its receipt, the proposed total estimated cost for performing the task and a breakdown of that cost, established in accordance with the Basis of Payment specified in the Contract.

4. The Contractor must not commence work until a TA authorized by the DND Procurement Authority has been received by the Contractor. The Contractor acknowledges that any work performed before a TA has been received will be done at the Contractor's own risk.

#### 1.1.3 Task Authorization Limit

The DND Procurement Authority may authorize individual task authorizations up to a limit of **\$ 150 000.00**, Goods and Services Tax or Harmonized Sales Tax included, inclusive of any revisions.

Any task authorization to be issued in excess of that limit must be authorized by the Contracting Authority before issuance.

### 1.2 Disclosure Certification

On completion of the Work, the Contractor must submit to the Technical Authority and to the Contracting Authority a copy of the Disclosure Certification attached as Annex D stating that all applicable disclosures were submitted.

## 2. Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

### 2.1 General Conditions

2040 (2014-03-01), General Conditions - Research & Development, apply to and form part of the Contract.

## 3. Term of Contract

### 3.1 Period of the Contract

The Contract period is from the date of Contract to March 31, 2018 inclusive.

## 4. Authorities

### 4.1 Contracting Authority

The Contracting Authority for the Contract is:

Name: Sylvie Legendre  
Title: Supply Specialist  
Public Works and Government Services Canada  
Acquisitions and Compensation Directorate  
1550 D'Estimauville Avenue  
Quebec, Quebec  
G1J 0C7

Telephone: 418 649-2860



Facsimile: 418 648-2209  
 E-mail address: sylvie.legendre@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.

#### 4.2 Technical Authority (to be completed by Canada at the contract award)

The Technical Authority for the Contract is:

Name : \_\_\_\_\_  
 Organization : \_\_\_\_\_  
 Telephone: \_\_\_\_\_  
 Facsimile: \_\_\_\_\_  
 E-mail address: \_\_\_\_\_

The Technical Authority 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.

#### 4.3 Contractor's Representative (to be completed by the bidder)

##### Administrative Representative

Name : \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Organization: \_\_\_\_\_  
 Telephone: \_\_\_\_\_  
 Facsimile: \_\_\_\_\_  
 E-mail address: \_\_\_\_\_

##### Technical Representative

Name : \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Organization: \_\_\_\_\_  
 Téléphone: \_\_\_\_\_  
 Facsimile: \_\_\_\_\_  
 E-mail address: \_\_\_\_\_

#### 5. Proactive Disclosure of Contracts with Former Public Servants

By providing information on its status, with respect to being a former public servant in receipt of a Public Service Superannuation Act (PSSA) pension, the Contractor has agreed that this information will be reported on departmental websites as part of the published proactive disclosure reports, in accordance with Contracting Policy Notice: 2012-2 of the Treasury Board Secretariat of Canada.

#### 6. Payment

##### 6.1.1 Basis of Payment - For the Work of task 1 described in the Statement of Work (Annex A).

The Contractor will be reimbursed for the costs reasonably and properly incurred in the performance of the Work, as determined in accordance with the Basis of Payment in Annex B, to a limitation of expenditure of \$\_\_\_\_\_ **(to be inserted at contract award)**. Customs duties are included and applicable taxes extra, if applicable.

#### **6.1.2 Basis of Payment - For the work of task 2 (tasks subject to a task authorisation process) described in the Statement of Work (Annex A).**

**One of the following types of basis of payment** will form part of the approved Task Authorization (TA). The task price must be determined in accordance with **Section B of the Basis of Payment in Annex B**.

(a) Firm Unit Price(s) or Firm Lot Price TA

In consideration of the Contractor satisfactorily completing all of its obligations under the authorized Task Authorization (TA), the Contractor will be paid a firm price **in accordance with the basis of payment, in Annex B, Section B**, as specified in the authorized TA. Customs duties are included and Goods and Services Tax or Harmonized Sales Tax is extra, if applicable.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been authorized, in writing, by the Contracting Authority before their incorporation into the Work.

(b) Ceiling Price TA

The Contractor will be reimbursed its costs reasonably and properly incurred in the performance of the Work, plus a profit, as determined **in accordance with the Basis of Payment in Annex B, Section B**, to the ceiling price specified in the approved TA. Customs duties are included and Goods and Services Tax or Harmonized Sales Tax is extra, if applicable.

The ceiling price is subject to downward adjustment so as not to exceed the actual costs reasonably incurred in the performance of the Work and computed in accordance with the Basis of Payment.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work unless they have been approved, in writing, by the Technical Authority or the Contracting Authority, before their incorporation into the Work.

(c) TA subject to a Limitation of Expenditure

The Contractor will be reimbursed for the costs reasonably and properly incurred in the performance of the Work specified in the authorized Task Authorization (TA), as determined **in accordance with the Basis of Payment in Annex B, Section B**, to the limitation of expenditure specified in the authorized TA.

Canada's liability to the Contractor under the authorized TA must not exceed the limitation of expenditure specified in the authorized TA. Customs duties are included and Goods and Services Tax or Harmonized Sales Tax is extra, if applicable.

No increase in the liability of Canada or in the price of the Work specified in the authorized TA resulting from any design changes, modifications or interpretations of the Work will be authorized or paid to the

Contractor unless these design changes, modifications or interpretations have been authorized, in writing, by the Contracting Authority before their incorporation into the Work

## 6.2 Canada's Obligation - Portion of the Work - Task Authorizations

Canada's obligation with respect to the portion of the Work under the Contract that is performed through task authorizations is limited to the total amount of the actual tasks performed by the Contractor.

## 6.3 Limitation of Expenditure - Total

1. Canada's total liability to the Contractor under the Contract must not exceed \$ \_\_\_\_\_ **(the amount will be inserted at contract award)**. Customs duties are included and Goods and Services Tax or Harmonized Sales Tax is 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 Work, will be authorized or paid to the Contractor unless these design changes, modifications or interpretations have been approved, in writing, by the Contracting Authority before their incorporation into the Work. The Contractor must not perform any work or provide any service that would result in Canada's total liability being exceeded before obtaining the written approval of the Contracting Authority. The Contractor must notify the Contracting Authority in writing as to the adequacy of this sum:
  - (a) when it is 75 percent committed, or
  - (b) four (4) months before the Contract expiry date, or
  - (c) as soon as the Contractor considers that the contract funds provided are inadequate for the completion of the Work,

whichever comes first.
3. If the notification is for inadequate contract funds, the Contractor must provide to the Contracting Authority a written estimate for the additional funds required. Provision of such information by the Contractor does not increase Canada's liability.

## 6.4 Method of Payment

### 6.4.1 For Section A of Annex B - Basis of Payment - Progress Payments

1. Canada will make progress payments in accordance with the payment provisions of the Contract, no more than once a month, for cost incurred in the performance of the Work up to 90 percent of the amount claimed and approved by Canada if:
  - (a) an accurate and complete claim for payment using form PWGSC-TPSGC 1111 (<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/1111.pdf>) and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
  - (b) the amount claimed is in accordance with the Basis of payment;

- (c) the total amount for all progress payments paid by Canada does not exceed 90 percent of the total amount to be paid under the Contract;
  - (d) all certificates appearing on form PWGSC-TPSGC 1111 have been signed by the respective authorized representatives.
2. The balance of the amount payable will be paid in accordance with the payment provisions of the Contract upon completion and delivery of all work required under the Contract if the Work has been accepted by Canada and a final claim for the payment is submitted.
  3. Progress payments are interim payments only. Canada may conduct a government audit and interim time and cost verifications and reserves the right to make adjustments to the Contract from time to time during the performance of the Work. Any overpayment resulting from progress payments or otherwise must be refunded promptly to Canada.

#### **6.4.2 For Section B of Annex B - Basis of Payment**

**6.4.2.1** Payments will be made not more frequently than once a month.

**6.4.2.2** Depending on the method of payment specified in the applicable TA, one of the following method of payment clauses will apply.

##### **6.4.2.2.1 Single Payment**

Canada will pay the Contractor upon completion and delivery of the Work in accordance with the payment provisions of the Task Authorization and the Contract if:

- (a) an accurate and complete invoice and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- (b) all such documents have been verified by Canada;
- (c) the Work delivered has been accepted by Canada.

##### **6.4.2.2.2 Milestone Payments (For a Firm Price TA)**

Canada will make milestone payments in accordance with the Schedule of Milestones detailed in the Task Authorization and the payment provisions of the Contract if:

- (a) an accurate and complete invoice, and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- (b) all work associated with the milestone and as applicable any deliverable required has been completed and accepted by Canada.

##### **6.4.2.2.3 Progress Payments (For a TA subject to a Limitation of Expenditure or a Ceiling Price)**

(a) Canada will make progress payments in accordance with the payment provisions of the Task Authorization and the Contract for cost incurred in the performance of the Work up to **90 percent** of the amount claimed and approved by Canada if:

- (i) an accurate and complete invoice and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- (ii) the amount claimed is in accordance with the Basis of payment and the Task Authorization;
- (iii) the total amount for all progress payments paid by Canada does not exceed 90 percent of the total amount to be paid under the Task Authorization.

(b) The balance of the amount payable will be paid in accordance with the payment provisions of the Task Authorization and the Contract upon completion and delivery of all work required under the Task Authorization if the Work has been accepted by Canada and a final claim for the payment is submitted.

(c) Progress payments are interim payments only. Canada may conduct a government audit and interim time and cost verifications and reserves the right to make adjustments to the Contract from time to time during the performance of the Work. Any overpayment resulting from progress payments or otherwise must be refunded promptly to Canada.

## **6.5 Funding by Fiscal Year for the firm portion of the Work (Task 1 of the statement of Work in Annex A):**

Despite the Total Estimated Cost (Limitation of Expenditure) specified in the Contract, and unless otherwise authorized in writing by the Contracting Authority, the maximum amount which may be paid for work completed, for the firm portion of the Work (task 1), in the period ending March 31 of the year specified is as follows:

Period of April 1st 2014 to March 31st 2015: \$ 60 000.00

## **6.6 SACC Manual Clauses**

A9117C (2007-11-30), T1204 - Direct Request by Customer Department  
C0305C (2008-05-12), Cost Submission

## **7. Invoicing Instructions - Progress Claim**

1. The Contractor must submit a claim for progress payment using form PWGSC-TPSGC 1111. Form PWGSC-TPSGC 1111 is available at the following Website  
<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html>

Each claim must show:

- (a) all information required on form PWGSC-TPSGC 1111;
- (b) all applicable information detailed under the section entitled "Invoice Submission" of the general conditions;
- (c) the Task Authorization (TA) number;

- (d) the description of the milestone invoiced, as applicable.
2. For TAs subject to a Limitation of Expenditure or a Ceiling Price, each invoice must be supported by:
- (a) a list of all expenses, in accordance with the TA;
  - (b) a copy of time sheets to support the time claimed;
  - (c) a copy of the invoices, receipts, vouchers for all direct expenses, travel and living expenses;
  - (d) a copy of the monthly progress report.
3. Goods and Services Tax (GST) or Harmonized Sales Tax (HST), as applicable, must be calculated on the total amount of the claim before the holdback is applied. At the time the holdback is claimed, there will be no GST/HST payable as it was claimed and payable under the previous claims for progress payments.
4. The Contractor must prepare and certify one original and two (2) copies of the claim on form PWGSC-TPSGC 1111, and forward it to the Contracting Authority for certification.

**ATTN: Mrs Micheline Cauchon-Gravel**

Public Works and Government Services Canada  
1550, Avenue D'Estimauville  
Québec, Québec  
G1J 5E9

The Contracting Authority will then forward the original and two (2) copies of the claim to the Technical Authority for appropriate certification after inspection and acceptance of the Work takes place, and onward submission to the Payment Office for the remaining certification and payment.

5. The Contractor must not submit claims until all work identified in the claim is completed.

**8. Certifications**

- 8.1 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 entire contract period. 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.

**8.2 SACC Manual Clauses**

**A3060C** (2008-05-12), Canadian Content Certification

**9. Applicable Laws**

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in \_\_\_\_\_ (to be inserted at contract award).

**10. 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) the general conditions **2040** (2014-03-01), General Conditions - Research & Development;
- (c) Annex A, Statement of Work;
- (d) Annex B, Basis of Payment;
- (e) Annex C, DND 626, Task Authorization Form;
- (f) Annex D, Contractor Disclosure of Foreground Information;
- (g) the signed Task Authorizations (including all of its annexes, if any);
- (h) the Contractor's bid dated \_\_\_\_\_.

## 11. Defence Contract

*SACC Manual* clause A9006C (2012-07-16) Defence Contract

## 12. Foreign Nationals (Canadian Contractor)

*SACC Manual* clause A2000C (2006-06-16) Foreign Nationals (Canadian Contractor)

## 13. Insurance

*SACC Manual* clause **G1005C** (2008-05-12), Insurance

## 14. Progress Reports

1. The Contractor must submit monthly reports, in electronic format, on the progress of the Work, to both the Technical Authority and the Contracting Authority.
2. The progress report must contain three parts:
  - (a) PART 1: The Contractor must answer the following three questions:
    - (i) Is the project on schedule?
    - (ii) Is the project within budget?
    - (iii) Is the project free of any areas of concern in which the assistance or guidance of Canada may be required?

Each negative response must be supported with an explanation.

- (b) PART 2: A narrative report, brief, yet sufficiently detailed to enable the Technical Authority to evaluate the progress of the Work, containing as a minimum:

- (i) A description of the progress of each task and of the Work as a whole during the period of the report. Sufficient sketches, diagrams, photographs, etc., must be included, if necessary, to describe the progress accomplished.
- (ii) An explanation of any variation from the work plan.
- (iii) A description of trips or conferences connected with the Contract during the period of the report.
- (iv) A description of any major equipment purchased or constructed during the period of the report.

## **15. Site Regulations**

The Contractor must comply with all standing orders or other regulations, instructions and directives in force on the site where the Work is performed.

## **16. Identification badge**

SACC Manual clause **A9065C** (2006-06-16), Identification Badge.



## ATTACHMENT 1 - FINANCIAL BID PRESENTATION SHEET

### Section A - Financial bid for the work of task 1 (as described in the Statement of Work - Annex A):

1. LABOUR : Firm all-inclusive rates (including profit and overhead, applicable taxes extra), in accordance with the following:

**Note to bidders :**

- Bidders are requested to quote one firm hourly rate per proposed resources
- If the resource works for a subcontractor, the bidder should clearly indicate the name of the subcontractor.
- Bidders may propose a number of resources greater than the number of lines available in the following table.

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate		
	A From April 1st 2014 to March 31, 2015	B Total est. number of hours	C Extended cost per resource (A X B)
Labour Category :  Engineer/scientist (investigator/supervisor)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Technican/support staff (1)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Technican/support staff (2)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate		
	A From April 1st 2014 to March 31, 2015	B Total est. number of hours	C Extended cost per resource (A X B)
Labour Category :  Engineer/scientist (research assistant) (1)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Engineer/scientist (research assistant) (2)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Engineer/scientist (research assistant) (3)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____

TOTAL ESTIMATED LABOUR: \$ \_\_\_\_\_

**Items 2 through 7 should be completed if the Bidder's rates in 1. above do not include the following:**

**If an item is not applicable, write "NA" on the total estimated line.**

2. EQUIPMENT: at laid down cost without markup

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Buyer ID - Id de l'acheteur

qcn015

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

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Description	Estimated price	Total est. Qty.
(a)	\$	
(b)	\$	
(c)	\$	
(d)	\$	
(e)	\$	

TOTAL ESTIMATED EQUIPMENT: \$ \_\_\_\_\_

## 3. RENTALS : at actual cost without markup

Description	Estimated price	Total est. Qty.
(a)	\$	
(b)	\$	
(c)	\$	
(d)	\$	
(e)	\$	

TOTAL ESTIMATED RENTALS: \$ \_\_\_\_\_

## 4. MATERIALS AND SUPPLIES: at laid down cost without markup

Description	Estimated price	Total est. Qty.
(a)	\$	
(b)	\$	
(c)	\$	
(d)	\$	
(e)	\$	

TOTAL ESTIMATED MATERIALS AND SUPPLIES: \$ \_\_\_\_\_

5. SUBCONTRACTS: at actual cost without markup

Support for the proposed subcontractor's price is required in the same details as that required for the Bidder's price. The estimated price for subcontracts should include all direct charges and travel & living expenses which would be to the account of the subcontractor.

**Details are to be provided on a separate sheet.**

**The bidder can include the labour cost of the subcontracts in the table of section 1.**

TOTAL ESTIMATED SUBCONTRACTS: \$ \_\_\_\_\_

6. TRAVEL & LIVING: at actual cost without markup but not to exceed the limits of the Treasury Board Travel Directive. With respect to the TB Travel Directive, only the meal, private vehicle and incidental allowances specified in Appendices B, C and D of the TB Travel Directive <http://www.tbs-sct.gc.ca/hr-rh/gtla-vgcl/> and the other provisions of the directive referring to "travellers" rather than those referring to "employees", are applicable.

**Details are to be provided on a separate sheet.**

TOTAL ESTIMATED TRAVEL & LIVING: \$ \_\_\_\_\_

**TOTAL ESTIMATED COST TO LIMITATION OF EXPENDITURE for the work of Task 1 : \$ 60,000.00  
(applicable taxes extra)**

**Section B - Financial bid for the portion of the Work to be performed on an "as and when requested basis" using a Task Authorization (Task 2 of the Statement of Work in Annex A) :**

1. LABOUR : Firm all-inclusive rates (including profit and overhead, applicable taxes extra), in accordance with the following:

**Note to bidders :**

- Bidders must quote a firm hourly rate per proposed resources and per period.
- If the resource works for a subcontractor, the bidder should clearly indicate the name of the subcontractor.

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate			
	A From April 1st 2014 to March 31, 2015	B From April 1st 2015 to March 31, 2016	C From April 1st 2016 to March 31, 2017	D From April 1st 2017 to March 31, 2018
Labour Category :  Engineer/scientist (investigator/ supervisor)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Technician/support staff (1)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Technician/support staff (2)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Engineer/scientist (research assistant) (1)	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate			
	A From April 1st 2014 to March 31, 2015	B From April 1st 2015 to March 31, 2016	C From April 1st 2016 to March 31, 2017	D From April 1st 2017 to March 31, 2018
Name of the proposed resource:  _____				
Labour Category :  Engineer/scientist (research assistant) (2)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Engineer/scientist (research assistant) (3)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour

2. EQUIPMENT: at laid down cost without markup
3. RENTALS : at actual cost without markup
4. MATERIALS AND SUPPLIES: at laid down cost without markup
5. SUBCONTRACTS: at actual cost without markup
6. TRAVEL & LIVING: at actual cost without markup but not to exceed the limits of the Treasury Board Travel Directive. With respect to the TB Travel Directive, only the meal, private vehicle and incidental allowances specified in Appendices B, C and D of the TB Travel Directive <http://www.tbs-sct.gc.ca/hr-rh/gtla-vgcl/> and the other provisions of the directive referring to "travellers" rather than those referring to "employees", are applicable.

**TOTAL ESTIMATED COST TO LIMITATION OF EXPENDITURE for the work of task 2 : \$ 790 000.00**

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File No. - N° du dossier

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Buyer ID - Id de l'acheteur

qcn015

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

W7701-14-5749

CCC No./N° CCC - FMS No/ N° VME

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**(applicable taxes extra)**

## ATTACHMENT 2

## POINT RATED TECHNICAL CRITERIA

Point Rated Technical Criteria		Max	Min
<b>1. TECHNICAL PROPOSAL</b>		<b>30</b>	<b>18</b>
<p><b>1.1 - Demonstration of understanding of the context, scope and objectives</b></p> <p>Understanding the context, scope and objectives should be total and not be limited to the description contained in the "Statement of Work". The bidder should show in his own words that he fully understand the context, scope and objectives of the "Statement of Work".</p> <p>The bidder should demonstrate its understanding of project context, objectives and scope in a clear and concise manner (3 pages or less).</p> <p>The required elements for this criteria are:</p> <ol style="list-style-type: none"> <li>There is a brief introduction.</li> <li>There is a concise evaluation of: <ol style="list-style-type: none"> <li>the project needs,</li> <li>the objectives of the proposed work,</li> <li>the reasons that justify the conduct of the work as proposed, and</li> <li>the advantages that the proposed work will generate.</li> </ol> </li> <li>The text is concise.</li> <li>The text is clear and easy to understand.</li> <li>Key issues are raised</li> </ol>	<p><b>10 points</b> - Excellent. All required elements are there. Understanding is beyond expectations. The text is concise without confusion. All expected key issues are raised, and additional issues that were not expected are discussed.</p> <p><b>8 to 9 points</b> - Very good. All required elements are there. The text is concise without confusion. All expected key issues are raised.</p> <p><b>6 to 7 points</b> - Good. All required elements are there. The text is relatively concise, without major confusion. Most of expected key issues are raised.</p> <p><b>4 to 5 points</b> - Limited. Some required elements are missing. The text is either not concise enough, or it presents important confusion, or most of the expected key issues are missing.</p> <p><b>1 to 3 points</b> - Weak. Many required elements are missing. The text is not concise enough, presents important confusion, and most of the expected key issues are missing.</p> <p><b>0 points</b> - Any other situation.</p>	<b>10</b>	<b>6</b>



<p><b>1.2 Identification of risk elements</b></p> <p>The bidder should clearly describe the project components that it considers at risk and should propose a mitigation plan that achieves the performance objectives of the project in accordance with the cost and duration. The elements described should be relevant and the mitigation plan should be realistic.</p>	<p><b>9 to 10 points</b> - The bidder has recognized and provided a list of the major direct and peripheral problems and demonstrated his ability to solve them.</p> <p><b>6 to 8 points</b> - The bidder is aware of the major direct and peripheral problems, provided a list of those problems, but forgot 1 or 2 important problems. However, he showed his ability to solve the problems he identified.</p> <p><b>3 to 5 points</b> - The bidder is aware of the major direct and peripheral problems, provided a list of those problems, but showed a limited ability to solve some of them.</p> <p><b>1 to 2 points</b> - The bidder is aware of the nature and existence of direct and peripheral problems, but no description of those problems is provided. His ability to solve them is not well demonstrated.</p> <p><b>0 point</b> - Any other situation.</p>	<p><b>10</b></p>	<p><b>6</b></p>
<p><b>1.3 Strategy and methodology</b></p> <p>The bidder should clearly present the technical approach and methodology he proposes. The technical approach and methodology should be consistent, relevant to the project, complete and realistic. Innovation, unique approaches that clearly bring efficiency and effectiveness to final design, design analysis and design validation are considered valuable and will be evaluated.</p>	<p><b>10 points:</b> Excellent strategy and methodology proposed to achieve objectives. Description of strategy and methodology is very clear and precise. The proposed approach fully meets the needs of the project.</p> <p><b>8-9 points:</b> Very good strategy and methodology proposed to achieve objectives. Description of strategy and methodology is very clear and precise. The proposed approach meets the needs of the project very well.</p> <p><b>6-7 points:</b> Good strategy and methodology proposed to achieve objectives. Description of strategy and methodology is very clear or precise. The proposed approach meets the needs of the project.</p>	<p><b>10</b></p>	<p><b>6</b></p>

	<p><b>4 to 5 points:</b> Limited strategy and methodology proposed to achieve objectives. Description of strategy and methodology is limited. The proposed approach partially meets some needs of the project.</p> <p><b>1 to 3 points:</b> Poor strategy and methodology proposed to achieve objectives. Description of strategy and methodology is inadequate The proposed approach meets few needs of the project.)</p> <p><b>0 point</b> - Any other situation.</p>		
<p><b>2. QUALIFICATIONS OF RESOURCES DIRECTLY INVOLVED IN THE PROJECT (EXPERIENCE AND ACADEMIC TRAINING) - Chief investigator/supervisor directly involved in the project</b></p> <p>The Bidder should clearly identify the name of the proposed resource for each labour category identified below in 2.1 to 2.3. The same resource can be proposed for more than one category and will then be assessed for each of those categories.</p> <p>Each resource will be evaluated individually. The overall scores obtained by each resource in the given category will be added and then divided by the number of resources available to obtain an average. The average will be the rating assigned to the bidder.</p> <p>The Bidder should submit with its proposal the curriculum vitae (CV) of the proposed resource. The Bidder should indicate the resource's experience in terms of months of experience</p> <p>The CV should provide enough information to enable the evaluation team to properly evaluate the proposal. If the information provided is not sufficient to confirm that the experience meets the requirements of the criterion, the points for that criterion will not be attributed.</p> <p>To determine whether the experience of the proposed resources is acceptable, the bidder should provide a description of the project in which the proposed resources were involved. The following information should be provided for each project: the topic, the context, the objectives, the scope, the software tools involved (if applicable), the project periods (month and year of the beginning and month and year of the end), the exact dates of the involvement of the proposed resource, the role of the proposed resource in the project, the level of effort in the project for the proposed resource, the tasks performed by the proposed resource and the duration of each task performed by the proposed resource.</p> <p>Listing experience without providing any supporting data to describe where and how such experience was obtained will result in the experience not being included for evaluation purposes.</p>		12	3

To be considered by the evaluation team, the diploma must be from a recognized Canadian university, or an equivalent established by a recognized Canadian credential-assessment service if the diploma or certificate was obtained abroad.			
* The list of recognized organizations is posted on the Web site of the Canadian Information Centre for International Credentials at the following address: <a href="http://cicic.ca">http://cicic.ca</a>			
<b>2.1 Academic background and Experience in the field of electromagnetic modeling, simulation and analysis of metamaterial devices and structures</b>	<p>Resources with PhD in electrical engineering, Physics or engineering physics with more than 96 months experience: <b>4 points</b></p> <p>- Resources with PhD in electrical engineering, Physics or engineering physics with more than 60 months experience, or with Master in electrical engineering, Physics or engineering physics with more than 96 months experience: <b>3 points</b></p> <p>- Resources with PhD in electrical engineering, Physics or engineering physics with more than 36 months experience, or with Master in electrical engineering, Physics or engineering physics with more than 60 months experience : <b>1 point</b></p> <p>- All other cases: <b>0 point</b></p>	<b>4</b>	<b>1</b>
<b>2.2 Academic background and Experience in the field of electromagnetic experiments and experimental data analysis of metamaterial devices and structures</b>	<p>Resources with PhD in electrical engineering, Physics or engineering physics with more than 96 months experience: <b>4 points</b></p> <p>Resources with PhD in electrical engineering, Physics or engineering physics with more than 60 months experience, or with Master in electrical engineering, Physics or engineering physics with more than 96 months experience: <b>3 points</b></p> <p>Resources with PhD in electrical engineering, Physics or engineering physics with more than 36 months experience, or with Master in electrical engineering, Physics or engineering</p>	<b>4</b>	<b>1</b>

	<p>physics with more than 60 months experience : <b>1 point</b></p> <p>All other cases: <b>0 point</b></p>		
<p><b>2.3 Academic background and Experience in designing, constructing, building and fabricating devices, metamaterials, metamaterial devices and structures</b></p>	<p>Resources with PhD in electrical engineering, Physics or engineering physics with more than 96 months experience: <b>4 points</b></p> <p>Resources with PhD in electrical engineering, Physics or engineering physics with more than 60 months experience, or with Master in electrical engineering, Physics or engineering physics with more than 96 months experience: <b>3 points</b></p> <p>- Resources with PhD in electrical engineering, Physics or engineering physics with more than 36 months experience, or with Master in electrical engineering, Physics or engineering physics with more than 60 months experience : <b>1 point</b></p> <p>- All other cases: <b>0 point</b></p>	<b>4</b>	<b>1</b>
<p><b>3. SCIENTIFIC EXPERTISE OF THE PROPOSED RESOURCES</b></p> <p>Total publications (papers in scientific journals, patents, invited talks in international conferences, contract reports) by the proposed main resource/chief investigator/supervisor related to:</p> <p>For the chief investigator/supervisor, the bidder should indicate the resources' research publications. The relevance of the research publication should be demonstrated clearly and precisely. A scientific paper can cover more than one sub-criteria of this section.</p> <p>N.B: Research publication is meant to be a book chapter or a paper that has been published (or submitted) in a journal or conference proceedings subject to peer review. PhD and Master thesis are also considered as scientific publication</p> <p>To determine whether the research publication is acceptable, the bidder should provide a description of the research publication produced by the proposed resource. The following information should be provided for each research publication:</p> <ul style="list-style-type: none"> <li>- topic, scope and contribution,</li> <li>- source and complete reference (journal, conference, etc.)</li> <li>- level of involvement of the proposed resource in the research publication</li> <li>- etc.</li> </ul>		<b>60</b>	<b>24</b>

Each resource will be evaluated individually. The overall scores obtained by each resource in the given category will be added and then divided by the number of resources available to obtain an average. The average will be the rating assigned to the bidder.			
<b>3.1 - Research publication in Electromagnetic modeling, simulation and analysis of metamaterials, metamaterial devices and structures.</b>	<b>20 points:</b> 16 and more. <b>12 points:</b> 8 to 15. <b>8 points:</b> 5 to 7. <b>3 points:</b> 2 to 4 <b>0 point:</b> All other cases	<b>20</b>	<b>8</b>
<b>3.2 - Research publication in Electromagnetic experiments and experimental data analysis of metamaterials, metamaterial devices and structures</b>	<b>20 points:</b> 16 and more. <b>12 points:</b> 8 to 15 <b>8 points:</b> 5 to 7 <b>3 points:</b> 2 to 4 <b>0 point:</b> All other cases.	<b>20</b>	<b>8</b>
<b>3.3- Research publication in Constructing and fabricating devices, metamaterials, metamaterial devices and structures</b>	<b>20 points:</b> 16 and more. <b>12 points:</b> 8 to 15 <b>8 points:</b> 5 to 7 <b>3 points:</b> 2 to 4 <b>0 point:</b> All other cases.	<b>20</b>	<b>8</b>
<b>4. EXPERIENCE OF TECHNICAL SUPPORT STAFF/LABORATORY TECHNICIANS DIRECTLY INVOLVED IN FABRICATION OR CHARACTERIZATION OF METAMATERIALS.</b>  The Bidder should submit with its proposal the curriculum vitae (CV) of the proposed resources. The Bidder should indicate the resources' experience in terms of months of experience  The CV should provide enough information to enable the evaluation team to properly evaluate the proposal. If the information provided is not sufficient to confirm that the experience meets the requirements of the criterion, the points for that criterion will not be attributed.  To determine whether the experience of the proposed resources is acceptable, the bidder should provide a description of the project in which the proposed resources were involved. The following information should be provided for each project: the topic, the context, the objectives, the scope, the software tools involved (if applicable), the project periods (month and year of the beginning and month and year of the end), the exact dates of the involvement of the proposed resource, the role of the proposed resource in the project, the level of effort in the project for the proposed resource, the tasks performed by the proposed resource and the duration of each task performed by the proposed resource.		<b>5</b>	<b>1</b>

<p>Listing experience without providing any supporting data to describe where and how such experience was obtained will result in the experience not being included for evaluation purposes.</p> <p>Each resource will be evaluated individually. The overall scores obtained by each resource in the given category will be added and then divided by the number of resources available to obtain an average. The average will be the rating assigned to the bidder.</p> <p>To be considered by the evaluation team, the diploma must be from a recognized Canadian university, or an equivalent established by a recognized Canadian credential-assessment service if the diploma or certificate was obtained abroad.</p> <p>* The list of recognized organizations is posted on the Web site of the Canadian Information Centre for International Credentials at the following address: <a href="http://cicic.ca">http://cicic.ca</a></p>			
<p><b>4.1 - Experience of technical staff/laboratory technicians</b></p>	<ul style="list-style-type: none"> <li>- Resources with at least 5 years of experience: <b>5 points</b></li> <li>- Resources with more than 3 years of experience and less than 5 years : <b>3 points</b></li> <li>- Resources with at least 1 year of experience and less than 3 years : <b>1 points</b></li> <li>- Resources with less than 1 year of experience: <b>0 points</b></li> </ul>	<b>5</b>	<b>1</b>

## 5. EXPERIENCE OF RESEARCH ASSISTANTS DIRECTLY INVOLVED IN THE PROJECT

5

3

The Bidder should submit with its proposal the curriculum vitae (CV) of the proposed resources. The Bidder should indicate the resources' experience in terms of months of experience

The CV should provide enough information to enable the evaluation team to properly evaluate the proposal. If the information provided is not sufficient to confirm that the experience meets the requirements of the criterion, the points for that criterion will not be attributed.

To determine whether the experience of the proposed resources is acceptable, the bidder should provide a description of the project in which the proposed resources were involved. The following information should be provided for each project: the topic, the context, the objectives, the scope, the software tools involved (if applicable), the project periods (month and year of the beginning and month and year of the end), the exact dates of the involvement of the proposed resource, the role of the proposed resource in the project, the level of effort in the project for the proposed resource, the tasks performed by the proposed resource and the duration of each task performed by the proposed resource.

Listing experience without providing any supporting data to describe where and how such experience was obtained will result in the experience not being included for evaluation purposes.

Each resource will be evaluated individually. The overall scores obtained by each resource in the given category will be added and then divided by the number of resources available to obtain an average. The average will be the rating assigned to the bidder.

To be considered by the evaluation team, the diploma must be from a recognized Canadian university, or an equivalent established by a recognized Canadian credential-assessment service if the diploma or certificate was obtained abroad.

\* The list of recognized organizations is posted on the Web site of the Canadian Information Centre for International Credentials at the following address:  
<http://cicic.ca>

<b>5.1 - Experience of research associates/assistants directly involved in the project.</b>	<ul style="list-style-type: none"> <li>- Resources with Master in electrical engineering, Physics or engineering physics: <b>5 points</b></li> <li>- Resources with Bachelor in electrical engineering, Physics or engineering physics: <b>3 points</b></li> </ul>	<b>5</b>	<b>3</b>
<b>6. QUALIFICATIONS OF THE BIDDER</b>  The bidder should describe each project as follows: <ul style="list-style-type: none"> <li>- Title;</li> <li>- Client/company contacts;</li> <li>- Start and end dates (months and years);</li> <li>- Brief description of the tasks carried out by the Bidder;</li> <li>- Disciplines involved in the project;</li> <li>- Budget of the project.</li> </ul> <u>To be considered by the evaluation team, the budget of the project must be at least \$20,000.00</u>		<b>36</b>	<b>9</b>
<b>6.1 - Experience of the bidder in the field of electromagnetic modeling, simulation and analysis of metamaterials, metamaterial devices and structures</b>	The bidder completed, in the last 10 years: <ul style="list-style-type: none"> <li>- 8 projects/contracts or more: <b>10 points.</b></li> <li>- at least 5 projects/contracts but less than 8: <b>6 points.</b></li> <li>- at least 2 projects/contracts but less than 5: <b>3 points.</b></li> <li>- All other cases: <b>0 point.</b></li> </ul>	<b>10</b>	<b>3</b>



<p><b>6.2 - Experience of the bidder in the field of electromagnetic experiments and experimental data analysis of metamaterials, metamaterial devices and structures</b></p>	<p>The bidder completed, in the last 10 years:</p> <ul style="list-style-type: none"> <li>- 8 projects/contracts or more: <b>10 points.</b></li> <li>- at least 5 projects/contracts but less than 8: <b>6 points.</b></li> <li>- at least 2 projects/contracts but less than 5: <b>3 points.</b></li> <li>- All other cases: <b>0 point.</b></li> </ul>	<b>10</b>	<b>3</b>
<p><b>6.3 - Experience of the bidder in the field of design and fabrication of metamaterials, metamaterial devices and structures</b></p>	<p>The bidder completed, in the last 10 years:</p> <ul style="list-style-type: none"> <li>- 8 projects/contracts or more: <b>10 points.</b></li> <li>- at least 5 projects/contracts but less than 8: <b>6 points.</b></li> <li>- at least 2 projects/contracts but less than 5: <b>3 points.</b></li> <li>- All other cases: <b>0 point.</b></li> </ul>	<b>10</b>	<b>3</b>
<p><b>6.4 - Experience of the bidder in the field of electromagnetic modeling, simulation and analysis of metamaterials, metamaterial devices and structures in optical regime (wavelength less than 12 micrometer)</b></p>	<p>The bidder completed, in the last 10 years:</p> <ul style="list-style-type: none"> <li>- 4 projects/contracts or more: <b>6 points.</b></li> <li>- 2 projects/contracts or more and : <b>4 points.</b></li> <li>- All other cases: <b>0 point.</b></li> </ul>	<b>6</b>	
<p><b>7. BIDDER FACILITIES AND EQUIPMENT ACCESS - Facilities/Equipment/tools to support metamaterial R&amp;D</b></p>		<b>80</b>	<b>50</b>
<p><b>7.1 - Software tools/Electromagnetic analysis tools</b></p> <p>The Bidder should provide the details and location of the softwares it is licensed to use or has access to.</p>	<ul style="list-style-type: none"> <li>- Modeling of geometry, meshing for electromagnetic analyses. Material properties, source terms and boundary conditions can all be arbitrary functions of the dependent variables. (e.g. COMSOL Multiphysics): <b>10 points</b></li> <li>- Finite element method solver for electromagnetic structures such as for</li> </ul>	<b>30</b>	<b>20</b>

	<p>antenna design, and the design of complex RF electronic circuit elements including filters, transmission lines, and packaging (e.g. HFSS - High Frequency Structure Simulator) : <b>10 points</b></p> <p>- 3D EM analysis of high frequency (HF) devices (e.g. CST Microwave Studio - Computer Simulation Technology 3D EM Simulation) : <b>10 points</b></p> <p>Note: The points are cumulative.</p>		
<p><b>7.2 - Metamaterials fabrication tools</b></p> <p>For each facility, equipment, tool, the Bidder should provide a general description, details, specification and location.</p>	<p><b>For</b></p> <p>a) Standard cleanroom b) Photolithography c) Thin film deposition d) E-beam lithography with 10nm or better linewidth resolution :</p> <p>Ownership by the Bidder : <b>10 points</b> Accessiblity by the Bidder (but not the owner) : <b>5 points</b> Not avialable : <b>0 points</b></p> <p><b>For</b></p> <p>e) Focus ion beam lithography f) Focus ion beam micromachining/milling</p> <p>Ownership by the Bidder : <b>5 points</b> Accessiblity by the Bidder (but not the owner) : <b>2 points</b> Not avialable : <b>0 points</b></p> <p>Note: The points are cumulative.</p>	<b>50</b>	<b>30</b>
<b>8. MANAGEMENT PROPOSAL</b>		<b>10</b>	<b>5</b>
<p><b>8.1 Project control (coordination, supervision)</b></p> <p>For task 1 of the contract, the bidder should clearly demonstrate his project management process. This process should include a</p>	<p><b>8 to 10 points</b> - The bidder proposes an excellent workflow management method that takes into account risks, contingencies and compliance with deadlines.</p>	<b>10</b>	<b>5</b>

calendar/flow chart and work plan and should be included with the Bidder's proposal.	<p><b>4 to 7 points</b> - The bidder proposes a workflow management method that takes into account risks, contingencies and compliance with deadlines.</p> <p><b>1 to 4 points</b> - The bidder proposes a workflow management method that omits one of the following elements: risks, contingencies or compliance with deadlines.</p> <p><b>0 point</b> - The bidder does not propose a realistic workflow management method.</p>		
<b>TOTAL</b>	<b>238</b>	<b>113</b>	

## ANNEX A - STATEMENT OF WORK

### 1. General

#### 1.1 Title

Study of metamaterial optical properties for defence applications

#### 1.2 Objective

This statement of work will provide scientific and technical support for studying metamaterial electromagnetic and optical properties in the optical-to-infrared spec-trum for potential military capabilities in the future. These capabilities may include new and enhanced electro-optical sensors optics for surveillance and signature management for enhanced maneuverability.

#### 1.3 Background

Since Russian scientist Victor Veselago first proposed the concept of metamaterials in 1967, this potentially disruptive technology began to draw substantial attention in science community after the first demonstration of negative refraction (refractive in-dex  $<0$ ) in metamaterial in 2000. Metamaterial is an array of unit cells made from tiny but macroscopic structural L-C circuitry. In order to establish metamaterial prop-erties in selected wavelength of electromagnetic waves, the dimension of the in-ductance-capacitance (L-C) circuitry is substantially smaller than the selected wave-length. As a result, the electromagnetic wave does not 'see' the individual unit cell but the collective electromagnetic characteristics made from millions of unit cells. By designing the L-C unit cells, we can tailor the electrical permittivity and magnetic permeability of each cell and as a result those of the collective metamaterial as well.

With the capability to potentially create materials with tailored electromagnetic prop-erties including negative refraction, there are potential new capabilities such as "superlens" for sub-wavelength imaging, cloaking, enhancement of sensor signal-to-noise ratio (SNR), and many others emerging. However, there are several short-comings such as loss, highly wavelength dependant (not broad band), and highly polarization sensitive (if unit cells are not symmetric design which is often the case). Potential solutions include gradient designs, a recently demonstrated helical 3-dimension structure, and possibly tunable designs.

Most studies and demonstrations of metamaterials to date have been characteristics (transmission, absorption, reflection and loss, etc) and applications (radars and an-tennas) in the microwave spectrum. The main reason is that the dimension of de-sired repetitive L-C circuit features of unit cell of metamaterial operating in this spec-trum is in the order of millimetres, which is sufficient to fulfill the requirement of metamaterials that the unit cell dimension must be a lot smaller than the wavelength of interest. As repetitive L-C unit cells in millimetre scale could be made with high precision and in large size without much technical difficulties, potential applications were first examined in microwave spectrum. Scaling the unit cells with sufficiently size precision among the repetitive cells for studies in shorter wavelength used to be challenging.

With emerging microelectronic fabrication techniques from etching, molding, elec-troplating, to laser 3-dimensional lithography and machining, it is now possible to create metamaterials with sub-micrometre features with high precision for potential applications in infrared spectrum. In recent years, there have

been increasing num-bers of publications proposing, simulating and testing metamaterials with sub-micrometre cells designed for near-infrared and infrared spectrum applications.

With more profound understanding of metamaterials and the recent emerging stud-ies for potential applications in visible-to-infrared spectrum among metamaterial R&D community, DRDC in 2011 began to examine closely the recent development of metamaterials in visible-to-infrared spectrum in view to create a knowledge base and R&D activities for DND and the CF clients. In order to support ongoing and future R&D activities on metamaterials, DRDC is soliciting scientific and technical support for studying metamaterial properties in the optical-to-infrared spectrum for potential military capabilities. This support will include:

- (1) Literature survey and analysis;
- (2) Guidance and recommendations on metamaterials and its applications;
- (3) Methodology, design, simulation and analysis;
- (4) Fabrication and characterization of metamaterial devices;
- (5) Documentation and report.

#### 1.4 Acronyms

SNR	Signal-to-noise ratio
LC	Inductance-capacitance
DND	Department of National Defence
DRDC	Defence R&D Canada
EM	Electromagnetic
EO	Electro-optical

## **2. SCOPE OF THE WORK**

In this Statement of work, the works are divided in two parts. The first part is Task 1 outlines specific activities and requirement which the supplier must perform after contract award. The second part is Task 2 under which the work to be performed is described in several sub-tasks which can be combined to form task authorizations.

### 2.1 Task 1: Low-index anisotropic metamaterials for beam focusing in EO detectors

Low-index anisotropic metamaterials (for example, permittivity  $E_{XX}=1$ ,  $E_{ZZ}=0.1$ ) must be used to refract and guide light. By tailoring these anisotropic metamaterials, it is possible to realize beam guiding and focusing capability at specific spectrum frequencies for EO detectors and imaging arrays. In this task, the supplier must design, simulate and analyse metamaterials for beam guiding and focusing in the 0.5 to 2.5 micrometre spectral range. This task consists of the following activities:

- Determine the electromagnetic properties of low index anisotropic metamaterials for light guiding and focusing
- Validate electromagnetic properties (permittivity, permeability, power flow, refraction, reflection, loss) of the low-index anisotropic metamaterials by simulations (plane waves and Gaussian beam)
- Design such low-index anisotropic metamaterials (physical dimensions and thicknesses, multiple layers or other configurations, selected materials)

- 
- Validate electromagnetic properties (permittivity, permeability, power flow, refraction, reflection, loss) of the designed low-index anisotropic metamaterials by simulations (plane waves and Gaussian beam)
  - Configure and design proper meta-structures based on the designed low index anisotropic metamaterials (hetero-junctions or other multiple element configurations) for beam guiding and focusing
  - Determine the improvement of using such selected meta-structures based on low-index anisotropic metamaterial on current EO imaging arrays according to DRDC inputs by comparing and analysing figure-of-merits of EO detectors and imaging arrays such as SNR, beam size and power distribution on detectors, signal loss, quantum efficiency, detectivity, cross-talk with and without such meta-structures
  - Determine feasible and realistic fabrication procedures for the meta-structures based on the designed low-index anisotropic metamaterials in hetero-junction or other multiple element configurations
  - Validate electromagnetic properties (permittivity, permeability, power flow, refraction, reflection, loss) of the meta-structures by simulations (plane waves and Gaussian beam)
  - Report all technical data and analysis

## 2.2 Task 2: Task authorization - Study, design, simulation, fabrication, characterization of metamaterials for new and enhanced electro-optical sensors and optics; and signature management.

The work to be performed is described in the following tasks. To complete each task authorization it may be required to combine one of the following tasks.

### (a): Perform literature survey and analysis

The supplier will provide services to perform literature survey and subsequent analysis regarding metamaterials potentially applicable to EO applications and capabilities specified by DRDC. This task may include, but not limited to the following activities:

- Literature survey in open literatures and patents for information and specifications related to metamaterials
- Analysis on the findings including but not limiting to current state-of-the-art designs (planar or 3D architecture design and fabrication, materials used such as metals, dielectrics or less metallic materials such as transparent-conducting ox-ides, bandwidth, tunability), performance (spectral transmission/absorption/reflection as function of incident angle, bandwidth, loss, polarization, tunability), and advantages and disadvantages

### (b): Analyse technical approaches and provide recommendations on metamaterials and its applications

The supplier will analyse technical approaches and provide recommendations on metamaterials applicable to EO applications and capabilities specified by DRDC). This task may include, but not limited to the following activities:

- Analyse DRDC approaches and concepts of metamaterials in association to EO applications
- Provide analytical results including advantages and disadvantages of these approaches (bandwidth, fabrication, transmission/absorption, loss, tunability)
- Propose recommendations or alternate approaches (designs, materials used) to those of DRDC's and associated analytical results including advantages and disadvantages (bandwidth, fabrication, transmission/absorption, loss, tunability)

**(c): Provide methodology and perform design, simulation and analysis**

The supplier will provide methodology on characterization of metamaterials applicable to specified EO applications and capabilities, and perform design, simulation and analysis. This task may include, but not limited to the following activities:

- Provide definition of scientific and technical methodology such as how to de-termine all relevant metamaterial parameters such as electrical permittivity and magnetic permeability, and refractive indices, transmission, absorption, emissivity with respect to incident wavelengths and polarizations in visible, midwave infrared (3 to 5 micrometre) and longwave infrared (8 to 12 micrometre) in infrared region, measurement of bandwidth and loss and tunability. Propose design and specification of metamaterials
- Perform electromagnetic wave simulations based on designs and specification of metamaterials in 2D planar and 3D free space such as power flow, transmission/absorption/reflection as function of angle, loss, tunability, bandwidth, spot size, polarization
- Analyse simulation results to establish correlations between designs(materials chosen, physical dimension, configurations) and simulated performance

**(d): Perform fabrication and characterization of metamaterial devices**

The supplier will fabricate and characterise the fabricated metamaterial devices. This task may include, but not limited to the following activities:

- Fabricate metamaterial devices based on designs approved by DRDC scientific authority, such as metamaterial devices such as filters, light guiding and focusing devices, tailored (spectral and/or directional) emissivity devices
- Perform electromagnetic (electrical, optical, magnetic) characterization as a function of wavelengths and polarization in laboratory such as transmission, re-flection, refraction, absorption, spot size and optical distortion in visible-to-infrared spectrum in 2D (planar) and 3D (free space), propagation of EM radiation within the metamaterial devices between entry and exit point/surface; distribution and uniformity of EM radiation on the surface
- Analyse the measurement results
- Compare the measurement results to simulation results obtained in Task c)

**3. REPORTS AND OTHER DELIVERABLES****3.1 Reports and other deliverables**

**The deliverables of Task 1** must consist of materials of the corresponding activities which are to be included in two progress reports and one final report. More specifically,

Progress Report 1 (Three weeks after task begins)

- Objective
- Methodology
- Electromagnetic properties of low index anisotropic metamaterials
- Simulation results (plane waves and Gaussian beam) of electromagnetic properties (permittivity, permeability, power flow, refraction, reflection, loss) of the low-index anisotropic metamaterials

Progress Report 2 (Six weeks after task begins)

- Objective
- Methodology
- Design (sketches and drawings) of the low-index anisotropic metamaterials including selected materials, physical dimensions, thicknesses, configurations
- Simulation results (plane waves and Gaussian beam) of electromagnetic properties (permittivity, permeability, power flow, refraction, reflection, loss) of the designed low-index anisotropic metamaterials

Final Report (Twelve weeks after task begins)

- Objective
- Methodology
- Design (sketches and drawings) of meta-structure based on the designed low-index anisotropic metamaterials
- Results of analysis of improvement (SNR, beam size, power distribution, signal loss, quantum efficiency, detectivity, cross-talk) of EO imaging array performance with the use of the meta-structure
- Fabrication procedure of meta-structure
- Simulation results (plane waves and Gaussian beam) of electromagnetic properties (permittivity, permeability, power flow, refraction, reflection, loss) of the meta-structure

The simulation work must be performed by recognised electromagnetic modelling work tools such as COMSOL Multiphysics, HFSS - High Frequency Structure Simulator, and CST - Computer Simulation Technology 3D EM Simulation, or equivalent.

The above to be included in progress reports or final report each in two paper copies and one electronic copy in Adobe PDF or MSWord in either official language.

**The deliverables of Task 2** must consist of the deliverables of the corresponding activities in a task or task(s) including progress reports, and a final report to summarize the results of all the activities performed in the tasks. For example, a progress report and final report should include the following items:

- Objective
- Methodology
- All data and results which include design, simulation, analysis, fabrication procedures, test setup and procedures, and CAD files, prototype metamaterials, meta-structure and devices based on designed metamaterials, test results of these prototype devices
- Recommendations

The simulation work must be performed by recognised electromagnetic modelling work tools such as COMSOL Multiphysics, HFSS - High Frequency Structure Simulator, and CST - Computer Simulation Technology 3D EM Simulation, or equivalent.

The above to be included in progress reports or final report each in two paper copies and one electronic copy in Adobe PDF or MSWord in either official language.

### 3.3 Publications

Any manuscript for publication in magazines, newspapers or other, including presentation summaries or other types of publication, must be submitted to the Technical Authority for revision and approval at least ninety (90) days before the date of the presentation or publication. An explicit reference regarding federal government funding must be included, and it must be clearly mentioned that the content is the authors' responsibility. The Technical Authority will provide a written objection if there are specific elements (e.g.



audience) that are not in the federal government's best interests. If the Technical Authority objects in writing, he/she shall send the written objection to the organization responsible for publication (the newspaper or conference).

#### **4. MEETINGS**

Any manuscript for publication in magazines, newspapers or other, including presentation summaries or other types of publication, must be submitted to the Technical Authority for revision and approval at least ninety (90) days before the date of the presentation or publication. An explicit reference regarding federal government funding must be included, and it must be clearly mentioned that the content is the authors' responsibility. The Technical Authority will provide a written objection if there are specific elements (e.g. audience) that are not in the federal government's best interests. If the Technical Authority objects in writing, he/she shall send the written objection to the organization responsible for publication (the newspaper or conference).

#### **5. GOVERNMENT SUPPLIED MATERIAL (GSM) (in French - MFG - Matériel fournis par le gouvernement)**

None.

#### **6. GOVERNMENT FURNISHED EQUIPMENT (GFE) (in French - EFG - Équipement fourni par le gouvernement)**

None.

#### **7. WORK LOCATION**

The Contractor must conduct the work at his own premises.

## ANNEX B - BASIS OF PAYMENT

### Section A - For the work of task 1 (as described in the Statement of Work - Annex A):

1. LABOUR : Firm all-inclusive rates (including profit and overhead, applicable taxes extra), in accordance with the following:

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate		
	A From April 1st 2014 to March 31, 2015	B Total est. number of hours	C Extended cost per resource (A X B)
Labour Category :  Engineer/scientist (investigator/supervisor)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Technican/support staff (1)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Technican/support staff (2)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Engineer/scientist (research assistant) (1)  Name of the proposed ressource:	\$ _____ /hour	_____ hours	\$ _____

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate		
	A From April 1st 2014 to March 31, 2015	B Total est. number of hours	C Extended cost per resource (A X B)
_____			
Labour Category :  Engineer/scientist (research assistant) (2)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____
Labour Category :  Engineer/scientist (research assistant) (3)  Name of the proposed ressource:  _____	\$ _____ /hour	_____ hours	\$ _____

TOTAL ESTIMATED LABOUR: \$ \_\_\_\_\_

## 2. EQUIPMENT: at laid down cost without markup

Description	Estimated price	Total est. Qty.
(a)	\$ _____	
(b)	\$ _____	
(c)	\$ _____	
(d)	\$ _____	
(e)	\$ _____	

TOTAL ESTIMATED EQUIPMENT: \$ \_\_\_\_\_

## 3. RENTALS : at actual cost without markup

Description	Estimated price	Total est. Qty.
(a)	\$	
(b)	\$	
(c)	\$	
(d)	\$	
(e)	\$	

TOTAL ESTIMATED RENTALS: \$ \_\_\_\_\_

## 4. MATERIALS AND SUPPLIES: at laid down cost without markup

Description	Estimated price	Total est. Qty.
(a)	\$	
(b)	\$	
(c)	\$	
(d)	\$	
(e)	\$	

TOTAL ESTIMATED MATERIALS AND SUPPLIES: \$ \_\_\_\_\_

## 5. SUBCONTRACTS: at actual cost without markup

Support for the proposed subcontractor's price is required in the same details as that required for the Bidder's price. The estimated price for subcontracts should include all direct charges and travel & living expenses which would be to the account of the subcontractor.

TOTAL ESTIMATED SUBCONTRACTS: \$ \_\_\_\_\_

6. TRAVEL & LIVING: at actual cost without markup but not to exceed the limits of the Treasury Board Travel Directive. With respect to the TB Travel Directive, only the meal, private vehicle and incidental allowances specified in Appendices B, C and D of the TB Travel Directive <http://www.tbs-sct.gc.ca/hr-rh/gtla-vgcl/> and the other provisions of the directive referring to "travellers" rather than those referring to "employees", are applicable.

TOTAL ESTIMATED TRAVEL &amp; LIVING: \$ \_\_\_\_\_

**TOTAL ESTIMATED COST TO LIMITATION OF EXPENDITURE for the work of Task 1 : \$ 60,000.00  
(applicable taxes extra)**

Solicitation No. - N° de l'invitation

W7701-145749/C

Amd. No. - N° de la modif.

File No. - N° du dossier

QCN-3-36177

Buyer ID - Id de l'acheteur

qcn015

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

W7701-14-5749

CCC No./N° CCC - FMS No/ N° VME

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**Section B - For the work of task 2 (as described in the Statement of Work - Annex A):**

1. LABOUR : Firm all-inclusive rates (including profit and overhead, applicable taxes extra), in accordance with the following:

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate			
	A From April 1st 2014 to March 31, 2015	B From April 1st 2015 to March 31, 2016	C From April 1st 2016 to March 31, 2017	D From April 1st 2017 to March 31, 2018
Labour Category :  Engineer/scientist (investigator/ supervisor)  Name of the proposed ressource: _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Technician/support staff (1)  Name of the proposed ressource: _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Technician/support staff (2)  Name of the proposed ressource: _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Engineer/scientist (research assistant) (1)  Name of the proposed ressource: _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour

Labour Categories and name of the proposed resources	Firm all-inclusive Hourly Rate			
	A From April 1st 2014 to March 31, 2015	B From April 1st 2015 to March 31, 2016	C From April 1st 2016 to March 31, 2017	D From April 1st 2017 to March 31, 2018
Labour Category :  Engineer/scientist (research assistant) (2)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour
Labour Category :  Engineer/scientist (research assistant) (3)  Name of the proposed resource:  _____	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour	\$ _____ /hour

2. EQUIPMENT: at laid down cost without markup
3. RENTALS : at actual cost without markup
4. MATERIALS AND SUPPLIES: at laid down cost without markup
5. SUBCONTRACTS: at actual cost without markup
6. TRAVEL & LIVING: at actual cost without markup but not to exceed the limits of the Treasury Board Travel Directive. With respect to the TB Travel Directive, only the meal, private vehicle and incidental allowances specified in Appendices B, C and D of the TB Travel Directive <http://www.tbs-sct.gc.ca/hr-rh/gtla-vgcl/> and the other provisions of the directive referring to "travellers" rather than those referring to "employees", are applicable.

**TOTAL ESTIMATED COST TO LIMITATION OF EXPENDITURE for the work of task 2 : \$ 790 000.00**  
**(applicable taxes extra)**

Solicitation No. - N° de l'invitation

W7701-145749/C

Amd. No. - N° de la modif.

Buyer ID - Id de l'acheteur

qcn015

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

File No. - N° du dossier

CCC No./N° CCC - FMS No/ N° VME

W7701-14-5749

QCN-3-36177

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## **ANNEX "C" - DND 626 TASK AUTHORIZATION FORM**

The *Form DND 626, Task Authorization* appended to the Solicitation file is to be inserted at this point and forms part of this document.



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## ANNEX D

### CONTRACTOR DISCLOSURE OF FOREGROUND INFORMATION

Please see reference applicable in your contract to look into Article 1 - Interpretation of 2040 General Conditions to obtain the complete definition of the term Foreground Information and thus to help you to determine the information which must be revealed. <http://sacc.pwgsc.gc.ca/sacc/query-e.jsp>.

The Contractor shall respond to the following questions:

1. Contract No.:
2. What is the descriptive title of the FIP (Foreground Intellectual Property)?
3. Abbreviated description of the FIP and, if applicable, of the different systems and sub-systems.
4. What is or was the objective of the project?
5. Explain how the FIP meets the objective of the project (for example: the advantage of the new solution, what problem did the FIP resolve or what benefits did the FIP deliver).
6. Under which category (ies) would you best describe the FIP and why: Patents, Inventions, Trade Secrets, Copyright, Industrial Designs, Rights in Integrated Circuit Topography, Know-how, Other?
7. Describe the features or aspects of the FIP that are novel, useful and not obvious.
8. Has the FIP been tested or demonstrated? If yes, please summarise the results.
9. Has any publication or disclosure to others been made? If so, to whom, when, where and how?
10. Provide names and addresses of the inventors.
11. Provide an explicit and detailed description of the FIP developed during the contract (Refer to pertinent section of the technical report, if necessary).

Please specify name and position of person approving / authorizing this disclosure. This person is to sign and date the disclosure.

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

\_\_\_\_\_  
Date

(Internal DRDC Valcartier)

\_\_\_\_\_  
Nom

Titre : (Technical authority)

\_\_\_\_\_  
Date

## **Annex C**

### **Form DND 626, Task Authorization**



**TASK AUTHORIZATION**  
**AUTORISATION DES TÂCHES**

All invoices/progress claims must show the reference Contract and Task numbers. Toutes les factures doivent indiquer les numéros du contrat et de la tâche.		Contract no. – N° du contrat
		Task no. – N° de la tâche
Amendment no. – N° de la modification		Increase/Decrease – Augmentation/Réduction
		Previous value – Valeur précédente
To – À	<b>TO THE CONTRACTOR</b>  You are requested to supply the following services in accordance with the terms of the above reference contract. Only services included in the contract shall be supplied against this task.  Please advise the undersigned if the completion date cannot be met. Invoices/progress claims shall be prepared in accordance with the instructions set out in the contract.	
Delivery location – Expédiez à	<b>À L'ENTREPRENEUR</b>  Vous êtes prié de fournir les services suivants en conformité des termes du contrat mentionné ci-dessus. Seuls les services mentionnés dans le contrat doivent être fournis à l'appui de cette demande.  Prière d'aviser le signataire si la livraison ne peut se faire dans les délais prescrits. Les factures doivent être établies selon les instructions énoncées dans le contrat.	
Delivery/Completion date – Date de livraison/d'achèvement	Date	for the Department of National Defence pour le ministère de la Défense nationale
Contract item no. N° d'article du contrat	Services	Cost Prix
		GST/HST TPS/TVH
		Total
APPLICABLE ONLY TO PWGSC CONTRACTS: The Contract Authority signature is required when the total value of the DND 626 exceeds the threshold specified in the contract.		
NE S'APPLIQUE QU'AUX CONTRATS DE TPSGC : La signature de l'autorité contractante est requise lorsque la valeur totale du formulaire DND 626 est supérieure au seuil précisé dans le contrat.		
for the Department of Public Works and Government Services pour le ministère des Travaux publics et services gouvernementaux		

## Instructions for completing DND 626 - Task Authorization

### Contract no.

Enter the PWGSC contract number in full.

### Task no.

Enter the sequential Task number.

### Amendment no.

Enter the amendment number when the original Task is amended to change the scope or the value.

### Increase/Decrease

Enter the increase or decrease total dollar amount including taxes.

### Previous value

Enter the previous total dollar amount including taxes.

### To

Name of the contractor.

### Delivery location

Location where the work will be completed, if other than the contractor's location.

### Delivery/Completion date

Completion date for the task.

### for the Department of National Defence

Signature of the DND person who has delegated **Authority** for signing DND 626 (level of authority based on the dollar value of the task and the equivalent signing authority in the PAM 1.4). **Note:** the person signing in this block ensures that the work is within the scope of the contract, that sufficient funds remain in the contract to cover this task and that the task is affordable within the Project/Unit budget.

### Services

Define the requirement briefly (attach the SOW) and identify the cost of the task using the contractor's quote on the level of effort. The Task must use the basis of payment stipulated in the contract. If there are several basis of payment then list here the one(s) that will apply to the task quote (e.g. milestone payments; per diem rates/labour category hourly rates; travel and living rates; firm price/ceiling price, etc.). All the terms and conditions of the contract apply to this Task Authorization and cannot be ignored or amended for this task. Therefore it is not necessary to restate these general contract terms and conditions on the DND 626 Task form.

### Cost

The cost of the Task broken out into the individual costed items in **Services**.

### GST/HST

The GST/HST cost as appropriate.

### Total

The total cost of the task. The contractor may not exceed this amount without the approval of DND indicated on an amended DND 626. The amendment value may not exceed 50% (or the percentage for amendments established in the contract) of the original value of the task authorization. The total cost of a DND 626, including all amendments, may not exceed the funding limit identified in the contract.

### Applicable only to PWGSC contracts

This block only applies to those Task Authorization contracts awarded by PWGSC. The contract will include a specified threshold for DND sole approval of the DND 626 and a percentage for DND to approve amendments to the original DND 626. Tasks that will exceed these thresholds must be passed to the PWGSC Contracting Authority for review and signature prior to authorizing the contractor to begin work.

### Note:

Work on the task may not commence prior to the date this form is signed by the DA Authority - for tasks within the DND threshold; and by both DND and PWGSC for those tasks over the DND threshold.

## Instructions pour compléter le formulaire DND 626 - Autorisation des tâches

### N° du contrat

Inscrivez le numéro du contrat de TPSGC en entier.

### N° de la tâche

Inscrivez le numéro de tâche séquentiel.

### N° de la modification

Inscrivez le numéro de modification lorsque la tâche originale est modifiée pour en changer la portée.

### Augmentation/Réduction

Inscrivez le montant total de l'augmentation ou de la diminution, y compris les taxes.

### Valeur précédente

Inscrivez le montant total précédent, y compris les taxes.

### À

Nom de l'entrepreneur.

### Expédiez à

Endroit où le travail sera effectué, si celui-ci diffère du lieu d'affaires de l'entrepreneur.

### Date de livraison/d'achèvement

Date d'achèvement de la tâche.

### pour le ministère de la Défense nationale

Signature du représentant du MDN auquel on a délégué le **pouvoir d'approbation** en ce qui a trait à la signature du formulaire DND 626 (niveau d'autorité basé sur la valeur de la tâche et le signataire autorisé équivalent mentionné dans le MAA 1.4). **Nota :** la personne qui signe cette attache de signature confirme que les travaux respectent la portée du contrat, que suffisamment de fonds sont prévus au contrat pour couvrir cette tâche et que le budget alloué à l'unité ou pour le projet le permet.

### Services

Définissez brièvement le besoin (joignez l'ET) et établissez le coût de la tâche à l'aide de la soumission de l'entrepreneur selon le niveau de difficulté de celle-ci. Les modalités de paiement stipulées dans le contrat s'appliquent à la tâche. Si plusieurs d'entre elles sont prévues, énumérez ici celle/celles qui s'appliquera/ront à la soumission pour la tâche à accomplir (p.ex. acompte fondé sur les étapes franchies; taux quotidien ou taux horaire établi selon la catégorie de main-d'œuvre; frais de déplacement et de séjour; prix fixe ou prix plafond; etc.). Toutes les modalités du contrat s'appliquent à cette autorisation de tâche et ne peuvent être négligées ou modifiées quant à la tâche en question. Il n'est donc pas nécessaire de répéter ces modalités générales afférentes au contrat sur le formulaire DND 626.

### Prix

Mentionnez le coût de la tâche en le répartissant selon les frais afférents à chaque item mentionné dans la rubrique **Services**.

### TPS/TVH

Mentionnez le montant de la TPS/TVH, s'il y a lieu.

### Total

Mentionnez le coût total de la tâche. L'entrepreneur ne peut dépasser ce montant sans l'approbation du MDN, formulaire DND 626 modifié à l'appui. Le coût de la modification ne peut pas être supérieur à 50 p. 100 du montant initial prévu dans l'autorisation de tâche (ou au pourcentage prévu dans le contrat pour les modifications). Le coût total spécifié dans le formulaire DND 626, y compris toutes les modifications, ne peut dépasser le plafond de financement mentionné dans le contrat.

### Ne s'applique qu'aux contrats de TPSGC

Le présent paragraphe s'applique uniquement aux autorisations de tâche accordées par TPSGC. On inscrira dans le formulaire DND 626 un plafond précis qui ne pourra être approuvé que par le MDN et un pourcentage selon lequel le MDN pourra approuver des modifications au formulaire DND 626 original. Les tâches dont le coût dépasse ces plafonds doivent être soumises à l'autorité contractante de TPSGC pour examen et signature avant qu'on autorise l'entrepreneur à débiter les travaux.

### Nota :

Les travaux ne peuvent commencer avant la date de signature de ce formulaire par le responsable du MDN, pour les tâches dont le coût est inférieur au plafond établi par le MDN, et par le MDN et TPSGC pour les tâches dont le coût dépasse le plafond établi par le MDN.