

**RETURN BIDS TO:  
RETOURNER LES SOUMISSIONS À:**  
**Bid Receiving Public Works and Government  
Services Canada/Réception des soumissions  
Travaux publics et Services gouvernementaux  
Canada**  
**1713 Bedford Row  
Halifax, N.S./Halifax, (N.É.)  
B3J 1T3  
Bid Fax: (902) 496-5016**

**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> MODELLING OF ACOUSTIC PROPERTIES	
<b>Solicitation No. - N° de l'invitation</b> W7707-145685/A	<b>Date</b> 2013-09-30
<b>Client Reference No. - N° de référence du client</b> W7707-14-5685	
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$HAL-208-9091	
<b>File No. - N° de dossier</b> HAL-3-71077 (208)	<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 2013-10-16</b>	<b>Time Zone</b> <b>Fuseau horaire</b> Atlantic Daylight Saving Time ADT
<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> LeBlanc, JoAnne	<b>Buyer Id - Id de l'acheteur</b> hal208
<b>Telephone No. - N° de téléphone</b> (902) 496-5010 ( )	<b>FAX No. - N° de FAX</b> (902) 496-5016
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> DEPARTMENT OF NATIONAL DEFENCE 9 GROVE ST DARTMOUTH NOVA SCOTIA B3A3C5 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> See Herein	<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**  
Acquisitions  
1713 Bedford Row  
Halifax, N.S./Halifax, (N.É.)  
B3J 3C9

**Title: Finite Element Modelling of the Acoustic Properties of Rubber Containing Inclusions****TABLE OF CONTENTS****PART 1 - GENERAL INFORMATION**

1. Security Requirement
2. Statement of Work
3. Debriefings

**PART 2 - BIDDER INSTRUCTIONS**

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

**PART 3 - BID PREPARATION INSTRUCTIONS**

1. Bid Preparation Instructions

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

1. Evaluation Procedures
2. Basis of Selection

**PART 5 - CERTIFICATIONS**

1. Mandatory Certifications Required Precedent to Contract Award
2. Additional Certifications Precedent to Contract Award

**PART 6 - RESULTING CONTRACT CLAUSES**

1. Security Requirement
2. Statement of Work
3. Standard Clauses and Conditions
4. Term of Contract
5. Authorities
6. Proactive Disclosure of Contracts with Former Public Servants
7. Payment
8. Invoicing Instructions
9. Certifications
10. Applicable Laws
11. Priority of Documents
12. Defence Contract
13. SACC Manual Clauses

**List of Annexes:**

- Annex A - Statement of Work  
Annex B - Basis of Payment

Solicitation No. - N° de l'invitation

W7707-145685/A

Amd. No. - N° de la modif.

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Buyer ID - Id de l'acheteur

hal208

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W7707-14-5685

CCC No./N° CCC - FMS No/ N° VME

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## Annex C - Evaluation Criteria

## **PART 1 - GENERAL INFORMATION**

### **1. Security Requirement**

There is no security requirement associated with this bid solicitation.

### **2. Statement of Work**

The work will be performed as per the Annex "A" - Statement of Work, attached herein.

### **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 (2013-06-01) 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: ninety (90) days

### **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 electronic mail to PWGSC will not be accepted.

### **3. Former Public Servant**

Contracts with 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, bidders must provide the information required below.

## 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 Bidder a FPS in receipt of a pension? **Yes ( ) No ( )**

If so, the Bidder 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, Bidders agree that the successful Bidder'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 Reduction Program

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? **Yes ( ) No ( )**

If so, the Bidder 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 reduction 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 seven (7) 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 Nova Scotia.

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

### PART 3 - BID PREPARATION INSTRUCTIONS

#### 1. Bid Preparation Instructions

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

Section I: Technical Bid (two copies)  
 Section II: Financial Bid (one copy)  
 Section III: Certifications (one copy) **Bidder must submit the certifications required under Part 5.**

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>). 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 explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

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

Bidders must submit their financial bid in accordance with the Basis of Payment. The total amount of Applicable Taxes must be shown separately.

### **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.
- (c) The evaluation team will determine first if there are three (3) or more bids with a valid Canadian Content certification. In that event, the evaluation process will be limited to the bids with the certification; otherwise, all bids will be evaluated. If some of the bids with a valid certification are declared non-responsive, or are withdrawn, and less than three responsive bids with a valid certification remain, the evaluation will continue among those bids with a valid certification. If all bids with a valid certification are subsequently declared non-responsive, or are withdrawn, then all the other bids received will be evaluated.

#### **1.1 Technical Evaluation**

Point Rated Technical Criteria are listed herein in Annex "C".

### **2. Basis of Selection**

#### **2.1 Highest Rated Within Budget**

1. To be considered responsive, a bid must:

- (a) comply with all the requirements of the bid solicitation;
- (b) meet all mandatory technical evaluation criteria; and
- (c) obtain the required minimum of 250 points for each of the technical and management criteria specified in the solicitation, and have a combined score of not less than 600 points. The total overall rating is performed on a scale of 800 points.

2. Bids not meeting (a) or (b) or (c) will be declared non responsive.. The responsive bid with the highest number of points will be recommended for award of a contract, provided that the total evaluated price does not exceed the budget available for this requirement. The maximum funding available for the Contract resulting from the bid solicitation is \$60,000.00 (Goods and Services Tax or Harmonized Sales Tax extra, as appropriate). This disclosure does not commit Canada to pay the maximum funding available. In the case of a tie the bid with the highest technical proposal will be recommended.

## **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" 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

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

### 2.1.2 This procurement is conditionally limited to Canadian services.

Subject to the evaluation procedures contained in the bid solicitation, bidders acknowledge that only bids with a certification that the service offered is a Canadian service, as defined in clause A3050T, may be considered.

Failure to provide this certification completed with the bid will result in the service offered being treated as a non-Canadian service.

#### The Bidder certifies that:

( ) the service offered is a Canadian service as defined in paragraph 2 of clause A3050T.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## PART 6 - RESULTING CONTRACT CLAUSES

### 1. Security Requirement

There is no security requirement applicable to this Contract.

### 2. Statement of Work

The Contractor must perform the Work in accordance with the Statement of Work at Annex "A".

### 3. 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.

### 3.1 General Conditions

SACC Manual Clause 2010B (2013-06-27), General Conditions - Professional Services (Medium Complexity) apply to and form part of the Contract.

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

##### **4.1 Period of the Contract**

The work will be performed from date of contract award, and completed by March 15, 2014.

#### **5. Authorities**

##### **5.1 Contracting Authority**

The Contracting Authority for the Contract is:

JoAnne LeBlanc  
Supply Officer  
Public Works and Government Services Canada  
Acquisitions Branch  
1713 Bedford Row  
Halifax, Nova Scotia B3J 3C9  
Telephone: 902-496-5010  
Facsimile: 902-496-5016  
Email: JoAnne.LeBlanc3@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.

##### **5.2 Project Authority**

The Project Authority for the Contract is: Will be completed upon contract award.

The Project 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 Project Authority, however the Project 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.

##### **5.3 Contractor's Representative (to be completed by supplier)**

Contractor Contact Name: \_\_\_\_\_  
Business Name: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Email: \_\_\_\_\_  
Procurement Business Number: \_\_\_\_\_

## 6. 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.

## 7. Payment

### 7.1 Basis of Payment

The Contractor will be reimbursed for the costs reasonably and properly incurred in the performance of the work, as determined in accordance with the prices quoted in accordance with Annex B, Basis of Payment.

### 7.2 Limitation of Expenditure

1) Canada's total liability to the Contractor under the Contract must not exceed \$\_\_\_\_\_ 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.

### 7.3 Method of Payment - Progress Payments

1. Canada will make milestone payments in accordance with the Schedule of Milestones detailed in the Contract and the payment provisions of the Contract, 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, Claim for Progress Payment, and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;

(b) the total amount for all milestone payments paid by Canada does not exceed total amount to be paid under the Contract;

(c) all the certificates appearing on form PWGSC-TPSGC 1111 have been signed by the respective authorized representatives;

(d) all work associated with the milestone and as applicable any deliverable required have been completed and accepted by Canada.

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.

## **8. Invoicing Instructions - Progress Claims**

1. The Contractor must submit a claim for payment using form PWGSC-TPSGC 1111 (<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) a list of all expenses;
- (d) expenditures plus pro-rated profit or fee;
- (e) the description and value of the milestone claimed as detailed in the Contract.

### Each claim must be supported by:

- (a) a copy of the invoices, receipts, vouchers for all direct expenses, travel and living expenses;
- (b) a copy of the monthly progress report, if applicable.

2. Goods and Services Tax or Harmonized Sales Tax (GST/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.

3. 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 Project Authority identified under the section entitled "Authorities" of the Contract for appropriate certification after inspection and acceptance of the Work takes place.

The Project Authority will then forward the original and two (2) copies of the claim to the Contracting Authority for certification and onward submission to the Payment Office for the remaining certification and payment action.

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

## **9. Certifications**

## 9.1 Compliance

Compliance with the certifications and related documentation provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the term of the Contract. If the Contractor does not comply with any certification, provide the related documentation or if 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.

## 9.2 SACC Manual Clauses

SACC Manual Clause A3060C (2008-05-12) Canadian Content Certification.

## 10. Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in Nova Scotia.

## 11. 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) 2010B (2013-06-27) General Conditions - Professional Services (Medium Complexity);
- (c) Annex A, Statement of Work;
- (d) Annex B, Basis of Payment;
- (e) the Contractor's bid dated \_\_\_\_\_ .

## 12. Defence Contract

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

## 13. SACC Manual Clauses

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

### List of Annexes:

Annex A - Statement of Work  
Annex B - Basis of Payment

Solicitation No. - N° de l'invitation

W7707-145685/A

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CCC No./N° CCC - FMS No/ N° VME

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**ANNEX "A"**  
**STATEMENT OF REQUIREMENT**

Title: Finite Element Modelling of the Acoustic Properties of Rubber Containing Inclusions

**Attached herein.**

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**ANNEX "B"**  
**BASIS OF PAYMENT**

Your Financial Bid will be used to determine the Basis of Payment. Negotiation of the pricing basis may be required. If the proposed hourly rates are not those negotiated with PWGSC, detailed financial data should be provided if required.

Labour: For each individual and/or labour category to be employed on the project, indicate the proposed hourly rate (including overhead, excluding profit) and the estimated time to be spent by each.

\$ \_\_\_\_\_

Other Direct Charges:

Equipment: Identify the items required to complete the work and identify the pricing basis inclusive of customs duty. These items will be delivered to Canada upon completion of the project.

Materials, Supplies, Components: Indicate general categories and the pricing basis. Indicate whether the items are likely to be used or consumed during the course of the Work.

Other Charges: Identify any other direct charges anticipated such as long distance communication and rentals and provide the estimated costs and relevance to the proposed work.

\$ \_\_\_\_\_

Subcontracts: Identify potential subcontractors and provide the same cost breakdown information detailed herein.

\$ \_\_\_\_\_

Profit: State your proposed profit, if any, and the basis on which it is computed and applied.

\$ \_\_\_\_\_

**Total Estimated Price (excluding HST/GST):** \_\_\_\_\_

**Harmonized or Goods and Services Taxes (HST/GST) must be identified separately.**

### **ANNEX "C"** **EVALUATION CRITERIA**

The Technical and Management proposals will be evaluated and scored in accordance with the following evaluation criteria. It is suggested that bidders address these criteria in sufficient detail in their proposals.

#### **Technical Proposal (maximum 400 points, minimum 250 points)**

- a) Demonstrated understanding of the relevant subject area, as well as objectives of the requirement. (100 points)
- b) Proposed work feasibility, approach, and methodology. (100 points)
- c) Recognition of direct as well as peripheral problems and solutions proposed. (100 points)
- d) Adequacy of level of effort, work plan, schedule, and deliverables. (100 points)

#### **Management Proposal (maximum 400 points, minimum 250 points)**

- a) Proposed management of the project and the demonstrated qualifications and experience of the project manager, including: position within the organization, relevant experience, education, and demonstrated ability to control costs. (50 points)
- b) Demonstrated key personnel capability - qualification, competence, and practical experience in relevant areas. (150 points)
- c) Demonstrated company capability including subcontractors, if applicable - relevant practical experience and competence proven by previous work on projects in relevant areas. (150 points)
- d) Adequacy of planned team organisation, including availability of team members and backup capability, reporting structure, management of project, subcontracts and capability to carry out the project within the time frame allotted. (50 points)

Responsive bidders must meet a minimum score of 250 for both the technical and management proposals, and have an overall score not less than 600.

#### **Total Points: 800 points**

#### **Basis of Selection**

1. To be considered responsive, a bid must:

- (a) meet all the mandatory requirements of the solicitation; and
- (b) obtain the required minimum score of 250 points for each of the technical and management criteria specified in the solicitation, and have a combined score of not less than 600. The total overall rating is performed on a scale of 800 points.

2. Bids not meeting (a) or (b) above will be given no further consideration. The responsive bid with the highest overall points within the stated budget will be recommended for award of a contract.



## **REQUIREMENT**

### **Title**

Finite Element Modelling of the Acoustic Properties of Rubber Containing Inclusions

### **Requirement**

Finite element modelling tools for underwater acoustic materials that contain various types of inclusions (such as air voids, fibres, and fillers) shall be developed and validated.

See Appendix A, Statement of Work.

### **Security:**

All work is unclassified and the contractor will not have access to any classified information.

### **Intellectual Property**

This requirement has been reviewed in accordance with "Basis for DRDC Ownership of Intellectual Property Arising from DRDC Contracts" form and it has been determined that the Intellectual Property arising from this requirement should rest with the Contractor.

### **Time Schedule**

Start: On contract award  
Completion: 15 March 2014

### **Deliverables**

In addition to the return of all non-expended items (equipment, software, books, etc.) acquired by the contractor in support of this requirement and claimed for against the contract, the deliverables shall be:

- Finite element model files and example calculations
- Matlab or other code written in support of this work
- Results of calculations performed in electronic format (Matlab or ASCII file format)
- Monthly progress reports.
- Final report.

### **Reports**

In addition to brief monthly progress reports, there shall be a final report due at the completion of the contract. As directed by the Project Authority, DRDC Atlantic requires an electronic copy of the reports.

**Report Standard and Format**

Reports will be to a standard acceptable to the Project Authority. Should a report not be in accordance with the requirement of the work, the Project Authority shall have the right to reject it or require its correction.

**Travel and Living**

None anticipated.

**Contractor Personnel**

All contractor personnel shall be named in the contract. All proposed changes in contractor personnel shall be addressed by the contractor to Public Works and Government Services Canada who in turn will request DRDC Atlantic's approval.

**Government Furnished Equipment (GFE)**

None.

**DRDC Atlantic Support, Facilities and Responsibilities**

None.

**Controlled Goods**

The contractor will not require access to controlled goods.

**Control Procedures**

Inspection shall be by and to the satisfaction of the Project Authority.

Progress will be monitored through brief monthly written reports submitted with progress claims and regular consultations between the contractor and the Project Authority. The work shall be deemed 100% complete upon receipt and approval of the draft final report by the Project Authority. The contractor must allow time for editorial review of the draft report by the Project Authority and agree to make minor editorial changes. Upon receipt of the Final Report and other deliverables, and upon receipt of a Claim for Holdback, the holdback will be released.

**Approval Prior To Publication**

All manuscripts for publication in scientific journals or the like, abstracts of oral presentations and any releases that describe portions of the contract work or related information shall be submitted to the Project Authority for approval of release. If the inadvertent presence of either defence classified or proprietary material is determined, the Project Authority will consult with the contractor to redraft the relevant sections to their joint satisfaction to produce an unclassified text or theme without sensitive information. Review of manuscripts and releases will be completed within two months after receipt. Review of abstracts and any other releases will proceed rapidly and approval of release will follow without delay.

## **Appendix A: Statement of Work**

### Finite Element Modelling of the Acoustic Properties of Rubber Containing Inclusions

#### **Objective:**

The purpose of this work is to develop finite element modelling tools for investigating the acoustic properties of elastomeric materials containing various types of inclusions, and to use these tools to study a number of examples from the literature, as well as cases provided by the Project Authority.

#### **Requirement**

Defence R&D Canada – Atlantic has a requirement for the development of easy-to-use modelling tools for underwater acoustic materials that contain various types of inclusions, such as air voids, fibres, and fillers. This Statement of Work describes in general terms the tasks that are to be carried out under the contract. It is expected that proposals will include:

- Sufficient discussion of the relevant literature to demonstrate an understanding of the acoustic behaviour of polymers containing various types of inclusions, as well as competence in developing and using appropriate modelling techniques.
- A detailed work plan that describes the technical approach that will be used, the software that will be written or utilized, and a schedule that includes tasks, milestones, and deliverables.

#### **Problem Description**

Consider a system consisting of four layers, as illustrated in Figure 1. Layers 1 and 4 are semi-infinite half spaces containing fluids (such as air or water). The fluid in Layer 1 is defined by a sound speed  $c_1$ , attenuation coefficient  $\alpha_1$ , and density  $\rho_1$ . The fluid in Layer 4 is defined by a sound speed  $c_4$ , attenuation coefficient  $\alpha_4$ , and density  $\rho_4$ . The type of fluid in Layer 1 could be different than Layer 4 (for example air on one side of the panel and water on the other side).

An infinite size panel is inserted between the two fluid half-spaces. The panel contains two layers: a viscoelastic matrix with one or more types of inclusions arranged in a periodic array, and a hard backing material (such as a metal or glass reinforced composite material). For convenience these two layers will be referred to as the viscoelastic layer and the metal layer. The inclusions in the viscoelastic matrix could be large air voids of various geometries (sphere, cylinder, ellipse), solid particles, or a more complicated geometry such as coated particles [1]. The inclusions are arranged in a periodic array. The two layers in the panel may be arranged such that the viscoelastic layer faces the sound source (Figure 1a) or the metal layer faces the sound source (Figure 1b). The properties of the viscoelastic matrix may be defined by its density  $\rho$ , and frequency dependent Young's modulus  $E^*$  and Poisson's ratio  $\nu$ , where the asterisk indicates that the properties are complex valued. Alternatively, the viscoelastic matrix material properties may be defined by its acoustic properties

where the subscripts  $L$  and  $G$  refer to longitudinal and shear deformation, respectively. In order to keep the problem as general as possible, the metal layer properties may be described in a similar manner to the viscoelastic matrix, that is with frequency dependent properties. The thicknesses of the viscoelastic and metallic layers are variable and may be set to zero for some calculations.

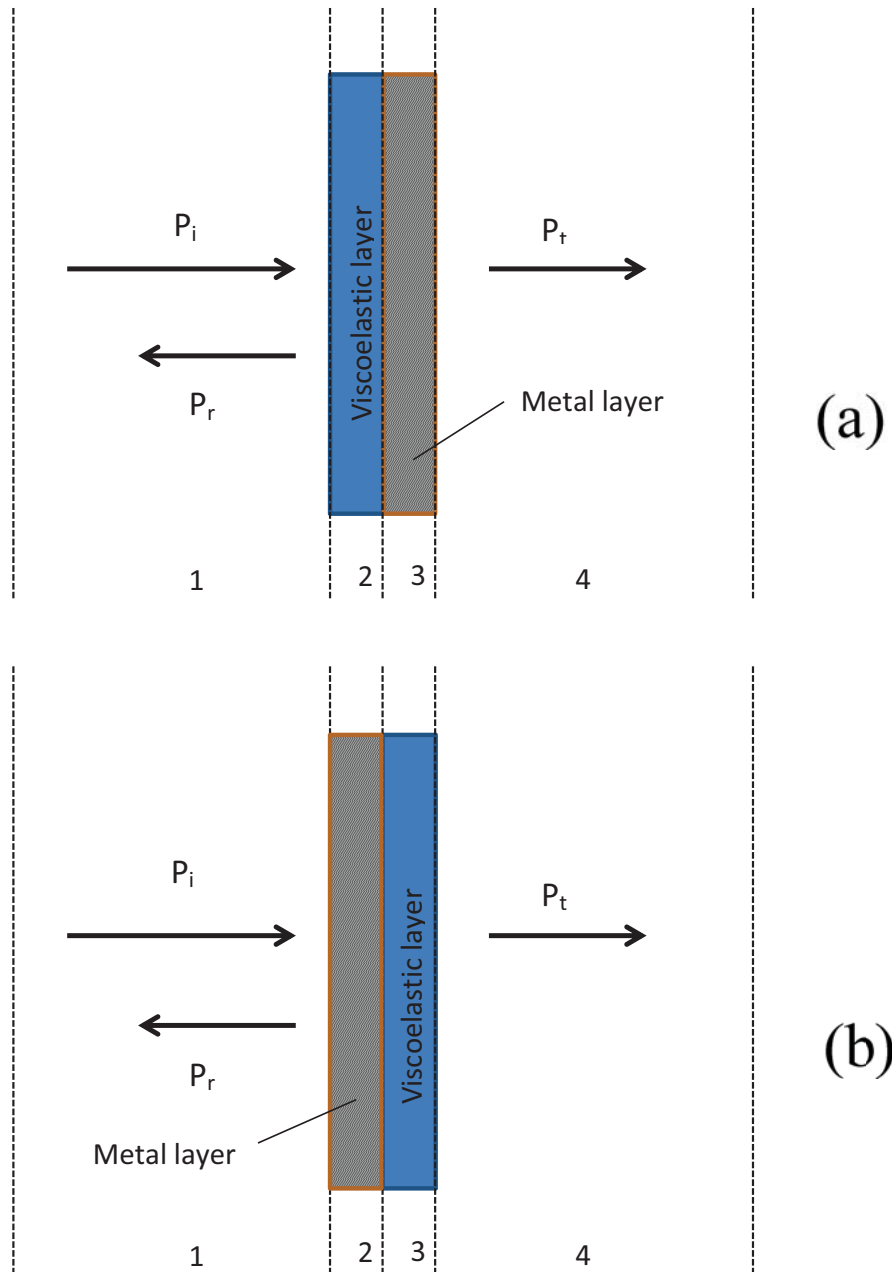


Figure 1. Diagram showing layered system being insonified by a plane acoustic wave.

A plane acoustic wave with pressure amplitude  $P_i$  is incident on Layer 2. The transmitted and reflected pressure amplitudes are  $P_t$  and  $P_r$ , respectively. The goal is to calculate the frequency dependent reflection and transmission coefficients, defined by:

$$R = \frac{P_r}{P_i} \quad (1)$$

$$T = \frac{P_t}{P_i} \quad (2)$$

The panel may be oriented at normal incidence to the plane wave (Figure 1), or it may vary from this orientation (Figure 2).

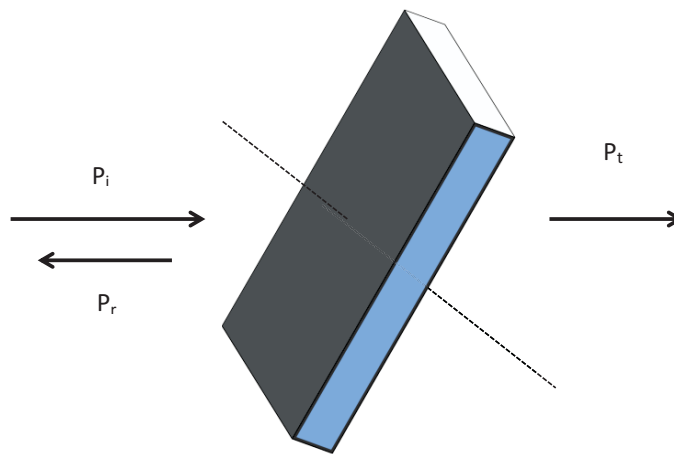


Figure 2. Illustration of non-normal panel orientation.

### Tasks

Finite element methods shall be used to model the acoustic properties of the viscoelastic layer containing inclusions, as well as the four layer system shown in Figure 1. The target frequency range for the calculations is 0 – 30 kHz. If feasible, the ability for the user to specify non-normal incidence angles (azimuthal and inclination) for the sound wave shall be included in the models. Non-reflecting boundary conditions shall be used for the fluid spaces (Layers 1 and 4) to ensure that a free field environment is simulated. The finite element code shall properly account for losses associated with dynamic bulk compression. The contractor shall clearly discuss in their proposal the details of the modelling approach that is to be used and tested, the finite element software that will be used and its suitability to study the acoustic properties of viscoelastic materials (including the two points raised above regarding boundary conditions and loss in the dynamic bulk modulus). If possible, an easy to use front-end to the finite element code shall be



used or developed that facilitates mesh development and running of the code for the type of problems being considered here. A desired outcome of this work would be a set of modelling tools, as well as examples that could serve as templates for further studies by DRDC.

1. The case of a homogeneous, isotropic viscoelastic material without inclusions shall first be considered to confirm agreement with well-established theory [2]. Finite element calculations for the reflection and transmission of sound from a layered system (Figure 1) containing a solid viscoelastic material (without inclusions) shall be compared with analytical calculations from the literature [2-7] or provided by the Project Authority.

2. Demonstrate that the modelling of inclusions has been implemented correctly by comparing example calculations to those previously published in the literature [1, 8-11]. Examples shall include examination of the effects of frequency, as well as the size, shape, and spacing of the inclusions. Both air voids and hard particle examples shall be included. Verification shall include cases where acoustic insertion loss or echo reduction have been calculated in the literature (for example, see [9]).

3. For selected cases, examine the effect of hydrostatic pressure on the echo reduction of coatings with air voids.

4. For selected cases involving air-voided rubber, calculate the frequency-dependent dynamic compression properties for finite size panels (approximately 350 mm × 350 mm × 25 mm) with various boundary conditions. In particular, the effect of free and constrained motion on the edges of the panel (in the plane of the panel) on the dynamic compression properties and acoustic behavior of the plate shall be studied. Specific details will be provided by the Project Authority.

## **References**

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