



RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Travaux publics et Services gouvernementaux
Canada
Place Bonaventure,
800 rue de la Gauchetière Ouest
Bureau 1110,
Montréal
Québec
H5A 1L6
FAX pour soumissions: (514) 496-3822

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

Title - Sujet Relative Navigation System	
Solicitation No. - N° de l'invitation 9F050-160961/A	Date 2017-06-07
Client Reference No. - N° de référence du client 9F050-16-0961	
GETS Reference No. - N° de référence de SEAG PW-\$MTB-690-14368	
File No. - N° de dossier MTB-7-40011 (690)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2017-07-21	
Time Zone Fuseau horaire Heure Avancée de l'Est HAE	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Paquin, Esther	Buyer Id - Id de l'acheteur mtb690
Telephone No. - N° de téléphone (514) 496-3889 ()	FAX No. - N° de FAX (514) 496-3822
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: AGENCE SPATIALE CANADIENNE EXPLORATION SPACIALE/SPACE EXPLORAT 6767 ROUTE DE L AEROPORT ST HUBERT Québec J3Y8Y9 Canada	

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address

**Raison sociale et adresse du
fournisseur/de l'entrepreneur**

Issuing Office - Bureau de distribution

Travaux publics et Services gouvernementaux Canada
Place Bonaventure,
800 rue de la Gauchetière Ouest
Voir aux présentes - See herein
Montréal
Québec
H5A 1L6

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



Item Article	Description	Dest. Code Dest.	Inv. Code Fact.	Qty Qté	U. of I. U. de D.	Unit Price/Prix unitaire FOB/FAM	Destination	Plant/Usine	Delivery Req. Livraison Req.	Del. Offered Liv. offerte
1	Relative Navigation System	9F050	9F050	1	EA	\$	XXXXXXXXXXXX	XXXXXXXXXXXX		

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CHANGE OF ADDRESS-BIDS DELIVERY
For bids delivered starting Monday 8th, 2017: In person or by mail:
PLACE BONAVENTURE, 1ST FLOOR, Local 1110
800 DE LA Gauchetière Street West,
Suite 1110, Montréal, (QC) H5A 1L6

PART 1 - GENERAL INFORMATION

1.1 Introduction

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

- Part 1 General Information: provides a general description of the requirement;
- Part 2 Bidder Instructions: provides the instructions, clauses and conditions applicable to the bid solicitation;
- Part 3 Bid Preparation Instructions: provides bidders with instructions on how to prepare their bid;
- Part 4 Evaluation Procedures and Basis of Selection: indicates how the evaluation will be conducted, the evaluation criteria that must be addressed in the bid, and the basis of selection;
- Part 5 Certifications: includes the certifications to be provided;
- Part 6 Financial Requirements: includes specific requirements that must be addressed by bidders; and
- Part 7 Resulting Contract Clauses: includes the clauses and conditions that will apply to any resulting contract

The following Annexes and Attachments:

- Annex A Statement of Work
- Annex B Basis of Payment-Firm Price
- Annex B-1 Basis of Payment-Optional Services
- Annex C Non-Disclosure Agreement
- Attachment 1 to Part 2 Mandatory Non-Disclosure Agreement
- Attachment 1 to Part 3 Technical and Managerial Bid Preparation Instructions
- Attachment 1 to Part 4 Point Rated Evaluation Criteria

1.2 Summary

Project title

Relative Navigation System Phase 0.

Description

Public Works and Government Services Canada (PWGSC) on behalf of Canadian Space Agency (CSA) located in St-Hubert, (Quebec) is seeking bids for the project entitled Relative Navigation System Phase 0. In 2011, CSA, in a joint effort with NASA, investigated the feasibility of deploying a system to monitor incoming and departing Visiting Vehicles (VV) on the ISS. This system was envisioned to be installed at different locations on the ISS, thus covering the different approaches of the different docking and berthing ports of the orbital station. The study demonstrated the feasibility of such a system, although the requirement to monitor the relative attitude of the VV was levied on the spacecraft. It was determined that a global relative navigation system, based on the Space Station side (as opposed to a spacecraft mounted system) would be the preferred solution for the future. The planning of the next generation space platform, such as a deep-space habitat, is therefore a good opportunity to assess the development of a relative navigation system on this new space platform.

Canada has undertaken discussions with the international partners to determine the next step for human exploration. A rendezvous working group has been put in place under this partnership. This working group is in charge of providing recommendations with respect to relative navigation and rendezvous on a future deep-space habitat. One of the recommendations is that the habitat be equipped with a proximity operations sensor to support VV system redundancy. This sensor would be useful in helping VVs achieve sensor independence and sensor dissimilarity, thus, levying the requirement on the habitat instead of the current paradigm which levies the requirement for redundancy and dissimilarity on the VV.

As such, Phase 0 study services are being solicited so as to inform Canada on key aspects of relative navigation and rendezvous technology. The concept of operations involves having the sensor package re-position-able by a robotic arm in order to limit the mass launched to cislunar space. In the current concept, the sensor package would be positioned prior to each docking event near the docking port where the VV will mate. The relative navigation technology functions include providing range, range-rate, relative position, velocity, attitude and attitude rates of the VV at key positions from the habitat. At the end of the Phase 0 study, Canada should have all the technical and programmatic information necessary to make an informed decision about a potential relative navigation sensor system contribution and for subsequent immediate next steps.

Work requirements of the intended solicitation includes elements associated with mission analysis, planning and development, mission operations, systems engineering, trades assessments, support to CSA with respect to the applicable deep-space habitat mission development, and project management of the study.

Period of Contract

The contract will be issued for a period of eight (8) months and six (6) months option.

Intellectual Property

The Intellectual Property will vest to the Crown.

Security Requirements

There are no security requirements associated with this requirement.

Integrity provisions for procurement

As per the Integrity Provisions under section 01 of *Standard Instructions 2003 and 2004*, bidders must provide a list of all owners and/or Directors and other associated information as required. Refer to section 4.21, 5.16 and 8.70.2 of the *Supply Manual* for additional information on the Integrity Provisions.

Former Public Servant

For services requirements, Bidders must provide the required information as detailed in article 2.3 of Part 2 of *the bid solicitation*, in order to comply with Treasury Board policies and directives on contracts awarded to former public servants. Please also refer to Part 5 – Certifications.

Trade agreements

This requirement is not subject to the trade agreements.

Canadian Content

The requirement is limited to Canadian goods and/or services.

Federal Contractors Program for Employment Equity

The Federal Contractors Program (FCP) for employment equity applies to this procurement; see Part 5 – Certifications and Part 7 - Resulting Contract Clauses.

1.3 Debriefings

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

1.4 Communications

As a courtesy and in order to coordinate any public announcements pertaining to any resulting Contract, the Government of Canada requests that successful Bidders notify the Contracting Authority, five (5) days in advance of their intention to make public an announcement related to the recommendation of a contract award, or any information related to the contract. The Government of Canada retains the right to make primary contract announcements.

PART 2 - BIDDER INSTRUCTIONS

2.1 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-conditionsmanual>) 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 (2017-04-27) 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: 60 days

Insert: 240 days

2.1.1 Mandatory Non-Disclosure Agreement Requirement

If a Supplier or a subcontractor wishes to review the Reference documents, it must request these documents from the Contracting Authority listed below through e-mail. The documents mentioned above contains information that is confidential or proprietary to Canada or third party. The Supplier or any subcontractor must sign a Non-Disclosure Agreement in the form set out in Attachment 1 to Part 2 and return the original duly signed to the Contracting Authority before being provided with a copy of these documents. All Suppliers must return the documents at the end of the RFP period, or upon request from the Contracting Authority within thirty (30) days following that request.

2.2 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:

Public Works and Government Services Canada

Quebec Region

Place Bonaventure, South-East Portal

800 de La Gauchetière Street West

1st Floor, Local 1110, Montreal, Quebec,

Canada, H5A 1L6

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

2.3 Former Public Servant

Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, bidders must provide the information required below before contract award. If the answer to the questions and, as applicable the information required have not been received by the time the evaluation of bids is completed, Canada will inform the Bidder of a time frame within which to provide the information. Failure to comply with Canada's request and meet the requirement within the prescribed time frame will render the bid non-responsive.

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 Adjustment Directive

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of the Work Force Adjustment Directive? **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 adjustment program.

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

2.4 Enquiries - Bid Solicitation

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

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

2.5 Applicable Laws

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

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.

2.6 Improvement of Requirement During Solicitation Period

Should bidders consider that the specifications or Statement of Work contained in the bid solicitation could be improved technically or technologically, bidders are invited to make suggestions, in writing, to the Contracting Authority named in the bid solicitation. Bidders must clearly outline the suggested improvement as well as the reason for the suggestion. Suggestions that do not restrict the level of competition nor favour a particular bidder will be given consideration provided they are submitted to the Contracting Authority at least ten (10) days before the bid closing date. Canada will have the right to accept or reject any or all suggestions.

2.7 Maximum Funding

The maximum available funding, applicable taxes extra, as appropriate, for the contract for the purposes of this bid solicitation is \$360,000.00 (Applicable Taxes extra, as appropriate). Bids

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Buyer ID - Id de l'acheteur
mtb690
CCC No./N° CCC - FMS No./N° VME

valued in excess of this amount will be considered non-responsive, pursuant to Part4-Evaluation Procedures and Basis of Selection, Section 4.1.2-Financial Evaluation. This disclosure does not commit Canada to pay the maximum funding available.

2.8 Basis for Canada's Ownership of Intellectual Property

The Canadian Space Agency (CSA) has determined that any intellectual property rights arising from the performance of the Work under the resulting contract will belong to Canada, on the following grounds:

-The main purpose of the Contract, or of the deliverables contracted for, is to augment an existing body of Canada's Background Information as a prerequisite to the transfer of the expanded Background to the private sector, through licensing or assignment of ownership (not necessarily to the original Contractor), for the purposes of Commercial Exploitation.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

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

- Section I: Technical and Managerial Bid, Executive Summary (in separate stand-alone documents) **one (1) paper copy and two (2) electronic copies on CD or USB**
Section II: Financial Bid **one (1) paper copy and one (1) electronic copy on CD or USB**
Section III: Certifications **one (1) paper copy**

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

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

For the electronic copies of Section I (Technical and Managerial Bid and Executive Summary), all of the information must be contained in one file. The only acceptable formats are: MS Word, PDF and HTML;

For the electronic copy of Section II (Financial Bid), all of the information must be contained in one file. The only acceptable formats are: MS Word, PDF and HTML;

The electronic copy of Section II must be submitted on a separate CD or USB than the electronic copy submitted for Section I;

Prices must appear in Section II (Financial Bid) only. No prices must be indicated in any other section of the bid;

The total number of pages for Section I should not exceed 50 pages (8.5 X 11 inches) 216 mm X 279 mm) paper excluding bid appendices;

The bid should 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/achatsprocurement/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.

The bid should use a numbering system that corresponds to the bid solicitation;

The bidder should ensure that the cover page in their bid (Section I, II and III) includes the following table duly filled out:

Company Name	Company address
Project Title	Title of the Request for Proposal: Relative Navigation System Phase 0
Project summary (7 lines)	

Section I: Technical and Managerial Bid

In their technical and managerial bid, bidders should demonstrate their understanding of the requirements contained in the bid solicitation and explain how they will meet these requirements. Bidders should demonstrate their capability and describe their approach in a thorough, concise and clear manner for carrying out the work.

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

Part 4: *Evaluation Procedures and Basis of Selection* contains additional instructions that bidders should consider when preparing their technical and managerial bid.

The structure and content requested for the Technical and Managerial Bid (Section I) are detailed in Attachment 1 to Part 3: Technical and Managerial Bid Preparation Instructions.

Section II: Financial Bid

3.1.1 Bidders must submit their financial bid in accordance with the basis of payment Annex B, and Annex B-1-Optional Services, included in the Request for Proposal. The total amount of Applicable Taxes must be shown separately.

Prices must be in Canadian funds, Applicable Taxes excluded and Canadian customs duties and excise taxes included.

3.1.2 Price Breakdown

Bidders are requested to detail the following elements for the performance of each task, milestone or phase of the Work, as applicable:

(a) Labour: For each individual and (or) labour category to be assigned to the Work, indicate: i) the hourly rate, inclusive of overhead and profit; and ii) the estimated number of hours.

(b) Equipment: Specify each item required to complete the Work and provide the pricing basis of each one, Canadian customs duty and excise taxes included, as applicable.

(c) Materials and Supplies: Identify each category of materials and supplies required to

complete the Work and provide the pricing basis.

(d) Travel and Living Expenses: Indicate the number of trips and the number of days for each trip, the cost, destination and purpose of each journey, together with the basis of these costs which must not exceed the limits of the National Joint Council (NJC) Directive. With respect to the National Joint Council (NJC) Travel Directive, only the meal, private vehicle and incidental allowances specified in Appendices B, C and D of the 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" are applicable. All travel must have prior authorization of the Project Authority. All payments are subject to government audit.

(e) Subcontracts: Identify any proposed subcontractor and provide for each one the same price breakdown information as contained in this article.

(f) Other Direct Charges: Identify any other direct charges anticipated, such as long distance communications and rentals, and provide the pricing basis.

(g) Applicable Taxes: Identify any Applicable Taxes separately.

Section III: Certifications

Bidders must submit the certifications required under Part 5.

PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION

4.1 Evaluation Procedures

(a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and managerial evaluation criteria;

(b) An evaluation team composed of representatives of Canada will evaluate the bids.

4.1.1 Technical and Management Evaluation

4.1.1.1 Mandatory Technical Criterion

The Mandatory Technical Criterion is described at Attachment 1 to Part 4: Evaluation Criteria for the Technical and Managerial Bid. Bids must meet the mandatory technical criterion. Bids that fail to meet the mandatory technical criterion will be declared non-responsive

4.1.1.2 Point Rated Technical and Management Criteria

The Point Rated Technical and Management Criteria are described at Attachment 1 to Part 4: Point Rated Technical Criteria. **Criteria not addressed will be given a score of zero.**

4.1.2 Financial Evaluation

4.1.2.1 Mandatory Financial Criterion

Bids must meet the mandatory financial criterion. Bidder must respect the maximum funding available under the heading Maximum Funding in Part 2, Section 2.7-Maximum Funding (Applicable Taxes extra, as appropriate).

Bids that fail to meet this mandatory financial criterion will be declared non-responsive. Bids valued in excess of this amount will be considered non-responsive.

This disclosure does not commit Canada to pay the maximum funding available.

4.1.2.2 Evaluation of Price

The price of the bid will be evaluated in Canadian dollars, all Applicable Taxes excluded, FOB destination, Canadian customs duties and excise taxes included.

4.2 Basis of Selection – Highest Combined Rating of Technical Merit and Price

1) To be declared responsive, each bid must:

- (a) comply with all the requirements of the bid solicitation;
- (b) meet the mandatory technical criterion and mandatory financial criterion;
- (c) obtain the required minimum of 10 points on a scale of 20 points for the Evaluation Criterion #1: Relevance and Merit of the Concept; obtain the required minimum of 10 points on a scale of 20 points for the Evaluation Criterion #2: Feasibility of Achieving Goals and Technical Objective; obtain the required minimum of 10 points on a scale of 20 points for the Evaluation Criterion #3: Understanding the Requirements and Technical Principles; obtain the required minimum of 10 points on a scale of 20 points for the Evaluation Criterion #4: Scope of the Study; obtain the required minimum of 5 points on a scale of 10 points for the Evaluation Criterion #5: Team Capability; and obtain the required minimum of 5 points on a scale of 10 points for the Evaluation Criterion #6: Project Management Plan;

(d) obtain the minimum overall score of sixty (60) points in the evaluation of rated technical criteria. The rating scale contains one hundred (100) points.

2. Bids not meeting (a) or (b) or (c) or (d) will be declared non-responsive;
3. Responsive bids received will be ranked according to their combined score made up of the overall technical score and pricing score. For each responsive bid, the overall technical score and the pricing score will be added to determine its combined score. Bids will be ranked starting from the Bid with the highest combined score down to the lowest combined score resulting in a Responsive Bid List.
4. For each responsive bid, the score obtained for each technical criterion will be added to determine its overall technical score (maximum of 100 points).
5. To establish the pricing score, the following equation will be used:

$$\text{pricing score} = \left(\frac{\text{max funding} - \text{bid price}}{\text{max funding}} \right) \times 50$$

the pricing score is limited to 10 points. It therefore follows that the maximum pricing score is awarded to bids with a price representing 80% of the maximum funding. Bids with a price lower than 80% funding will receive the maximum score of 10.

6. Neither the responsive bid obtaining the highest overall technical score nor the one with the highest pricing score will necessarily be accepted. The responsive bid with the highest combined score of technical merit and price will be recommended for award of a contract.

In the event that more than one responsive bid has the same combined score, the bid which obtained the highest overall technical score will be recommended for award of a contract.

In the event that all available budget has not been spent, Canada may elect to award a contract to responsive bid that finished second. CSA will make a decision based on the availability of funds.

The table below illustrates an example where all three bids are responsive and the selection of the contractor is determined by adding the overall technical score and pricing scores, respectively. In this example, the maximum funding is 100,000\$(100).

Ex. Basis of Selection – Highest Combined Rating of Technical Merit and Price

Bidder	Bidder 1	Bidder 2	Bidder 3
Overall Technical Score	70	85	92
Bid Price	\$90 000	\$80 000	\$100 000
Calculation of Pricing Score	$((100-90)/100) \times 50=5$	$((100-80)/100) \times 50=10$	$((100-100)/100) \times 50=0$
Combined Score	75	95	92
Overall Rating	3rd	1st	2nd

PART 5 – CERTIFICATIONS

Bidders must provide the required certifications and associated information 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 in carrying out any of its obligations under the Contract, if any certification made by the Bidder is found to be untrue, whether made knowingly or unknowingly, 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 and to cooperate with any request or requirement imposed by the Contracting Authority may render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be 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 inform the Bidder of a time frame within which to provide the information. Failure to comply with the request of the Contracting Authority may meet the requirement within that time period will render the bid non-responsive.

5.1.1 Integrity Provision-Required Documentation

In accordance with the Ineligibility and Suspension Policy (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Bidder must provide the required documentation, as applicable, to be given further consideration the procurement process

5.1.2 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 Contractor Program (FCP) for employment equity «FCP Limited Eligibility to Bid» list (http://www.labour.gc.ca/eng/standards_equality/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.

5.1.3 Additional Certifications Precedent to Contract Award

5.1.3.1 Former Public Servant

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

the answer to the questions and, as applicable the information required have not been received by the time the evaluation of bids is completed, Canada will inform the Bidder of a time frame within which to provide the information. Failure to comply with Canada's request and meet the requirement within the prescribed time frame will render the bid non-responsive.

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 Adjustment Directive

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of the Work Force Adjustment Directive? **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 adjustment program.

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

5.1.3.2 Canadian Content Certification

This procurement is conditionally limited to Canadian goods.

Subject to the evaluation procedures contained in the bid solicitation, bidders acknowledge that only bids with a certification that the good(s) offered are Canadian goods, as defined in clause [A3050T](#), may be considered.

Failure to provide this certification completed with the bid will result in the good(s) offered being treated as non-Canadian goods.

The Bidder certifies that:

() a minimum of 80 percent of the total bid price consist of Canadian goods as defined in paragraph 1 of clause [A3050T](#).

For more information on how to determine the Canadian content for a mix of goods, a mix of services or a mix of goods and services, consult Annex 3.6.(9), Example 2, of the [Supply Manual](#).

5.1.3.2.1 SACC Manual clause A3050T (2014-11-27) Canadian Content Definition.

5.1.3.3 Status and Availability of Resources

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

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

5.1.3.4 Education and Experience

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

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File No. - N° du dossier
MTB-7-40011

Buyer ID - Id de l'acheteur
mtb690
CCC No./N° CCC - FMS No./N° VME

PART 6 - FINANCIAL AND OTHER REQUIREMENTS

6.1 Financial Capability

SACC Manual clause A9033T (2012-07-16), Financial Capability

PART 7 - RESULTING CONTRACT CLAUSES

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

7.1 Statement of Work

The Contractor must perform the Work in accordance with the Statement of Work in Annex A and the Contractor's technical and Managerial Bid entitled _____, dated _____ (*will be inserted at contract award*).

7.2 Optional Goods and/or Services

The Contractor grants to Canada the irrevocable option to acquire optional goods and services defined in the Statement of Work, in Annex A, Par. 3.6, of the contract under the same conditions and at the prices and/or rates stated in the Contract. The option may only be exercised by the contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment. The Contracting Authority may exercise the option covers during a period of up to six (6) months after the baseline contract for Phase 0 activities is deemed completed.

7.3 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-andguidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

7.3.1 General Conditions

2040 (2016-04-04), General Conditions - Research & Development, apply to and form part of the Contract:

7.3.1.1 Canada to Own Intellectual Property Rights in Foreground Information

1. The general conditions 2040 are amended by deleting the sections entitled "Records and Disclosure of Foreground Information", "Ownership of Intellectual Property Rights in Foreground Information", "Licenses to Intellectual Property Rights in Foreground and Background Information", "Contractor's Rights to Grant Licenses", "Waiver of Moral Rights", "License to Intellectual Property Rights in Canada's Information", "Transfer or License of Contractor's Rights", "Transfer of Intellectual Property Rights upon Termination of the Contract for Default", and "Products Created Using the Foreground Information" in their entirety. This section applies in lieu of those sections.
2. Record Keeping and Provision of Information
 - a. During and after the performance of the Contract, the Contractor must keep detailed records of the Foreground Information, including details of its creation. The Contractor must report and fully disclose to Canada all Foreground Information as required by the Contract. If the Contract does not specifically state when and how the Contractor must do so, the Contractor must provide this information if requested by the Contracting Authority, whether before or after the completion of the Contract.

- b. Before and after final payment to the Contractor, the Contractor must provide Canada with access to all records and supporting data that Canada considers pertinent to the identification of Foreground Information.
- c. For any Intellectual Property that was developed or created in relation to the Work, Canada will be entitled to assume that it was developed or created by Canada, if the Contractor's records do not list that Intellectual Property or do not indicate that it was created by the Contractor, or by someone on behalf of the Contractor, other than Canada.

3. Contractor Requirements

- a. All Intellectual Property rights in the Foreground Information belong to Canada as soon as they come into existence. The Contractor has no right in or to any such Intellectual Property Rights in the Foreground Information, except any right that may be granted in writing by Canada.
- b. The Contractor must incorporate the copyright symbol and one of the following notices, as appropriate into all Foreground Information that is subject to copyright regardless of the form or medium upon which it is recorded: © Her Majesty the Queen in Right of Canada (year), or © Sa Majesté la Reine du chef du Canada (year).
- c. The Contractor must execute any documents relating to the Intellectual Property Rights in the Foreground Information as Canada may require. The Contractor must, at Canada's expense, provide Canada all reasonable assistance in the preparation of applications and in the prosecution of any applications for registration of any Intellectual Property Rights in any jurisdiction, including the assistance of the inventor in the case on inventions.

4. Licensing Requirements

- a. The Contractor grants to Canada a license to use the Background Information to the extent that it is reasonably necessary for Canada to exercise fully all its rights in the deliverables and in the Foreground Information. This license is non-exclusive, perpetual, irrevocable, worldwide, fully-paid and royalty-free. The license cannot be restricted in any way by the Contractor providing any form of notice to the contrary, including the wording on any shrink-wrapped license attached to any deliverable.
- b. For greater certainty, Canada's license in the Background Information includes, but is not limited to:
 - i. the right to disclose the Background Information to third parties bidding on or negotiating contracts with Canada and to sublicense or otherwise authorize the use of that information by any contractor engaged by Canada solely for the purpose of carrying out such contracts. Canada will require these third parties and contractors not to use or disclose that

information except as may be necessary to bid, negotiate or carry out those contracts;

- ii. the right to disclose the Background Information to other governments for information purposes;
 - iii. the right reproduce, modify, improve, develop or translate the Background Information or have it done by a person hired by Canada. Canada, or a person designated by Canada, will own the Intellectual Property Rights associated with reproduction, modification, improvement, development or translation.
 - iv. without restricting the scope of any license or other right in the Background Information that Canada may otherwise hold in relation to any custom-designed or custom-manufactured part of the Work, the right to use and disclose to a contractor engaged by Canada the Background Information for the following purposes:
 - A. For the use, operation, maintenance, repair or overhaul of the custom-designed or custom-manufactured parts of the Work;
 - B. In the manufacturing of spare parts for maintenance, repair or overhaul of any custom-designed or custom-manufactured part of the Work by Canada if those parts are not available on reasonable commercial terms to enable timely maintenance, repair or overhaul.
 - c. The Contractor agrees to make the Background Information, including in the case of Software, the source code, promptly available to Canada for any purpose mentioned above. The license does not apply to any Software that is subject to detailed license conditions that are set out elsewhere in the Contract. Furthermore, in the case of commercial off-the-shelf software, the Contractor's obligation to make the source code promptly available to Canada applies only to source code that is within the control of or can be obtained by the Contractor or any subcontractor.
5. The Contractor represents and warrants that it has the right to grant to Canada the license and any other rights to use the Background Information. If the Intellectual Property Rights in any Background Information are owned by a subcontractor or any other third party, the Contractor must have a license from that subcontractor or third party that permits compliance with paragraph 4 or arrange, without delay, for the subcontractor or third party to grant promptly the required license directly to Canada.
6. If requested by Canada, during and after the Contract, the Contractor must provide a written permanent waiver of moral rights, as defined in the [Copyright Act](#), R.S., 1985, c. C-42, from every author that contributes to any Foreground Information subject to copyright protection that is a deliverable to Canada under the Contract. If the Contractor is an author of the Foreground Information, the Contractor permanently waives the Contractor's moral rights in that Foreground Information.

7.3.2 Supplemental General Conditions

The following supplemental general conditions apply to and form part of the Contract:
4002 (2010-08-16), Software Development or Modification Services
4003 (2010-08-16), Licensed Software

7.3.3 Non-disclosure Agreement

The Contractor must obtain from its employee(s) or subcontractor(s) the completed and signed non-disclosure agreement, attached at Annex C, and provide it to the Contracting Authority before they are given access to information by or on behalf of Canada in connection with the Work.

7.4 Period of the Contract *(will be inserted at contract award)*

7.5 Authorities

7.5.1 Contracting Authority

The Contracting Authority for the Contract is:

Esther Paquin
Contract Specialist
Public Works and Government Services Canada
Quebec Region
7th Floor
Place Bonaventure, South-East Portal
800 de La Gauchetière Street West
Suite 1110,
Montreal, Quebec, H5A 1L6
Telephone: 514-496-3889
Facsimile: 514-496-3822
E-mail address: esther.paquin@tpsgc-pwgsc.gc.ca

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

7.5.2 Technical Authority *(will be inserted at contract award)*

The Technical Authority for the Contract is:

Name : _____
Title : _____
Organization : _____
Address : _____
Telephone: ____ ____ ____
Facsimile: ____ ____ ____
E-mail address: _____

The Technical Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Technical Authority; however, the Technical Authority has no authority

to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

7.5.3 Contractor's Representative *(will be inserted at contract award)*

The Contractor's Representative for the Contract is:

Name: _____
Title: _____
Organization: _____
Address: _____
Telephone: ____-____-____
Facsimile: ____-____-____
E-mail: _____

7.6 Proactive Disclosure of Contracts with Former Public Servants

SACC Manual Clause A3025C (2013-03-21)

7.7 Payment

7.7.1 Basis of Payment (Milestone Payment)

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm price, as specified in the Contract for a cost of \$ _____ *(the amount will be inserted at contract award)*. Customs duties are included and Applicable taxes are extra, if applicable.

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

7.7.2 Basis of Payment (Limitation of expenditures) (Optional Services)

Canada's total liability to the Contractor under the Contract must not exceed \$ _____. Customs duties are _____ *(insert "included", "excluded" or "subject to exemption")* and Applicable Taxes are extra.

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:

when it is 75 percent committed, or four (4) months before the contract expiry date, or

as soon as the Contractor considers that the contract funds provided are inadequate for the completion of the Work,
whichever comes first.

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.

7.7.3 Method of Payment

7.7.3.1 Milestone Payments

Canada will make milestone payments in accordance with the Schedule of Milestones detailed in Annex B- Basis of Payment and the payment provisions of the Contract if:

(a) an accurate and complete claim for payment using form PWGSC-TPSGC 1111 (<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/1111.pdf>) and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;

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

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

7.7.3.2 Limitation of expenditures (Optional Services)

1. Canada will make progress payments in accordance with the payment provisions of the Contract, no more than once a month, for cost incurred in the performance of the Work, up to 90 percent of the amount claimed and approved by Canada if:
 - a) an accurate and complete claim for payment using form [PWGSC-TPSGC 1111](#), 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 amount claimed is in accordance with the basis of payment;
 - c) the total amount for all progress payments paid by Canada does not exceed 90 percent of the total amount to be paid under the Contract;
 - d) all certificates appearing on form [PWGSC-TPSGC 1111](#) have been signed by the respective authorized representatives.
2. The balance of the amount payable will be paid in accordance with the payment provisions of the Contract upon completion and delivery of all work required under the Contract if the Work has been accepted by Canada and a final claim for the payment is submitted _____ (insert one of the options provided under the Remarks section above.)
3. Progress payments are interim payments only. Canada may conduct a government audit and interim time and cost verifications and reserves the rights to make adjustments to the Contract from time to time during the performance of the Work. Any overpayment resulting from progress payments or otherwise must be refunded promptly to Canada.

7.7.3.3 Schedule of Milestones

The schedule of milestones for which payments will be made in accordance with the Contract is detailed in Annex B, Annex B-1.

7.8 SACC Manual Clauses

SACC Manual Clause A9117C (2007-11-30), T1204 - Direct Request by Customer Department

7.9 Invoicing Instructions - Progress Claim - Firm Price

7.9.1 Progress Claim - Firm Price

1. The Contractor must submit a claim for progress payment using form PWGSC-TPSGC

1111 Claim for Progress Payment (<http://www.tpsgc-pwgsc.gc.ca/appacq/forms/documents/1111.pdf>).

Each claim must show:

- (a) all information required on form PWGSC-TPSGC 1111;
- (b) all applicable information detailed under the section entitled "Invoice Submission" of the general conditions;
- (c) the description and value of the milestone claimed as detailed in the Contract.

2. Applicable Taxes 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 Applicable Taxes payable as it was claimed and payable under the previous claims for progress payments.

3. The Contractor must prepare and certify **one (1) original and two (2) copies** of the claim on form PWGSC-TPSGC 1111, forward:

a) the **original and one (1) copy** to the Canadian Space Agency at the address shown on page 1 of the Contract under "Invoices" (Financial Services Section) for appropriate certification by the Project Authority identified herein after inspection and acceptance of the Work takes place;

and,

b) **one (1) copy of the original** progress claim to the Contracting Authority identified under the section entitled "Authorities" of the Contract.

4. The CSA's Financial Services Section will then forward the original and one (1) copy of the claim to the Contracting Authority for certification and onward submission to the Payment Office for the remaining certification and payment action.

5. The Contractor must not submit claims until all work identified in the claim is completed and has been approved by CSA.

7.9.2 Progress Claim-Limitation of expenditures

The Contractor must submit a claim for payment using form PWGSC-TPSGC 1111, Claim for Progress Payment (<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/1111.pdf>.)

1. 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.
2. Applicable Taxes 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 Applicable Taxes 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:
 - a) **the original and one (1) copy** to the Canadian Space Agency (CSA) at the address shown on page 1 of the Contract under " **Invoices** " (Financial Services Section) for appropriate certification by the Technical Authority identified herein after inspection and acceptance of the Work takes place;and,
 - b) **one (1) copy of the original progress claim** (including all back-up documentation) to the Contracting Authority specified herein.
4. The CSA's Financial Services Section will then forward the original and one (1) copy of the claim to the Contracting Authority for certification and onward submission to the Payment Office for the remaining certification and payment action.
5. The Contractor must not submit claims until all work identified in the claim is completed.

7.10 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 entire contract period. 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.

7.11 Applicable Laws

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

7.12 Priority of Documents

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

- (a) the Articles of Agreement;
- (b) the supplemental general conditions 4002 (2010-08-16), Software Development or Modification Services and 4003(2010-08-16), Licensed Software;
- (c) the general conditions 2040 (2016-04-04) General Conditions - Research & Development;
- (d) Annex A, Statement of Work;
- (e) Annex B, Basis of Payment;
- (f) Annex C, Non-disclosure Agreement; and
- (g) the Contractor's bid dated _____ (insert date of bid) (If the bid was clarified or amended, insert at the time of contract award: "as clarified on _____" **or** ", as amended on _____" and insert date(s) of clarification(s) or amendment(s))

7.13 Foreign Nationals (Canadian Contractor)

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

7.14 Insurance

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

7.15 Directive on Communications with the Media

1. Definitions

"Communication Activity(ies)" includes: public information and recognition, the planning, development, production and delivery or publication, and any other type or form of dissemination of marketing, promotional or information activities, initiatives, reports, summaries or other products or materials, whether in print or electronic format that pertain to the present agreement, all communications, public relations events, press releases, social media releases, or any other communication directed to the general public in whatever form or media it may be in, including but without limiting the generality of the preceding done through any company web site.

2. Communication Activities Format

The Contractor must coordinate with the Canadian Space Agency (CSA) all Communication Activities that pertain to the present contract.

Subject to review and approval by the CSA, the Contractor may mention and/or indicate visually, without any additional costs to the CSA, the CSA's participation in the contract through one or both of the following methods at the complete discretion of the CSA:

- a. By clearly and prominently labelling publications, advertising and promotional products and any form of material and products sponsored or funded by the CSA, as follows, in the appropriate official language:
"This program/project/activity is undertaken with the financial support of the Canadian Space Agency."
"Ce programme/projet/activité est réalisé(e) avec l'appui financier de l'Agence spatiale canadienne."

b. By affixing CSA's corporate logo on print or electronic publications, advertising and promotional products and on any other form of material, products or displays sponsored or funded by the Canadian Space Agency.

Any and all mention or reference to the Canadian Space Agency in addition to those specified above in (a) and (b) must be specifically accepted by the CSA prior to the publication.

The Contractor must obtain and use a high resolution printed or electronic copy of the CSA's corporate identity logo and seek advice on its application, by contacting the Technical Authority, as mentioned in section 7.5.2 of this contract.

3. Communication Activity Coordination Process

The contractor must coordinate with the CSA's Directorate of Communications and Public Affairs all Communication Activities pertaining to the present contract. To this end, the contractor must:

a. As soon as the Contractor intends to organize a Communication Activity, send a Notice to the CSA's Directorate of Communications and Public Affairs. The Communications Notice must include a complete description of the proposed Communication Activity. The Notice must be in writing in accordance with Article 44 of the General Conditions 2040 contract titled Notice. The Communications Notice must include a copy or example of the proposed Communication Activity.

b. The contractor must provide to the CSA any and all additional document in any appropriate format, example or information that the CSA deems necessary, at its entire discretion to correctly and efficiently coordinate the proposed Communication Activity. The Contractor agrees to only proceed with the proposed Communication Activity after receiving a written confirmation of coordination of the Communication Activity from the CSA's Directorate of Communications and Public Affairs.

c. The Contractor must receive beforehand the authorization, approval and written confirmation from the CSA's Directorate of Communications and Public Affairs, before organizing, proceeding or hosting a communication activity.

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File No. - N° du dossier
MTB-7-40011

Buyer ID - Id de l'acheteur
mtb690
CCC No./N° CCC - FMS No./N° VME

ANNEX "A"

STATEMENT OF WORK

The Statement of Work ((Annex A) appended to the bid solicitation package, forms part of this document. **(See appended document).**

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ANNEX B

**BASIS OF PAYMENT
SCHEDULE OF MILESTONES**

The schedule of milestones for which payments will be made in accordance with the Contract is as follows:

Milestone No.	Description of Deliverable	Firm Amount	Delivery Date
1	Specify		
2	Specify		
3	Specify		
Etc			

Total Firm Price \$ _____ (All Taxes applicable extra)

ANNEX B-1 (Optional Services)

BASIS OF PAYMENT

For the work described in Annex «A», the Contractor will be paid as follows:

1. **LABOUR:** at actual hourly firm rate inclusive of overhead and profit: **Est.: \$**

2. **EQUIPMENT:** at laid down cost without markup **Est.: \$**

3. **MATERIALS AND SUPPLIES:** at laid down cost without markup **Est.: \$**

4. **TRAVEL AND LIVING EXPENSES:** **Est.: \$**

The Contractor 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, private vehicle and incidental expenses provided in Appendices B, C and D of the National Joint Council (NJC) 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” are applicable. All travel must have prior authorization of the Project Authority. All payments are subject to government audit.

5. **DIRECT CHARGES/SUBCONTRACTS:** at actual cost without markup **Est.: \$**
6. **SUBCONTRACTS:** at actual cost without markup **Est.: \$**

Estimated Cost to a Limitation of Expenditure: \$
(All taxes applicable extra)

ANNEX "C"

NON-DISCLOSURE AGREEMENT

I, _____, recognize that in the course of my work as an employee or subcontractor of _____, I may be given access to information by or on behalf of Canada in connection with the Work, pursuant to Contract Serial No _____ between Her Majesty the Queen in right of Canada, represented by the Minister of Public Works and Government Services and _____, including any information that is confidential or proprietary to third parties, and information conceived, developed or produced by the Contractor as part of the Work. For the purposes of this agreement, information includes but not limited to: any documents, instructions, guidelines, data, material, advice or any other information whether received orally, in printed form, recorded electronically, or otherwise and whether or not labeled as proprietary or sensitive, that is disclosed to a person or that a person becomes aware of during the performance of the Contract.

I agree that I will not reproduce copy, use, divulge, release or disclose, in whole or in part, in whatever way or form any information described above to any person other than a person employed by Canada on a need to know basis. I undertake to safeguard the same and take all necessary and appropriate measures, including those set out in any written or oral instructions issued by Canada, to prevent the disclosure of or access to such information in contravention of this agreement.

I also acknowledge that any information provided to the Contractor by or on behalf of Canada must be used solely for the purpose of the Contract and must remain the property of Canada or a third party, as the case may be.

I agree that the obligation of this agreement will survive the completion of the Contract Serial

No: _____

Signature

Date

ATTACHMENT 1 TO PART 2
MANDATORY NON-DISCLOSURE AGREEMENT (NDA)
FOR
A RELATIVE NAVIGATION SYSTEM
REQUEST FOR PROPOSAL
PUBLIC WORKS GOVERNMENT SERVICES CANADA (PWGSC)
9F050-160961/A

BY:

_____, a body corporate duly incorporated under the laws of _____, having its Head Office located at _____;
Hereinafter referred to as the ("Supplier")

TO: HER MAJESTY THE QUEEN IN RIGHT OF CANADA, as represented by the Minister of Public Works and Government Services;
Hereinafter referred to as ("Canada")

The Supplier agrees that, for the purpose of preparing a response to PWGSC for the RFP (the "Purpose") is being giving access to Confidential Information or proprietary to Canada or to third party and agrees to comply with the obligations referred to under this NDA;

1. The Supplier acknowledges that the Reference documents for must be treated as confidential and must not be disclosed or used in any way except in relation with the Purpose of this RFP.
2. For the purpose of this NDA, Confidential Information includes any Reference documents and any documents, Instructions, guidelines, data, material, advice or another information whether received orally, in printed form or recorded electronically or otherwise and whether or not labeled as proprietary, that is disclosed to a person or entity or that person or entity becomes aware of for the purpose of this RFP.
3. The Supplier agrees that the Reference documents will not be reproduced, copied, divulged, released or disclosed, in whole or in part, in whatever way or form any Confidential Information to any person or entity other than a person employed by the Supplier without the prior written consent of the PWGSC's Contracting Authority and for any purpose other than for the preparation of a response to this RFP.
4. The Supplier agrees to immediately notify the PWGSC's Contracting Authority if any person, other than the Supplier's current employees accesses the Confidential Information at any time.
5. Also, regardless of whether it is Confidential Information, the Supplier must at all times treat the information designated as Confidential Information and ensure it cannot be

accessed by anyone excepting the Supplier's current employees, which have a legitimate "need to know" for the Purpose of presenting a RFP.

6. The Supplier shall at all times use the same degree of care as it uses to protect its own confidential information of like importance to prevent the unauthorized use or disclosure of Confidential Information, but in no event less than a reasonable degree of care. The Supplier shall not, nor shall it permit its employees to, remove any copyright, confidential, proprietary rights, or intellectual property notices attached to or included in any Confidential Information and shall reproduce all such notices on any copies of the Confidential Information.
7. The Supplier is responsible for any breach of this NDA by any of its employees, and the Supplier shall not, nor shall permit its employees to, modify, disassemble, decompile, or reverse engineer any Confidential Information even if it relates to the Purpose.
8. All the Information contained in Reference documents and all other Confidential Information disclosed under this NDA shall remain the property of Canada or a third party, or of any other person or entity to whom it lawfully belongs, as applicable.
9. Without restricting the generality of the foregoing, the Supplier recognizes that no license or conveyance of any rights to the Supplier under any discoveries, inventions, patents, trade secrets, copyrights, or other form of intellectual property is granted or implied by the disclosure of Confidential Information under this NDA.
10. The Supplier must require any proposed subcontractor with a "need to know", to execute a NDA on the same conditions as those contained in this NDA prior to disclosure of the Confidential Information.
11. All Confidential Information will remain the property of Canada and must be returned to the Contracting Authority within thirty (30) days following that request.
12. The NDA remains in force indefinitely.
13. Nothing in this NDA should be construed as preventing the disclosure or use of any confidential information to the extent that such information:
 - (a) is or becomes in the public domain through no fault of the Supplier or any proposed subcontractor;
 - (b) is or becomes known to the Supplier from a source other than Canada, except any source that is known to the Supplier to be under an obligation to Canada not to disclose the information; or
 - (c) is disclosed under compulsion of a legislative requirement or any order of a Court or other tribunal having jurisdiction.
14. The Supplier agrees that a breach of this NDA may result in disqualification of a Supplier or a Qualified Supplier at any time, or immediate termination of the resulting Contract. The Qualified Respondent also acknowledges that a breach of this NDA may result in a review of the Qualified Supplier's security clearance and review of the Qualified Supplier's status as an eligible Supplier for other requirements.

Solicitation No. - N° de l'invitation
9F050-160961/A
Client Ref. No. - N° de réf. du client
9F050-16-0961

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-7-40011

Buyer ID - Id de l'acheteur
mtb690
CCC No./N° CCC - FMS No./N° VME

15. The Supplier acknowledges and agrees that it will be liable for any and all claims, loss, damages, costs, or expenses incurred or suffered by Canada caused by the failure of the Supplier, or by anyone to whom the Supplier discloses the Confidential Information to comply with these conditions.

IN WITNESS WHEREOF, this Non-Disclosure Agreement has been duly signed this day of _____, 2015, by an authorized representative of the

Name of Supplier

Name of authorized representative (print)

Signature
(I have authority to bind the corporation)
Signed by its authorized representative

Witness

Name of the Witness

Solicitation No. - N° de l'invitation
9F050-160961/A
Client Ref. No. - N° de réf. du client
9F050-16-0961

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-7-40011

Buyer ID - Id de l'acheteur
mtb690
CCC No./N° CCC - FMS No./N° VME

**ATTACHMENT 1 TO PART 3
TECHNICAL AND MANAGERIAL BID PREPARATION INSTRUCTIONS
(See appended document)**

Solicitation No. - N° de l'invitation
9F050-160961/A
Client Ref. No. - N° de réf. du client
9F050-16-0961

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-7-40011

Buyer ID - Id de l'acheteur
mtb690
CCC No./N° CCC - FMS No./N° VME

**ATTACHMENT 1 TO PART 4
EVALUATION CRITERIA FOR THE TECHNICAL AND
MANAGERIAL BID**

(See Appended Document)



CSA-RNS-SOW-0007

Canadian Space Agency

ANNEX “A”

BLEORNAV – Beyond LEO Relative Navigation Phase 0 Statement of Work (SOW)

**Initial Release
May 17, 2017**

FOR CANADIAN SPACE AGENCY USE ONLY

This document and the information contained herein are not to be used for any purpose other than to accomplish Canadian Space Agency programs and projects whether they are completely Canadian initiatives or in cooperation with International Partners. The contents of this document are not to be disclosed or transferred in whole or in part, to any third party without the prior written consent of the Canadian Space Agency.

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1 INTRODUCTION

For more than two decades, CSA has been investing in technologies aimed at providing robust relative navigation systems for space. More precisely, this technology has been successfully demonstrated under joint NASA/CSA funding, during 3 shuttle Detailed Test Objective (DTO) flights, namely, STS-128, STS-131 and STS-135. A direct derivative of this technology is now being used for mission critical purposes on board Orbital's Cygnus resupply vehicles. However, these demonstrations have always been operated from the Visiting Vehicle's (VV) point of view, never from the International Space Station (ISS) point of view. One can imagine a system, similar to an air traffic control system, monitoring the incoming and departing VV from the ISS. In 2011, NASA and CSA, in a joint effort, investigated the feasibility of deploying a system to monitor incoming and departing VV on the ISS. This system was envisioned to be installed at different locations on the ISS, thus covering the different approaches of the different docking and berthing ports of the orbital station. The study successfully completed Phase A with Systems Requirements Review (SRR). It demonstrated the feasibility of such a system, although the requirement to monitor the relative attitude of the VV was levied on the spacecraft. NASA and other international partners concurred that a global relative navigation system, based on the Space Station side (as opposed to a spacecraft mounted system) would be the preferred solution for the future. The planning of the next generation Space Station is therefore a good opportunity to assess the development of a relative navigation system on this new Space Station.

Under the ISS Capability Studies, the Rendezvous working group, co-chaired by NASA and JAXA, composed of representatives from the European Space Agency (ESA), the Roscosmos (Russia). This working group is in charge of providing recommendations on Rendezvous with future CisLunar Habitat (CH). One of the recommendations is that the CH be equipped with a proximity operations sensor to support VV system redundancy. This sensor would be useful in helping VVs achieve sensor independence and sensor dissimilarity, thus, levying the requirement on the CH instead of the current paradigm which levies the requirement for redundancy and dissimilarity on the VV. Levying the requirement on the CH would result in recurring savings in upmass.

The concept of operations involves having the sensor package re-position-able by a robotic arm in order to limit the mass launched to cislunar space. As pictured in Figure 1-1, the sensor package would be positioned prior to each docking event near the docking port where the VV will mate.

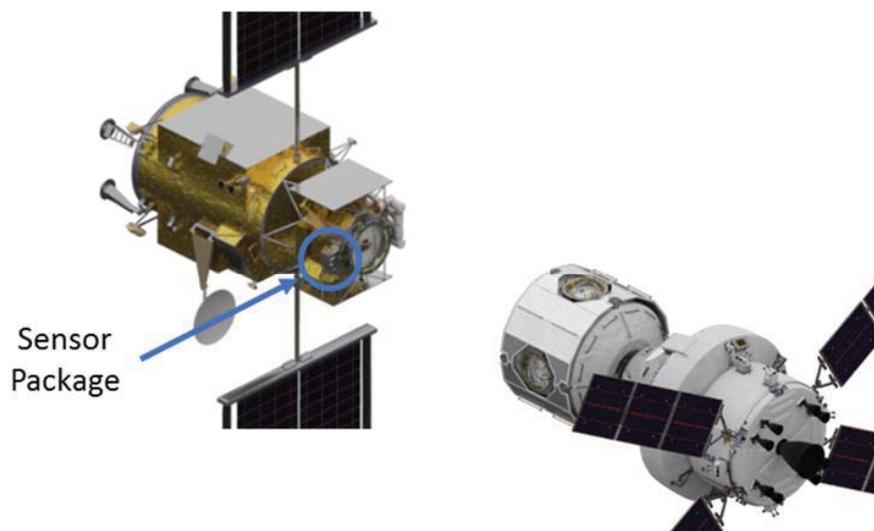


FIGURE 1-1 CISELUNAR HABITAT RELNAV SENSOR INSTALLATION
(Credit: NASA)

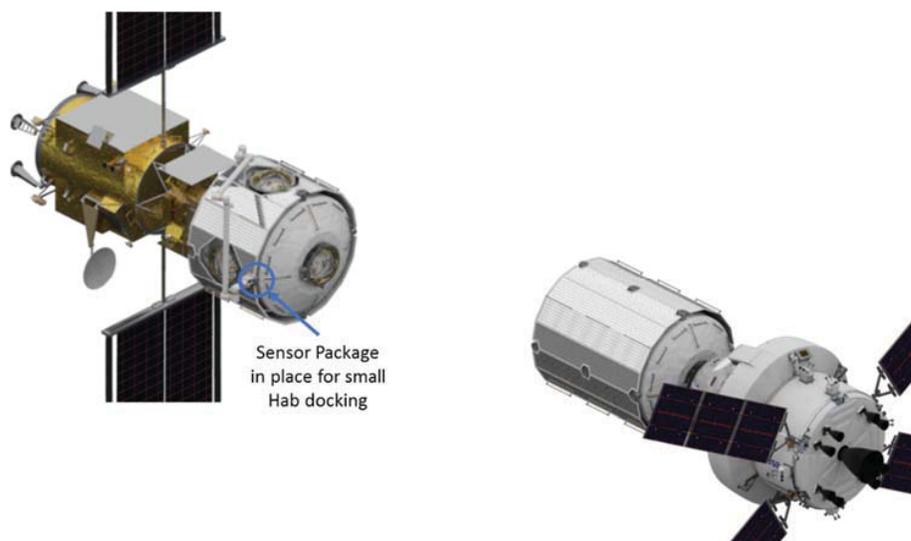


FIGURE 1-2 CISELUNAR RELNAV SENSOR IN LOCATION FOR NEXT VV
(Credit: NASA)

The type of measurement and functional ranges, currently being considered, for the navigation data to support VV independent/dissimilar navigation needs are the following (as presented in Figure 1-3):

- Rang and range-rate starting at Approach Initiation (AI) burn (~3 to 5km) up to Keep out Sphere (KOS), a 100m to 200m (TBC) radius sphere centered on the center of mass of the CH. As a goal, range and range-rate should be provided up to distance of 40km.
- Range, range-rate, bearing angles (relative position) starting at KOS (range ~100 to 200m) while on the approach axis. Range coupled with bearing angles provide a relative position solution (X,Y, and Z).
- Relative position, velocity, attitude and attitude rates starting at Go for docking on the approach axis (range = ~15 to 20m).

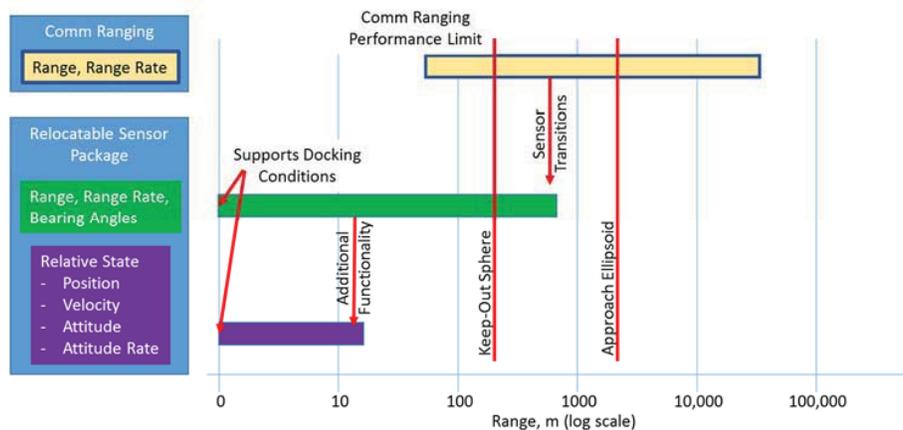


FIGURE 1-3 CH RELNAV SENSOR OPERATIONAL REGIMES

(Credit: NASA)

It is envisioned that, regardless of how many sensors and measurements are available, someone either on the ground or in the Station (if crewed) needs to visually see what is happening during capture (docking/berthing). Therefore, support for visual monitoring of the VV by the crew is also included, note that this video monitoring could be part of the relocatable RelNav sensor package:

- Video to CH and ground, starting at KOS (~100-200m) on approach axis through docking.
- Desired at 1km.

Preliminary accommodations needed for the sensor are:

- Mass less than 20kg
- Volume less than 40cm x 30cm x 30cm
- Maximum power of 75 Watts
- Data/video direct connectivity or wireless LAN (WLAN)

The scope of the system is currently the following:

- A sensor package that would provide the data at the different regimes presented in Figure 1-3 in accordance with the preliminary mission requirements presented in Annex D.
- An architecture of the overall relative navigation system on the CH, for instance, it is envisioned that this sensor package would feed its data to a global filter that would consume data from different sources (i.e., star trackers, gyroscope, ...) in order to provide the final relative navigation solution.

1.1 SCOPE

This Statement of Work (SOW) defines activities for Phase 0, including system definitions and feasibility assessments, associated with the Beyond LEO Relative Navigation (BRNAV) system potential contributions. The system being defined as the different hardware and software subsystems.

One key result of a Phase 0 is to provide information for CSA to clearly understand the options, costs, schedule, and risks. The sub-systems being studied in Phase 0 remain options subject to further down-selection or descope. For that reason it is important to provide information for each separately. Details of each options will be included in separate Contract Data Requirements List (CDRL) and Data Item Description (DID) (as described in Section 3 - Work Requirements).

1.2 OBJECTIVE

The objectives of Phase 0 are to identify and consolidate users' needs, identify mission requirements, validate concept definition and design, develop a concept of operations, identify critical technologies, and prepare development plans for follow on phases of a potential BRNAV contributions to a BLEO habitat.

At the end of this Phase 0 Study, the CSA should have all the technical and programmatic information necessary to make an informed decision about the BLEORNAV system.

1.3 DOCUMENT CONVENTIONS

A number of the sections in this document describe controlled requirements and specifications and therefore the following verbs are used in the specific sense indicated below:

- a) “Must” is used to indicate a mandatory requirement;
- b) “Should” indicates a goal or preferred alternative. Such goals or alternatives must be treated as requirements on a best efforts basis, and verified as for other requirements. The actual performance achieved must be included in the appropriate verification report, whether or not the goal performance is achieved;
- c) “May” indicates an option;
- d) “Will” indicates a statement of intention or fact, as does the use of present indicative active verbs.

2 DOCUMENTS

2.1 APPLICABLE DOCUMENTS (AD)

This section lists the documents that are required for the bidder to develop the proposal.

The following documents of the exact issue date and revision level shown are applicable and form an integral part of this document to the extent specified herein AD-1, AD-2, AD-3 and AD-4 can be obtained from the following File Transfer Protocol (FTP) site:

<ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/>.

TABLE 2-1: APPLICABLE DOCUMENTS

AD No.	Document Number	Document Title	Rev. No.	Date
AD-1.	CSA-ST-GDL-0001	CSA Technology Readiness Levels and Assessment Guidelines	C	March 2017
AD-2.	CSA-ST-FORM-0003	Critical Technology Element (CTE) Identification Criteria Worksheet	A	March, 2014
AD-3.	CSA-ST-FORM-0001	Technology Readiness and Risk Assessment (TRRA) Worksheet (PDF)	F	March 2017
AD-4.	CSA-SE-STD-0001	CSA Systems Engineering Technical Reviews Standard	Rev. A	Nov 7, 2008

2.2 REFERENCE DOCUMENTS (RD)

The following documents provide additional information or guidelines that either may clarify the contents or are pertinent to the history of this document, but are not required to develop the proposal.

RD-2 can be obtained from the following FTP site: <ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/>.

TABLE 2-2: REFERENCE DOCUMENTS

RD No.	Document Number	Document Title	Rev. No.	Date
RD-1.	PMBOK Guide	A Guide to the Project Management Body of Knowledge	5 th Edition or latest	2013

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Initial Release

RD No.	Document Number	Document Title	Rev. No.	Date
RD-2.	CSA-SE-PR-0001	CSA Systems Engineering Methods and Practices	Rev. B	Mar 10, 2010
RD-3.	Apogy Website	https://projects.eclipse.org/proposals/apogy		
RD-4.	Xcore documentation	https://wiki.eclipse.org/Xcore		
RD-5.	ESD 30000	Space Launch System (SLS) Mission Planner's Guide	Initial Baseline	April 2017
RD-6.	SLS-SPEC-159	Cross-Program Design Specification for Natural Environments (DSNE) http://ntrs.nasa.gov/search.jsp?R=20160004378	Rev. D or latest	Nov 4, 2015
RD-7.	Core Flight System Website	https://cfs.gsfc.nasa.gov/		
RD-8.	Guidelines on Costing (Treasury Board)	https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=30375		
RD-9.	NASA HEO Presentation to Advisory Council	Progress in Defining the Deep Space Gateway and Transport Plan www.nasa.gov/sites/default/files/atoms/files/nss_chart_v23.pdf	v.23	March, 2017
RD-10.	NASA GSFC-STD-7000	Goddard Technical Standard: General Environmental Verification Standard (GEVS) for GSFC Flight Programs and Projects http://everyspec.com/NASA/NA-SA-GSFC/GSFC-STD/GSFC_STD_7000_170/	A	April 22, 2013
RD-11.	ANSI/AIAA G-043-2012	Guide to the Preparation of Operational Concept Documents http://arc.aiaa.org/doi/abs/10.2514/4.869297		2012

3 WORK REQUIREMENTS

The Contractor must manage the project to effectively achieve project performance, scope, quality, cost and schedule requirements of this SOW. The Contractor must provide the management, technical leadership, and support necessary to ensure effective and efficient performance of all project efforts and activities.

The Contractor must report project costs, schedule, technical, performance and risks issues as defined herein.

3.1 MISSION ANALYSIS, PLANNING AND DEVELOPMENT

The Contractor must perform the following tasks:

- Collect/define User Requirements/Science Requirements /Demonstration or Commercial Requirements
- Parsing of requirements to distinguish essential from desirable. Requirements can be captured in a User Requirements Document, Science Requirement Document, Product Requirement, etc.
- Initial Analysis comprising Concept Formulation, feasibility Assessment, Analysis, Derivation of Mission and System Requirements.

3.1.1 Cislunar Architecture and Draft Standards Review

It is expected that the Cislunar Architecture will evolve and that draft international standards will be proposed to facilitate interoperability, reduce costs, and inform early definition and design work. The Contractor must support CSA in the review, evaluation and development of recommendations regarding the other partner element concepts and the proposed standards. The standards include External Robotic Interfaces, Power, Avionics, Software, and Thermal.

3.1.2 Mission Objectives and User Needs Definition

The Contractor must review the preliminary mission requirements, presented in Appendix D and produce inputs in the form of a Mission Objective and User Needs Definition Document (CDRL MD1) for the Canadian contribution.

This document must capture and summarize the pertinent mission goals, assumptions and objectives, identify the stakeholders and provide a clear articulation of observation requirements, data and applications needs, processing and distribution requirements, calibration, validation and characterization requirements, as expressed by the user community.

3.1.3 Mission Conceptual Design

The Contractor must develop a Mission Concept Document (MCD) (CDRL MD2) that supports the definition, development, and operation of the system or instrument. This document communicates to systems developers and users, in the user's language, the desired characteristics of the system or instrument to be developed.

3.1.4 Mission Requirements

The Contractor must review the preliminary list of mission requirements provided in Appendix D and modify and further develop as needed which details/contains the mission requirements required to proceed with the development of system requirements (CDRL MD3). The Mission Requirements Document (MRD) must be a separate document as the intent is to use this document in subsequent phases of the project.

3.1.5 Mission Feasibility Study

The Contractor must perform a study to demonstrate the viability of the mission (CDRL MD4).

3.1.6 Mission Development Plan

The contractor must breakdown the mission into sub-systems at a level sufficient to estimate required developments, cost, risk and performance. The system breakdown must be the basis of the Technology Readiness and Risk Assessment (TRRA) and Development Plan for the mission.

The Mission Development Plan includes:

- identification of the mission cost;
- identification of the mission schedule;
- identification of the technology development required to bring the technology readiness to the appropriate level at the appropriate time;
- identification of the development and manufacturing approach;
- identification of scientific ground support needs;
- approach for calibration, data product, application development and simulation;
- provision of a mission risk assessment;
- identification of potential collaborations;
- provision of a Canadian capabilities development strategy; and
- provision of a commercialisation plan.

The information requested in sections 3.1.6.1 through 3.1.6.7 must be presented in the Mission Development Plan (CDRL MD5).

3.1.6.1 Mission Cost Estimate

The Contractor must provide an indicative BLEORNAV System Cost, in accordance with Treasury Board (TB) guidelines (RD-8), as per Table 3-1 Template for Cost Breakdown, broken down per Work Breakdown Structure (WBS), for all phases leading to the development, implementation, operation and disposal. Along with the cost estimate, a detailed justification for

BLEORNAV – Beyond LEO Relative Navigation Phase 0

those costs must be included. The justification must describe the type of analysis (analogous, bottom-up, etc.), as well as the assumptions made (CDRL PM6).

Cost estimates must provide sufficient granularity to allow costing estimating of the BLEORNAV System across the life cycle of the mission.

TABLE 3-1: TEMPLATE FOR COST BREAKDOWN (EXAMPLE)

Category (per WBS)		Phase A	Phase B	Phase C	Phase D	Phase E	Phase F
Labour	Management						
	Technology Development						
	Design						
	Documentation						
	Reviews						
	Manufacturing						
	Assembly						
	Testing						
	Product Assurance						
	Operations Team Support						
	Total Labour						
Non-Labour	Hardware / Software Procurement						
	Operations Team Support						
	Tools, Equipment and Facilities						
	Travel and Living						
	Other Direct Charges						
Total Non-Labour							
Risk	Risk Contingency						
Taxes	GST						
Total By Phase							
Total All Phases							

3.1.6.2 Overall Mission Schedule

The Contractor must suggest a preliminary Mission Schedule relative to the overall life cycle of the mission including the impact of hardware integration and qualification milestones. The timeline must include key milestones from Phase A to Phase F completion, such as Preliminary Design Review, Critical Design Review and Launch. Refer to CSA Systems Engineering

Technical Review Standard (AD-4) for a full description of all the possible reviews, which may vary depending on the nature of the mission architecture.

3.1.6.3 Development and Manufacturing Approach

The Contractor must provide an overview of the development and manufacturing approach, specifying the major tasks required in the development and manufacturing cycles and the general strategy best suited for this approach. Identification of the potential long-lead items is also required.

3.1.6.4 Preliminary Mission Risk Assessment

The Contractor must provide a preliminary technical, schedule, cost and programmatic risk assessment for the entire mission lifecycle, starting with Phase A through to Phase F. For each risk identified, the Contractor must identify the phase of the mission to which the risk applies, the likelihood of occurrence, the impact should the risk occur and any possible mitigation actions that may be taken to decrease either the likelihood or the impact. Specific mitigation actions must be identified for medium and high risks. Contingency plans (i.e.: identifying alternative strategies) must also be developed for medium and high risks, or when it is uncertain that mitigation plans will be effective.

The Contractor must integrate all risks when producing risk-related information and document it in a Risk Assessment Matrix. The risk assessment process and matrix are generally provided in (RD-1).

3.1.6.5 Collaboration

The Contractor must identify potential partners/stakeholders either at the national/international level, state the benefits of their participation in such a mission and provide a preliminary assessment of roles and responsibilities. The basis and process of stakeholder analysis is described in the Project Management Book of Knowledge (PMBok) (RD-1).

3.1.6.6 Canadian Capabilities Development

This report must provide an estimate of the anticipated percentage of Canadian content relative to the overall cost presented in Table 3-1, what options could be undertaken to maximize the Canadian content and their corresponding impacts and benefits. The Contractor must describe the Canadian supply chain involved in this current Phase 0 study, and expected to be involved in subsequent phases.

The report must also provide an overview of the Contractor's strategy to develop and maintain Canadian capabilities. If the overall approach of the Contractor implies technology transfer and partnership with foreign entities to develop the Canadian capabilities, the Contractor must specify teaming arrangements, Intellectual Property (IP) ownership issues, licensing, royalties and opportunities that this partnership would open.

3.1.6.7 Preliminary Commercialization Plan

The Contractor must provide information on the minimum business in the field required to maintain the necessary expertise in the long run.

The Contractor must provide a preliminary commercialization plan to explain the potential economic benefits of an investment in such a mission. This plan must include a description of potential products and spin-offs (space and non-space) that can be commercialized, a stakeholder analysis, and analysis of the competitors (national and international) for the potential products. The Contractor must include an estimate of the potential market for their products as well as specify companies/market segments/export markets that would purchase their products. The Contract must describe and explain their overall/general business model for any potential new business.

3.1.7 Technology Readiness and Risk Assessment (TRRA)

The Contractor must conduct a Technology Readiness and Risk Assessment (TRRA) in accordance with the requirements of the CSA TRRA guidelines(AD-1).

The main steps of the TRRA are:

- Logically breakdown the instrument into technology elements (CDRL MD6);
- Classify technology elements as critical or non-critical using the criteria defined in the Critical Technology Elements (CTE) worksheet (AD-2) and provide sufficient rationale for that classification (CDRL MD7);
- Produce a Technology Readiness and Risks Assessment for each Critical Technology Element using the PDF form provided in AD-3 (CDRL MD8).
- Prepare a report according to CDRL MD9.

As the maturity of the technology grows and requirements are better defined, the TRRA may need to be updated to reflect this progress.

The Contractor must update the Technology Readiness and Risk Assessment to reflect the change in maturity of the system as a result of the work performed in Phase 0. For purposes of technology development, the Contractor should also provide driving requirements, cost estimate, and schedule to reach the next Technology Readiness Level (TRL) for Critical Technology Elements (CTE).

3.1.8 Technology Roadmap

The Contractor must provide a Technology Development Plan, also known as Technology Roadmap (TRM) including the recommended timeline and sequence of required technology developments to reach TRL 6 and eventually TRL 8 (CDRL MD10). The TRM will also provide a notional budget providing estimated costing for the proposed technology development steps.

The TRM must show how the technology development plan and associated TRL progression aligns with the system's mission phases/milestones versus the NASA mission phases/milestones.

The Technology Roadmap may be provided as a chapter of the Mission Development Plan (CDRL MD5).

3.1.9 Intellectual Property

The Contractor must complete the Contractor Disclosure of Intellectual Property CSA Form (CDRL MD11), identifying the Background and Foreground Intellectual Property (BIP and FIP) that will be generated in this Phase 0 contract, the owners of the BIP and how it will be managed and coordinated among the various collaborators and entities involved.

3.2 OPERATIONS

3.2.1 Preliminary Concept of Operations

The Contractor must develop a Preliminary Concept of Operations (CDRL OP1) in order to meet the mission objectives. This document must provide a comprehensive summary of all operability aspects of the mission.

3.3 ENGINEERING

3.3.1 Preliminary System Conceptual Design

The Contractor must develop a Preliminary System Conceptual Design Document (CDRL EN1) that meets the BLEORNAV System Mission, Performance and Functional Requirements.

3.3.2 Preliminary Interface Control Document

The Contractor must prepare a Preliminary Interface Control Document (ICD) (CDRL EN2), to the extent of the information available, in which:

- 1) All external interfaces are identified and characterized.
- 2) All internal interfaces are identified and characterized between all sub-systems, including those between the BLEORNAV and the CH.
- 3) All software interfaces are identified and characterized.

3.3.3 Preliminary CAD Models

The Contractor must develop a Computer Assisted Design (CAD) model in Système International (SI) units (CDRL EN4) of the proposed conceptual design.

3.3.4 Preliminary Software Interface Definition

The different contributions of the CisLunar concept will be integrated in a simulation environment: Apogy (RD-3). In order to integrate into Apogy, the first step is to define a software interface using the Xcore (RD-4) language.

The Contractor must provide a preliminary version of the Software Interface implemented by the API. The language must be the Xcore language format (CDRL EN6). The goal is to integrate into Apogy during subsequent Phases of the project.

The following listing shows an example of an interface defined using the Xcore language format.

```
class BLOERNav {
    op Pose acquirePose()
}
```

3.3.5 Core Flight System Architecture Assessment

The envisioned software architecture for CisLunar will be based on NASA's Core Flight System (cFS) framework (RD-7). The cFS is a NASA Agency Asset for Spacecraft Flight Software Reuse. It has been productized over several years by Goddard Space Flight Center and has been supported by continuous NASA level funding since 2012. The cFS is an open source software supported by the NASA community. It has been fully tested, documented and is at TRL 9. The architecture is based on published service layer (cFS) and open source Operating System Abstraction Layer (OSAL) for common services such as: publish and subscribe message bus, time services, events, tables, file, task execution. It also runs on multiple platforms.

Figure 3-1 presents an overview of the architecture.

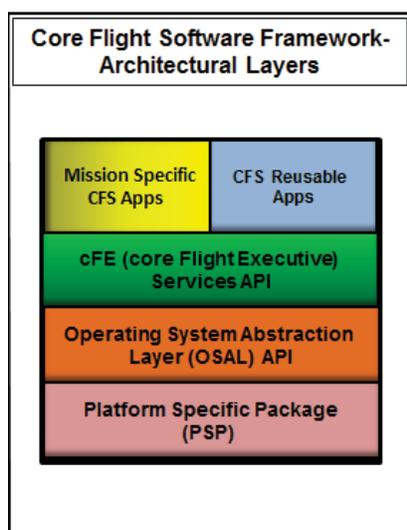


FIGURE 3-1 CFS ARCHITECTURAL LAYERS

It is envisioned that the cFS will be running on NASA assets and therefore, there will be a Mission Specific App (yellow box in Figure 3-1) connecting the Relative Navigation System provided by the CSA to the cFS infrastructure. The Contractor could also elect to use cFS for designing the onboard architecture of the Relative Navigation System but it is not mandatory (the list of supported boards will be provided during the contract and is evolving in time)

The Contractor must therefore perform a feasibility assessment of interfacing with cFS by performing the following prototyping activities:

- Develop a Mission Specific cFS App communicating with relative navigation hardware (that could be provided as Government Furnished Equipment (GFE), however, the choice of hardware is at the contractor's discretion.
- The bread board will then be commanded via cFS commands and telemetry will be monitored also via the mechanisms provided by cFS.
- The cFS single computer board (SCB) on which the Mission Specific App will be deployed, and also providing the other layers of the cFS architecture can be provided by the Contractor of as GFE, at the Contractor's discretion. The GFE platform will be based on a modern ARM architecture.

The deliverables for this work package will be the source code along with build instructions in Contractor's Format (CDRL EN7).

3.3.6 Supporting Analyses

The Contractor must provide the analyses in support to the conceptual design and feasibility assessment exercises (CRDL EN5), taking into account both docking and berthing scenarios.

3.4 MISSION REQUIREMENTS VERIFICATION MATRIX

The Contractor must develop the Mission Requirements Verification Matrix (CDRL EN3) to identify the various requirements developed to meet the Phase 0 scope.

3.5 PROJECT MANAGEMENT

The Contractor is responsible for establishing and maintaining a project management control system necessary meeting the requirements provided in the next sub-sections.

Refer to Appendix A, for the full Contract Data Requirement List (CDRL).

3.5.1 Team Organization

The Contractor must set up and maintain a project organization specific to this project. The Contractor must provide and maintain a current Project Organizational Chart showing personnel assignments by name and function, and showing subcontractor-reporting relationships.

The Contractor must nominate a Project Manager, who will be responsible for all aspects of the work carried out by the Contractor and will act as single point of contact within its project organization for communications between the Contractor and the CSA Mission Manager (MM) and/or Technical Authority (TA). In the absence of the single point of contact, the Contractor must designate an alternate to maintain continuity of communication between the Contractor and Project/Mission Manager and/or TA.

The Contractor must also identify other key personnel who are considered essential to the performance of the contract. The Contractor must assign personnel with appropriate qualifications and experience to all posts within the project organization, including scientists with the necessary expertise to define/interpret the science requirements for the mission and data products (for the purpose of the contract work).

The Contractor must include, within its program management structure, the necessary leadership to effectively manage the performance of subcontractors in keeping with the project objectives.

3.5.2 Contractor Work Breakdown Structure

The Contractor must prepare and maintain a detailed Contractor Work Breakdown Structure (CWBS) (CDRL PM4). The CWBS must include all project management, product assurance, mission and operations planning and engineering work identified in this SOW, including subcontractors' work.

3.5.3 Detailed Schedule and Critical Path

The Contractor must prepare and maintain a detailed schedule (CDRL PM5) based on the CWBS for all the work to be performed under this Phase 0 contract.

The schedule must show dependencies between the activities to identify the critical path. The schedule must be updated at each major milestones. The schedule must include all the milestones listed in Table 3-2 : Proposed Project Milestones.

TABLE 3-2 : PROPOSED PROJECT MILESTONES

ID	Milestone
M1	Kick-off Meeting (KoM)
M2	Mission Concept Review (MCR)
M3	Technology Readiness and Risk Assessment
M4	Mission Requirements Review (MRR)

3.5.4 Communications and Access

The Contractor must establish and maintain a close management and technical interface with CSA to assure a coordinated program effort and monitoring of the total program cost, schedule and performance.

The Contractor must provide access to its plant and personnel, at mutually agreeable dates, by representatives of CSA or other organizations nominated by the CSA, for review of program status.

The Contractor must provide temporary accommodation and other facilities for the use of the CSA representatives (and the nominated attendees) visiting the Contractor's premises for reviews, meetings, audits, liaison, etc.

The accommodation must be adequate for the purposes of the visit and the facilities provided must include telephone, faxing, photocopying and Internet access.

All documentation and data generated by the Contractor for the project must be accessible to the CSA Mission Manager and TA for review.

3.5.5 Project Meetings

The Contractor must hold the meetings described in Table 3-3 Planned Meetings. Some or all of these meetings may be attended by representatives of the CSA, and/or other organizations nominated by the CSA.

All meetings between the Contractor and CSA Mission Manager and/or TA will be held at a mutually agreeable time and location. The Contractor must provide formal notification of the proposed meeting date to the CSA Mission Manager and/or TA no less than 10 working days before the meeting (with the exception of the KoM where the Contractor must provide formal notification no less than 5 working days before the meeting).

For meetings held at government venues, the Contractor must inform the CSA Mission Manager and/or TA of the names of Contractor and Subcontractor attendees no less than 10 working days before each meeting.

Additional teleconferences and face-to-face review meetings must be held if necessary when mutually agreed to by the Contractor and the CSA Mission Manager.

Meetings can be alternatively replaced by videoconference or teleconferences for cost and/or time savings and when appropriate to support the scope of the meeting.

All technical reviews will be chaired by the CSA Mission Manager.

TABLE 3-3: PLANNED MEETINGS

ID	Meetings	Date Time after Contract Award	Venue
M1	Kick-off Meeting (KoM)	2 weeks	CSA/Telecon
M2	Mission Concept Review (MCR)	3 months	Telecon
M3	Technology Readiness and Risk Assessment (TRRA)	6 months	Contractor
M4	Mission Requirements Review (MRR)	8 months	CSA
	Bi-Weekly Meetings	As required	Telecon
	Provision to support two (2) international meetings.	TBD	TBD, could be USA, Europe or Japan

3.5.5.1 Bi-weekly Teleconference Meetings

The Contractor must hold bi-weekly teleconference meetings with the Project Manager (PM), and the duration should be limited to one hour. The bi-weekly teleconference is mainly to address technical issues and to discuss progress.

3.5.5.2 M1 – Kick-off Meeting

This meeting will serve as an opportunity for CSA and Public Works and Government Services Canada (PWGSC) to review the Contractor's plans, the requirements of the work (SOW), schedules, deliverables, risks, and address issues (CDRL PM8).

3.5.5.3 M2 – Mission Concept Review (MCR)

The purpose of the MCR is to demonstrate the feasibility of the mission and the project readiness to proceed with the development of mission requirements.

The Contractor must make a presentation (CDRL PM9) such as to demonstrate that the MCR entry and exit criteria are met, including the common entry and exit criteria, as per AD-4.

The deliverables for this review will be as per Table A-1.

3.5.5.4 M3 – Technology Readiness and Risk Assessment (TRRA)

The focus of the TRRA process is to provide inputs to the Technology Development Plan by identify critical technologies and assess their maturity level. The intent of this milestone is to review the PDF worksheets (CDRL MD8) for each Critical Technology Element.

Please refer to section 3.1.7 for more information.

3.5.5.5 M4 – Mission Requirements Review (MRR)

The purpose of the MRR is to demonstrate the validity of the mission requirements and the project readiness to proceed with the development of system requirements.

The Contractor must make a presentation (CDRL PM10) such as to demonstrate that the MRR entry and exit criteria are met, including the common entry and exit criteria, as per AD-4.

The deliverables for this review will be as per Table A-1.

3.5.6 Agendas, Minutes and Action Item Log

The Contractor must provide a Meeting Agenda (CDRL PM1) for all reviews and meetings including teleconferences and must deliver these to the CSA Mission Manager and/or TA no less than 5 working days before the meeting and must have it approved by the CSA Mission Manager and/or TA.

The Contractor must produce the minutes for all reviews and meetings including teleconferences and must deliver these to CSA (CDRL PM2). In the case of teleconferences, they must be delivered the next business day.

The Contractor must maintain a detailed Action Item Log (AIL) throughout the project to track actions resulting from all reviews and meetings including teleconferences using the following red-yellow-green stoplight method:

- 'Green' implying that the action item will be completed on-time.
- 'Yellow' implying that there exist an issue which will prevent meeting the deadline, and
- 'Red' implying that the action is past due.

Also, a chart indicating how many action items are open and how many are closed since the beginning of the project must be produced for the monthly progress report and at the meetings. The AIL (CDRL PM3) must be delivered with the Monthly Progress Report PM7.

3.5.7 Project Reporting

3.5.7.1 Monthly Progress Reports

The Contractor must submit monthly Progress Reports (CDRL PM7).

The Monthly Progress Reports must be delivered no later than five working days after the end of the month. As all deliverables, it must be submitted via CSA CM Library for the BLEORNAV mission, and a copy must also be sent by email to the PWGSC Contracting Officer.

3.5.7.2 Phase 0 Closure Report

The Contractor must submit a Phase 0 Closure Report (CDRL PM11).

The report must summarize the outcome of the Phase 0 work.

3.5.8 Document Deliverables

The Contractor must deliver all documentation listed in the CDRL tables (Appendix A) as a minimum. Some documents may be combined or divided by mutual agreement. The format and content of the deliverables must be in accordance with the requirements specified in the Data Item Descriptions (DIDs) (Appendix B), both the specific DID identified in the CDRL and the DID-100 – General Preparation Instructions.

Except for the documents that will remain CSA documents, the Contractor may propose documents in a contractor's format provided the purpose, scope and content equal or exceed the DID requirements. Subject to CSA approval, the content of the contractor's document will replace the content of the document specified in the DID.

All documents must be delivered via the CSA CM Library for the BLEORNAV mission. Login credentials will be provided after the Kick-Off Meeting.

SI units must be used/supplied by the Contractor. Conversion factors must be supplied for all non-SI units used in the deliverable documents (including dates as YYYY-MM-DD).

The delivery schedule for all documentation must be as defined in the CDRL table.

The Contractor must obtain approval from the CSA for all CDRL Documents so indicated in the CDRL table.

3.5.8.1 Documents Delivered for Approval

The term “Approval” as used in this document and in other documents referred to herein, means written approval by CSA Mission Manager, of documents submitted by the Contractor. Once approved, the document is authorized for further use by CSA. The CSA does not take responsibility for the validity of the data, or statements, and the Contractor is fully responsible for the content and secondary effects derived there from.

The document may not be changed without the CSA Mission Manager approval. No request or document for which approval is required must be acted upon or implemented by the Contractor until such approval is provided. Such requests and documents will be reviewed promptly by the CSA Mission Manager and the necessary written approval or disapproval will be provided after their receipt by CSA. In the event of a failure by the CSA Mission Manager to approve or disapprove the document within fifteen (15) working days, the document may be deemed approved.

In the event that a request or document is disapproved, the CSA Mission Manager will advise the Contractor in writing as to the reasons for such disapproval and will define the additions, deletions or corrections that the CSA Mission Manager deems necessary to render the request or document acceptable. Disapproved requests or documents that are subsequently amended by the Contractor and resubmitted for approval will be either approved or disapproved by the CSA. Approval or disapproval of resubmitted requests or documents will be based solely on those points that were not previously deemed to be acceptable.

3.5.8.2 Documents Delivered for Review

The term “Review” as used in this document and in all other documents referred to herein, means, unless specifically stated otherwise, a CSA review of the documents submitted for that purpose by the Contractor. The acceptance by the CSA Mission Manager of a document for review must imply that the document has been reviewed, commented on, revised as necessary, and has been determined to meet the requirements.

The CSA does not take responsibility for the validity of the data, or statements, and the Contractor is fully responsible for the content and secondary effects derived there from.

In the event that the CSA Mission Manager does not concur with a document submitted for review, the CSA Mission Manager will so notify the Contractor. Such notification will include a full explanation of the reasons for the lack of concurrence and will recommend the additions, deletions and/or corrections that the CSA Mission Manager deems are beneficial to the needs of the project.

The Contractor is obligated to consider implementation of the changes suggested by CSA insofar as the changes are in accordance with the relevant DID in Appendix B and this SOW. If written notification of concurrence is not provided by the CSA Mission Manager within fifteen (15) working days of the receipt of the document, the document must be deemed to have been reviewed and accepted by the CSA Mission Manager without comment.

3.5.9 Subcontract Management

The Contractor must be fully responsible for implementation and execution of all tasks, including those subcontracted to others. Whenever this is the case, the Contractor must prepare and maintain subcontract Statements of Work, technical requirements documents, etc., necessary to effectively manage the subcontractors’ work.

At the request of the CSA Mission Manager and/or TA, copies of subcontractor documentation must be delivered to the CSA Mission Manager and/or TA.

The Contractor must ensure that all of the relevant requirements of this Statement of Work are flowed down to the subcontract Statements of Work.

3.6 OPTIONAL SERVICES

It is expected that the Deep Space Gateway architecture and associated standards will undergo modifications during this period, that the Relative Navigation System (RNS) concept will need to be updated, and that the International Partners will have special requests or raise new questions regarding the RNS concept and architecture.

The Contractor must:

Project Management

1. Plan, schedule, assign and organize resources and ensure completion of all work carried out under the contract.
2. Maintain project management interface with the CSA project team.
3. Monitor and report on technical, cost and schedule progress, on a monthly basis according to CDRL-PM7.
4. Provide the management, technical leadership, applicable technical subject matter experts and disciplines, and the support necessary to ensure effective and efficient performance of all project efforts and activities.
5. Produce a closure report at the end of the option period (per CDRL-PM11)

Engineering

1. Support CSA in the review, evaluation and development of recommendations regarding modifications to the Deep Space Gateway partner element concepts and the proposed standards. The standards include External Robotic Interfaces, Power, Avionics, Software, and Thermal.
2. Provide technical leadership on the conceptual design and architecture of the RNS including preparation and presentation of special topics, as requested by CSA.
3. Provide support as requested by CSA to develop/evaluate new/novel concepts for RNS and its subsystems in order to remain compatible with modifications to the Deep Space Gateway concept.
4. As requested by CSA, generate CSA ICD material for novel operations and/or review external ICD material related to relative navigation. Support CSA in the identification and evolution of interface definition. This includes the preparation of draft technical drawings or models.
5. As requested by CSA, perform relevant analysis, model updates, operational flows, and deliver associated documentation as required to address technical aspects and changes related to the RNS concept, requirements or operations.
6. Maintain and update Phase 0 documentation, as applicable, based on international developments.

International Meeting Support

1. Prepare/review/update presentations in support of international discussions and meetings with respect to technical aspects of the RNS.
2. As requested by CSA, participate in concept and mission review meetings at international partner locations. Four international, week-long meetings must be assumed, supported onsite by a maximum of two members of the Contractor team.

4 CONTRACTOR DELIVERABLES

4.1 HARDWARE

The Contractor must deliver the breadboard developed as part of the Work.

4.2 SOFTWARE

The Contractor must deliver source code of the software developed as part of the Work.

4.3 DOCUMENTATION

The Contractor must deliver all documentation requested in Appendix A.

The Contractor may propose to combine documents called by more than one CDRL into one document, but this is subject to prior approval from the CSA. Where this approval is granted, the document cover page must list all the CDRL numbers that are covered by this document (see DID-100 – General Preparation Instructions).

Documentation, reporting and other deliverables must be according to instructions provided in Appendix B of this SOW, which also provides naming convention. Presentation material should be in Power Point format. Documents provided in Adobe PDF format must not be protected against copy of text and figures.

Documents must be delivered in the original software application format. One electronic copy of each deliverable document must be transferred to the CSA to the address and in the format specified in DID-100 – General Preparation Instructions. No paper copy is to be delivered.

All documents must be provided 10 working days prior to the specified Review/Meeting unless otherwise indicated.

5 GOVERNMENT FURNISHED EQUIPMENT

No government furnished equipment is expected to be deliverable under this internal study. If applicable, any government furnished information must be returned to the Crown at the conclusion of the Contract.

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APPENDICES

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A CONTRACT DATA REQUIREMENTS LIST (CDRL)

This Appendix defines the documentation to be delivered by the Contractor.

LEGEND:

1) DID No.

- CF = Contractor's format

2) Document Versions:

- D: Draft (under Version Control, expected to be updated – up to 50% complete and correct)
- P:Preliminary (under Version Control, expected to be updated - 70% complete and correct).
- IR: Initial Release (under Configuration Control, may well be revised during normal project life - 95-100% complete & correct).
- U: Update (expected revision, but not final; under Configuration Control, previous versions remain unchanged under Configuration Control).
- F: Final (under Configuration Control, normally not expected to be revised, but could be if necessary - 100% complete and correct).

TABLE A-1: CONTRACT DATA REQUIREMENTS LIST

CDRL No.	Title	SOW Sect. No.	DID No.	Initial Release	Update	Final	Acceptance Category
A.1 PROJECT MANAGEMENT							
PM1	Meeting Agenda	3.5.6	110	M1, M3, M4			Review
PM2	Minutes of Meetings	3.5.6	111	M1, M3, M4			Review
PM3	Action Items Log (AIL)	3.5.6	112	M1, M3, M4	As required		Review
PM4	CWBS and Work Package Descriptions	3.5.2	102	Proposal	M1 KoM		Approval
PM5	Phase 0 Project Schedule	3.5.3	105	M1 KoM	Monthly		Review
PM6	Mission Life-Cycle Cost Estimates	3.1.6.1	Table 3-1	M2 MCR		M4 MRR	Approval
PM7	Progress Report	3.5.7.1	107		Monthly		Review
PM8	Kick-Off Meeting Presentation	3.5.5.2	CF	M1 KoM			Review
PM9	Mission Concept Review Presentation	3.5.5.3	CF	M2 MCR			Review
PM10	Mission Requirements Review Presentation	3.5.5.5	CF	M4 MRR			Review
PM11	Phase 0 Closure Report	3.5.7.2	114			M4 MRR	Review
A.2 MISSION DOCUMENTATION							
MD1.	Mission Objectives and User Needs Definition	3.1.2	CF	M2 MCR	As required	M4 MRR	Review
MD2.	Mission Concept Document (MCD)	3.1.3	002	M2 MCR	As required	M4 MRR	Review
MD3.	Mission Requirements Document (MRD)	3.1.4	008			M4 MRR	Approval
MD4.	Mission Feasibility Study	3.1.5	204			M2 MCR	Review
MD5.	Mission Development Plan (MDP)	3.1.6	007	M2 MCR	As required	M4 MRR	Approval
MD6.	Product Breakdown Structure (PBS) for the mission and sub-systems (to be used in TRRA and Mission Development Plan)	3.1.7	CF	M2 MCR		M4 MRR	Approval
MD7.	Criticality Technology Element (CTE) Report	3.1.7	AD-2	M3 TRRA		M4 MRR	Approval
MD8.	TRRA for Critical Element (PDF Worksheets)	3.1.7	AD-3	M3 TRRA		M4 MRR	Approval
MD9.	TRRA Stand Alone Report	3.1.7	0013	M3 TRRA	As required	M4 MRR	Approval
MD10.	Technology Roadmap (TRM)	3.1.8	CF	M3 TRRA		M4 MRR	Approval

BLEORNAV – Beyond LEO Relative Navigation Phase 0

CSA-RNS-SOW-0007

Initial Release

CDRL No.	Title	SOW Sect. No.	DID No.	Initial Release	Update	Final	Acceptance Category
MD11.	Contractor Disclosure of IP	3.1.9	App. C	Proposal		M4 MRR	Approval
A.3 OPERATIONS							
OP1.	Preliminary Concept of Operations (ConOps)	3.2.1	825	M2 MCR		M4 MRR	Approval
A.4 ENGINEERING							
EN1.	Preliminary System Conceptual Design Document	3.3.1	700	M2 MCR		M4 MRR	Review
EN2.	Preliminary Interface Control Document (ICD)	3.3.2	501			M2 MCR	Review
EN3.	Requirements Verification Matrix	3.4	CF			M4 MRR	Review
EN4.	CAD models	3.3.3	CF			M4 MRR	Review
EN5.	Analyses	3.3.6	CF			M4 MRR	Review
EN6.	Software Interface Definition in Xcore Format	3.3.4	CF			M4 MRR	Review
EN7.	cFS Mission Specific App (source code and build instructions)	0	CF			M4 MRR	Review

B DATA ITEMS DESCRIPTIONS (DIDS)

DID-002 – MISSION CONCEPT DOCUMENT (MCD).....32

DID-007 – MISSION DEVELOPMENT PLAN.....34

DID-008 – MISSION REQUIREMENTS DOCUMENT35

DID-0013 – TECHNOLOGY READINESS AND RISK ASSESSMENT WITH STAND ALONE REPORT 37

DID-100 – GENERAL PREPARATION INSTRUCTIONS40

DID-102 – CWBS AND WORK PACKAGE DESCRIPTIONS.....46

DID-105 – PROJECT SCHEDULE47

DID-107 – PROGRESS REPORT48

DID-110 – MEETING AGENDA50

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DID-112 – ACTION ITEMS LOG (AIL).....52

DID-114 – PHASE CLOSURE / FINAL REPORT53

DID-204 – MISSION FEASIBILITY STUDY54

DID-501 – INTERFACE CONTROL DOCUMENT (ICD).....56

DID-0600 – CAD MODELS59

DID-700 – SYSTEM CONCEPTUAL DESIGN DOCUMENT60

DID-800 – OPERATIONS REQUIREMENTS DOCUMENT62

DID-825 –SYSTEM CONCEPT OF OPERATIONS64

DID-827 – OPERATIONS DEVELOPMENT PLAN.....66

DID-002 – Mission Concept Document (MCD)

PURPOSE:

To support the definition, development, and operation of the system or instrument. This document communicates to systems developers and users, in the user's language, the desired characteristics of the system or instrument to be developed.

PREPARATION INSTRUCTIONS:

The MCD is an important complementary document to the System Requirements Document (SRD), the Interface Requirements Document (IRD), and the Environmental Requirements and Test Specification (ERTS). Written in a narrative form and non-specification-type prose, it describes the way in which the system is envisioned to fit and function within its operational environment.

The contents of the MCD must be tailored as outlined below.

1. Introduction
 - 1.1. Identification
 - 1.2. Scope
 - 1.3. System overview
 - 1.4. Document overview
2. Referenced documents
3. System description
 - 3.1. System goals and objectives
 - 3.2. System scope
 - 3.3. Minimum supporting documentation
 - 3.4. System states and modes
 - 3.5. System architecture
 - 3.6. System interfaces
 - 3.7. System capabilities
4. Operational needs
 - 4.1. Mission needs
 - 4.2. Users' needs
5. Operations
 - 5.1. Operational overview
 - 5.1.1. Mission
 - 5.1.2. Operational policies

- 5.1.3.Operational constraints
- 5.1.4.Existing operational environment
- 5.2. Operations team
 - 5.2.1.Personnel profile
 - 5.2.2.Organizational structure
 - 5.2.3.Personnel interactions
 - 5.2.4.Personnel activities
- 5.3. Operational processes
- 6. Operational environment
- 7. Support environment
- 8. System operational scenarios

DID-007 – Mission Development Plan

PURPOSE:

To define the programmatic activities required to initiate and develop the mission.

PREPARATION INSTRUCTIONS:

Referring to Table A-1:

- The Initial Release must include drafts of items 3, 10, 12, and 13, and preliminary inputs of the remainder of the plan.
- The Update must include final versions of items 3, 10, 12, and 13, and drafts of the remainder of the plan.
- The Final Release must be the final version of the plan.

The plan must include the following:

- 1) An introduction including the scope, the purpose and a list of assumptions (if any);
- 2) A description of the mission including goals and objectives;
- 3) Identification of stakeholders and their needs and expectations;
- 4) A description of the estimated mission life cycle cost;
- 5) A description of the estimated mission schedule including all major milestones;
- 6) A description of the technology development required;
- 7) A description of the proposed development and manufacturing approach;
- 8) A description of the preliminary mission risk assessment;
- 9) A description of the preliminary Concept of Operation;
- 10) A description of potential collaborations;
- 11) A description of the intellectual property to be generated throughout the whole project (not just Phase 0);
- 12) A description of the proposed Canadian capabilities development strategy;
- 13) A description of the proposed commercialisation plan; and
- 14) Recommendations for follow-on activities.

DID-008 – Mission Requirements Document

PURPOSE:

To capture the mission requirements required to proceed with the development of system requirements. The MRD will include functional and performance requirements, interface requirements, mission environmental requirements, and operational requirements. It will also serve to distinguish essential requirements from goals (desirable objectives), and identify gaps, assumptions, TBDs, TBCs and unknowns that must be addressed.

PREPARATION INSTRUCTIONS:

The document must include the following:

- 1) An introduction including the scope and purpose
- 2) A short description of the mission including background objectives and a list of assumptions (if any);
- 3) A list of applicable and reference documents (if any);
- 4) User requirements, which represent a clear articulation of the data and applications needs as expressed by the user community; these requirements shall be summarized in a table at the end of this section or in an Appendix;
- 5) Mission requirements that respond to user requirements and break down as follows:
 - a) functional requirements,
 - b) performance requirements,
 - c) operational requirements,
 - d) resource allocation requirements,
 - e) verification requirements, other applicable requirements types.
- 6) Interface Requirements, including but not limited to:
 - a) Electrical Interface Requirements;
 - b) Thermal Interface Requirements;
 - c) Mechanical Interface Requirements;
- 7) Mission environmental requirements will likely be derived from GSFC Standard GEVS (RD-10) and will cover topics such as mechanical, thermal, vacuum, contamination, outgassing, EMC/EMI, acoustics, shock, radiation, for the following environments:
 - a) Ground operations and handling
 - b) Integration to launch vehicle environment (for flight segment only)
 - c) Launch environment (for flight segment only)
 - d) On-orbit environment (for flight segment only)

- 8) In-flight requirements:
 - a) Operational modes
 - b) Upload and download of data/telemetry requirements
 - c) Telemetry availability
 - d) Commanding capabilities
 - e) Staffing requirements (ground and flight segments)
- 9) Recovery of samples (for flight segment only, the DSXR may retrieve lunar or asteroid samples brought to the deep space habitat)
 - a) Timing and location of recovery
 - b) Contamination protection requirements (reciprocal)

The mission requirements must be summarized in one or more tables at the end of this section or in an Appendix.

DID-0013 – Technology Readiness and Risk Assessment with Stand Alone Report

PURPOSE:

The Technology Readiness and Risk Assessment (TRRA) Report is used to describe in a systematic and objective fashion, at a specific point in time (milestone) in the development process, the technological readiness of a system for a particular spaceflight mission, the criticality of the constituent technologies, and the expected degree of difficulty in achieving the remaining technology development steps.

The TRRA provides for all the Critical Technology Elements (CTEs) of the proposed concept, as per the Product Breakdown Structure (PBS), a high-level summary of the maturity of the technologies and the technology development risks.

The TRRA Report is used to assess project status and technical risks, and to guide definition of risk reduction work in following phases.

Agreement on the appropriate PBS level and identification of the CTEs is required prior to the TRRA leading to the elaboration of the TRRA Report. For each CTE the TRRA Report captures the key requirements, heritage, Technology Readiness Level (TRL) achieved, Technology Need Value (TNV), the Research and Development Degree of Difficulty (R&D3) to complete the development, and references to supporting evidence for all assessments.

PREPARATION INSTRUCTIONS:

The TRRA Report must contain the following information, as a minimum:

1. INTRODUCTION

This section should include

- 1.1. Project Description;
- 1.2. Purpose of Document;
- 1.3. Scope.

2. DOCUMENTS

This section must include

- 2.1. Applicable Documents (which must include the following):
 - a) TRRA Guidelines (CSA-ST-GDL-0001 at latest approved revision).
- 2.2. Reference Documents (which must include the following):
 - a) TRL Handbook for Space Applications (TEC-SHS/5574; ESTEC);
 - b) (all evidence documents referred to in body of report).

3. MISSION OBJECTIVES

This section must provide an overview of the mission, describing the key mission requirements and any assumptions.

4. MISSION ENVIRONMENT

This section must describe in detail the mission environment and any assumptions.

This section should include a summary comparison table(s) between heritage and current mission environments with references to source documents.

5. PRODUCT BREAKDOWN STRUCTURE

This section must provide a table or diagram with hierarchy of PBS and element numbers.

This section must provide schematics illustrating the elements of the PBS and their parts.

6. KEY PERFORMANCE PARAMETERS (KPPS) FOR EACH CTE

This section must describe the Key Performance Parameter(s) identified for each PBS element (where applicable). The KPP description must identify what parameter value/range is currently achievable and what is required.

7. CRITICAL TECHNOLOGY ELEMENTS (CTES)

7.1. Description of the CTE;

7.2. Rationale for selecting the CTEs.

The intent of this section can be met by completing and cross-referencing the Critical Technologies Elements Identification Criteria Worksheet (CSA-ST-FORM-0003).

8. TECHNOLOGY MATURITY AND VIABILITY ASSESSMENTS

This section must include a sub-section for each CTE covering:

8.1. Description;

8.2. Main requirements (including KPP(s) associated with this CTE);

8.3. Heritage and compliance;

8.4. TRL achieved;

8.5. R&D3;

8.6. TNV.

The intent of this section can be met by completing and cross-referencing the applicable Technology Readiness and Risk Assessment Worksheet (CSA-ST-FORM-0001) for each CTE and including the Technology Risk Matrix generated from the Technology Readiness and Risk Assessment Data Rollup Tool (CSA-ST-RPT-0002).

9. TRRA SUMMARY AND RECOMMENDATIONS

This section must include a Summary table of results with columns covering:

- PBS # ; Technology Name; TRL (calculated); TNV (user input);
- R&D3 (user input); TNV • Δ -TRL (calculated); /R&D3/ (calculated).

This section must present a summary of remaining Technology R&D Options, Risks, Cost, and Feasibility for each CTE of the PBS.

This section must summarize the recommended technology development plan and should refer to a separate Technology Development Plan report if appropriate.

10. CONCLUSIONS

This section should include a statement regarding current overall state of TRRA assessment and identify any open work.

11. APPENDIX A – TECHNOLOGY READINESS AND RISK ASSESSMENT WORKSHEETS

This section must include, or refer to an attachment which includes, all of the completed worksheets: the Critical Technologies Elements Identification Criteria Worksheet (CSA-ST-FORM-0003 – AD-2), the Technology Readiness and Risk Assessment Worksheet (CSA-ST-FORM-0001 (AD-3) for each CTE and rollup using the Technology Readiness and Risk Assessment Data Rollup Tool (CSA-ST-RPT-0002). These worksheets can be obtained from the FTP site:

<ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/>.

DID-100 – General Preparation Instructions

PURPOSE:

This DID specifies:

- a) format requirements for the preparation and formatting of deliverable project documentation;
- b) document and data delivery methods, notifications and identification requirements;
- c) document and data structure requirements;
- d) metadata requirements for all document and data submissions.

When documentation is prepared in the Contractor's format, it must still meet the requirements of this DID.

PREPARATION INSTRUCTIONS:

1. GENERAL INSTRUCTIONS

1.1. Preparation

All documentation shall be written in English and must be delivered in electronic format. Documents must be prepared using the most appropriate software (Microsoft Word, Excel, etc.). Schedules must be submitted in Microsoft Project format. Documents whose native format is not a common office program must be delivered in PDF in addition to the native format.

The electronic file name and the identification number written on the document itself must have the following format:

WXYZ-CDRL-NUM-CIE_ContractNumber_sentYYYY-MM-DD

where:

WXYZ:	A 4-8 letter acronym of the project
CDRL-NUM:	The CDRL Identifier
CIE:	Name of the Company (no space, no hyphen)
ContractNumber:	For example: _9F028-07-4200-03
_sentYEAR-MONTH-DAY:	Date Tracking Number

1.2. Electronic Documents Format

Electronic copies of text documents must be formatted for printing on 8.5" x 11" paper.

1.2.1. Page Numbering

General format of documents should include page numbers and be formatted according to the contractor's normal standard. If the document is divided into volumes, each such volume must restart the page numbering sequence.

1.2.2. Document Numbers

All pages must contain the Document Number at the top of the page. Document Numbers must include revision status and volume identification as applicable.

1.3. Delivery, Notifications and Identification Requirements

Data must be submitted with a Letter of Transmittal (or an electronic equivalent as mutually agreed by the CSA and the Contractor), and acknowledged. The Letter of Transmittal must be forwarded by the Contractor in two copies; one copy of acknowledgement to be signed and returned to the Contractor by the recipient. The Letter of Transmittal will contain as a minimum, the Contract Serial Number, the CDRL Number and the Title.

Documents may be delivered via e-mail or direct transfer (FTP) or on DVD or CD-ROM disk.

1.3.1. E-mailed documents

E-mailed documents must be sent to:

asc.bibliothequegc-cmlibrary.csa@canada.ca

Covering e-mails must contain the project/program acronym or equivalent identifier in the "Subject" line and include the CDRL identifier under which deliverable documents are being submitted.

1.3.2. Direct Transferred Documents

For direct transfer, a notification of the document's availability and location on a contractor repository must be sent to:

asc.bibliothequegc-cmlibrary.csa@canada.ca

If deliverables contain ITAR content, notifications of their availability on contractor repositories shall be sent to: the CSA CM ITAR Receipt Desk:

CSA-CM-ITAR@asc-csa.gc.ca

The notification must include the project/program acronym or equivalent identifier and the CDRL identifier under which deliverable documents are being submitted.

1.3.3. Documents Delivered on DVD or CD-ROM disk

Hard copy and media deliverables are to be addressed to:

CM Library, 6A-100
Attention: CSA RNS Phase 0 Project
Canadian Space Agency
6767, Route de l'Aéroport
Longueuil, QC, J3Y 8Y9
CANADA

The DVD or CD-ROM label must show the following information:

- a) Company Name
- b) Document Title
- c) Document Number and Revision Status
- d) CSA SOW Number
- e) CDRL Number and Title

f) Contract Number

2. DOCUMENT STRUCTURE AND CONTENT Overall

Except as otherwise specified, all documents must have the overall structure as follows:

- a) Cover/Title Page;
- b) Table of Contents;
- c) Introduction;
- d) Applicable and Reference Documents;
- e) Body of Document; and
- f) Appendices

2.2. Cover/Title Page

The title page must contain the following information:

- a) Document Number and date: Volume x of y (if multivolume)
- b) Rev. indicator / date of Rev.
- c) Document Title
- d) Project Name
- e) Contract No.
- f) CDRL Item No. or Nos., if one document responds to more than one CDRL, subject to prior approval from the PA.
- g) Prepared for: Canadian Space Agency
- h) Prepared by: Contractor name, CAGE Code, address, and phone number
- i) Product tree identifier, if applicable
- j) © HER MAJESTY THE QUEEN IN RIGHT OF CANADA [YEAR].

2.3. Table of Contents

The table of contents must list the title and page number of each titled paragraph and subparagraph, at least down to the third level inclusive. The table of contents must then list the title and page number of each appendix, figure and table, in that order.

2.4. Introduction

This section must be identified as section 1 and must, as a minimum, provide the following information:

- a) Project description and background;
- b) Identification (number, title) and a brief overview of the system, hardware, or software to which the document applies;
- c) Purpose of the document;
- d) Scope of the document (what it includes and what it does not include);
- e) Document conventions; and
- f) Roles and responsibilities of the participants and stakeholders.

The requirements specified in the following DIDs are the minimum expected. The Contractor must include in all documents all additional information required in order to ensure that the document provided will achieve its purpose as stated in the DID.

2.5. Applicable and Reference Documents

This section must list by Document Number and title, all applicable and reference documents. This section must also identify the source of all applicable and reference documents and the revision indicator.

2.6. Body of Document

The body of the document must be prepared in accordance with the content and format requirements defined in the specific Data Item Description.

2.7. Appendices

Appendices may be used to provide information published separately for convenience of document maintenance. Acronyms must be in the last appendix.

3. METADATA ON DELIVERABLES

This section is optional at the discretion of the CSA Project Manager.

In order for CSA to be able to properly manage deliverables and the system configuration as well as to process contractor's deliverables in an efficient manner, the contractor must, for each deliverable, provide metadata as described in the following table.

BLEORNAV – Beyond LEO Relative Navigation Phase 0

CSA-RNS-SOW-0007

Initial Release

Provided by Supplier	Metadata Description	Comments
Yes	CSA Project Identifier	Project Acronym
Yes	Contract Identifier	PWGSC identifier
Yes	Contract Revision Identifier	PWGSC identifier
Optional	Contract Revision Date	
Yes	SOW Identifier	CSA Doc ID
Yes	SOW Revision Identifier	CSA Doc Revision ID
Yes	Document Type	Dwg, Doc, RFD, RFW, ECR, ECN, IP CR, IP CN/CD, QN, etc.
Yes	CDRL Identifier	Per CSA SOW (e.g. EN-006)
Yes	CDRL Sub-category Identifier	If multiple, separate subject documents per CDRL item (e.g. EN-006.03) (can be contractor defined)
Optional	Project WBS identifier	
Optional	SOW paragraph identifier.	
Optional	DID/ DRD Identifier	
Yes	Deliverable submission format	Electronic, Hard copy, On media (CD-ROM, etc.)
Yes	Deliverable Transmittal Identifier	e.g. CADM09-0123. Can also be a notification of delivery identifier
Yes	Deliverable Transmittal Date	
Yes	Originator's Organization Identifier	CAGE code, company name, short name, etc.
Optional	Document Author	
Yes	Deliverable Type	Dwg, Doc, RFD, RFW, ECR, ECN, NCR, Problem Report, IP CR, IP CN/CD, QN, etc.
Yes	Document Type	Specification, Design, Plan, Tech Note, Report, etc.
Yes	Originator's Document Identifier	
When applicable	Originator's Document Volume Identifier	
When applicable	Originator's Document Part Identifier	
When applicable	Originator's Document Issue Identifier	When both Issue and Revision are used concurrently to identify released documents
Yes	Originator's Document Revision Identifier	
Yes	Originator's Document Title	
Yes	Document Release Date	
Yes	Document Effective Date	Applicable to document changes, deviations, waivers,
Yes	Document Expiry Date	If applicable
When applicable	Originator's Authorizing ECN Identifier	Class 2 ECN approving document release and submission to customer
Yes	Document Maturity	Draft, Preliminary, Initial Release, Updated Revision, etc.
When applicable	Class	If deliverable is a change, deviation, waiver, etc. to a released item. (Class I, Class II)
Yes	Security Classification of Deliverable	Per Government of Canada definitions for Classified and Protected data (C,S,TS,PA,PB,PC)
Yes	Sensitivity of Document contents	Company Proprietary, Trade Secret, etc.
Yes	ITAR Content Indicator	Yes or No
Yes	Export Controlled Content Indicator	Yes or No

BLEORNAV – Beyond LEO Relative Navigation Phase 0

CSA-RNS-SOW-0007

Initial Release

Provided by Supplier	Metadata Description	Comments
Yes	Affected Document Identifier	If deliverable is a change, deviation, waiver, etc. to a released document/drawing/model. Enables change-to-document, waiver-to-document relationships, etc.
Yes	Affected Document Revision Identifier	As above
Yes	Affected Document Title	As above
Yes	Product Breakdown Structure / Item Hierarchy Identifier	Critical for Item-to-Document Relationship
Yes	Associated Project/System Milestone Review	PDR, CDR, etc. When Reviews are at sub-system level, identify accordingly. e.g. Bus PDR
When applicable	Associated System Baseline	If different from Project Milestone
Yes	Filename of Deliverable	Filename and file type (for all representations submitted - .doc, .pdf, etc.). Original, revisable format to be delivered before contract completion.
Yes	Format of Deliverable / Application used to produce	MS WORD 2007, Project Scheduler 9, etc.
When applicable	Filename of Parent Deliverable Bundle	If part of a document Bill of Material
When applicable	Identification of Delivery Media	If physically delivered
When applicable	Originator's Repository Address of deliverable	To identify source location of document

DID-102 – CWBS and Work Package Descriptions

PURPOSE:

The Contractor Work Breakdown Structure (CWBS) is used during planning for estimating resources and scheduling the work. During the implementation phase, it is used for reporting and controlling costs and schedule.

PREPARATION INSTRUCTIONS:

The Contractor must provide a Work Breakdown Structure (WBS) describing all the project elements that organize and define the total scope of the project, including subcontracted work, and must be deliverable-oriented.

The Contractor must prepare and maintain a WBS Dictionary made up of Work Package Descriptions (WPDs) for every element to the lowest level of the WBS. Each WPD must include, as a minimum:

- a) A unique identifier traceable to the WBS;
- b) A title;
- c) The name of the individual responsible for completion of the work;
- d) The scope of the work package;
- e) The start date and duration;
- f) Required inputs and dependencies;
- g) A description of every activity covered by the WPD including the level of effort and earned value measurement method for each activity, and all non-labour costs;
- h) Assumptions;
- i) Output and work package acceptance criteria;
- j) Issue date;
- k) Version number; and
- l) List of deliverable with delivery milestone.

DID-105 – Project Schedule

PURPOSE:

To provide a schedule planning and control system for the project and to provide visibility to the CSA of the program progress and status.

PREPARATION INSTRUCTIONS:

The project schedule must be based on the CWBS, in the form of a Gantt chart. The schedule must be provided in MS project format, and in PDF. The project schedule must be detailed enough to show each CWBS task to be performed, and must provide the following information:

- 1) dependencies,
- 2) resource requirements,
- 3) the start and end date of each task (baseline and actual),
- 4) task duration,
- 5) completion status in percentage;
- 6) deadlines and milestones, and
- 7) critical path.

The schedule must show dependencies between the Contractor and other organizations.

The tasks related to deliverables must be limited to three months in the project schedule. When applicable, the Contractor must divide longer tasks into smaller significant tasks.

Tasks that are not related to any specific deliverable, such as Project Management and S&MA activities, must be grouped separately from the deliverables, and must be shown at the top of the chart.

DID-107 – Progress Report

PURPOSE:

The Progress Report presents the results of the work done to date in the contract, and in particular since the previous report. The Progress Report is used by the Government to assess the Contractor's progress in performance of the work.

PREPARATION INSTRUCTIONS:

The Monthly Progress Report must include status data and information summarizing project management, technical and schedule progress and accomplishment for each element of the Contractor's Work Breakdown Structure (CWBS). The report must address the major activities of the reporting period and must emphasize major achievements and events of special significance. Difficulties and/or problems that have affected the work progress, proposed corrective actions, project impact expected and concerns for the future, must also be reported.

Each progress report must answer the following three questions:

- 1) Is the project on schedule?
- 2) Is the project within budget?
- 3) Is the project free of any areas of concern in which the assistance or guidance of the CSA may be required?

Each negative response must be supported with an explanation.

The Progress Report must include the following information, as a minimum:

- 1) Summary outlook, including technical performance, work performed, schedule and cost status (at CWBS level 2), organization and key personnel changes and areas of concerns;
- 2) Financial status including actual and forecasted expenditures, by month, as compared to the original monthly planned expenditure profile;
- 3) Updated milestones payment plan;
- 4) A detailed integrated project schedule status including:
 - a) Dependencies between activities,
 - b) Percent of completion for all activities,
 - c) List of completed milestones,
 - d) Critical path,
 - e) 1st level subcontractor's activities having impact on WP delivery date;
 - f) All other activities having an impact on WP delivery date.
- 5) Schedule variances from the plan, including deviations from schedule and proposed corrective actions for significant variances;
- 6) Major meetings schedule update;

- 7) Status of the work in progress, specifically the work performed in the previous calendar period; sufficient sketches, diagrams, photographs, etc. must be included, if necessary, to describe the progress accomplished;
- 8) The work projected for the next period, and estimated date of completion of next milestone;
- 9) Outline of technical and programmatic issues, with solutions recommended;
- 10) Contractual issues, including changes to activities and costs;
- 11) Subcontracts events, status and issues;
- 12) Equipment ordered, received, made and assembled;
- 13) Description of trips or conferences connected with the Contract during the period of the report;
- 14) Risk status report including previous issues resolved, status of on-going risks (changes, likelihoods and impacts), and identification of new risks, their likelihood and impact, and proposed mitigation action;
- 15) Status of all action items from previous review(s) and meeting(s).

DID-110 – Meeting Agenda

PURPOSE:

The Meeting Agenda specifies the purpose and content of a meeting.

PREPARATION INSTRUCTIONS:

The meeting agendas must contain the following information, as a minimum.

1. DOCUMENT HEADER:

- a) Title;
- b) Type of meeting;
- c) Project title, project number, and contract number;
- d) Date, time, and place;
- e) Chairperson; and
- f) Expected duration.

2. DOCUMENT BODY:

- a) Introduction;
- b) Opening Remarks: CSA;
- c) Opening Remarks: Contractor;
- d) Review of previous minutes and all open action items;
- e) Project technical issues;
- f) Project management issues;
- g) Other topics;
- h) Review of newly created/closed action items, decisions, agreements and minutes; and
- i) Set or confirm dates of future meetings.

DID-111 – Minutes of Meetings

PURPOSE:

The minutes of reviews or meetings provide a record of decisions and agreements reached during reviews/meetings.

PREPARATION INSTRUCTIONS:

Minutes of meeting must be prepared for each formal review or meeting in the Contractor's format and must, as a minimum, include the following information:

- 1) Title page containing the following:
 - a) Title, type of meeting and date
 - b) Project title, project number, and contract number
- 2) Purpose and objective of the meeting;
- 3) Location;
- 4) Agenda;
- 5) Summary of the discussions, decisions and agreements reached;
- 6) List of attendees by name, position, phone numbers and e-mail addresses as appropriate;
- 7) Listing of open action items and responsibility for each action to be implemented as a result of the review;
- 8) Other data and information as mutually agreed; and
- 9) The minutes must include the following statement:

“All parties involved in contractual obligations concerning the project acknowledge that minutes of a review/meeting do not modify, subtract from, or add to the obligations of the parties, as defined in the contract.”

DID-112 – Action Items Log (AIL)

PURPOSE:

The Action Item Log (AIL) lists, in chronological order, all items on which some action is required, allows tracking of the action, and in the end provides a permanent record of those Action Items (AI).

PREPARATION INSTRUCTIONS:

The Action Item Log (AIL) must be in a tabular form, with the following headings in this order:

- 1) Item Number;
- 2) Item Title;
- 3) Description of the action required;
- 4) Open Date;
- 5) Source of AI (e.g. PDR meeting, RID, etc.);
- 6) Originator;
- 7) Person responsible (for taking action);
- 8) Target/Actual Date of Resolution;
- 9) Progress update;
- 10) Rationale for closure;
- 11) Status (Open or Closed); and
- 12) Remarks.

The date in column 8) will be the target date as long as the item is open, and the actual date once the item is closed.

DID-114 – Phase Closure / Final Report

PURPOSE:

The purpose of the Phase Closure/ Final Report is to record formally the history of the Phase (or Project if this is the Final Report), its achievements, financial, material and human resources expenditure, problems encountered and solutions implemented.

PREPARATION INSTRUCTIONS:

The Phase Closure / Final Report will encompass all the work done in the project during the Phase just ended or for the entire project. It should be a comprehensive summary of the phase or project work with the emphasis on the problems encountered, solutions implemented, successes encountered and lessons learned. It must include sufficient drawings, graphs, tables, figures, sketches and photographs as appropriate. The Phase Closure Report must be a standalone document and must contain at least the following information:

- 1) Executive Summary.
- 2) Comparison of system performance results against system requirements and objectives.
- 3) Comparison of run-out costs with estimates by major Work Package (if applicable).
- 4) Comparison of actual versus planned schedules and milestones.
- 5) Comparison of risks anticipated versus actual experience.
- 6) Problems encountered and solutions implemented.
- 7) Final CDRL.
- 8) Lessons learned.

DID-204 – Mission Feasibility Study

PURPOSE:

The feasibility report is used to assess the strengths and weaknesses of the proposed mission and its objectives. It must determine the practicality of the mission objectives, evaluate the prospects of success and provide recommendations based on the findings of the report.

PREPARATION INSTRUCTIONS:

The document must include the following:

- 1) an introduction including the scope, the purpose and a list of assumptions (if any);
- 2) a list of applicable and reference documents (if any);
- 3) a short description of the mission including the mission objectives, performance criteria , the overall requirements of the spacecraft (BUS, sub-systems), the payload(s), the ground segment and user terminals.
- 4) define the success criteria for the mission and analyze the current status of the project for comparison
- 5) Assess present and future needs
- 6) Define alternatives to meet those needs
- 7) Evaluate viable alternatives (note: consider the most applicable approach for the mission)
 - a) Experimental approach: demonstrate the viability of achieving the performance criteria for each mission objective through experimental data and results.
 - i) The experimental data and results must be compared to the applicable theories. Any divergence between theory and experiment must be explained and suggestions are to be made for possible improvements to reduce the deviation between experimental results and theory.
 - b) Analytical approach: demonstrate the viability of achieving the performance criteria for each mission objective through previously obtained experimental data and flight demonstration results.
 - i) The contractor must demonstrate the applicability of the analytical data used to evaluate the feasibility of the performance criteria of the mission objectives. The contractor must provide a description of the methods used to obtain the analytical data and present the applicability of the analytical data to the current mission.
 - ii) The contractor must propose improvements/changes to obtain the analytical results to conform to the current mission performance criteria and applicable theories.
- 8) Identify and develop the preferred solution
- 9) Programmatic Aspects:
 - a) Provide an estimation of the cost of developing the most viable technologies that are essential to the completion of the project.

- b) Provide a realistic timeline of the development of the viable technologies
- c) Deduce from cost and scheduling estimations; the most cost and time efficient technology to develop and apply in the project.
- d) State the benefits of the technological developments and the project itself toward Canada in social and economic terms.

Any appendices required to provide detailed information pertinent to the mission requirements that is not suitable to be contained in the main document as explanatory notes.

DID-501 – Interface Control Document (ICD)

PURPOSE:

To define and control the interface between several cooperating or attached Hardware Configuration Items (HWCI) or Configuration Software Configuration Items (CSCI).

PREPARATION INSTRUCTIONS:

The ICD may describe the interfaces between a system or subsystem and all external systems or subsystems with which it interfaces (External ICD), or it may define all interfaces amongst subsystems within a system (Internal ICD).

Examples of External ICDs are:

- Spacecraft-to-Launch Vehicle ICD
- Spacecraft-to-Ground Segment ICD

Examples of Internal ICDs are:

- Spacecraft Internal ICD (e.g. between Bus and Payloads)
- Ground Segment Internal ICD

Systems may be manned or unmanned; they may be space or ground systems such as Ground Segment facilities. The specific requirements below must be tailored accordingly.

The ICD may be structured by types of interfaces (as defined above), or by subsystem and then by types of interfaces under each subsystem.

The ICD must contain the following information, as a minimum, tailored as required by the type of ICD as described above, and the particular system and interfaces being defined:

1. Purpose and Scope
2. Applicable and Reference Documents
3. Identification (name, number) and brief overview of the system and role within the system, of the interfaces to which the ICD applies
4. Interface diagrams showing by name and identifier all interfaces among the HWCIs and CSCIs to which this ICD applies
5. Identification (name, identifier) and purpose of each of the interfaces
6. Physical / Mechanical Interfaces
 - 6.1. Coordinate System
 - 6.2. Dimensions and tolerances
 - 6.3. Units of measurement
 - 6.4. Envelope, Volume and Mass Properties
 - 6.5. Attachment methods

- 6.6. Alignment features
- 7. Structural/Mechanical Interfaces
 - 7.1. Applied Loads and Disturbances (including random vibrations, frequency spectrum)
 - 7.2. Acoustics
 - 7.3. Depressurization/Repressurization
 - 7.4. Ground Handling Environment
- 8. Thermal/Fluids Interfaces
 - 8.1. General Requirements (touch temperature, condensation prevention, etc.)
 - 8.2. Thermal Environment
 - 8.3. Payload/Subsystems Cooling
 - 8.4. Vacuum Exhaust Interfaces
- 9. Electrical Power Interfaces
 - 9.1. Electrical Power Requirements, Sources and Allocation
 - 9.2. Power Supply characteristics and limits
 - 9.3. Overload protection and limits
 - 9.4. Power control
 - 9.5. Electrical connectors (types, pinouts, locations, mating and demating)
 - 9.6. Cable schematics
- 10. Electromagnetic Compatibility (EMC)
 - 10.1. EMC Classifications
 - 10.2. Host system produced interference environment
 - 10.3. Payload produced interference environment
 - 10.4. Bonding and grounding
 - 10.5. Power and signal circuits isolation
- 11. Command and Data Handling (C&DH)
 - 11.1. Communications Technology (RS-422, Ethernet, Analog, Discrete, video, laptop, etc.)
 - 11.2. Signal Characteristics
 - 11.3. Response / Telemetry Format
 - 11.4. Request/Command Format
 - 11.5. Processing Requirements
 - 11.6. Connector/Pin Interface
 - 11.7. Data Acquisition, Storage and Management
 - 11.8. Synchronization

- 11.9. Application Programming Interfaces
- 12. Environmental Interfaces
- 13. Any environmental factors not addressed elsewhere in the ICD (e.g. radiation, atmosphere, illumination, etc.)
- 14. Materials and Processes Interfaces
- 15. Human Factors Interfaces
- 16. Propulsion Interfaces
- 17. Pyrotechnic Interfaces
- 18. Fire Prevention
- 19. Ground Operations and scientific data processing
 - 19.1. Facilities
 - 19.2. Payload Handling
 - 19.3. Ground Support Equipment (GSE)
 - 19.4. Communications Requirements
 - 19.5. Power Requirements
 - 19.6. Special Equipment
 - 19.7. Storage

DID-0600 – CAD Models

PURPOSE:

To provide a 2D or 3D virtual model of a product to support the performance of various analyses (mechanical, electrical, thermal, optical) and virtual testing.

PREPARATION INSTRUCTIONS:

All CAD models developed must be delivered.

Models must be delivered in the following formats:

- a) Mechanical design: STEP AP203 (.stp);
- b) Electrical design: .dsn, .sch, Pspice and Gerber formats;
- c) Thermal Design: TMG universal file format, or I-Deas Archive file format;
- d) Software design: UML 2.0 or XML;
- e) Model-based Systems Engineering Model (if required): Artisan Studio.
- f) Optical design models: Zemax

In cases where a different tool is used from the one CSA uses, the model and outputs must be supplied in native format in addition to the required format. For generic modeling and analysis that don't use a specialty tool, CSA will accept Matlab, Excel and MathCad format data. Where a highly specialized tool is used (e.g. bearing analysis, EMC analysis) delivery format must be negotiated with the CSA. Translation from the Contractor's tool to the required format is only acceptable where the results can be repeated in CSA's tool. Translation that corrupts the model, loses data, or produces data that is interpreted differently, is not acceptable.

Assumptions that are used must be stated, along with resulting limits on model accuracy.

DID-700 – System Conceptual Design Document

PURPOSE:

In its preliminary form, to describe the preliminary system conceptual design proposed to meet the mission requirements.

In its final form, to describe the conceptual design of the system, to assist in finalizing the design of the system and allocating the requirements to subsystems, to demonstrate its feasibility and to support programmatic estimates.

PREPARATION INSTRUCTIONS:

NOTE: This DID comprises two sets of requirements: the first for the preliminary form of the document and the second for its final form.

Preliminary form

The preliminary document must include the following:

- 1) An introduction including the scope, the purpose and a list of assumptions (if any);
- 2) A description of the overall system conceptual design;
- 3) A description of any payload detailed analysis, breadboard design and performance (field) testing, if applicable; and
- 4) A description of any trade-off studies performed.

Final form

The final document must include the following:

- 1) Introduction: recalling the major objectives and guidelines for the project;
- 2) Architecture, design and interfaces: giving a high level description of the architecture and design of the system and its subsystems, including internal and external interfaces;
- 3) Trade-offs: criteria definition, analysis, criteria results, decisions;
- 4) Design decisions: rationales for design choices;
- 5) Budgets: a summary of the engineering budgets and TPMs, and margins, their allocation to subsystems;
- 6) Drawings and schematics: architectural diagrams for the main aspects of the system (structure, electronics, power, communications, software, etc.) describing and referencing important design drawings such as functional interconnect diagrams, activity flow diagrams, ICDs;
- 7) Analyses: summarizing the analyses performed, main results and problems encountered; this is a summary of each full analysis report presented separately;
- 8) Tests: summarizing the tests to be performed to verify the performance and environmental requirements;

- 9) Operations concepts: summarizing the operations of the system in both nominal and contingency conditions;
- 10) Maintenance approach: describing the maintenance approach especially for maintainable items such as the spares for manned systems, flight software and ground systems;
- 11) Matrix: To demonstrate design compliance to requirements by providing clear link between design and requirements. Indication of design compliance, non-compliance and partial compliance.

DID-800 – Operations Requirements Document

PURPOSE:

To define the operations requirements for the entire mission.

PREPARATION INSTRUCTIONS:

- 1) Requirements documents must conform to norms of English usage for Systems Engineering:
 - "must" indicates a mandatory requirement
 - "should" indicates a preferred but not mandatory alternative,
 - "will" indicates statement of intention or fact
 - "may" indicates an option.
- 2) Requirements documents must define the requirements on the mission as a whole and must not contain specific requirements on sub-items. All requirements must be verifiable at the mission level.
- 3) Requirements documents must cite applicable standards and parent requirements, and must make clear the priority sequence of the applicable documents.
- 4) All operations requirements, including operational interface requirements, must be defined and must be verifiable, preferably by test.
- 5) The operations requirements must respond to the mission requirements and the Concept of Operations (ConOps).
- 6) The operations requirements must be complete and sufficiently accurate to proceed with the preliminary design.
- 7) Traceability from operations requirements to mission requirements must be established and maintained throughout the system life cycle.
- 8) Operational requirements must be derived from the following:
 - a) Mission requirements (driver);
 - b) ConOps (driver);
 - c) Feedback from Requirements Analysis;
 - d) Feedback from Validation activities; and
 - e) Existing constraints and assumptions.
- 9) In the development process, new constraints and assumptions must be identified, if any.
- 10) Requirements must conform to the following standards for quality:
 - a) They must be unambiguously clear to the intended readership;
 - b) There must be one requirement per paragraph;
 - c) Each requirement must have a unique identifier (e.g. an ID number or paragraph number);
 - d) They must not define design solutions;

- e) They must define their source and/or rationale; and
- f) They must specify the conditions under which they apply.

DID-825 –System Concept of Operations

PURPOSE:

To define the overall end-to-end System Concept of Operations.

PREPARATION INSTRUCTIONS:

This document must be prepared in accordance with standard ANSI/AIAA G-043-1992 - Guide for the Preparation of Operational Concept Documents (TBD).

The System Concept of Operations must contain the following information:

- 1) Introduction including the scope, the purpose and a list of assumptions (if any);
- 2) Description of the overall concept of operations that proves the feasibility of command and control, housekeeping and payload data acquisition, downlinking, turnaround time, processing, analysis and distribution and payload calibration;
- 3) System operations requirements and constraints:
 - a) System description,
 - b) End-users description and requirements,
 - c) System Health and Safety requirements,
 - d) Programmatic and operational constraints,
 - e) Relationship with other missions / programs,
 - f) External dependencies or interfaces with other organizations;
- 4) Space segment characteristics including spacecraft monitoring and control, and spacecraft modes;
- 5) Ground segment characteristics including Command & Control and Data Reception for the LEOP, commissioning phase and routine operations phase;
- 6) System operations concepts:
 - a) Planning processes,
 - b) Operations execution processes,
 - c) Evaluation processes,
 - d) Data Reception,
 - e) Data Transfer,
 - f) Data processing,
 - g) Data turnaround time,
 - h) Instrument calibration,
 - i) Support processes,
 - j) Operations team,

- k) Orbit determination and maintenance;
- 7) Operational Scenarios.

DID-827 – Operations Development Plan

PURPOSE:

To describe the process to be followed for developing, verifying and validating the plans, processes and procedures that will be used to operate the system during Flight Operations, both the LEOP and Commissioning Phases, and the Routine Operations phase.

PREPARATION INSTRUCTIONS:

The operations development plan must contain the following information, as a minimum:

- 1) Introduction;
 - a) Purpose and Scope;
 - b) Definitions;
 - c) Document Revision;
 - d) Document Overview;
- 2) Documents;
 - a) Applicable Documents;
 - b) Reference Documents;
- 3) Operations Development Overview;
 - a) Operations Definition;
 - i) Resource Management;
 - ii) System Engineering;
 - iii) System Operation;
 - b) Assumptions and Constraints;
 - c) Operations Development WBS;
 - d) Operations Development Strategy;
 - e) Operations Development Phases;
 - f) Operations Development within Program Schedule;
 - g) Conclusion of Operations Development;
- 4) Specific Operations Development Activities;
 - a) Operations Planning Phase;
 - b) Operations Implementation Phase;
 - c) Operations Integration, Pre-launch, and Inter-launch Phases;
- 5) Operations Development Inputs and Outputs;

- a) Inputs from Space Segment;
 - b) Inputs from Ground Segment development;
 - c) Inputs by the Customer;
 - i) Customer Supplied Personnel;
 - ii) Customer Supplied Inputs;
 - d) Outputs by Operations Development;
- 6) Specific Operations Development System Engineering and Management Activities;
- a) Operations Development Milestones;
 - i) Operations Planning Review;
 - ii) Operations Validation Readiness Review;
 - iii) Operations Verification Review;
 - iv) Operations Readiness Review;
 - v) Quality Assurance;
 - b) Operations Development Team Staffing Plan (including by functional areas);
 - c) Operations Team Training;
 - d) Operations Team exercise and rehearsals;
 - e) Configuration and Data Management (CADM);
 - f) External and Internal Interfaces;
 - g) Routine Operations;
 - i) Operational Scenarios;
 - ii) Routine Operations Planning Timeline;
 - iii) Routine Operational Organization, Roles and Responsibilities;
 - h) Maintenance Operations;
 - i) Scenarios;
 - ii) Planning Timeline;
 - iii) Operational Organization, Roles and Responsibilities;
 - i) Contingency Operations;
 - i) Scenarios;
 - ii) Planning Timeline;
 - iii) Operational Organization, Roles and Responsibilities;
 - j) Charter for the Operations Working Group (OWG);
 - k) Deliverable Documentation;
 - l) Detailed Operations Work Packages;

7) Operations Development Schedule.

C CONTRACTOR DISCLOSURE OF INTELLECTUAL PROPERTY

C.1 PURPOSE

The BIP/FIP Disclosure Report serves to identify FIP produced under the Contract with the CSA, as well as any BIP elements that were used to develop the FIP.

This is not to be confused with the identification of the FIP and BIP that will be generated throughout the entire project, which is documented in DID-007 – Mission Development Plan.

C.2 DEFINITIONS

Intellectual Property (IP)	means any information or knowledge of an industrial, scientific, technical, commercial artistic or otherwise creative nature relating to the work recorded in any form or medium; this includes patents, copyright, industrial design, integrated circuit topography, patterns, samples, know-how, prototypes, reports, plans, drawings, Software, etc.
Background Intellectual Property (BIP)	IP that is incorporated into the Work or necessary for the performance of the Work and that is proprietary to or the confidential information of the Contractor, its subcontractors or any other third party.
Foreground Intellectual Property (FIP)	IP that is first conceived, developed, produced or reduced to practice as part of the Work under the Contract.

C.3 INSTRUCTIONS FOR COMPLETING IP DISCLOSURE TABLES

Identification

- The Contractor must respond to the 7 questions in Table C-1 when Foreground Intellectual Property (FIP) is created under the Contract with the CSA.

BIP

- If the Contractor intends to use Background Intellectual Property (BIP) to develop the FIP, the Contractor must complete Table C-2 (Disclosure of BIP brought to the project by the Contractor) and forward it to the CSA Project Manager before the beginning of the Contract if any.
- At the end of the Contract, the Contractor must review and update the BIP disclosure (Table C-2) when applicable.
- Only the BIP elements that were used to develop the FIP elements should be listed.

FIP

- At the end of the Contract, the Contractor must complete Table C-3 (Disclosure of the FIP developed under the Contract).
- If Canada is the owner of the FIP and identifies some FIP elements that would benefit from being patented by Canada, the Contractor must also complete Table C-4 (Canada's Owned FIP Additional Information).

General Instructions for BIP and FIP tables

- Tables must be structured according to the CSA IP form provided.
- Each IP element must have a unique ID # in order to easily link the elements of the different tables.
- Titles of IP elements must be descriptive enough for project stakeholders to get a general idea of the nature of the IP.
- Numbers and complete titles of reference documents must be included.

TABLE C-1: CONTRACTOR DISCLOSURE OF INTELLECTUAL PROPERTY

Contractor Legal Name:	
Project Title supported by the Contract:	
CSA Project Manager of the Contract:	
Contract #:	
Date of the disclosure:	
Will there be Contractor's Background Intellectual Property brought to the project:	
<input type="checkbox"/>	Yes - Complete Table C-2 - Disclosure of Background Intellectual Property
<input type="checkbox"/>	No
For Canada's owned IP, are there any IP elements that, to your opinion, would benefit from being patented by Canada?	
<input type="checkbox"/>	Not applicable, FIP resides with the Contractor
<input type="checkbox"/>	Yes - Complete Table 5 5 - Canada's Owned Additional Information
<input type="checkbox"/>	No
For the Contractor:	
<hr/>	
Signature	Date
For CSA Project Manager:	
<hr/>	
Signature	Date

TABLE C-2 : BIP DISCLOSURE

1 BIP ID#	2 Project Element	3 Title of the BIP	4 Type of IP	5 Type of access to the BIP required to use/improve the FIP	6 Description of the BIP	7 Reference documentation	8 Origin of the BIP	9 Owner of the BIP
	Describe the system or sub system in which BIP is integrated (e.g. camera, control unit, etc.)	Use a title that is descriptive of the BIP element integrated to the work	Is the BIP in the form of an invention, trade secret, copyright, design?	Describe how the BIP will be available for Canada to use the FIP (e.g. BIP information will be incorporated in deliverable documents, software will be in object code, etc.)	Describe briefly the nature of the BIP (e.g. mechanical design, algorithm, software, method, etc.)	Provide the number and full title of the reference documents where the BIP is fully described. The reference document must be available to Canada. Provide patent# for Canada if BIP is patented.	Describe circumstances of the creation of the BIP. Was it developed from internal research or through a contract with Canada? If so, provide contract number.	Name the organization that owns the BIP. Provide the name of the subcontractor if not owned by the prime contractor.

TABLE C-3 : FIP DISCLOSURE

1 FIP ID #	2 Project Element	3 Title of FIP	4 Type of FIP	5 Description of the FIP	6 Reference documentation	7 BIP used to generate the FIP	8 Owner of the FIP	9 Patentability
(e.g.FIP-CON-99, where CON is the contract acronym)	Describe the system or sub-system for which the FIP element was developed (e.g. a camera, ground control, etc.)	Use a title that is descriptive of the FIP element.	Specify the form of the FIP e.g. invention, trade secret, copyright, industrial design	Specify the nature of the FIP e.g. software, design, algorithm, etc.?	Provide the full title and number of the reference document where the FIP is fully described. The reference document must be available to Canada	BIP referenced in Table C-2 (e.g. BIP-CON-2, 1.5)	Specify which organization owns the FIP e.g. Contractor, Canada * or Subcontractor. Provide the name of the subcontractor if not owned by the prime contractor. *If Canada is the owner of the FIP, complete Table C-4 below. Provide reference to contract clauses that support FIP ownership. Provide reference to WPDs under which the technical work has been performed.	In the case where the IP is owned by Canada, indicate with an "X", any IP elements described is patentable and complete Table C-4 only for this IP.

TABLE C-4 : CANADA’S OWNED FIP ADDITIONAL INFORMATION

1 FIP ID #	2 Title of FIP	3 Aspects of FIP that are novel, useful and non obvious	4 Limitations or drawback of the FIP	5 References in literature or patents pertaining to the FIP	6 Has the FIP been prototyped, tested or demonstrated? (e.g. analytically, simulation, hardware)? Provide results	7 Inventor(s)	8 Was the FIP disclosed to other parties?

D PRELIMINARY MISSION REQUIREMENTS

This section presents the mission level requirements. Some portions of the requirements are intentionally left as to be determined (TBD) to avoid driving toward a specific technical solution. It is expected that these numbers will be jointly developed between CSA and the Contractor during this study. Moreover, these requirements are meant as a starting point for developing the concept of the mission. It is thus expected that these requirements will be reviewed, tailored and that additional requirements will be developed during this Phase 0.

D.1 FUNCTIONAL REQUIREMENTS

Requirement Code	Title	Description	Rationale/Note
MRQ-FCT-BLRNS-001	Far Range Navigation Data	The BLRNS shall provide range, range rate and bearing angle navigation data of the VV between 5km and 15m of the docking / berthing port.	
MRQ-FCT-BLRNS-002	Extended Range Navigation Data	The BLRNS should provide range, range rate and bearing angle navigation data of the VV between 40km and 15m of the docking / berthing port.	
MRQ-FCT-BLRNS-003	Near Range Navigation Data	The BLRNS shall provide position, velocity, attitude and attitude rate navigation data of the VV, when the VV from 20m up to docking/berthing.	
MRQ-FCT-BLRNS-004	Imaging Functionality	The BLRNS shall have 3D imaging capabilities	Assess safety clearance and other surveying tasks as needed.
MRQ-FCT-BLRNS-005	Automatic Acquisition	The BLRNS shall automatically acquire the VV when it becomes inside its field of view.	Minimize manual operation.

D.2 INTERFACE REQUIREMENT

Since there is no information on interfaces at this stage, only one high level requirement capturing the intent is presented. It is expected that the Contractor further develops requirements based on the concept of operations being developed during this study.

Requirement Code	Title	Description	Rationale/Note
MRQ-INT-BLRNS-001	Beyond LEO Space Station Interface	The BLRNS shall comply to the different interfaces of the Beyond LEO Space Station: mechanical, command and control, thermal, electrical	Expected to be further developed on the concept study phase, reflecting the concept of operations.

D.3 ENVIRONMENT REQUIREMENTS

The environment is the element of the study which presents the most uncertainty. It is expected that the Contractor will have to derive a set of requirements based on the natural environment of the Cis-Lunar orbit.

Requirement Code	Title	Description	Rationale/Note
MRQ-ENV-BLRNS-001	External Environment Survival	The BLRNS shall be designed to survive the Beyond LEO Space Station external environment, for a period of 15 years (TBR).	Note that this requirement can also be met by an appropriate sparing approach.
MRQ-ENV-BLRNS-002	Launch Vibration Environment	The BLRNS shall operate nominally after being exposed to the SLS launch vibration environment	Primary LV is SLS but EELVs may be used for some mission.
MRQ-ENV-BLRNS-003	Shock Environment	The BLRNS shall operate nominally after being exposed to the SLS launch shock environment.	Primary LV is SLS but EELVs may be used for some mission.
MRQ-ENV-BLRNS-005	Environmental Lighting Conditions	The BLRNS shall be immune to environmental lighting conditions, except when the sun is in its field of view.	Probably not expected to operate under any kind of lighting conditions. It is reasonable to expect that docking will occur under favorable and constant lighting conditions (i.e. not in eclipse, Sun not in camera FOV).
MRQ-ENV-BLRNS-006	Reliability / Robustness	The BLRNS shall be tolerant to operational factors which could affect its lifetime such as plumbing and MMOD	Note this may affect the choice of location of the sensor and its design. An off axis, robotically mounted sensor package may be better protected against direct plumbing
MRQ-ENV-BLRNS-007	Unpowered Survival	The BLEORNAV shall survive up to 3 hours (TBR) unpowered in the habitat external environment	Allow for deployment of sensor to/from stowage location. Assumes no support for robot power in the system. Based on current ISS timeline.

D.4 PERFORMANCE REQUIREMENTS

Requirement Code	Title	Description	Rationale/Note
MRQ-PRF-BLRNS-001	Target Acquisition Time	The BLRNS shall automatically perform acquisition of the VV within 90 seconds when the target is in the operational field of view and range.	Minimize manual operation and operation time.
MRQ-PRF-BLRNS-002	Tracking Update Rate	The BLRNS shall provide raw navigation data at least twice per second (2Hz) with a target of 4 times per second (4Hz).	Typical GNC requirement.
MRQ-PRF-BLRNS-003	Coverage Area	The BLRNS shall cover and area greater than 60 x 20 degrees (TBR).	Lots of motion expected in plane and little out of plane. Mounting on a robotics platform would alleviate FOV constraints (except for initial acquisition).
MRQ-PRF-BLRNS-004	Bearing Mode LOS Bias	The BLRNS LOS (Az, El) RSS measurement bias shall be less than 0.3 degree (3-sigma). Intermediate values can be linearly interpolated.	Draper analysis uses 0.333deg at 1 sigma for LOS camera
MRQ-PRF-BLRNS-005	Bearing Mode LOS Noise	The BLRNS LOS (Az, El) RSS measurement noise shall be less than 0.15 degree (3-sigma). Intermediate values can be linearly interpolated.	Draper analysis uses 0.05deg at 1 sigma for LOS camera
MRQ-PRF-BLRNS-006	Bearing Mode Range Bias	The BLRNS bearing range RSS measurement bias shall be less than 0.5% of the target range.	Draper analysis uses 0.33m to 7m (for 1m to 1.5km) for 1 sigma
MRQ-PRF-BLRNS-007	Bearing Mode Range Noise	The BLRNS bearing range RSS measurement noise shall be less than 0.5% of the target range.	Draper analysis uses 0.33m to 7m (for 1m to 1.5km) for 1 sigma

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CSA-RNS-SOW-0007

Initial Release

Requirement Code	Title	Description	Rationale/Note
MRQ-PRF-BLRNS-008	6DOF Pose Bias	The BLRNS LOS 6DOF relative pose RSS measurement bias shall be less than 2cm at the minimum docking range and less than 1m at the maximum 6DOF range (3-sigma). Intermediate values can be linearly interpolated.	
MRQ-PRF-BLRNS-009	6DOF Pose Noise	The BLRNS LOS 6DOF relative pose RSS measurement noise shall be less than 2cm at the minimum docking range and less than 1m at the maximum 6DOF range (3-sigma). Intermediate values can be linearly interpolated.	
MRQ-PRF-BLRNS-010	6DOF Relative Attitude Bias	The BLRNS LOS 6DOF relative attitude RSS measurement bias shall be less than 0.5 degree at the minimum docking range and less than 5 degrees at the maximum 6DOF range (3-sigma). Intermediate values can be linearly interpolated.	IDSS can tolerate 4 degrees.
MRQ-PRF-BLRNS-011	6DOF Relative Attitude Noise	The BLRNS LOS 6DOF relative attitude RSS measurement noise shall be less than 0.5 degree at the minimum docking range and less than 5 degrees at the maximum 6DOF range (3-sigma). Intermediate values can be linearly interpolated.	IDSS can tolerate 4 degrees.

D.5 OPERATIONS REQUIREMENTS

There is currently only one operations requirement outlining the importance of having autonomous operations where possible. It is expected that additional operations requirements will be developed during the course of this study.

Requirement Code	Title	Description	Rationale/Note
MRQ-OPS-BLRNS-001	Self-Calibration	The BLRNS shall have the capability to perform self-extrinsic calibration with position better than 5cm (TBR) and pointing better than 0.05 degrees (TBR). I.e. determine its position and aim in the station frame	May drive the need for a star tracker. Position within tolerance of the IDA. Draper analysis also uses 0.05deg. Note this is very conservative.
MRQ-OPS-BLRNS-002	VV Sensor Interference	The BLRNS performance shall not be degraded by VV sensor radiation and shall not degrade the VV sensor performance	Eventually, this requirement would need to be more specific but states the intent here in order to steer the concept design.

D.6 SOFTWARE REQUIREMENTS

This section presents a preliminary set of software requirements, reflecting the need for standardized data and software updates from ground.

Requirement Code	Title	Description	Rationale/Note
MRQ-SW-BLRNS-001	Upgradable from Ground	The BLRNS shall have the capability to upgrade its different CSCIs, namely, software, firmware and configuration files, from ground.	Allow for growth, bug fixes, configuration of different VV as needed.
MRQ-SW-BLRNS-002	Navigation Data Format	The Navigation Data provided by the BLRNS shall consist, as a minimum, of a quaternion representing the orientation, a 3 dimensional vector representing the translation in x,y and z and a time stamp expressed in a common time reference.	
MRQ-SW-BLRNS-003	BLRNS Simulator	There shall be a simulator of the BLRNS system.	To incorporate into an integrated simulation environment to be defined. The fidelity of the simulator is to be defined.
MRQ-SW-BLRNS-004	Software API	There shall be a software API provided for both the Simulated and the Real BLRNS system.	To integrate into existing tools.

D.7 MASS POWER AND VOLUME REQUIREMENTS

This section captures the mass, power and volume requirements.

Requirement Code	Title	Description	Rationale/Note
MRQ-ELE-BLRNS-001	Power Consumption	The BLRNS shall not consume more than TBD watts of power.	Realistic power consumption numbers will be developed during Phase 0.
MRQ-PHYS-BLRNS-001	Mass	The BLRNS shall have a mass less than 20Kg (TBR).	Realistic mass numbers will be developed during this study.
MRQ-PHYS-BLRNS-002	Volume	The BLRNS shall occupy a volume less than 40x30x30cm (TBR).	Realistic volume numbers will be developed during this study.

E ACRONYMS AND ABBREVIATIONS

6DOF	6 Degrees of Freedom
AD	Applicable Document
AI	Approach Initiation
AIL	Action Item Log
API	Application Programming Interface
BIP	Background Intellectual Property
BLEORNAV	
BRNAV	Beyond LEO Relative Navigation
CAD	Computer Assisted Design
CDRL	Contract Data Requirements List
CF	Contractor's Format
cFS	Core System System
CH	Cislunar Habitat
CSA	Canadian Space Agency
CTE	Critical Technology Element
CWBS	Cost Work Breakdown Structure
DID	Data Item Description
DSNE	Design Specification for Natural Environments
ESA	European Space Agency
FIP	Foreground Intellectual Property
FTP	File Transfer Protocol
GEVS	Goddard Technical Standard: General Environmental Verification Standard
GSFC	Goddard Space Flight Center
ICD	Interface Control Document
ISS	International Space Station
JAXA	Japan Aerospace Exploration Agency
KoM	Kick-Off Meeting
KOS	Keep Out Sphere
LAN	Local Area Network
LEO	Low Earth Orbit
MCD	Mission Concept Document
MCR	Mission Concept Review
MM	Mission Manager
MRD	Mission Requirements Document

MRR	Mission Requirements Review
NASA	National Aeronautics and Space Administration
OSAL	Operating System Abstraction Layer
PM	Project Manager
PWGSC	Public Works and Government Services Canada
RD	Reference Document
RelNav	Relative Navigation
RNS	Relative Navigation System
SI	« Système International »
SLS	Space Launch System
SOW	Statement of Work
SRR	Systems Requirement Review
STS	Space Transportation System
TA	Technical Authority
TB	Treasury Board
TBD	To be determined
TRRA	Technology Readiness and Risk Assessment
TRL	Technology Readiness Level
VV	Visiting Vehicle
WAM	Work Authorization Meeting
WLAN	Wireless LAN

Attachment 1 to Part 3

Technical and Managerial Bid Preparation Instructions

General Information

The details provided in this Attachment complement the information introduced in paragraph 3.1 of Part 3: *Bid Preparation Instructions*.

The Bidder should present the information about the Technical and Managerial Bid in the following order:

1. Title/Project Identification Page (see 3A.1);
2. Table of Contents (see 3A.2);
3. Relevance Criteria (see 3A.3);
4. Technical Criteria (see 3A.4);
5. Managerial Criteria (see 3A.5);
6. Bid Appendices (see 3A.6)

The structure of the Technical and Managerial Bid, and its subsections, are described below. Some of the subsection headings are followed by numbers in brackets. These numbers represent the Evaluation Criteria (see Table 4A.1 of Attachment 1 to Part 4) that are applicable to that specific section/subsection for the bid submitted by a Bidder.

3A.1 Title/Project Identification Page

The first page of the bid submitted should state the following information:

- a) The Request For Proposal file number (RNS 9F0xx-xxxxxx)
- b) The company's name and address;
- c) The title of the proposed Work (the use of acronyms in the title is discouraged, unless they are described).

3A.2 Table of Contents

The table of contents should be formatted such that its headings are linked to their respective location in the bid for ease of reference when using the bid's Soft copy version.

3A.3 Relevance Criteria

The Bid should describe the proposed project as outlined in the following subsections.

3A.3.1 Relevance and Merit of the Concept (Evaluation Criterion 1)

This subsection should describe the concept in detail, and provide substantiated evidence describing the relevance and merit of the proposed concept with respect to the scope of work presented in the SOW. The description should include an understanding of the stated performance and functional requirements with explanations as to how the proposed solution would achieve the stated requirements. In doing so, this section should describe the degree of relevance the proposed concept has with the Bidder's technology. The relevance of the proposed concept will consider the components selected including their suitability, design, maturity levels, and space heritage or path to spaceflight.

3A.4 Technical Criteria

3A.4.1 Feasibility of Achieving Goals and Technical Objectives (Evaluation Criterion 2)

In this subsection, the Bidder should provide a description and overall feasibility assessment of the proposed approach and the degree to which it is capable of delivering the goals and technical objectives.

The proposed effort should be well presented and substantiated through well-conceived and feasible concepts and methods to obtain the desired technical results. The bid should explain and substantiate that the overall scenario is valid and demonstrate that the proposed concept is based on a reasonable technology development plan or on well proven technology. Details on technology readiness are provided in The CSA Technology Readiness Levels and Assessment Guidelines and the Technology Readiness Levels Handbook for Space Applications.

3A.4.2 Understanding the Requirements and Technical Principles (Evaluation Criterion 3)

In this section, the Bidder should provide an overview of the technical methodology and its correlation with the main activities of the work-plan. The methodology outlined in this section should describe how the work would be conducted using analytical methods, procedures, techniques, industry standards, best practices, and the state-of-the-art for pertinent disciplines.

The Bidder should also elaborate on and substantiate the proposed methodology while referring to the main activities of the work-plan described in the body of the bid and appearing in the Work Breakdown Structure (WBS). The effectiveness of the methodology and its correlation to the work-plan should be explained and substantiated in this section.

This section should identify and substantiate in detail the underlying requirements and the technical principles and knowledge necessary to realize the proposed concept. It should thoroughly demonstrate an understanding of these requirements and principles. The bid should include a presentation of proposed concept and operations requirements that will be addressed by the proposed activities and objectives, and their relationship to the overall objectives. A thorough review of the existing literature to the central theme of the proposed concept should be provided.

3A.4.3 Scope of the Study (Evaluation Criterion 4)

The section should address the scope and aspects of the proposed study in relation to what is specified in the statement of work. It should provide a detailed description and substantiation of the approach for the Phase 0 development including a conceptual design of potential systems and subsystems, and a description of the operation concept.

3A.5 Management Criteria

3A.5.1 Team Capability (Evaluation Criterion 5)

3A.5.1.1 Team Expertise

This subsection should identify the Project Manager and Technical Lead, and outline their respective qualifications. It should identify the key members of the project's technical, scientific and management teams and state the specific qualifications for the work required. Detailed résumés are to be included in an appendix in Section I of the Bid. Provisions for back-up personnel for key positions are to be stated.

3A.5.1.2 Team Organization and Arrangements

This subsection should outline the roles and responsibilities of the proposed team members, and discuss and highlight the unique expertise that they offer with respect to the capability of the team. This subsection should also provide detailed roles and responsibilities of the key human resources. An organization chart should illustrate the structure of the proposed project team.

3A.5.1.3 Previous Project Experience

The Bidder should identify any previous experience with projects of a similar scope as the one proposed, including any projects undertaken with the CSA or other institutions. The Bidder should list previous projects and assignments undertaken, within the last five years, which are relevant to the proposed scope of work. The Bidder should identify any team members in the current Bid that participated in those other projects and describe the nature of their contributions.

Note: The Bidder may describe as many previous projects as it feels are necessary to demonstrate the experience and qualifications of the company and of the proposed team, as long as the Bid length is not exceeded.

3A.5.2 Project Management Plan (Evaluation Criterion 6)

This subsection describes the Management Plan that will be retained to deliver the project, and to do so in the most effective manner.

The Management Plan should contain, as a minimum, the following information: Work Breakdown Structure, WP definition, personnel allocation, managerial risk assessment, milestones, deliverables, schedule, and project control system.

The Management Plan's presentation should be based on management tools most applicable to the proposed project, such as scope planning (WBS), schedule development charts (e.g. Gantt chart, etc.). Equivalent company-developed, project-tailored tools/charts are also acceptable, provided that the information is complete.

3A.5.2.1 Work Package Definition

This Management Plan subsection should define and specify the work to be executed according to the requirements of this SOW. The project should be broken down into Work Packages (WPs). Each WP should focus on specific activities that will form the total project and, as a minimum, should define and describe the specific work to be carried out and indicate: the person responsible, the WP's associated levels-of-effort and required resources, the schedule (start and finish dates), the risks, and the associated deliverables or outputs.

WPs stem from the WBS. The WBS should be taken to a low enough level and the associated WP should be defined in sufficient depth for the Bidder to demonstrate a clear understanding of the process to be followed to carry out the project. As a guideline, Table 1 of this attachment presents a sample Work Package Definition Sheet and Figure 1 provides a sample Work Breakdown Structure.

Table 1: Example of Work Package Definition Sheet

Project: Novel T/R Unit Demonstration	
Work Pack Title:	
TEST SETUP WBS Ref: 2200	
Sheet:	
1 of 1	
WP Estimated Value:	
Do not indicate \$ value in Section I of Bid, indicate value in Section II	
Scheduled Start: T0 + 2 weeks	Accountable Manager: Resource A
T0 + 12 weeks	Resources: Resource A, Resource B, Resource C
Scheduled End:	
Estimated Effort: 80 hours	
<u>Objectives:</u>	
1. Deliver a functional test setup for the T/R unit	
<u>Inputs:</u>	
1. Test plan and procedure	
2. Unit drawings	
3. Unit Interface Control Documents	
<u>Tasks:</u>	
1. Review input documentation	
2. Define requirements	
3. Produce initial concept	
4. Design test setup	
5. Fabricate test setup	
6. Commission and debug	
<u>Outputs and Deliverables:</u>	
1. Fully functional T/R unit test setup	
2. Test setup log manual	
3. Test setup user manual	

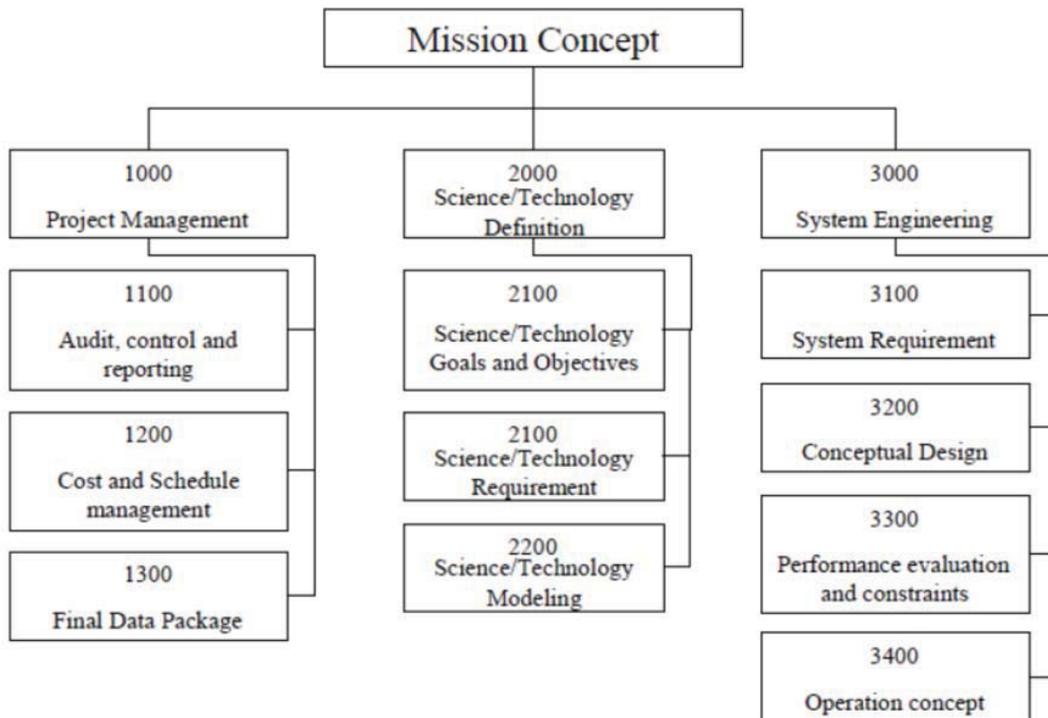


Figure 1: Example of a Work Breakdown Structure

3A.5.2.2 Resource Allocation

This Management Plan subsection should include a resource assignment matrix showing the level-of-effort for each individual team member that has been apportioned to each WP. The matrix should identify each individual by name, and provide the estimated time (number of hours or days) required to complete each task. As a guideline, Table 2 of this attachment presents a sample of a Resource Allocation Matrix (RAM). The RAM should be presented in the Managerial Bid.

Table 2: Example of Resource Allocation Matrix

WBS number	Work Pack Title	Resource A		Resource B		Resource C		Total
1.1	Project Management	A	200	P	25	P	25	250
1.2	Literature Survey	A	25	P	100	-	0	125
1.3	Requirements	P	50	A	100	P	100	250
1.4	Design	P	100	A	100	P	150	350
1.5	Build	-	0	P	200	A	150	350
1.6	Test and Analysis	A	100	P	200	P	200	500
Total			475		725		625	1825

P: Participant
A: Accountable

3A.5.2.3 Managerial Risk Assessment

This Management Plan subsection should provide an assessment of the managerial risks involved in performing the work for the concept study, and identify critical issues that may jeopardize successful completion of the project within cost and schedule constraints.

3A.5.2.4 Milestones and Deliverables

Milestones and deliverables should be detailed in accordance with what is specified in the Statement of Work

3A.5.2.5 Schedule

This Management Plan subsection should relate tasks, milestones and deliverables to a project timetable. For planning purposes, the project expected start date is August 1st, 2017.

3A.5.2.6 Project Control System

This Management Plan subsection should outline the methods and systems to be used to control tasks, schedules, and costs for the project. Any project management tool or a spreadsheet software package may be used as long as it contains, as a minimum, the information required in the Monthly Progress Report (DID-107). Additionally, the Project Control System should provide the capability to report the amount of work per WBS item for each individual on a monthly basis.

3A.6 Bid Appendices

The following items should be addressed in individual appendices as part of the Bid.

3A.6.1 Appendices Required with the Bid

1. List of acronyms used in the Bid;
2. Bidder's Criteria Substantiation (see Attachment 1 to Part 4, Section 4A.2);
3. Résumés: The Bid should include résumés (and/or NSERC form 100) of all key resources proposed and these should be appended to Section I;
4. List of Contacts: The list of contacts should be appended to Section I, in a format suitable for distribution and should include all of the Bidder's points-of-contact involved in the Bid development and/or contract negotiations. The following example format should be used:

Table 3: Sample List of Contacts

Role	Name	Telephone	Fax	E-mail
Project Manager				
Project Engineers/ Principal Investigator				
Contracting Authority				
Claims officer				
Communications (for press release)				
Etc.				

3A.6.2 Applicable Bid Appendices

The following Bid appendices are to be provided, *if applicable*, with Section I:

1. Corporate literature: Only literature that is relevant and will be useful to support the Bid;
2. Relevant technical and/or scientific papers published by team members;
3. Any other Bid appendices deemed appropriate by the Bidder.

Bidders are reminded that the Bid should not exceed 50 pages excluding appendices

Attachment 1 to Part 4

Evaluation Criteria for the Technical and Managerial Bid

4A.1 Mandatory Criterion

This criterion is deemed mandatory by CSA as the minimum necessary competence and capability for undertaking the work. The Mandatory requirement is evaluated on a pass or fail basis and will be evaluated very strictly as to compliancy. Therefore, no rating is associated with the criterion. Proposals not meeting the mandatory criterion will be deemed non-responsive.

M1: The Bidder and/or its subcontractors, if any, must have demonstrated experience that is relevant to the Work. In order to do so, the Bidder and/or its subcontractors, if any, must have experience in the user/mission requirements definition, system requirements definition, design, manufacture, test and successful operation of a minimum of one (1) system of similar or greater complexity over the last fifteen (15) years. Similar complexity is understood as a physical system (complex hardware and software) that is rated for operations in space, or in environments or applications requiring very high reliability and that is subject to stringent safety/assurance requirements (e.g. complex military systems, aeronautical systems, or applications in the nuclear industry).

The Bidder must provide the following two items.

1. Project Description: The Bidder must describe one or more projects the Bidder has led and/or managed to demonstrate how each category of experience was acquired:
 - User/Mission requirements definition
 - System requirements definition
 - Design development
 - Manufacture and Assembly
 - Testing
 - Successful operations
2. Project Complexity: The Bidder must describe the project complexity for the project/projects described. Project complexity is defined by the Government Canada through the Project Complexity and Risk Assessment Tool. Information on the tool can be found here:

<https://www.canada.ca/en/treasury-board-secretariat/services/information-technology-project-management/project-management/project-complexity-risk-assessment-tool.html>

For purposes of this evaluation criterion, the bidder must demonstrate complexity of the described project or projects by providing an assessment of the project(s) in key areas. Fifteen questions of the 64 questions were extracted from the PCRA tool that were deemed applicable for purposes of this criterion. Table 1 tabulates the questions. RNS rating, as assessed by CSA, is provided as information only.

The Bidder's project(s) must meet or exceed the minimum rating for each question specified in Table 1 for each Knowledge Area. For each Knowledge Area, the Bidder must provide supporting rationale.

More than one project may be used to satisfy this experience requirement.

The project must not be a project in which software development was the primary and only deliverable.

Table 1. Project Description Complexity Assessment.

The Bidder should consult the PCRA Tool information webpage for clarifications associated with each question.

Knowledge Area	Question	Ratings	RNS (for info and example)	RNS Rationale (for info and example)	Minimum	Bidder's project (add columns for other projects)	Rationale
Cost	1. What is the total project cost	1 = \$1-5 million 2 = \$5-10 million 3 = \$10-25 million 4 = \$25-100 million 5 = over \$100 million	3	Current ROM estimates indicate RNS to be mid-range.	2		
	2. What percentage of the total project cost estimate is for procurement?	1 = No procurement is required. 2 = under 25 per cent 3 = 26-50 per cent 4 = 51-75 per cent 5 = over 75 per cent	5	From Canada's perspective, procurement is >75%	2 (Bidder's perspective would include subcontracts)		
Investment portfolio management	3. Relative to the average project in your organization, which of the following adjectives describes the total project cost estimate?	1 = Small 3 = Medium 5 = Large	3	RNS is considered a medium project compared to other projects at the CSA.	1		
	4. How many people (part-time or full-time) on the project,	1 = under 10 2 = 10-25 3 = 26-100	3	It is expected RNS will require a moderate number of	2		

	including Government of Canada employees and individual contractors) are required to complete this project at its peak activity?	4 = 101-250 5 = over 250			people at its peak activity, including contractors.			
Time	5. From project definition to project close-out, what is the expected duration of the project?	1 = under 12 months 2 = 12-24 months 3 = 24-36 months 4 = 36-48 months 5 = over 48 months	4		Current ROM schedule information show this project would require more than 3 years to complete.	3		
Time	11. Is the project susceptible to time delays? Time delays can have a number of causes, such as the following: a.Changes in technology; b.Requirements of participating organizations; c.Seasonal considerations; d.The need for policy approvals; and e.External influences.	1 = No, the project is not susceptible. 3 = Yes, the project is moderately susceptible; time delays will have minor effects on the schedule. 5 = Yes, the project is highly susceptible; time delays will have major effects on the schedule.	5		RNS project is highly susceptible to time delays, on technical and programmatic aspects. Technical: highly dependent on parts procurement, testing, integration, interface definition with external stakeholders. Programmatic: highly dependent on approvals, agreements, international partnership, and external influences.	3		
Time	14. Are there any socio-economic considerations that	1 = No 5 = Yes	1		Regional benefits may be a consideration, however, given the	1		

	must be taken into account?										
Time	18. Do health and safety requirements add significant complexity to the requirements for this project?	1 = No 5 = Yes	5	5	size of RNS, this may not be possible. RNS will be associated with a human spaceflight and will be subject to safety requirements that will introduce significant complexity.	5					
Scope	50. How many of the following statements are true? a. The project solution requires a high degree (greater than normal) of availability. b. The project solution requires customization beyond normal configuration. c. The project solution requires a high degree of performance quality. d. The project solution requires a high degree of reliability.	1 = None of the statements are true. 2 = One of the statements is true. 3 = Two of the statements are true. 4 = Three of the statements are true. 5 = All of the statements are true.	5	5	All statements apply for RNS. In support of a deep-space habitat (with and without humans present), RNS will be required to be available, reliable, and its design (hardware/software) will be customized to meet the specific requirements of the mission.	3					
Scope	51. In defining project requirements, how many of the following statements are true? a. The requirements can be defined with very few people. b. The requirements can be defined in a short period of time. c. There are a small number of individual	1 = Four of the statements are true. 2 = Three of the statements are true. 3 = Two of the statements are true. 4 = One of the statements is true.	3	3	For RNS, it is envisaged that a small group of people can define the requirements and the number of individual requirements would be low. RNS is a self-contained system targeted for specific operations.	2					

	requirements to define. d.The requirements do not require a high degree of detail.	5 = None of the statements are true.						
Investment portfolio management	58. Are any other projects dependent on outputs or outcomes of this project?	1 = No 5 = Yes	5		Yes. RNS is a potential contribution to a larger international initiative.	5		
Investment portfolio management	59. Are outcomes of this project dependent on the outputs and/or outcomes of any other projects?	1 = No 5 = Yes	5		Yes. RNS is a potential contribution to a larger international initiative and as such is dependent on that initiative to define interfaces for example.	5		
Scope	60. What degree of integration with externalities, such as other projects, systems, infrastructure, or organizations, is required?	1 = There are few complex integration requirements; activities to specify integration are included in the project management plan. 3 = There is adequate understanding and planning for integration. 5 = There are highly complex or numerous integration requirements and	3		RNS is self-contained and expected to have few interfaces with external projects, systems and infrastructure. At the moment, these are adequately understood.	3		

Scope	61. What degree of integration is required within the project?	insufficient planning of required activities. 1 = There are few complex integration requirements; activities to specify integration are included in the project management plan. 3 = There is adequate understanding and planning for integration. 5 = There are highly complex or numerous integration requirements and insufficient planning of required activities.	3	3	RNS is self-contained and based on existing technologies demonstrated in various environments. It is not expected the degree of integration would deviate significantly from previous experiences. As such, there is adequate understanding and planning for integration.	3	
Scope	62. Relative to the average (typical) project in your organization, which of the following adjectives describes the number of tasks, elements, or deliverables in the	1 = Small 3 = Medium 5 = Large	3	3	RNS will have moderate number of tasks and deliverables in the work breakdown structure primarily owing to the moderate system and subsystems as well as the disciplines that will be involved.	3	

4A.2 Point Rated Criteria

The Bidder must achieve the minimum score requirement as indicated in Table 4A.1: List of Evaluation Criteria and Associated Ratings. The bid will be evaluated according to the point-rated criteria as specified in Table 4A.1 and as described in Section 4A.4: Evaluation Criteria and Benchmark Statements.

The criteria are grouped under the following divisions:

- 1) Relevance;
- 2) Technical; and
- 3) Management

Section 4A.4 “Evaluation Criteria and Benchmark Statements” of the current attachment contains a series of evaluation criteria, each supported by a set of 5 benchmark statements (0, A, B, C, D). Each of these statements has a corresponding value:

0 = 0% of the maximum point rating

A = 25% of the maximum point rating

B = 50% of the maximum point rating

C = 75% of the maximum point rating

D = 100% of the maximum point rating

As an example, the maximum point rating for the “Understanding the Requirements and Technical Principles” criterion is 20 points. If a Bid receives a “C” for this criterion in the evaluation process, the score attributed will be:

75% of 20 points = 15 points (score)

Table 4A.1 identifies:

1. The maximum point rating assigned to each criterion;
2. The maximum point rating possible for each division (Relevance, Technical, and Management);
3. The maximum point rating possible for the overall score;
4. The minimum point rating required for the overall score.

Table 4A.1: List of Evaluation Criteria and Associated Ratings

	Ratings
Relevance Criteria	
1. Relevance and Merit of the Concept	20
<i>Minimum Score Requirement</i>	10
Technical Criteria	
2. Feasibility of Achieving Goals and Technical Objectives	20
<i>Minimum Score Requirement</i>	10
3. Understanding the Requirements and Technical Principles	20
<i>Minimum Score Requirement</i>	10
4. Scope of the Study	20
<i>Minimum Score Requirement</i>	10
Management Criteria	
5. Team Capability	10
<i>Minimum Score Requirement</i>	5
6. Project Management Plan	10
<i>Minimum Score Requirement</i>	5
<i>Minimum Overall Score Requirement</i>	60
<i>Maximum Score</i>	100

4A.3 Bidder’s Criteria Substantiation

The Bidder is requested to provide their own substantiation, which should be submitted as an appendix to their Section (see section 3A.6.1: Appendices required with the bid of Attachment 1 of Part 3: Technical and Managerial Bid Preparation Instruction).

The substantiation should be concise yet sufficiently complete to give the evaluators a good overall appreciation of the bid’s merit relative to each criterion. Cross-references to appropriate sections of the bid should be provided and the essence of the referenced information should be summarized in the substantiation.

For convenience, a template for the Substantiation Table is provided in Table 4A.2 below. Enter each relevance/technical and management criterion section number, and the substantiation. Approximately half a page should be sufficient to make the Bidder’s case for the rating assigned in the substantiation column.

Table 4A.2: Bidder's Criteria Substantiation.

Company:	
Project Title:	
Criteria	
Substantiation	
<i>Ex.: 1</i> <i>(criterion number)</i>	<i>Criterion substantiation and Bidder's bid cross-reference.</i> <i>Approximately 300 words should be sufficient to make the case.</i>

4A.4 Evaluation Criteria and Benchmark Statements

RELEVANCE CRITERIA

Criterion 1 - Relevance and Merit of the Concept

This criterion evaluates the relevance and merit of the proposed concept relative to the scope of work presented in the SOW. Furthermore, this criterion assesses the degree to which the bid shows technical compliance to the proposed technology.

- 0)
 - The relevance and merit of the proposed concept are not addressed

- A)
 - The relevance and merit of the proposed concept are only partially addressed and not substantiated; OR
 - Addresses the technology but does not show an understanding of the driving needs, nor does it demonstrate how the proposed technology will contribute to meeting the stated requirements.

- B)
 - The relevance and merit of the proposed concept are addressed and partially substantiated; AND
 - The proposed technology demonstrates a capacity to meet requirements

- C)
 - The relevance and merit of the proposed concept are addressed and substantiated; AND
 - The proposed technology demonstrates a capacity to meet all of the requirements, AND
 - The proposed technology items are either based on a concept proven in space or a very high reliability/safety/assurance environment with a credible path to space.

- D)
 - The relevance and merit of the proposed concept are addressed in detail and well substantiated; AND
 - The proposed technology demonstrates the capacity to meet all of the requirements; AND
 - The proposed technology items are components and concepts proven either in space or a very high reliability/safety/assurance environment with a credible path to space.

Technical Criteria

Criterion 2 – Feasibility of Achieving Goals and Technical Objectives

This criterion assesses the description and overall feasibility of the proposed approach and the degree to which it is capable of delivering the goals and technical objectives. This includes the compatibility of the technology selected and incorporation into the proposed design to address the technical requirements and enhancements. This criterion evaluates the technical risks associated with the eventual integration and implementation of the concept, and assesses whether the proposed effort is well documented and substantiated.

0)

- The feasibility of achieving the goals and technical objectives is not demonstrated

A)

- The bid does not present an adequate case with system(s) that can deliver the technical objectives; OR
- The proposed concept can obtain the desired technical results, but gaps exist.; OR
- Main elements of a preliminary technology development road map are lacking to meet the basic technical requirements.

B)

- The bid presents an adequate case with system(s) that can deliver the technical objectives; AND
- The proposed concept can obtain the desired technical results, but some important details or information are omitted; AND
- Some elements of a preliminary technology development road map are lacking, in order to meet the basic technical requirements.

C)

- The bid presents a well-referenced case with system(s) that can deliver the technical objectives; AND
- The proposed concept displays feasible and valid concepts and methods that can achieve the desired technical results with details; AND
- Main elements of a preliminary technology development road map are presented to meet the basic technical requirements and enhancements of the study.

D)

- The bid presents a well-referenced and convincing case with system(s) that can undoubtedly deliver the technical objectives. AND
- The proposed concept relies on well proven technology with one or more components having space flight heritage and is substantiated with ample details; AND

- A preliminary technology development roadmap is presented to meet the basic technical requirements and enhancements of the study.

Criterion 3 - Understanding the Requirements and Technical Principles

This criterion assesses the degree to which the Bid identifies and substantiates in detail the underlying requirements and technical principles and also to what extent it demonstrates a thorough understanding of these requirements and principles as presented in Annex A – Statement of Work

0)

- The bid does not address the requirements, OR
- The bid does not identify the technical principles driving the proposed concept.

A)

- The bid includes an incomplete overview of the main requirements; OR
- The bid demonstrates incomplete knowledge of the technical principles relevant to the goal of the study; OR
- The bid does not identify how the objectives will help in further defining these requirements; OR
- The bid does not include an adequate review of the existing literature or that of previous relevant technology.

B)

- The bid includes only an overview of the main requirements; AND
- The bid exhibits a general understanding of the requirements and principles; AND
- The bid includes a cursory review of and references to existing literature or that of previous work relevant to the central theme of the proposed concept.

C)

- The bid identifies and demonstrates an understanding of the main requirements; AND
- The bid demonstrates knowledge of the technical principles relevant to the goal of the study; AND
- The bid includes a presentation of the proposed concept and operations requirements that will be addressed by the proposed activities and objectives; AND
- The bid includes references to and a discussion of other work or previous activities relevant to the central theme of the proposed concept.

D)

- The bid includes an exhaustive identification and understanding of the requirements; AND
- The bid demonstrates a comprehensive knowledge of the technical principles relevant to the goal of the study; AND
- The bid includes a presentation of proposed concept and operations requirements that will be addressed by the proposed activities and objectives, and their relationship to overall objectives; AND

- The bid refers to and discusses thoroughly existing literature relevant to the central theme of the proposed concept.

Criterion 4 - Scope of the Phase 0 Study

The criterion assesses the description and overall scope of the proposed Phase 0 Study.

0)

- The bid does not address the scope and the aspects of what is requested in the SOW; OR
- The bid does not provide a description of the approach for the Phase 0 development.

A)

- The bid addresses the scope and the aspects of what is requested in the SOW, but gaps exist; OR
- The bid does not provide a description of the approach for the Phase 0 development.

B)

- The bid addresses the scope and the aspects of what is requested in the SOW with minor or no gaps; AND
- The bid provides a description of the approach for the Phase 0 development, but either gaps exist or they are not relevant.

C)

- The bid addresses the full scope and aspects of what is requested in the SOW; AND
The bid provides a description and substantiation of a relevant approach for the Phase 0 development.

D)

- The bid addresses the full scope and aspects of what is requested in the SOW; AND
- The bid provides a detailed description and substantiation of a relevant approach for the Phase 0 development; AND
- The bid achieves the preliminary design of the proposed system and describes the operation concept.

MANAGEMENT CRITERIA

Criterion 5 - Team Capability

This criterion assesses the capability (education, knowledge, experience, expertise, and completeness of skill-sets in science, engineering, and management) of the personnel designated to carry out the Work.

0)

- The proposed team does not have the required expertise; OR
- The bid does not address this criterion

A)

- The proposed team has no experience in conducting work similar in complexity and scope to what is requested in the SOW; OR
- The proposed team lacks expertise and may not be capable of fulfilling the statement of work (SOW); OR
- The roles and responsibilities of the team members are not defined.

B)

- The key personnel identified in the proposed team have been involved in at least one project similar in complexity and scope to what is requested in the SOW; AND
- The proposed team is lacking some expertise but demonstrates that it is capable of fulfilling the statement of work (SOW); AND
- The team may have deficiencies in the overall skills of its members; AND
- Some team members have experience in the design and development of high reliability/safety/assurance hardware and software in a similar environment as described in the relevant SOW.

C)

- The key personnel identified in the proposed team have been involved in at least two projects similar in complexity and scope to what is requested in the SOW; AND
- The expertise of the proposed team demonstrates that it is highly capable of fulfilling the statement of work (SOW); AND
- The completeness of the team is very well demonstrated through the complementary skills of its members and by the roles / tasks that they are assigned during the concept study; AND
- The roles and responsibilities for most of the team members, including sub-contractors, are defined; AND
- Most of the required key personnel are identified and there are qualified back-up personnel identified for most of them; AND
- The key personnel have experience in the design and development of or high reliability/safety/assurance hardware and software in a similar environment as described in the relevant SOW.; AND
- At least one key personnel has extensive experience with space-rated hardware or operations.

D)

- The key personnel identified in the proposed team have been involved in more than two projects of similar complexity and scope to what is requested in the SOW; AND
- The supporting skill sets of team members is fully identified and assigned; AND
- The expertise of the proposed team demonstrates that it is highly capable of fulfilling the statement of work (SOW) with the potential of delivering an authoritative concept; AND
- The roles and responsibilities of all the team members, including all sub-contractors, are defined; AND
- The completeness of the team is very well demonstrated through the complementary skills of its members and by the roles / tasks that they are assigned during the concept study; AND
- All required key personnel are identified and there are qualified back-up personnel identified for all of them; AND
- The key personnel have significant experience in the design and development of space flight hardware and software in a similar environment as described in the relevant SOW.

Criterion 6 - Project Management Plan

This criterion assesses the completeness of the management plan (including WBS, WPs, personnel allocation, detailed schedule and milestones, and managerial risk assessment) and evaluates the effectiveness of the described methodology in successfully achieving the stated objectives of the work to carry out this study.

0)

- The work-plan does not follow a methodological approach and is unlikely to achieve the appropriate objectives; OR
- The bid does not address this criterion

A)

- The bid presents a poor work-plan; OR
- The proposed methodology is not effective in achieving the objectives of the work; OR
- There is a lack of correlation between the work-plan and the management method; OR
- Risks are not identified

B)

- The bid presents a basic work-plan; AND
- The proposed methodology is effective in achieving the objectives of the work; OR
- There is a lack of correlation between the work-plan and the management method; OR
- Risks are identified but mitigation strategies are insufficient.

C)

- The work-plan as described in the bid is based on a methodological approach; AND
- The effectiveness of the proposed methodology to achieve the objectives of the work is credible; AND
- The correlation between the work-plan and the management method exists; AND
- Risks are identified and mitigation strategies are discussed.

D)

- The work-plan as described in the bid follows a clearly defined methodology; AND
- The effectiveness of the proposed methodology to achieve the objectives of the work is highly credible; AND
- The correlation between the work-plan and the management method is clear; AND
- Risk analysis and mitigation strategies are provided;