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Travaux publics et Services gouvernementaux  
Canada

Place Bonaventure,  
800 rue de la Gauchetière Ouest  
Voir aux présentes - See herein

Montréal

Québec

H5A 1L6

FAX pour soumissions: (514) 496-3822

### Revision to a Request for a Standing Offer

### Révision à une demande d'offre à commandes

National Master Standing Offer (NMSO)

Offre à commandes principale et nationale (OCPN)

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Offer remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'offre demeurent les mêmes.

### Comments - Commentaires

### Vendor/Firm Name and Address

Raison sociale et adresse du  
fournisseur/de l'entrepreneur

### Issuing Office - Bureau de distribution

Travaux publics et Services gouvernementaux  
Canada

Place Bonaventure, portail Sud-Oue  
800, rue de La Gauchetière Ouest  
7e étage, suite 7300

Montréal

Québec

H5A 1L6

<b>Title - Sujet</b> OAC-Service ingenierie		
<b>Solicitation No. - N° de l'invitation</b> 9F052-160448/B		<b>Date</b> 2018-08-24
<b>Client Reference No. - N° de référence du client</b> 9F052-16-0448		<b>Amendment No. - N° modif.</b> 002
<b>File No. - N° de dossier</b> MTB-7-40004 (770)	<b>CCC No./N° CCC - FMS No./N° VME</b>	
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$MTB-770-14993		
<b>Date of Original Request for Standing Offer</b> Date de la demande de l'offre à commandes originale		2018-08-08
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2018-09-12</b>		<b>Time Zone</b> <b>Fuseau horaire</b> Heure Avancée de l'Est HAE
<b>Address Enquiries to: - Adresser toutes questions à:</b> Mathurin, Martine		<b>Buyer Id - Id de l'acheteur</b> mtb770
<b>Telephone No. - N° de téléphone</b> (514) 712-5733 ( )		<b>FAX No. - N° de FAX</b> (514) 496-3822
<b>Delivery Required - Livraison exigée</b>		
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b>		
<b>Security - Sécurité</b> This revision does not change the security requirements of the Offer. Cette révision ne change pas les besoins en matière de sécurité de la présente offre.		

Instructions: See Herein

Instructions: Voir aux présentes

<b>Acknowledgement copy required</b> <b>Accusé de réception requis</b>	<b>Yes - Oui</b> <input type="checkbox"/>	<b>No - Non</b> <input type="checkbox"/>
<b>The Offeror hereby acknowledges this revision to its Offer.</b> <b>Le proposant constate, par la présente, cette révision à son offre.</b>		
<b>Signature</b>	<b>Date</b>	
Name and title of person authorized to sign on behalf of offeror. (type or print) Nom et titre de la personne autorisée à signer au nom du proposant. (taper ou écrire en caractères d'imprimerie)		
<b>For the Minister - Pour le Ministre</b>		

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**Project Title**

Expert Consulting Services (engineering) for Space Sciences and Technologies

The above mentioned Request for Standing Offer (RFSO) is hereby amended as follows:

**A. Grant a two week extension to the bid solicitation closing date.**

**Under “Solicitation Closes”, on the first page of the RFSO document:**

**DELETE** in its entirety and **REPLACE** by:

**September 12<sup>th</sup> 2018 at 2:00 PM** (Eastern Daylight Time).

**B. Make the following changes to the RFSO.**

**Change 1:**

**Remove Resource Category 5E) Optics/Electro - Optics/Laser from Stream 5) Electronics, RADAR & Optics Engineering, and put it in a new separate stream, Stream 8) Optics/Electro - Optics/Laser.**

**REMOVE** APPENDIX 1 TO ANNEX A - RESOURCE CATEGORIES AND ASSOCIATED TASKS, APPENDIX 2 TO ANNEX A - MINIMUM RESOURCE REQUIREMENTS, ANNEX B – BASIS OF PAYMENT and APPENDIX 1 TO ANNEX B - FINANCIAL PRESENTATION SHEET in their entirety and **REPLACE** with the following updated versions hereto attached.

**Change 2:**

As per the attached APPENDIX 2 TO ANNEX A - MINIMUM RESOURCE REQUIREMENTS, Stream 6) Program & Project Management, Resource Category: 6D) Project Management Support, Level: Intermediate,

**DELETE:**

2) Must have at least four (2) years of Microsoft Office experience (Word, Project, Power Point, Visio)

**INSERT:**

2) Must have at least two (2) years of Microsoft Office experience (Word, Project, Power Point, Visio)

***ALL OTHER TERMS AND CONDITIONS OF THE RFSO REMAIN UNCHANGED.***

**APPENDIX 1 TO ANNEX A - RESOURCE CATEGORIES AND ASSOCIATED TASKS**

Stream	Resource Category	Tasks	Level(s)
1) Space Systems Engineering	1A) Space Systems Definition, Development, and Review	1) Prepare technical documentation for space projects, such as Systems Engineering Management Plan (SEMP), Statement of Work (SOW), Mission/User Requirements Document (MRD/URD), System Requirements Document (SRD), Assembly Integration and Test (AI&T) Plans and Procedures, Interface Control Documents (ICDs)	Senior and Intermediate
		2) Perform various systems engineering tasks during Space System Design, Analysis, Manufacturing, Integration, Test & Verification, Launch, Commissioning and Operations; including engineering Cost Estimation.	
		3) Conduct or participate in Technical Reviews, such as Preliminary Design Review (PDR), Critical Design Review (CDR), Test Readiness Review (TRR), of space systems,	
		4) Participate in external expert review panels for space projects at major technical reviews for missions led by CSA or by international partners.	
	1B) Space Systems Assembly, Integration & Test	1) Work on the Assembly Integration and Test (AI&T) of space subsystems or systems including implementing AI&T plans and procedures, reporting test results, and resolving related technical issues.	Technician
2) SATCOM and RF Engineering	1C) Space Systems Engineering Policies, Procedures & Practices	1) Review, update or prepare CSA Systems Engineering Policies, Procedures and Practices.	
	1D) Designer/Drafter Technician	1) Support systems design and produce technical system drawings or 3D models	
		2) Support technical system drawing reviews and provide recommendations and redline drawings/3D models	
	2A) SATCOM & Navigation	1) Perform various engineering tasks during Design, Analysis, Manufacturing, Integration, Test & Verification, Launch, Commissioning and Operations of Satellite Communications (SATCOM) and/or Global Navigation Space System (GNSS) systems	Senior and Intermediate
	2B) RF & Microwave Subsystems	1) Design, analyse and test RF sub-systems and circuits	
	2C) Antennas	1) Design, analyse and test antenna sub-systems.	
	2D) Interference analysis and spectrum management	1) Analyze interferences between different systems to support radio broadcasting license processes	
		2) Support the preparation of license applications	

Stream	Resource Category	Tasks	Level(s)
3) Mechanical/ Thermal Engineering	3A) Structure	1) Design, analyse and test of spacecraft structural configuration; 2) Design, evaluate and recommend space structures and mechanisms, including metallic and composite structures, light weight and deployable structures, spacecraft separation and deployment mechanisms; 3) Develop finite element models of space structures, and perform loads analysis, structural static and dynamic analyses of space structures; 4) Develop qualification plan and design vibration tests to qualify hardware components, subsystems, and systems for flight	Senior and Intermediate
	3B) Materials	1) Perform design, evaluation and testing of potential materials for space applications. These include conventional materials used in space, as well as new materials and coatings such as metal alloys, metal and polymeric composites, nano-materials, smart and nano-coatings.	
	3C) Thermal	1) Perform thermal design, analysis and testing of space-based systems, sub-systems and equipment.	
	4A) Software Development	1) Develop software code and applications for real-time, distributed and/or mission critical environments for on-board flight software and satellite ground control systems.	
4) Software Engineering	4B) Spacecraft Software Simulation	1) Develop software simulators	Senior and Intermediate
	5A) Digital Design	1) Perform digital design using microprocessors , microcontrollers, FPGAs and DSPs for space applications; 2) Perform digital design of computer or controller boards; 3) Develop digital boards for space applications	
5) Electronics Engineering	5B) Power Electronics	1) Design, analyse and test of power sub-systems and circuits for space applications.	Senior and Intermediate
	5C) Control Electronics	1) Design, analyse and test of analog, data acquisition and control sub-systems and circuits for space application.	
	5D) EMC-EMI-FSD	1) Perform various engineering task in the field of EMC/EMI, ESD and grounding for spacecraft and/or space applications;	
	5E) Electronics Technician	1) Assemble at flight level (NASA standards STD 8739.3 and STD 8739.2 or equivalent) of electronic printed circuit board, electronic units and subsystems. 2) Assemble at flight level (NASA Standards STD 8739.4 or equivalent) of cables and harnesses.	

Stream	Resource Category	Tasks	Level(s)
6) Program Management	6A) Transfer Payment Program Management Support	1) Provide advice and assistance in planning, implementing and administering space science and technology transfer payment programs (Grants and Contribution). Such advice and assistance includes but is not limited to: I. Planning documents such as budgets and schedules; II. Preparing documentation in support of publication of Announcements of Opportunities (AOs); III. Coordinating proposal solicitation and the corresponding evaluation process; IV. Funding (grant or contribution) implementation, monitoring, and closing. 2) Develop, write and implement frameworks and documents such as but is not limited to: Communication Plan, Recipient or Project Risk Assessment Framework, Audit Framework, Delivery and Program Risk Framework, G&C processes, policies, procedures, guidelines, operational templates and checklists. 3) Design and deliver G&C training courses.	Senior and Intermediate
		1) Conduct socio-economic studies, trend analysis or impact analysis on one or more aspects of technology transfer and commercialization (TTC), from terrestrial technologies to space systems (SPIN-IN), or space technologies to terrestrial sectors; 2) Do business studies. 3) Offer consulting or soliciting services to find potential receivers of technologies and marketing. 4) Undertake business diagnostics on technology transfer and commercialization. 5) Study or offer consulting services for the establishment of innovation centers or marketing assistance.	
		1) Provide advice and assistance in planning, developing space technology and science roadmaps, including related documentation 2) Conduct independent Technology Readiness and Risk Assessment (TRRA) 3) Conduct space technology and science surveys with external organizations 4) Perform synthesis and presentations of complex technical and scientific information in concise fashion (graphically, verbally) 5) Act as facilitator in consultative processes (e.g., workshops) in the context of science technology planning and prioritization	
	6C) Technology Requirements and Planning		Intermediate

Stream	Resource Category	Tasks	Level(s)
	6D) Project Management Support	<ol style="list-style-type: none"><li>1. Provide advice and assistance for the planning and implementation of space projects. Such advice and assistance can include:<ol style="list-style-type: none"><li>i. Implementation and planning of projects and in the preparation of budgets, deadlines, cost-benefit analysis and identification of stakeholders;</li><li>ii. preparation of documentation in support of publication of application for proposal;</li><li>iii. coordination of calls for proposals and processes related assessment;</li></ol></li><li>2. Prepare, write and implement various documents, for example: Project Management Plan, Project Approval Documents, Request for Proposal and Request for Information Documents, Development of Cost-Benefit Analysis, communication plans, project risk assessment frameworks, processes, policies, procedures and guidelines as well as the development of project reporting and communication template.</li></ol>	Senior and Intermediate
7) Mission Management	7A) Expert in Earth Observation (EO) applications and utilisation Support	<ol style="list-style-type: none"><li>1) Provide technical advice and assistance in planning, implementing and administering Earth Observation applications and utilisation activities, projects or missions. Such advice and assistance includes but is not limited to:<ol style="list-style-type: none"><li>i. Preparing documents for proposal solicitation (RFPs and AOs) and the corresponding evaluation process;</li><li>ii. EO application project implementation, monitoring, reviews and closing.</li><li>iii. Coordinating work with the Canadian EO communities;</li><li>iv. Analyze EO missions and EO application projects outcomes;</li><li>v. Produce EO Utilisation requirements documents in support of missions and projects;</li><li>vi. Analyze and make recommendations related to research work by the Canadian EO community.</li><li>vii. Review technical documents to ensure that the EO utilisations objectives will be met with proposed application projects/missions proposals</li></ol></li></ol>	Senior and Intermediate

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Stream	Resource Category	Tasks	Level(s)
	7B) Expert Scientific Support	1) Coordinating work with the Canadian space science scientific or medical communities; 2) Analyze space science mission/project outcomes; 3) Produce space science requirements documents in support of space missions and projects; 4) Analyze and make recommendations related to research work by the Canadian scientific community related to space sciences; 5) Review technical documents to ensure that the science objectives will be met with proposed space instrument/mission design; 6) Provide support to CSA in the operations of Space Science/Technology Programs instruments and experiments; 7) Coordination of Canadian observing time on international space missions.	
8) Optics/Electro Optics/Laser	8A) Optics/Electro Optics/Laser	1) Design, evaluate, test and characterize optical systems, including optical detection components for imaging and non-imaging space applications including laser sources for visible and near-IR projection and detection; 2) Work with optics including one or several of: geometrical and physical optics, laser technology, opto- electronics, opto-mechanical design, non-linear optics, physical optics, optical materials, holography, image processing, optical scanning methods, optical calibration, and spectrometry.	Senior and Intermediate

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## APPENDIX 2 TO ANNEX A - MINIMUM RESOURCE REQUIREMENTS

### Stream 1) Space System Engineering & Engineering Management

Resource Category	Level	Minimum Requirements
1A) Space Systems Definition, and Development, and Review	Senior	1) Must have at least twelve (12) years experience performing various aspects of Space System Design, Analysis, Manufacturing, Integration, Test and Verification, Launch, Commissioning, Operations and conducting or participating in Technical Reviews such as Preliminary Design Review (PDR), Critical Design Review (CDR), Test Readiness Review (TRR), etc. of space systems; 2) Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering or be a member or be eligible to become a member of the Professional Engineering Association.
	Intermediate	1) Must have at least six (6) years experience performing various aspects of Space System Design, Analysis, Manufacturing, Integration, Test and Verification, Launch, Commissioning, Operations and conducting or participating in Technical Reviews such as Preliminary Design Review (PDR), Critical Design Review (CDR), Test Readiness Review (TRR), etc. of space systems; 2) Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering or be a member or be eligible to become a member of the Professional Engineering Association.
1B) Space Systems Assembly, Integration and Test	Senior	1) Must have at least twelve (12) years experience in Assembly Integration and Test (AI&T) of space subsystems or systems, including implementing AI&T plans and procedures, reporting test results, and resolving related technical issues; 2) Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering or be a member or be eligible to become a member of the Professional Engineering Association.
	Intermediate	1) Must have at least six (6) years experience in Assembly Integration and Test (AI&T) of space subsystems or systems, including implementing AI&T plans and procedures, reporting test results, and resolving related technical issues; 2) Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering or be a member or be eligible to become a member of the Professional Engineering Association.
1C) Space Systems Engineering Policies, Procedures and Practices	Senior	1) Must have at least twelve (12) years experience in utilization or preparation of formal systems engineering policies, procedures and practices; 2) Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering or be a member or be eligible to become a member of the Professional Engineering Association.
	Intermediate	1) Must have at least six (6) years experience in utilization or preparation of formal systems engineering policies, procedures and practices; 2) Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering or be a member or be eligible to become a member of the Professional Engineering Association.
1D) Designer/Drafter Technician	Technician	1) Must have at least 1 years of experience designing technical drawings and 3D models 2) Must have a college diploma in a relevant technical field



**Stream 2) Communications Engineering**

Resource Category	Level	Minimum Requirements
2A) SATCOM & Navigation	Senior	1) Must have at least ten (10) years experience in system design in SATCOM and/or GNSS systems; 2) Must have at least four (4) years experience with General Communications Systems Software such as Signal Processing or Link Analysis; 3) Must hold a Bachelor's Degree in Electrical Engineering, Physics or Engineering Physics.
	Intermediate	1) Must have at least five (5) years experience in system design in SATCOM and/or GNSS systems; 2) Must have at least two (2) years experience with General Communications Systems software such as Signal Processing or Link analysis; 3) Must hold a Bachelor's Degree in Electrical Engineering, Physics or Engineering Physics.
	Senior	1) Must have at least ten (10) years experience designing, analyzing and measuring RF subsystems and circuits; Must have at least four (4) years experience using Advanced Design System (ADS) OR AWR Microwave Office OR ANSOFT Non-linear Design Suite; 2) Must hold a Bachelor's Degree in Electrical Engineering or Engineering Physics.
2B) RF and Microwave Subsystems	Intermediate	1) Must have at least five (5) years experience designing, analyzing and measuring RF subsystems and circuits; 2) Must have at least two (2) years experience using Advanced Design System (ADS) OR AWR Microwave Office OR ANSOFT Non-linear Design Suite; 3) Must hold a Bachelor's Degree in Electrical Engineering or Engineering Physics.
	Senior	1) Must have at least ten (10) years experience designing, analyzing and measuring antenna subsystems; 2) Must have at least four (4) years experience using Momentum OR Ensemble OR Numerical Electromagnetic Code (NEC) OR WIPL 3) Must hold a Bachelor's Degree in Electrical Engineering or Engineering Physics
	Intermediate	1) Must have at least five (5) years experience designing, analyzing and measuring antenna subsystems; 2) Must have at least two (2) years experience using Momentum OR Ensemble OR Numerical Electromagnetic Code (NEC) OR WIPL 3) Must hold a Bachelor's Degree in Electrical Engineering or Engineering Physics
2D) Interference analysis and spectrum management	Senior	1) Must have at least ten (10) years experience in analysis of interference between Communication systems 2) Must have at least four (4) years experience in preparation of filing for the International Telecommunication Union (ITU) 3) Must hold a Bachelor's Degree in Electrical Engineering or Engineering Physics
	Intermediate	1) Must have at least five (5) years experience in analysis of interference between Communication systems 2) Must have at least two (2) years experience in preparation of filing for the International Telecommunication Union (ITU) 3) Must hold a Bachelor's Degree in Electrical Engineering or Engineering Physics

### Stream 3) Mechanical & Thermal Engineering

Resource Category	Level	Minimum Requirements
3A) Structure	Senior	<ol style="list-style-type: none"> <li>Must have at least ten (10) years experience in each of the following: <ol style="list-style-type: none"> <li>spacecraft structural configuration, design, analysis and testing;</li> <li>designing, evaluating and recommending space structure, lightweight and deployable structures, spacecraft separation and deployment mechanisms;</li> <li>developing finite element models of space structures and performing loads analysis, structural static and dynamic analyses of space structures;</li> <li>developing qualification plan and design vibration tests to qualify hardware components, subsystems and systems for flight;</li> </ol> </li> <li>Must have at least two (2) years experience using NASTRA/PATRAN AND ANSYS AND Autocad or SolidEdge.</li> <li>Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering</li> </ol>
	Intermediate	<ol style="list-style-type: none"> <li>Must have at least five (5) years experience in each of the following: <ol style="list-style-type: none"> <li>spacecraft structural configuration, design, analysis and testing;</li> <li>designing, evaluating and recommending space structure, lightweight and deployable structures, spacecraft separation and deployment mechanisms;</li> <li>developing finite element models of space structures and performing loads analysis, structural static and dynamic analyses of space structures;</li> <li>developing qualification plan and design vibration tests to qualify hardware components, subsystems and systems for flight;</li> </ol> </li> <li>Must have at least two (2) years experience using NASTRA/PATRAN AND ANSYS AND Autocad or SolidEdge. Optional software are: C or Fortran and Abaqus;</li> <li>Must hold a Bachelor's Degree in Mechanical, Electrical, Aerospace or Systems Engineering</li> </ol>
	Senior	<ol style="list-style-type: none"> <li>Must have at least ten (10) years experience in space-based materials, including design, evaluation, compatibility and testing of potential materials for space applications. These include conventional materials used in space, as well as new materials and coatings such as metal alloys, metal and polymeric composites, nano-materials, smart and nano-coatings. Material qualification tests and development of test plans for space-based hardware.</li> <li>Must have at least six (6) years experience with space material data bases;</li> <li>Must hold a Bachelor's Degree in Mechanical or Aerospace Engineering</li> </ol>
3B) Materials	Intermediate	<ol style="list-style-type: none"> <li>Must have at least five (5) years experience in space-based materials, including design, evaluation, compatibility and testing of potential materials for space applications. These include conventional materials used in space, as well as new materials and coatings such as metal alloys, metal and polymeric composites, nano-materials, smart and nano-coatings. Material qualification tests and development of test plans for space-based hardware.</li> <li>Must have at least two (2) years experience with space material data bases;</li> <li>Must hold a Bachelor's Degree in Mechanical or Aerospace Engineering.</li> </ol>
	Senior	<ol style="list-style-type: none"> <li>Must have at least ten (10) years experience in thermal design, analysis and testing of space-based systems, subsystems and equipment;</li> <li>Must have at least six (6) years experience with IDEAS-TMG or equivalent (SINDA, SINDA/FLUIT, ESATAN, ThermXL). Optional software in CAD Systems;</li> <li>Must have a Bachelor's Degree in Mechanical, Aerospace or Systems Engineering;</li> </ol>
	Intermediate	<ol style="list-style-type: none"> <li>Must have at least five (5) years experience in thermal design, analysis and testing of space-based systems, subsystems and equipment;</li> <li>Must have at least two (2) years experience with IDEAS-TMG or equivalent (SINDA, SINDA/FLUIT, ESATAN, ThermXL). Optional software in CAD Systems;</li> <li>Must hold a Bachelor's Degree in Mechanical, Aerospace or Systems Engineering;</li> </ol>
3C) Thermal	Senior	<ol style="list-style-type: none"> <li>Must have at least ten (10) years experience in thermal design, analysis and testing of space-based systems, subsystems and equipment;</li> <li>Must have at least six (6) years experience with IDEAS-TMG or equivalent (SINDA, SINDA/FLUIT, ESATAN, ThermXL). Optional software in CAD Systems;</li> <li>Must have a Bachelor's Degree in Mechanical, Aerospace or Systems Engineering;</li> </ol>
	Intermediate	<ol style="list-style-type: none"> <li>Must have at least five (5) years experience in thermal design, analysis and testing of space-based systems, subsystems and equipment;</li> <li>Must have at least two (2) years experience with IDEAS-TMG or equivalent (SINDA, SINDA/FLUIT, ESATAN, ThermXL). Optional software in CAD Systems;</li> <li>Must hold a Bachelor's Degree in Mechanical, Aerospace or Systems Engineering;</li> </ol>

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**Stream 4) Software Engineering**

Resource Category	Level	Minimum Requirements
4A) Software Development	Senior	1) Must have at least ten (10) years experience designing and implementing mission critical software for spacecraft on-board systems, ground control support equipments, and/or avionics, using recognized software development standards;
		2) Must have at least five (5) years experience with modern software engineering standards and methodologies such as ISO, ECSS, CMMi, or NASA Standards;
		3) Must have at least three (3) years experience supporting writing requirements for space mission software;
		4) Must have a Bachelor's Degree in Computer Science or Electrical Engineering
4B) Spacecraft Software Simulation	Intermediate	1) Must have at least five (5) years experience designing and implementing mission critical software for spacecraft on-board , ground control support equipment, and/or avionics;
		2) Must have at least three (3) years experience with modern software engineering standards and methodologies such as ISO, ECSS, CMMi, or NASA Standards;
		3) Must have a Bachelor's Degree in Computer Science or Electrical Engineering
	Senior	1) Must have at least ten (10) years experience developing spacecraft or spacecraft subsystems high fidelity simulators using software tools such as Matlab/Simulink, DYMOLA, SIMSAT, EUROSIM, ViaSim, or STK;
	Intermediate	2) Must have a Bachelor's Degree in Computer Science or Electrical Engineering
		1) Must have at least five (5) years experience developing spacecraft or spacecraft subsystems simulators using software tools such as Matlab/Simulink, DYMOLA, SIMSAT, EUROSIM, ViaSim, or STK;
		2) Must have a Bachelor's Degree in Computer Science or Electrical Engineering

### Stream 5) Electronics Engineering

Resource Category	Level	Minimum Requirements
5A) Digital Electronics Design	Senior	<p>1) Must have at least ten (10) years experience in each of the following:</p> <ul style="list-style-type: none"> <li>i. design with microprocessors, microcontrollers, FPGAs and DSPs;</li> <li>ii. digital design of computer or controller boards;</li> <li>iii. developing digital boards for space applications, using related space standards;</li> </ul> <p>2) Must have at least four(4) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab and LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
	Intermediate	<p>1) Must have at least five (5) years experience in the following:</p> <ul style="list-style-type: none"> <li>i. design with microprocessors, microcontrollers (, FPGAs and DSPs;</li> <li>ii. digital design of computer or controller boards;</li> <li>iii. developing digital boards for space applications, using related space standards;</li> </ul> <p>2) Must have at least two(2) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab and LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
	Senior	<p>1) Must have at least ten (10) years experience in the design, analysis and test of power subsystems and circuits for space applications, using related space standards;</p> <p>2) Must have at least four (4) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab or LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
5B) Power Electronics	Intermediate	<p>1) Must have at least five (5) years experience in the design, analysis and test of power subsystems and circuits for space applications, using related space standards;</p> <p>2) Must have at least two (2) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab or LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
	Senior	<p>1) Must have at least ten (10) years experience in the design, analysis and test of analog, data acquisition and control subsystems and circuits for space applications, using related space standards;</p> <p>2) Must have at least four (4) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab or LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
	Intermediate	<p>1) Must have at least five (5) years experience in the design, analysis and test of analog, data acquisition and control subsystems and circuits for space applications, using related space standards;</p> <p>2) Must have at least two (2) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab or LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
5C) Control Electronics	Senior	<p>1) Must have at least ten (10) years experience in the design, analysis and test of analog, data acquisition and control subsystems and circuits for space applications, using related space standards;</p> <p>2) Must have at least four (4) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab or LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
	Intermediate	<p>1) Must have at least five (5) years experience in the design, analysis and test of analog, data acquisition and control subsystems and circuits for space applications, using related space standards;</p> <p>2) Must have at least two (2) years experience with Cadence/Orcad/Pspice or equivalent. Optional software are Matlab or LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
	Senior	<p>1) Must have at least ten (10) years experience in Electromagnetic Compatibility (EMC), Electromagnetic Interference (EMI), Electrostatic Discharge (ESD) and grounding expertise for spacecraft and space applications, using related space standards;</p> <p>2) Must have at least four (4) years experience with Matlab or Mathcad. Optional software is LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>
5D) EMC-EMI-ESD	Intermediate	<p>1) Must have at least five (5) years experience in EMC/EMI, ESD and grounding expertise for spacecraft and space applications, using related space standards;</p> <p>2) Must have at least two (2) years experience with Matlab OR MathCad. Optional software is: LabView;</p> <p>3) Must have a Bachelor's Degree in Electrical Engineering</p>

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Resource Category		Level	Minimum Requirements
5E) Electronics Technician	1)	Technician	Must have at least one (1) year experience in the following: i. assembly at flight level (NASA Standard STD 8739.3 and STD 8739.2) of electronic printed circuit boards, electronic units and subsystems; ii. assembly at flight level (NASA Standard STD 8739.4 or equivalent) of cables and harnesses;
	2)		Must have a college's degree in a relevant technical field

## Stream 6) Program & Project Management

Resource Category	Level	Minimum Requirements
6A) Transfer Payment Program Management Support	Senior	<p>1) Must have at least ten (10) years experience providing advice and assistance in planning, implementing and administering space science and technology transfer payment programs (Grants and Contribution). Such advice and assistance includes but is not limited to:</p> <ul style="list-style-type: none"> <li>i. Planning documents such as budgets and schedules;</li> <li>ii. Preparing documentation in support of publication of Announcements of Opportunity (AOs);</li> <li>iii. Coordinating proposals' solicitation (AOs) and the corresponding evaluation process;</li> <li>iv. Funding Agreement (grant or contribution) implementation, monitoring, and closing;</li> <li>v. Preparing documents such as but not limited to: Communication Plan, Recipient/ project Risk Assessment Framework, Audit Framework, Delivery and Program Risk Framework, G&amp;C processes, policies, procedures, guidelines, operational templates and checklists;</li> <li>vi. Design and delivery of G&amp;C training courses;</li> </ul> <p>2) Must have at least four(4) years experience with Microsoft Office;</p> <p>3) Must have a Bachelor's Degree in Science, Engineering or Administration</p>
	Intermediate	<p>1) Must have at least five (5) years experience providing advice and assistance in planning, implementing and administering space science and technology programs including transfer payment programs (Grants and Contribution). Such advice and assistance includes but is not limited to:</p> <ul style="list-style-type: none"> <li>i. Planning documents such as budgets and schedules;</li> <li>ii. Preparing documentation in support of publication of Announcements of Opportunity (AOs);</li> <li>iii. Coordinating proposals' solicitation (AOs) and the corresponding evaluation process;</li> <li>iv. Funding Agreement (grant or contribution) implementation, monitoring, and closing;</li> <li>v. Preparing documents such as but is not limited to: Communication Plan, Recipient/ project Risk Assessment Framework, Audit Framework, Delivery and Program Risk Framework, G&amp;C processes, policies, procedures, guidelines, operational templates and checklists;</li> <li>vi. Design and delivery of G&amp;C training courses;</li> </ul> <p>2) Must have at least two(2) years experience with Microsoft Office;</p> <p>3) Must have a Bachelor's Degree in Science, Engineering or Administration</p>
	Senior	<p>1) Must have at least ten (10) years experience performing socio-economic studies and trend analyses in the sectors of Earth Observation, Satellite Communications and/or Space Science and Exploration;</p> <p>2) Must have a Bachelor's Degree in a relevant field</p>
6B) Socio Economic Studies on technology transfer and commercialization (TTC)	Intermediate	<p>1) Must have at least eight (8) years experience performing socio-economic studies and trend analyses;</p> <p>2) Must have a Bachelor's Degree in a relevant field</p>
	Intermediate	<p>1) Must have at least 5 years experience in technology planning, prioritization and road mapping processes, for large industrial or government organizations;</p> <p>2) Must have experience in developing space technology roadmaps;</p> <p>3) Must have at least 5 years experience in space science or technology development</p>
6C) Technology Requirements and Planning	Intermediate	

Resource Category	Level	Minimum Requirements
6D) Project Management Support	Senior	<p>1) Must have at least ten (10) years of experience advising and assisting in the planning, implementation and administration of space projects. Such advice and assistance includes:</p> <ul style="list-style-type: none"><li>i. Development of project planning documents such as project management plans, project approval documents, cost-benefit analyzes and stakeholder identification;</li><li>ii. budgeting, work plan and schedule;</li><li>iii. preparation of documentation in support of the publication of Request for Proposal;</li><li>iv. coordination of calls for proposals and related evaluation processes;</li><li>v. preparation of various documents, for example: communication plans, project risk assessment frameworks, audit frameworks, program and delivery risk assessment frameworks, processes, policies , procedures, guidelines.</li></ul> <p>2) Must have at least four (4) years of Microsoft Office experience (Word, Project, Power Point, Visio) ; ;</p> <p>3) Must have a Bachelor's degree in Science, Engineering or Administration.</p>
	Intermediate	<p>1) Must have at least five (5) years of experience providing advice and support for the planning, implementation and administration of space projects. Such advice and assistance includes:</p> <ul style="list-style-type: none"><li>i. Development of project planning documents such as project management plans, project approval documents, cost-benefit analyzes and stakeholder identification;</li><li>ii. budgeting, work plan and schedule;</li><li>iii. document planning such as budgets, timelines, cost-benefit analysis and stakeholder identification</li><li>iv. preparation of documentation in support of the publication of Request for Proposal;</li><li>v. coordination of calls for proposals and related evaluation processes;</li><li>vi. preparation of various documents, for example: communication plans, project risk assessment frameworks, audit frameworks, program and delivery risk assessment frameworks, processes, policies , procedures, guidelines</li></ul> <p>2) Must have at least two (2) years of Microsoft Office experience (Word, Project, Power Point, Visio)</p> <p>3) Must have a Bachelor's degree in Science, Engineering or Administration.</p>

**Stream 7) Mission Management**

Resource Category	Level	Minimum Requirements
7A) Expert EO applications and utilization Support	Senior	1) Must have at least ten (10) years experience of the following: i. coordinating work with the EO communities; ii. analyzing EO mission/projects or EO applications outcomes iii. producing EO applications and data utilization requirements documents in support of missions and projects; iv. analyzing and making recommendations related to EO applications by the Canadian EO community; 2) Must have a Bachelor degree from a recognized university in areas such as Physical sciences, Environment, Earth sciences, Geography, Remote sensing, or any disciplines relevant to Earth Observation applications.
	Intermediate	1) Must have at least five (5) years experience of the following: i. coordinating work with the EO communities; ii. analyzing EO mission/projects or EO applications outcomes iii. producing EO applications and data utilization requirements documents in support of missions and projects; iv. analyzing and making recommendations related to EO applications by the Canadian EO community; 2) Must have a Bachelor degree from a recognized university in areas such as Physical sciences, Environment, Earth sciences, Geography, Remote sensing, or any disciplines relevant to Earth Observation applications.
7B) Expert Scientific Support	Senior	1) Must have at least ten (10) years experience following receipt of PhD in each of the following: i. coordinating work with the Canadian space science or medical communities; ii. analyzing space science mission/project outcomes; iii. producing science requirements documents in support of space missions and projects; iv. analyzing and making recommendations related to research work by the Canadian scientific community; v. providing support to the operations of Space Science / Technology instruments and experiments; 2) Must have a doctorate from a recognized university relevant to the area of expertise
	Intermediate	1) Must have at least five (5) years experience following receipt of PhD in each of the following: i. Coordinating work with the Canadian space scientific or medical communities; ii. analyzing space science mission/project outcomes; iii. producing science requirements documents in support of space missions and projects; iv. analyzing and making recommendations related to research work by the Canadian scientific community; v. providing support to the operations of Space Science / Technology instruments and experiments; 2) Must have a doctorate from a recognized university relevant to the area of expertise



**Stream 8) Optics/Electro - Optics/Laser**

Resource Category	Level	Minimum Requirements
8A) Optics/Electro - Optics/Laser	Senior	<p>1) Must have at least ten (10) years experience in the design, evaluation, testing and characterization of optical systems, including optical detection components for imaging and non-imaging space applications including laser sources for visible and near-IR projection and detection;</p> <p>2) Must have at least ten (10) years experience in optics including at least one of the following fields:</p> <ul style="list-style-type: none"><li>i. géométriques and physical optics</li><li>ii. laser technology</li><li>iii. opto-electronics</li><li>iv. opto-mechanical design</li><li>v. non-linear optics</li><li>vi. physical optics</li><li>vii. optical materials</li><li>viii. holography</li><li>ix. image processing</li><li>x. optical scanning methods</li><li>xi. optical calibration; and</li><li>xii. spectrometry.</li></ul> <p>3) Must have at least four (4) years experience using Code V, Zemax or other equivalent professional optical design software.</p> <p>4) Must have a Bachelor's Degree in Electrical Engineering, Physics or Engineering Physics</p>
	Intermediate	<p>1) Must have at least five (5) years experience in the design, evaluation, testing and characterization of optical systems, including optical detection components for imaging and non-imaging space applications including laser sources for visible and near-IR projection and detection;</p> <p>2) Must have at least five (5) years experience in optics including at least one of the following fields:</p> <ul style="list-style-type: none"><li>i. geometrical and physical optics</li><li>ii. laser technology</li><li>iii. opto-electronics</li><li>iv. opto-mechanical design</li><li>v. non-linear optics</li><li>vi. physical optics</li><li>vii. optical materials</li><li>viii. holography</li><li>ix. image processing</li><li>x. optical scanning methods</li><li>xi. optical calibration; and</li><li>xii. spectrometry.</li></ul> <p>3) Must have at least two (2) years experience using Code V OR Zemax OR Other professional optical design software;</p> <p>4) Must have a Bachelor's Degree in Electrical Engineering or Engineering physics.</p>

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## ANNEX B

### BASIS OF PAYMENT

**1. LABOUR:** at the following, all-inclusive, firm rates:

A work day is defined as 7.5 hours of work, exclusive of meal breaks. Payment shall be made for days actually worked, with no provision for annual leave, statutory holidays and sick leave. If time worked is more or less than a day, the per diem rate shall be prorated to reflect the actual time worked.

Category	Level	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate
		1 Nov 2018 to 31 Oct 2019	1 Nov 2019 to 31 Oct 2020	1 Nov 2020 to 31 Oct 2021	1 Nov 2021 to 31 Oct 2022	1 Nov 2022 to 31 Oct 2023
1A) Space Systems Definition, Development, and Review	Senior					
	Intermediate					
1B) Space Systems Assembly, Integration and Test	Senior					
	Intermediate					
1C) Space Engineering Policies, Procedures and Practices	Senior					
	Intermediate					
1D) Designer/Drafter Technician	Technician					
2A) SATCOM & Navigation	Senior					
	Intermediate					
2B) RF and Microwave Subsystems	Senior					
	Intermediate					
2C) Antennas	Senior					
	Intermediate					
2D) Interference analysis and spectrum management	Senior					
	Intermediate					

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Category	Level	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate
		1 Nov 2018 to 31 Oct 2019	1 Nov 2019 to 31 Oct 2020	1 Nov 2020 to 31 Oct 2021	1 Nov 2021 to 31 Oct 2022	1 Nov 2022 to 31 Oct 2023
3A) Structure	Senior					
	Intermediate					
3B) Materials	Senior					
	Intermediate					
3C) Thermal	Senior					
	Intermediate					
4A) Software Development	Senior					
	Intermediate					
4B) Spacecraft Software Simulation	Senior					
	Intermediate					
5A) Digital Electronics Design	Senior					
	Intermediate					
5B) Power Electronics	Senior					
	Intermediate					
5C) Control Electronics	Senior					
	Intermediate					
5D) EMC-EMI-ESD	Senior					
	Intermediate					
5E) Electronics Technician	Technician					
6A) Transfer Payment Program Management Support	Senior					
	Intermediate					
6B) Socio Economic Studies	Senior					

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Category	Level	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate	Firm All-Inclusive Per Diem Rate
		1 Nov 2018 to 31 Oct 2019	1 Nov 2019 to 31 Oct 2020	1 Nov 2020 to 31 Oct 2021	1 Nov 2021 to 31 Oct 2022	1 Nov 2022 to 31 Oct 2023
on technology transfer and commercialization (TTC)	Intermediate					
6C) Technology Requirements and Planning	Intermediate					
6D) Project Management Support	Senior					
	Intermediate					
7A) Expert EO applications and utilization Support	Senior					
	Intermediate					
7B) Expert Scientific Support	Senior					
	Intermediate					
8A) Optics/Electro-Optics/Laser	Senior					
	Intermediate					

The firm, all-inclusive per diem rates will be adjusted annually at the commencement of each period (1<sup>st</sup> August 2019 to 31<sup>st</sup> July 2020, as well as Option Period 1 through Option Period 3) by an amount established based on the percentage increase (decrease), nearest two decimal places, in the annual average index of the Consumer Price Index for Canada, All-Items (Not Seasonally Adjusted), from the 12-month base period ending December, two years prior to the option period start year, to the same 12-month period ending December, one year prior to the option period start year. This will be calculated using the following formula:

$$EPA = \left( \frac{A}{B} - 1 \right) \times 100$$

B

Where:

**A** = Annual Average Index for the 12 months ending December, 1 year prior to the option period start year.

**B** = Annual Average Index for the 12 months ending December, 2 years prior to the option period start year.

Upon application of the above formula, the firm all-inclusive hourly rates calculated for each option period exercised will be incorporated into the Basis of Payment above, by contract amendment.

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**\*Example of calculation:**

In Option Period 1 commencing August, 2020, the firm all-inclusive hourly rates would be increased by 2.40% based on the following assumptions:

**A** = Annual Average Index for the 12 months ending December 2019 (1 year prior to the option period start year) = 145.3

**B** = Annual Average Index for the 12 months ending December 2018 (2 years prior to the option period start year) = 141.9

**EPA** =  $\frac{(A - B)}{B} \times 100$

**EPA** =  $\frac{(145.3 - 141.9)}{141.9} \times 100 = 2.40\%$

**2. TRAVEL AND LIVING EXPENSES:**

The Offeror will be reimbursed its authorized travel and living expenses reasonably and properly incurred in the performance of the Work, at cost, without any allowance for profit and/or administrative overhead, in accordance with the meal and private vehicle provided in Appendices B, C and D of the Treasury Board Travel Directive (<http://www.njc-cnm.gc.ca/directive/travel-voyage/index-eng.php>), and with the other provisions of the directive referring to "travellers", rather than those referring to "employees".

All travel must have prior authorization of the Project Authority. All payments are subject to government audit.

**3. OTHER DIRECT CHARGES:** at actual cost without markup

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## APPENDIX 1 TO ANNEX B - FINANCIAL PRESENTATION SHEET

Stream	Resource Category	Level	Firm, all-inclusive per diem rate	Weighting	Weighted per diem rate
1) Space Systems Engineering	1A) Space Systems Definition, Development and Review	Senior		60 %	
		Intermediate		40 %	
	1B) Space Systems Assembly, Integration and Test	Senior		60 %	
		Intermediate		40 %	
	1C) Space Systems Engineering Policies, Procedures and Practices	Senior		60 %	
		Intermediate		40 %	
	1D) Designer/Drafter Technician	Technician		100%	
2) SATCOM and RF Engineering	2A) SATCOM & Navigation	Senior		60 %	
		Intermediate		40 %	
	2B) RF and Microwave Subsystems	Senior		60 %	
		Intermediate		40 %	
	2C) Antennas	Senior		60 %	
		Intermediate		40 %	
3) Mechanical /Thermal Engineering	2D) Interference analysis and spectrum management	Senior		60%	
		Intermediate		40%	
	3A) Structure	Senior		60 %	
		Intermediate		40 %	
	3B) Materials	Senior		60 %	
		Intermediate		40 %	
4) Software Engineering	3C) Thermal	Senior		60 %	
		Intermediate		40 %	
	4A) Software Development	Senior		60 %	
		Intermediate		40 %	
	4B) Spacecraft Software Simulation	Senior		60 %	
		Intermediate		40 %	
5) Electronics Engineering	5A) Digital Electronics Design	Senior		60 %	
		Intermediate		40 %	
	5B) Power Electronics	Senior		60 %	
		Intermediate		40 %	
	5C) Control Electronics	Senior		60 %	
		Intermediate		40 %	
	5D) EMC-EMI-ESD	Senior		60 %	
		Intermediate		40 %	
	5E) Electronics Technician	Technician		100 %	

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Stream	Resource Category	Level	Firm, all-inclusive per diem rate	Weighting	Weighted per diem rate
6) Program Management	6A) Transfer Payment Program Management Support	Senior		60 %	
		Intermediate		40 %	
	6B) Socio Economic Studies on technology transfer and commercialization (TTC)	Senior		60 %	
		Intermediate		40 %	
	6C) Technology Requirements and Planning	Intermediate		100 %	
	6D) Project Management Support	Senior		60%	
		Intermediate		40 %	
	7) Mission Management	7A) Expert EO Applications and Utilization Support	Senior		60 %
Intermediate				40 %	
7B) Expert Scientific Support		Senior		60 %	
		Intermediate		40 %	
8) Optics/Electro - Optics/Laser	8A) Optics/Electro - Optics/Laser	Senior		60 %	
		Intermediate		40 %	