Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:

Bid Receiving - PWGSC / Réception des soumissions - TPSGC
11 Laurier St. / 11, rue Laurier
Place du Portage , Phase III
Core 0B2 / Noyau 0B2
Gatineau, Québec K1A 0S5
Bid Fax: (819) 997-9776

REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION

Proposal To: Public Works and Government Services Canada

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

Proposition aux: Travaux Publics et Services Gouvernementaux Canada

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

Comments - Commentaires

Title - Sujet
LEAP Science Instruments

Solicitation No. - N° de l'invitation	**Date**
9F050-200032/B	2020-06-26

Client Reference No. - N° de référence du client
20200032

GETS Reference No. - N° de référence de SEAG
PW-$$ST-048-38063

File No. - N° de dossier	**CCC No./N° CCC - FMS No./N° VME**
048st.9F050-200032	

Solicitation Closes - L'invitation prend fin
at - à 02:00 PM
on - le 2020-08-10

Time Zone
Fuseau horaire
Eastern Daylight Saving Time EDT

F.O.B. - F.A.B.
Plant-Usine: ☐ **Destination:** ☑ **Other-Autre:** ☐

Address Enquiries to: - Adresser toutes questions à:	**Buyer Id - Id de l'acheteur**
Abbasi, Sameer Ali	048st

Telephone No. - N° de téléphone	**FAX No. - N° de FAX**
(873) 354-4921 ( )	( ) -

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:
CANADIAN SPACE AGENCY
6767 ROUTE DE L AEROPORT
9F050 -Space Exploration Strategic
Plannning
ST HUBERT
Quebec
J3Y8Y9
Canada

Instructions: See Herein

Instructions: Voir aux présentes

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

Delivery Required - Livraison exigée	**Delivery Offered - Livraison proposée**
See Herein	

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**

Issuing Office - Bureau de distribution
Science Procurement Directorate/Direction de l'acquisition de travaux scientifiques
Terrasses de la Chaudière, 4th Flo
10 Wellington Street
Gatineau
Quebec
K1A 0S5

Canada

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PART 1 - GENERAL INFORMATION

1.1 Introduction

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

Part 1 General Information: provides a general description of the requirement;

Part 2 Bidder Instructions: provides the instructions, clauses and conditions applicable to the bid solicitation;

Part 3 Bid Preparation Instructions: provides Bidders with instructions on how to prepare their bid;

Part 4 Evaluation Procedures and Basis of Selection: indicates how the evaluation will be conducted, the evaluation criteria that must be addressed in the bid, and the basis of selection;

Part 5 Certifications and Additional Information: includes the certifications and additional information to be provided;

Part 6 Financial and Other 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.

List of Annexes and Attachments:

Annex A Statement of Work
Annex B Basis of Payment
Annex C Non-disclosure Agreement

Attachment 1 to Part 3 Technical and Managerial Bid Preparation Instructions
Attachment 2 to Part 3 Electronic Payment Instruments
Attachment 1 to Part 4 Point Rated Evaluation Criteria

1.2 Summary

1.2.1 Public Works and Government Services Canada (PWGSC), is releasing this Request for Proposals (RFP) on behalf of the Canadian Space Agency (CSA) to acquire services to conduct Phase 0 studies for the development of scientific instruments as part of the Lunar Exploration Accelerator Program (LEAP).

The objective of the Scientific Instruments Phase 0 study is to demonstrate and confirm the feasibility, value and benefits of the instruments for the LEAP, and to demonstrate the validity of the mission requirements as well as the project readiness, so as to proceed with the development of the system requirements.

At the end of this Phase 0 study, the CSA should have all the scientific, technical and programmatic information necessary to assess the potential of the proposed Scientific Instrument that will contribute to the objectives of the LEAP.

The intent of this RFP is to award up to five (5) Phase 0 contracts with a maximum funding of $600,000.00 (Applicable Taxes extra) for each contract. In the event that the total maximum funding available of $3,000,000.00 (Applicable Taxes extra) is not exceeded, an additional contract(s) may be awarded as specified in Part 4- Evaluation Procedures and Basis of Selection of this bid solicitation.

The expected period of the contracts for the Phase 0 initiative is from date of contract up to nine (9) months.

1.2.2 Canadian Content

The requirement is limited to Canadian goods and Canadian services.

1.2.3 Epost Connect service

This bid solicitation requires bidders to use the epost Connect service provided by Canada Post Corporation to transmit their bid electronically. Bidders must refer to Part 2 entitled Bidder Instructions, and Part 3 entitled Bid Preparation Instructions, of the bid solicitation, for further information.

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 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

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-conditions-manual) issued by Public Works and Government Services Canada.

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

The 2003 (2019-03-04) 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: 90 days

2.1.1 *SACC* Manual Clauses

SACC Manual clause A7035T (2007-05-25), List of Proposed Subcontractors

2.2 Submission of Bids

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit via e-post Connect by the date, time and place indicated in the bid solicitation.

For bidders needing to register with epost Connect the email address is:

tpsgc.dgareceptiondessoumissions-abbidreceiving.pwgsc@tpsgc-pwgsc.gc.ca

Interested Bidders must register a few days prior to solicitation closing date.

Bids will not be accepted if emailed directly to this email address. This email address is to be used to open an epost Connect conversation, as detailed in Standard Instructions 2003, or to send bids through an epost Connect message if the Bidder is using its own licensing agreement for epost Connect.

Due to the nature of the bid solicitation, bids transmitted by facsimile or 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 awarded to FPSs, 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 FPSs 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 **Ontario***.*

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

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)** calendar days before the bid closing date. Canada will have the right to accept or reject any or all suggestions.

2.7 Bid Challenge and Recourse Mechanisms

(a) Several mechanisms are available to potential suppliers to challenge aspects of the procurement process up to and including contract award.

(b) Canada encourages suppliers to first bring their concerns to the attention of the Contracting Authority. Canada's Buy and Sell website, under the heading "Bid Challenge and Recourse Mechanisms" contains information on potential complaint bodies such as:

- Office of the Procurement Ombudsman (OPO)
- Canadian International Trade Tribunal (CITT)

(c) Suppliers should note that there are **strict deadlines** for filing complaints, and the time periods vary depending on the complaint body in question. Suppliers should therefore act quickly when they want to challenge any aspect of the procurement process.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

Epost Connect Bid Submission

Bidders must submit their bid electronically in accordance with section 08 of the 2003 standard instructions and Attachment 1 to Part 3 Technical and Managerial Bid Preparation Instructions of this solicitation document. The epost Connect system has a limit of 1GB per single message posted and a limit of 20GB per conversation.

The bid must be gathered per section and separated as follows:

Section I: Technical and Managerial Bid
Section II: Financial Bid
Section III: Certifications

Due to the impacts from the COVID-19 pandemic, and the reduced business hours and limited staff available at the NCR Bid Receiving Unit, bidders must transmit their bids electronically using the epost Connect service in a searchable format such as searchable PDF format. Bids that are submitted using other methods of bid delivery usually available such as in person delivery, facsimile, hard copy, CD or USB key will be considered non-responsive and will not be evaluated.

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

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.

Additional instructions are provided 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 in Annex **B**.

3.1.1.1 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. These items will be deliverable to Canada upon completion of the contract.

(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 for each resource.

(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.

3.1.2 Electronic Payment of Invoices – Bid

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Attachment 2 to Part 3 Electronic Payment Instruments, to identify which ones are accepted.

If Attachment 2 to Part 3 Electronic Payment Instruments is not completed, it will be considered as if Electronic Payment Instruments are not being accepted for payment of invoices.

Acceptance of Electronic Payment Instruments will not be considered as an evaluation criterion.

3.1.3 Exchange Rate Fluctuation

SACC Manual clause C3011T (2013-11-06), Exchange Rate Fluctuation

Section III: Certifications

Bidders must submit the certifications and additional information 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" and “financial” evaluation criteria.

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

4.1.1 Technical and Managerial Evaluation

Point rated technical and managerial evaluation criteria are included in Attachment 1 to Part 4 Point Rated Evaluation Criteria.

4.1.2 Financial Evaluation

4.1.2.1 Mandatory Financial Criteria

FM1 The Bidder must submit a total firm, all-inclusive price for the Work to be performed in cell (A) of the Basis of Payment at Annex B.

FM2 The maximum funding available for each Contract resulting from the bid solicitation is $600,000.00 (Applicable Taxes extra). Bids valued in excess of this amount will be considered non-responsive. This disclosure does not commit Canada to pay the maximum funding available.

SACC Manual Clause A0220T (2014-06-26), Evaluation of Price-Bid

4.2 Basis of Selection

4.2.1 Basis of Selection – Highest Rated Within Budget

1. To be declared responsive, a bid must:
   a. comply with all the requirements of the bid solicitation;
   b. meet all mandatory financial criteria;
   c. obtain the required minimum of 18 points overall for the technical evaluation criteria “Science Merit Criteria”. The rating is performed on a scale of 30 points;
   d. obtain the required minimum of 30 points overall for the technical evaluation criteria “Feasibility Criteria”. The rating is performed on a scale of 50 points; and
   e. obtain the required minimum of 12 points overall for the technical evaluation criteria “Managerial Criteria”. The rating is performed on a scale of 20 points.

2. Bids not meeting (a), (b), (c), (d) and/or (e) will be declared non responsive.

3. The bids will be ranked according to the total number of points obtained, starting from the highest total number of points to the lowest. The first five (5) responsive bids with the highest total of points will be recommended for award of a contract, provided that the total firm, all-inclusive price proposed does not exceed the budget available for this requirement.

4. In the event that two or more responsive bids obtain the same total number of points, the responsive bid with the highest number of points for criterion 4 will be ranked higher. If the

responsive bids have the same number of point for criterion 4, the responsive bid with the highest number of points for criterion 3 will be ranked higher.

5. If the total combined value of the first five (5) responsive bids recommended for award of a contract does not exceed the total maximum funding available of $3,000,000.00 (Applicable Taxes extra), further responsive bids may be recommend for award of a contract, up to the total maximum funding available. The selection of the additional bid(s) that may be recommended for award of a contract would be based on the next responsive bid(s) with the highest total number of points, provided that the total evaluated price does not exceed the remaining total maximum funding available for this requirement. If the total evaluated price of the next highest ranked responsive bid exceeds the remaining total maximum funding available for this requirement, no additional bid(s) will be recommended for award of a contract.

PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

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

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Unless specified otherwise, Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue, whether 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 will render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid.

5.1.1 Integrity Provisions - Declaration of Convicted Offences

In accordance with the Integrity Provisions of the Standard Instructions, all bidders must provide with their bid, **if applicable**, the Integrity declaration form available on the Forms for the Integrity Regime website (http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html), to be given further consideration in the procurement process.

5.2 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 or additional information 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 provide the certifications or the additional information listed below within the time frame specified will render the bid non-responsive.

5.2.1 Integrity Provisions – Required Documentation

In accordance with the section titled Information to be provided when bidding, contracting or entering into a real property agreement of 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 in the procurement process.

5.2.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the Employment and Social Development Canada (ESDC) - Labour's website (https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#).

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.

5.2.3 Additional Certifications Precedent to Contract Award

5.2.3.1 Canadian Content Certification

This procurement is limited to Canadian goods and Canadian services.

The Bidder certifies that:

( ) a minimum of 80 percent of the total bid price consist of Canadian goods and Canadian services as defined in paragraph 5 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, Example 2, of the Supply Manual.

5.2.3.1.1 *SACC Manual* clause A3050T (2018-12-06), Canadian Content Definition

5.2.3.2 Status and Availability of Resources

5.2.3.2.1 *SACC Manual* clause A3005T (2010-08-16), Status and Availability of Resources

5.2.3.3 Education and Experience

5.2.3.3.1 *SACC Manual* clause A3010T (2010-08-16), Education and Experience

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 at Annex A and the technical and management portions of the Contractor's bid entitled _____*(to be inserted at contract award)*, dated _____*(to be inserted at contract award)*.

7.2 Standard Clauses and Conditions

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

7.2.1 General Conditions

2040 (2018-06-21), General Conditions - Research & Development, apply to and form part of the Contract.

7.3 Security Requirements

7.3.1 There is no security requirement applicable to the Contract.

7.4 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 Project Authority before they are given access to information by or on behalf of Canada in connection with the Work.

7.5 Term of Contract

7.5.1 Period of the Contract

The period of the Contract is from date of Contract to _____ inclusive *(to be inserted at contract award)*.

7.6 Authorities

7.6.1 Contracting Authority

The Contracting Authority for the Contract is:

Name: Sameer Ali Abbasi
Title: Contracting Specialist
Public Works and Government Services Canada
Acquisitions Branch
Space Programs and Procurement Directorate
Address: Terrasses de la Chaudière, 4th Floor
10 Wellington Street

Gatineau, Quebec
K1A 0S5

Telephone: 873-354-4921
E-mail address: sameerali.abbasi@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.

7.6.2 Project Authority *(to be inserted at contract award)*

The Project Authority for the Contract is:

Name: _____
Title: _____
Organization: _____
Address: _____

Telephone: ___-___-_____
Facsimile: ___-___-_____
E-mail address: _____

The Project Authority named above is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the evaluation, recommendations and approvals of Progress claims, Schedule or Cost and Acceptance of the deliverable items of the Work under this Contract. Such Progress claim, scheduling, cost or acceptance of deliverables matters may be discussed with the Project Authority, however the Project Authority has no capacity 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.

7.6.3 Technical Authority *(to be inserted at contract award)*

The Technical Authority for the Contract is:

Name: _____
Title: _____
Organization: _____
Address: _____

Telephone: ___-___-_____
Facsimile: ___-___-_____
E-mail address: _____

The Technical Authority named above is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all recommendations to the Project Authority 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 capacity 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.

7.6.4 Contractor's Representative *(to be inserted at contract award)*

The Contractor's Representative for the Contract is:

Name: _____
Title: _____
Organization: _____
Address: _____

Telephone: ___-___-____
Facsimile: ___-___-____
E-mail: _____.

7.7 Proactive Disclosure of Contracts with Former Public Servants

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

7.8 Payment

7.8.1 Basis of 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 Annex B for a cost of *$ _____(to be inserted at contract award)*. Customs duties are included and Applicable Taxes are extra.

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.

7.8.2 Milestone Payments - Subject to holdback

1. 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, up to 90 percent of the amount claimed and approved by Canada if:

    a. an accurate and complete claim for payment using form PWGSC-TPSGC 1111, Claim for Progress Payment, and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;

    b. the total amount for all milestone payments paid by Canada does not exceed 90 percent of the total amount to be paid under the Contract;

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

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

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

7.8.3 SACC Manual Clauses

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

7.8.4 Electronic Payment of Invoices – Contract

The Contractor accepts to be paid using any of the following Electronic Payment Instrument(s):

a. Visa Acquisition Card;
b. MasterCard Acquisition Card;
c. Direct Deposit (Domestic and International);
d. Electronic Data Interchange (EDI);
e. Wire Transfer (International Only);
f. Large Value Transfer System (LVTS) (Over $25M)

7.9 Invoicing Instructions

1. The Contractor must submit a claim for payment using form PWGSC-TPSGC 1111, Claim for Progress Payment.

   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:

   i. Prepare and certify one (1) original of the claim form PWGSC-TPSGC 1111 and send a PDF copy by e-mail to the Contracting, Project, and Technical Authorities as identified under sub-articles 7.5.1, 7.5.2, and 7.5.3 of the contract with copy to the following CSA e-mail address: asc.facturation-invoicing.csa@canada.ca;

   ii. If mailed, the Contractor must prepare and certify **one (1) original and two (2) copies** of the claim form PWGSC-TPSGC 1111, and forward **one (1) copy** to the Contracting Authority and **one (1) original and one (1) copy** to CSA's Financial Services using the following mailing address for appropriate certification by the Project Authority or Technical Authority identified herein after inspection and acceptance of the Work takes place:

Canadian Space Agency
Care of: Financial Services'
6767 route de l'Aéroport, Saint-Hubert, Quebec, Canada
J3Y 8Y9

The Project Authority or Technical Authority 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.

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

7.10 Certifications and Additional Information

7.10.1 Compliance

Unless specified otherwise, the continuous compliance with the certifications provided by the Contractor in its bid or precedent to contract award, and the ongoing cooperation in providing additional information are conditions of the Contract and failure to comply will constitute the Contractor in default. Certifications are subject to verification by Canada during the entire period of the Contract.

7.10.2 *SACC Manual* Clauses

SACC Manual clause A3060C (2008-05-12), Canadian Content Certification

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 general conditions 2040 (2018-06-21), General Conditions - Research & Development;
(c) Annex A, Statement of Work;
(d) Annex B, Basis of Payment;
(e) Annex C, Non-Disclosure Agreement;
(f) the Contractor's bid dated _____, _____*(to be inserted at contract award)*.

7.13 Foreign Nationals (Canadian Contractor)

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

7.14 Insurance

SACC Manual clause G1005C (2016-01-28), Insurance - No Specific Requirement

7.15 Canadian Space Agency's 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 early on 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 at least one 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 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 Project Authority as mentioned in Paragraph 7.6.2 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 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 the clause notice included in the general conditions applicable to the contract. 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.

7.16 Dispute Resolution

(a) The parties agree to maintain open and honest communication about the Work throughout and after the performance of the contract.

(b) The parties agree to consult and co-operate with each other in the furtherance of the contract and promptly notify the other party or parties and attempt to resolve problems or differences that may arise.

(c) If the parties cannot resolve a dispute through consultation and cooperation, the parties agree to consult a neutral third party offering alternative dispute resolution services to attempt to address the dispute.

(d) Options of alternative dispute resolution services can be found on Canada's Buy and Sell website under the heading "Dispute Resolution".

ANNEX A

STATEMENT OF WORK

The Statement of Work (SOW) for Lunar Exploration Accelerator Program (LEAP) Phase 0 Science Instruments, initial release, dated May 20, 2020 is to be inserted at this point and forms part of the document.

ANNEX B

BASIS OF PAYMENT

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

SCHEDULE OF MILESTONES

Milestone No.	Description	Firm Amount	Due Date
M2	Mission Concept Review (MCR) and Technology Readiness and Risk Assessment (TRRA)	45% OF (A) *(to be inserted at contract award)*	4 months after contract award *(date to be inserted at contract award)*
M3	Mission Requirements Review (MRR)	45% OF (A) *(to be inserted at contract award)*	8 months after contract award *(date to be inserted at contract award)*
M4	Project Close-out (PCO)	10% OF (A) *(to be inserted at contract award)*	9 months after contract award *(date to be inserted at contract award)*

(A) Total firm, all-inclusive price:	$_____(Applicable Taxes Extra) * *(to be inserted at contract award)*

***** *(to be deleted at contract award)***:**
The total firm, all-inclusive price must be provided by the Bidder in their Financial bid and should include the price breakdown as requested in Section 3.1.1.1 of this bid solicitation. The firm amount per milestone will be calculated by Canada based on the formula detailed in the table above and will be incorporated into the resultant contract.

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 3: Technical and Managerial Bid Preparation Instructions

The document Technical and Managerial Bid Preparation Instructions (Attachment 1 to Part 3) appended to the bid solicitation is to be inserted at this point and form part of this document.

Attachment 2 to Part 3: Electronic Payment Instruments

ELECTRONIC PAYMENT INSTRUMENTS

As indicated in Part 3, clause 3.1.2, the Bidder must complete the information requested below, to identify which electronic payment instruments are accepted for the payment of invoices.

The Bidder accepts to be paid by any of the following Electronic Payment Instrument(s):

( ) VISA Acquisition Card;

( ) MasterCard Acquisition Card;

( ) Direct Deposit (Domestic and International);

( ) Electronic Data Interchange (EDI);

( ) Wire Transfer (International Only);

( ) Large Value Transfer System (LVTS) (Over $25M)

Attachment 1 to Part 4: Point Rated Evaluation Criteria

The document Point Rated Evaluation Criteria (Attachment 1 to Part 4) appended to the bid solicitation is to be inserted at this point and form part of this document.

Canadian Space Agency | Agence spatiale canadienne

CSA-LEAP-SOW-0001

Canadian Space Agency

Annex A

Lunar Exploration Accelerator Program (LEAP) Phase 0 Science Instruments

Statement of Work (SOW)

Initial Release

May 20, 2020

Livelink Number : 44287597

Canada

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1 INTRODUCTION

1.1 BACKGROUND AND CONTEXT

In February 2019, the Government of Canada (GoC) announced the Lunar Exploration Accelerator Program (LEAP) as part of a new National Space Strategy to "position Canada's commercial space sector to help grow the economy and create the jobs of the future". The Federal Budget 2019 confirmed that the Canadian Space Agency (CSA) can access up to $150 M over five years starting in 2019-20 for LEAP to "help small and medium-sized enterprises develop new technologies to be used and tested in lunar orbit and on the Moon's surface".

The strategy enables Canada and its space sector to grow the economy and create the jobs of the future by advancing science, developing and demonstrating space technologies and participating in new commercial and science mission opportunities linked to our participation in lunar exploration while generating benefits for Canadians in space and on Earth.

In light of the above, the Contractor must advance the readiness of Canadian science instruments to demonstrate their science and/or technology on the lunar surface or lunar orbit.

A suite of missions are being planned internationally over the next several years, offering flight opportunities beginning in 2024 for Canadian payloads developed through the LEAP. These opportunities include smaller payload contributions on commercial flights to larger robotics contributions on Lunar Surface Mobility (LSM) robotics missions.

The Work, through this Statement of Work (SOW), will focus on scientific instruments that could be mounted and fully operational on a rover, on a lander, or developed as a small independent flight system (e.g. CubeSat).

1.2 OBJECTIVE

The objective of the Scientific Instruments Phase 0 study is to demonstrate and confirm the feasibility, value and benefits of the instruments for the LEAP, and to demonstrate the validity of the mission requirements as well as the project readiness, so as to proceed with the development of the system requirements.

At the end of this Phase 0 study, the CSA should have all the scientific, technical and programmatic information necessary to assess the potential of the proposed Scientific Instrument that will contribute to the objectives of the LEAP.

The primary goal as defined in this SOW is to generate the activities and the resulting information in the form of documents, meetings, reviews and other means of communication to attain the objective stated above.

1.3 SCOPE

This SOW defines the overall work to be performed for Phase 0 of a scientific instrument contribution to potential future Canadian space missions. The requirements and deliverables as well as the scientific, technical, programmatic, and administrative tasks to be performed during Phase 0 are also described.

One key result of a Phase 0 is to provide information for CSA to clearly understand the options, costs, schedule, and risks. Further development of the science instruments that are being studied in Phase 0 will be subject to further down-selection or de-scope. The CSA must have all the information necessary to make a decision as to whether or not to proceed with the development of the science instruments under the next phases. Therefore, producing an indicative cost estimate for phases A, B, C, D, E, and F is part of the work to be carried out in Phase 0.

1.4 DOCUMENT CONVENTIONS

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

1. “Must” is used to indicate a mandatory requirement;
2. “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;
3. “May” indicates an option;
4. “Will” indicates a statement of intention or fact, as does the use of present indicative active verbs.

2 DOCUMENTS

2.1 APPLICABLE DOCUMENTS (AD)

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; they can be obtained from the File Transfer Protocol (FTP) links provided in Table 2-1.

TABLE 2-1: APPLICABLE DOCUMENTS

AD No.	Document Number	Document Title	Rev. No.	Date
AD-01	CSA-ST-GDL-0001	CSA Technology Readiness and Assessment Guidelines	D	Mar, 2019
AD-02	CSA-ST-FORM-0003	Critical Technology Element (CTE) Identification Criteria Worksheet	B	Mar, 2019
AD-03	CSA-SPEX-GDL-0001	CSA SE Scientific Readiness Level Guidelines	Draft 2.0	June, 2017
AD-04	CSA-SE-STD-0001	CSA Systems Engineering Technical Reviews Standard	A	Nov, 2008

2.2 REFERENCE DOCUMENTS

The following documents provide additional information or guidelines that either may clarify the contents or are pertinent to the history of this document. Some links to the documents are provided in Table 2-2, a copy of the other documents can be provided upon request to CSA.

TABLE 2-2: REFERENCE DOCUMENTS

RD	Document Number/Source	Revision	Title	Date
RD-01	ftp://ftp.asc-csa.gc.ca/users/ExP/pub/Publications/Science%20Priority%20Reports/		Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond	2017
RD-02	https://www.globalspaceexploration.org/wordpress/	3rd version	Global Exploration Roadmap (GER)	2018
RD-03	https://www.nasa.gov/content/commercial-lunar-payload-services		NASA Commercial Lunar Payload Services website	
RD-04	https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32600		Guidelines on Costing (Treasury Board)	2019
RD-05	PMBOK Guide	6th Edition	A Guide to the Project Management Body of Knowledge	2017
RD-06	CSA-SE-PR-001	B	Systems Methods and Practices	2010
RD-07	CSA-SE-STD-0002	IR	Contract Data Requirements List (CDRL) Compendium	2009

3 SCOPE OF WORK

The scope of work defined herein consists of carrying all Phase 0 work for one science instrument that responds to the identified needs and priorities of the CSA and the Canadian space science community outlined in the Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond 2017 (RD-01). An alignment with the international exploration goals as expressed in the Global Exploration Roadmap (GER, RD-02) is also desirable.

For the purpose of the Work, the science instrument will enable the answer to a highly visible scientific question, including the needed level of autonomy to successfully perform its key contribution to a mission on the lunar surface or its vicinity. This Work targets scientific instruments that could be mounted and fully operational on a rover, on a lander, or can be developed as a small independent flight system (e.g. CubeSat) (see list of preliminary requirements in Appendix C). It must be noted that two different rover sizes are foreseeable at this point, one that could carry a maximum 3 kilogram (kg) payload and one that could carry a maximum 10 kg payload.

The science instrument must survive within the lunar environment in accomplishing its mission, such as being subject to extreme temperature variations as well as regolith and radiation exposure on the lunar surface. The ability or not to operate in permanently shadowed areas or survive throughout the lunar night must be established. Science instruments that could address scientific questions relevant to the lunar pole and non-polar regions are possible.

Critical aspects of science instruments are their capability to fulfill the scientific goal while minimizing mass, volume and power. It is then crucial to consider the capabilities and Science Investigation Priorities (SIPs) that the proposed science instrument will address versus its footprint on the potential host mission.

The overall scope of work is to perform the following:

a. Develop an end-to-end concept of the science instrument that must include:

   i. a detailed description of the proposed capability(ies),
   ii. predicted reliability under the lunar environment,
   iii. proposed interfaces to the “to be determined” (TBD) platform,
   iv. ground segment (as applicable), and
   v. science data collection, storage, transmission and analysis from Phase A through to disposal of the payload.

   As mentioned, mass, volume and power are the critical constraints and must be specified as requirements for the next steps and future prototyping. To understand what will be provided as part of the TBD mission in terms of power and telecommunication, the Contractor is invited to consult the Commercial Lunar Payload Service (CLPS) vendors payload user’s guides (RD-03).

b. Demonstrate the link between the proposed concept and technology development and the list of objectives. The Contractor must also demonstrate how the proposed element will contribute in fulfilling the SIPs for Lunar exploration as outlined in RD-01 on the selected mission or suite of mission opportunities. The Contractor must demonstrate how the science instrument will contribute in a significant manner to a potential host mission for Canada in line with the SIPs.

c. Develop a detailed concept for the identified targeted SIPs and describe:

   i. the proposed solution,
   ii. its operational concept and how it could fit into a potential host mission(s) objectives,

iii. its feasibility, cost, schedule, constraints, performance, and Technology Readiness Level (TRL) assessment from the development to the flight implementation as defined herein.

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 is also responsible for reporting and delivering all deliverables listed in Table A-1 Contract Data Requirement List (CDRL).

3.1 SCIENCE INSTRUMENT PROJECT PLANNING AND DEVELOPMENT

3.1.1 Science Objectives and User Needs Definition

The Contractor must produce inputs in the form of Science Objectives and User Needs Definition Document (CDRL MD1) for what would be the Canadian contribution to a potential international host mission. The Science Objectives must be aligned with the SIPs for Lunar exploration as outlined in RD-01.

The CDRL MD1 document will capture and summarize the pertinent scientific instrument goals, assumptions and scientific 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.

A science traceability matrix must be completed as part of this work. An example is provided in Table 3-1. This matrix must be reviewed, updated and included in the CDRL MD1 document, accompanied by a narrative description that explains the rationale for the establishment of the instrument functional requirements to meet the science measurement requirements. This matrix provides systems engineers with fundamental requirements needed to design the mission, and can be used to show clearly the effects of any de-scoping or loss of elements on the achievement of the science objectives.

TABLE 3-1: SCIENCE TRACEABILITY MATRIX

Science Goals	Science Objectives	Science Measurement Requirements		Instrument Functional Requirements			Mission Functional Requirements (top level)
		Observables	Physical Parameters	Mandatory		Target	
Goal 1 Goal 2 Etc	Objective 1	Absorption line Morphological feature Rate of change of observable phenomenon	% abundance of absorber Size of feature Duration of event	Vertical resolution	XX km	ZZ km	Observing strategies: requires yaw and elevation manoeuvres (orbiter), or, traverse and instrument positioning (rover) Launch window: to meet nadir and limb overlap requirement (orbiter) ,or, to achieve landing site (rover) Need YY seasons to trace evolution of phenomena Need YY months of observation to observe variability of phenomena
				Horizontal resolution	XX deg x XX lat x XX lon	ZZ deg x ZZ lat x ZZ lon	
				Temporal resolution	XX min	ZZ min	
				Precision	XX K	ZZ K	
				Accuracy	XX K	ZZ K	
	Objective 2 to N			Repeat above categories			

3.1.2 Scientific Instrument System Requirements

Independent of a future availability of a Mission Requirement Document (MRD), a stable requirement baseline is necessary to manage the interface with external partners and proceed with the development of system requirements (see section 3.3.3).

The Contractor must develop a preliminary Scientific Instrument System Requirements Document (CDRL MD2), which will be used to capture the subset of mission requirements that will be applicable to the development of the Scientific Instrument. The document will include functional and performance requirements, interface requirements, and mission environmental requirements. It will also serve to distinguish essential requirements from desirable ones, and identify gaps, assumptions, TBDs and "to be confirmed" (TBC)s. A list of preliminary requirements is provided in Appendix C.

3.1.3 Mission Development Plan

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

The Development Plan must include:

a. a science development plan;
b. the technology development required to bring the technology readiness to the appropriate level at the appropriate time;
c. the development and manufacturing approach;
d. the approach for calibration, data product, application development and simulation;
e. a risk assessment;
f. a technology readiness and risk assessment
g. the identification of potential collaborations;
h. a Canadian capabilities development strategy; and
i. a commercialisation plan (optional).

The information requested in sections 3.1.4 through 3.1.3.7 must be presented in the Mission Development Plan (CDRL MD3) with additional CDRLs identified in some of these sections.

3.1.3.1 Science Development Plan

The Contractor must provide a Science Development Plan as part of the Mission Development Plan in order to define all scientific activities that need to be conducted in order to meet the science objectives elaborated under section 3.1.1. The science team roles and responsibilities, the description and methodology for the instrument support activities and science investigations for Phases A, B, C, D, and E, and the milestones must be presented in the Plan.

An important part of the plan is to evaluate the Science Readiness Level (SRL) of the science solutions and to define to work needed to reach all following levels. The SRL scale is described in AD-03 and summarized in Table 3-2.

Potential science collaborations and Canadian science capabilities development strategies must be identified and reported under the work performed in sections 3.1.3.5 and 3.1.3.6. All identified milestones must be integrated in the overall mission schedule (section 3.1.4).

All cost related to the defined activities must be included in the mission cost estimate (see section 3.1.5). For cost evaluation, it can be assumed that instrument support activities will be contracted and science investigation will be pursued under grants support.

TABLE 3-2: THE CSA SCIENCE READINESS LEVEL SCALE

(see details in AD-03)

Science Readiness Level Description	SRL No	Program or Mission Phase
Basic scientific principles observed and reported	SRL 1	Fundamental research
Science investigation defined	SRL 2	SE R&D programs (preparatory phases including: Science Definition, Concept Studies, Science Maturation); SST FAST program;
Science investigation proof of concept	SRL 3	
Science investigation validated using simulated and/or breadboard data	SRL 4	
Science investigation validated using analogue and/or instrument prototype data	SRL 5	SST STDP and FAST, Phases 0/A
Science investigation validated using instrument Engineering Model calibration/ characterization data products	SRL 6	Phases B, C, D
Science investigation validated using instrument Flight Model pre-launch calibration data products, and analogue science operations where relevant	SRL 7	
Science investigation data production proven through successful mission operations	SRL 8	Phase E Operations
Science investigation outcomes generated through publication of results	SRL 9	Phase E Data Analysis

3.1.3.2 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. This may imply the creation of breadboards, mock-ups, prototypes, and simulations to ensure the path to flight is viable for the development cycle. The necessity of a testing campaign for the qualification of space systems must be assessed and necessary information to evaluate its feasibility (i.e. how and where the testing will be done, has the facility been contacted to verify availability, has cost been taken into account) must be provided. Specific needs for testing at analogue sites should also be described where other test methods are insufficient, including test objectives and rationale. All these costs must be included in the Life Cycle Costs (LCC) of the project (see section 3.1.5).

The Contractor must identify long lead items (CDRL MD4) (see section 3.3.6).

3.1.3.3 Preliminary Risk Assessment

The Contractor must provide a preliminary risk assessment (including technical, schedule, cost, and programmatic risks) for the science instrument's 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 be realized, and any possible mitigation actions that could 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.

Stating simply a 'schedule risk' is not an acceptable consideration. Rather, what risk factor causes the schedule slippage and what mitigation/contingency does the Contractor propose to do about it, is what is needed.

The Contractor must integrate all risks when producing risk-related information and document these in a Risk Assessment Matrix. The risk assessment process and matrix are provided in AD-01 in a general manner.

3.1.3.4 Technology Readiness and Risk Assessment

The Contractor must conduct a TRRA in accordance with the requirements of the CSA TRRA guidelines (AD-01).

The main steps of the TRRA are to:

a. Logically break down the instrument into technology elements;

b. Classify technology elements as critical or non-critical using the criteria defined in the Critical Technology Elements (CTE) worksheet (AD-02) and provide sufficient rationale for the classification; and

c. Produce a TRRA for each CTE using the Portable Document Format (PDF) form provided in AD-01.

As the maturity of the technology grows and requirements are better defined, the TRRA may need to be updated to reflect this progress. The TRRAs must reflect the change in maturity of the instrument as a result of the work performed in Phase 0.

The TRRA will allow the TRL identification of the instrument and sub-systems in order to map the road ahead for prototyping and models, further validating the cost and schedule.

3.1.3.5 Collaboration

The Contractor must identify potential partners and/or stakeholders at the national and/or international level (academic, Other Government Departments (OGD), Agencies, etc.), state the benefits of their participation in this mission and provide a preliminary assessment of roles and responsibilities, including potential in-kind or financial contributions to the life cycle mission cost. This should be considered from a scientific and engineering perspective.

The basis and process of stakeholder analysis is described in the Project Management Book of Knowledge (PMBoK) (RD-05).

3.1.3.6 Canadian Capability Development

The Contractor must provide an estimate of the anticipated percentage of Canadian content relative to the overall cost presented in section 3.1.5 (see Table 3-3) what options could be undertaken to maximize the Canadian content and their corresponding impacts and benefits.

The Contractor must also provide an overview of their strategy to develop and maintain Canadian scientific and engineering 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.

3.1.3.7 Preliminary Commercialisation Plan (optional)

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

The Contractor should provide a preliminary commercialisation plan to explain the potential economic benefits of an investment in such a mission. This plan should include a description of potential products and spin-offs (space and non-space) that can be commercialized, a stakeholder analysis, and an analysis of the competitors (national and international) for the potential products.

3.1.4 Overall Schedule

The Contractor must suggest a preliminary Schedule relative to an overall life cycle of the potential host mission including the impact of hardware integration and qualification milestones. The schedule must include the activities related to the Science Development Plan (see section 3.1.3.1) and the Development and Manufacturing Approach (see section 3.1.3.2). The timeline must include key milestones such as Preliminary Design Review (PDR), Critical Design Review (CDR) and Launch. A six months integration period to allow the incorporation of the science instrument within the host mission should be assumed at this point.

Refer to CSA Systems Engineering Technical Review Standard (AD-04) for a full description of all the possible reviews, which may vary depending on the project's specific needs and constraints. The project schedule prepared by the Contractor must provide a graphical representation of predicted tasks, milestones, dependencies, task duration, and the critical path.

3.1.5 Cost Estimate

The Contractor must provide an indicative Cost Estimate for the science instrument, in accordance with Treasury Board (TB) guidelines (RD-04), as per Table 3-3 Science Instrument Cost Breakdown, for all phases leading to the development, implementation, operation and disposal. Along with the cost estimate, a justification for these 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 science instrument for the life cycle of a mission. This estimate is for information purpose and it will not be contractually binding for the Contractor to compete for subsequent phases if any.

TABLE 3-3: TEMPLATE FOR SCIENCE INSTRUMENT COST BREAKDOWN

Category		Phase A	Phase B	Phase C	Phase D	Phase E	Phase F
	GFY (example)	FY20/21	Etc.				
Labour	Management						
	Technology Development						
	Design						
	Documentation						
	Reviews						
	Manufacturing						
	Assembly						
	Testing						
	Product Assurance						
	Science Team Support						
	Ground segment						
	Operations						
	Total Labour						
Non-Labour	Hardware / Software Procurement						
	Science Team Support						
	Tools, Equipment and Facilities						
	Travel and Living						
	Subcontractors						
	Other Direct Charges						
	Total Non-Labour						
	Subtotal						
Risk	Risk Contingency						
Taxes	Applicable Taxes						
Total By Phase							
Total All Phases							

3.1.6 Intellectual Property

The Contractor must complete the Contractor Disclosure of Intellectual Property CSA Form (CDRL MD5), identifying the Background Intellectual Property (BIP) and Foreground Intellectual Property (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 PRELIMINARY CONCEPT OF OPERATIONS

The Contractor must develop a Preliminary Concept of Operations (ConOps) (CDRL OP1) in order to meet the Science Objectives. This document must provide a comprehensive summary of all operability aspects of the Scientific Instrument. This includes the commissioning, debarking, normal Ops, abnormal Ops, and post-mission Ops. Specific needs for validation of the operations concept at analogue sites and training of operations staff should be described where other test methods are insufficient, including analogue test objectives and rationale.

3.3 ENGINEERING

3.3.1 Systems Engineering Methodology

The Contractor is responsible for performing the engineering and the Systems engineering based on best industrial practices. The Contractor is also responsible for reporting and delivering all Engineering deliverables listed in Table A-1 according to the Data Item Descriptions (DIDs). Flexibility on the DIDs content is possible subject to CSA approval. The CSA can provide to the Contractor, if required, RD-06 Systems Methods and Practices for reference.

The development of requirements is always accompanied by design and operational elements. Therefore, during the execution of this SOW, deliverables associated with design concept and operations are required to further validate requirements, cost and schedule.

3.3.2 Technical Reviews

This SOW identifies two (2) major reviews as part of Phase 0, the Mission Concept Review (MCR) and the Mission Requirements Review (MRR) (see section 3.3.4). The Contractor must use AD-04 for the execution of the reviews. However, due to the nature, size, cost and timeline of this contract, it is important to effectively tailor the reviews. The Contractor may adapt the reviews, subject to CSA approval, to achieve the necessary objectives.

The Contractor must develop the MCR by producing the required work, material and deliverables to validate the feasibility of the mission to the CSA. Therefore the degree of correctness and completeness of the work, material and deliverables must be properly estimated by the Contractor to meet this objective.

Following the MCR, the Contractor must develop the MRR, which focuses on the System Requirements of the instruments which are validated by solid operational and design concepts.

3.3.3 System Requirements

The System Requirements (see section 3.1.2) must be developed based on the Science Objectives and the User's Needs (see section 3.1.1) and documented in CDRL MD2. A traceability matrix must be produced as part of the System Requirement Document to show the direct link with the Science Objectives and the User's Needs Document and to ensure nothing has been lost during the Engineering Process.

System Requirements must be refined using the Conceptual Design as defined hereafter and the Preliminary Concept of Operations defined in section 3.2.

3.3.4 Conceptual Design

The Contractor must develop a System Conceptual Design Document (CDRL EN1) that shows that the proposed design meets the System Requirements. This concept must be substantiated by analysis when applicable. The Conceptual Design Document will indicate the compliance to the requirements via a Compliance Matrix.

By compliance to the System Requirements, the Conceptual Design Document validates the degree of feasibility of meeting the Missions Objectives and the User's Needs by the proposed design.

3.3.5 Prototypes, Breadboards and Engineering Models

The TRL of the instrument, sub-systems and components must be evaluated in the execution of this SOW. This will allow the definition of a roadmap for prototyping, breadboarding and other types of Engineering Models (EM) to be developed in order to deliver the instrument as per the project planning and technical/science objectives.

3.3.6 Long Lead Items

Long Lead Items (LLI) must be identified and documented (CDRL MD4) at the early stage of the project to ensure that parts, modules and sub-systems that have a long procurement time are identified in order to take the appropriate actions to preserve the project timeline and the associated engineering activities. Specifically, to meet the need to build Breadboards, Prototypes and EMs required to reach major Systems Engineering milestones such as the CDR (Phase C) and then with Manufacturing, Assembly, Integration and Tests (MAIT) (Phase D).

3.3.7 Technical Performance Measures (Engineering Budget)

The Contractor must provide an Engineering Budget as per CDRL EN2 and supported (as required) by analysis in order to fully characterize the design and present the most current and accurate values. The Engineering Budget must be updated regularly as the design matures.

3.3.8 Models and Analysis

Models and Analyses supporting the development of the instrument must be presented according to CDRL EN3. Models and Analyses are key in validating requirements and design decisions.

3.3.9 Technical Notes

The Contractor may prepare system engineering reports in the form of Technical Notes (TN) (CDRL EN4) if required to address and resolve technical problems that occur during the program. The purpose of these TNs is to document and exchange technical information on the progress of work on a relatively informal basis.

These notes cannot be used as a means of satisfying the requirement for a CDRL item, unless accepted by the CSA.

3.4 PROJECT MANAGEMENT

The Contractor is responsible for establishing and maintaining a project management control system to ensure that the cost, schedule, technical and programmatic requirements of this SOW are met. If information for the Contractor to fulfill its responsibilities to complete the contract is missing from this SOW, it is the duty of the Contractor to inform the CSA as soon as this situation comes to light. If CSA does not have the information on hand or cannot obtain the information, the Contractor and CSA must make and document assumptions so that the work will not be stopped. Refer to Appendix A, for the minimum required CDRL.

3.4.1 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 appoint an experienced Project Manager (PM) responsible for all aspects of the work carried out by the Contractor. The PM will act as the single Point of Contact (POC) within its project organization for communications between the Contractor and the CSA Project Authority (PA) and the CSA Technical Authority (TA) for the contract. In the PM's absence, the Contractor must designate an alternate to maintain continuity of communication between the Contractor and the SA and TA.

The Contractor must also identify other essential personnel to execute the contract with appropriate qualifications and experience assigned to all positions within the project organization, including scientists with the necessary expertise to define and 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. This implies that the subcontractors have the correct processes and/or policies in place to be able to perform and track the work to the highest standards (e.g. ISO-9000s).

3.4.2 Communications and Access

The Contractor must establish and maintain a close management and technical interface with CSA to coordinate program effort and monitor the total program cost, schedule, and performance.

The Contractor must provide access to its plant and personnel, as well as to its subcontractor plants and personnel, at mutually agreeable dates, by representatives of CSA (such as CSA Safety and Mission Assurance (S&MA) 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 purpose of the visits and the facilities provided must include telephone, photocopying, and internet access.

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

3.4.3 Detailed Schedule and Critical Path

The Contractor must prepare and maintain a detailed schedule (CDRL PM5) based on the Contractor Work Breakdown Structure (CWBS) (CDRL PM4, see section 3.4.6) 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 and must be marked on the schedule chart. The schedule must be updated at each major milestone. The schedule must include all the milestones listed in Table 3-4: Proposed Project Milestones.

TABLE 3-4: PROPOSED PROJECT MILESTONES

ID	Milestone	CDRL
M1	Kick-off Meeting (KoM)	• PM1, PM2, PM3 – Agenda, minutes, Action Item Log (AIL) • PM4 – Contractor Work Breakdown Structure and Work Package Descriptions PM5 – Project Schedule
M2	Mission Concept Review (MCR) and Technology Readiness and Risk Assessment (TRAA)	• PM1, PM2, PM3 – Agenda, minutes, AIL • PM6 – Mission Life-Cycle Cost Estimates • PM8 – Mission Concept Review Presentation • MD1 – Science Objectives and User Needs Definition Document • MD2 – Scientific Instrument Requirements Document • MD3 – Mission Development Plan (MDP) • MD4 – Long Lead Items (LLI) List • OP1 – Preliminary Concept of Operations (ConOps) • EN1 – Preliminary System Conceptual Design Document
M3	Mission Requirements Review (MRR)	• PM1, PM2, PM3 – Agenda, minutes, AIL • PM9 – Mission Requirements Review Presentation • EN2 – Technical Performance Measures Report (Budget) • EN3 – Models & Analyses • Updated documents presented at M2
M4	Project Close-Out (PCO)	• PM10 – Phase 0 Closure Report • PM11 – Contractor Disclosure of IP • Final version of the documents presented at M2 and M3

3.4.4 Project Meetings

The Contractor must hold the meetings described in Table 3-5: Planned Meetings. Some or all of these meetings may be attended by representatives of the CSA, and/or other organizations designated by the CSA.

All meetings between the Contractor and CSA will be held at mutually agreed times and locations. The Contractor must provide formal notification of the proposed meeting date to the CSA PA 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 PA 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 PA.

Meetings can be alternatively replaced by 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 TA.

TABLE 3-5: PLANNED MEETINGS

ID	Meetings	Date Time after Contract Award	Venue
M1	Kick-off Meeting (KoM)	2 weeks	CSA/Telecon.
M2	Mission Concept Review (MCR) and Technology Readiness and Risk Assessment (TRRA)	4 months	CSA/Telecon.
M3	Mission Requirements Review (MRR)	8 months	CSA
	Teleconference Meetings	As required	Telecon.

3.4.4.1 Teleconference Meetings

The Contractor should hold teleconference meetings with the CSA PA and TA when necessary. Frequent exchanges between the Contractor and CSA throughout the duration of the contract are necessary to ensure CSA's input into the work carried out. The teleconferences are mainly to address technical issues and to discuss progress.

3.4.4.2 M1 – Kick-off Meeting

The KoM will serve as an opportunity for CSA and Public Services and Procurement Canada (PSPC) to review the Contractor's plans, the requirements of the work (SOW), schedules, deliverables, risks, and to address issues. A presentation can be prepared but is not mandatory.

3.4.4.3 M2 – Mission Concept Review (MCR)

The MCR confirms the mission needs, examines the proposed mission's objectives and the concept for meeting those objectives, and determines the project readiness to proceed with the development of mission requirements.

The Contractor must make a presentation (CDRL PM8) to demonstrate that the MCR entry and exit criteria are met, including the common entry and exit criteria, as per AD-04.

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

3.4.4.4 M3 – Mission Requirements Review (MRR)

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

The Contractor must make a presentation (CDRL PM9) to demonstrate that the MRR entry and exit criteria are met, including the common entry and exit criteria, as per AD-04.

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

3.4.5 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 TA no less than 5 working days before the reviews and 1 working day before a meeting, and must have it approved by the CSA TA. Agenda can be combined with the meeting presentation as long as the information required is provided.

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) (CDRL PM3) 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 exists 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 (CDRL PM1).

3.4.6 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. Since this work also includes the planning analysis for all phases until completion, the CWBS must contain all the Work Packages (WPs) necessary to carry out all the work for a complete mission.

3.4.7 Project Reporting

3.4.7.1 Monthly Progress Reports

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

The Monthly Progress Reports must be delivered no later than 5 working days after the end of the month. As all deliverables, it must be submitted via the secure CSA portal for the Phase 0 science instrument, and a copy must also be sent by email to the PSPC Contracting Officer.

3.4.7.2 Phase 0 Closure Report

The Contractor must submit a Phase 0 Closure Report (CDRL PM10).

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

3.4.8 Deliverables

The Contractor must deliver all documentation content listed in the CDRL tables (Appendix A) as a minimum. Documents may be combined or divided subject to CSA approval to optimize production and avoid unnecessary duplication of information. The format and content of the deliverables must be in accordance with the requirements specified in the DIDs (Appendix B), both the specific DID identified in the CDRL and the DID-100 – General Preparation Instructions.

With the exception of documents that will remain CSA documents, the Contractor may propose documents in a Contractor's Format (CF) 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 Configuration Management (CM) Library for the Phase 0 science instrument mission. Login credentials will be provided after the KoM.

International System of Units (SI) units must be used 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 Table A-1.

The Contractor must obtain approval from the CSA for all CDRL Documents as indicated in Table A-1.

3.4.8.1 Documents Delivered for Approval

The term "Approval" as used in this document and in other documents referred to herein, means written approval by the 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 TA approval. Any request or document for which approval is required must not be acted upon or implemented by the Contractor until such approval is given. The CSA TA will promptly review such requests and documents and give the necessary written approval or disapproval. If the CSA TA fails 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 TA will advise the Contractor in writing as to the reasons for such disapproval and will define the additions, deletions or corrections that the CSA TA 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.

3.4.8.2 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 TA 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 TA does not concur with a document submitted for review, the CSA TA 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 TA 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 TA 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 TA without comment.

3.4.9 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 SOWs, technical requirements documents, etc., necessary to effectively manage the subcontractors' work.

At the request of the CSA PA, copies of subcontractor documentation must be delivered to the CSA PA.

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

3.4.10 CSA's Performance Indicators

The Contractor must respond to a series of questions pertaining to the outcomes achieved through the Contract. The questions will be made available through an electronic link provided by CSA toward the end of the contract. Approximately one month will be provided for the Contractor to answer the questions. It is foreseen that approximately 5-10 questions will be solicited. Sample questions are provided in CDRL PM11.

APPENDICES

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
   - DIDs are provided in Appendix B, these are consistent with the documentation that should be produced in a Phase 0 project as detailed in the Contract Data Requirements List (CDRL) Compendium (RD-07)

2) **Document Versions (this refers to the version of the document that will be delivered though the duration of the Phase 0 contract):**
   - 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 and 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 Section No.	DID No.	M1 KoM	M2 MCR	M3 MRR	M4 PCO	Acceptance Cate-gory
A.1 PROJECT MANAGEMENT								
PM1	Meeting Agenda	3.4.5	110	IR	IR	IR		R
PM2	Minutes of Meetings	3.4.5	111	IR	IR	IR		A
PM3	Action Items Log (AIL)	3.4.5	112	IR	As required			A
PM4	CWBS and Work Package Descriptions	3.4.6	102	U				A
PM5	Phase 0 Project Schedule	3.4.3	105	IR	Monthly			R
PM6	Mission Life-Cycle Cost Estimates	3.1.5	Table 3-3 and 009		P	IR	F	A
PM7	Progress Report	3.4.7.1	107	Monthly				R
PM8	Mission Concept Review Presentation	3.4.4.3	CF		F			R
PM9	Mission Requirements Review Presentation	3.4.4.4	CF			F		R
PM10	Phase 0 Closure Report	3.4.7.2	114				F	R
PM11	CSA's Performance Indicators	3.4.10	130				F	R
A.2 MISSION DOCUMENTATION								
MD1	Science Objectives and User Needs Definition Document	3.1.1	000		IR	F		A
MD2	Scientific Instrument System Requirements Document	3.1.2	400A		P	IR	F	A
MD3	Mission Development Plan (MDP)	3.1.3	007A		IR	F		A
MD4	Long Lead Items List	3.1.3.2 & 3.3.6	529		IR	F		A
MD5	Contractor Disclosure of IP	3.1.6	120				F	A
A.3 OPERATIONS								
OP1	Concept of Operations (ConOps)	3.2	825		P	IR	F	A
A.4 ENGINEERING								
EN1	System Conceptual Design Document	3.3.4	700A		P	IR	F	R
EN2	Technical Performance Measures Report (Budget)	3.3.7	530			IR	F	R
EN3	Models & Analyses	3.3.8	600			IR	F	R
EN4	Technical Notes	3.3.9	CF	As required				R

B DATA ITEMS DESCRIPTIONS (DIDS)

DID-100 – GENERAL PREPARATION INSTRUCTIONS 24
DID-000 – MISSION/SCIENCE OBJECTIVES AND USERS' NEEDS DEFINITION 30
DID-007A – MISSION DEVELOPMENT PLAN....32
DID-009 – LIFE CYCLE COST ANALYSIS (LCCA)....34
DID-102 – CWBS AND WORK PACKAGE DESCRIPTIONS....35
DID-105 – PROJECT SCHEDULE 36
DID-107 – PROGRESS REPORT 37
DID-110 – MEETING AGENDA 39
DID-111 – MINUTES OF MEETINGS....40
DID-112 – ACTION ITEMS LOG (AIL)....41
DID-114 – PHASE CLOSURE / FINAL REPORT 42
DID-120 – FIP AND BIP DISCLOSURE....43
DID-130 – CSA'S PERFORMANCE INDICATORS....44
DID-400A – SCIENTIFIC INSTRUMENT SYSTEM REQUIREMENTS DOCUMENT 45
DID-529 – LONG LEAD ITEMS LIST 48
DID-530 – TECHNICAL PERFORMANCE MEASURES REPORT (BUDGET) 49
DID-600 – COMPUTER-AIDED DESIGN (CAD) MODELS 51
DID-700A – SYSTEM CONCEPTUAL DESIGN DOCUMENT....52
DID-825 – SYSTEM CONCEPT OF OPERATIONS 53

DATA ITEM DESCRIPTION

DID-100 – General Preparation Instructions

DID Issue: IR **Date: 2013-12-19**

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 must 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:

CM_Receipt@space.gc.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:

CM_Receipt@space.gc.ca

If deliverables contain ITAR content, notifications of their availability on Contractor repositories must 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 XXXX 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

2.1. 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 TA.

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

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

Provided by Supplier	Metadata Description	Comments
Yes	CSA Project Identifier	Project Acronym
Yes	Contract Identifier	PSPC identifier
Yes	Contract Revision Identifier	PSPC 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, 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, 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)[1]
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

[1] C = Confidential, S = Secret, TS = Top Secret, PA PB PC = Protected A, B, C

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

DATA ITEM DESCRIPTION

DID-000 – Mission/Science Objectives and Users' Needs Definition

DID Issue: IR **Date: 2014-02-14**

PURPOSE:

The purpose of this document is to provide all the science justification, as well as mission and scientific objectives, the identification of the users and the definition of their needs. This document acts as the source for the Mission Requirements Document (MRD) and the Preliminary Mission Development Plan (MDP).

PREPARATION INSTRUCTIONS:

This must be a CSA document with a CSA number. The document must contain the following information, as a minimum:

1) Introduction
    a) Document purpose,
    b) Document scope;
2) Applicable and Reference Documents;
3) Mission Description:
    a) Mission description/overview,
    b) Mission general objectives,
    c) Mission science & application objectives,
    d) Data products,
    e) Mission success criteria;
4) Science Objectives:
    a) Introduction, background, scope,
    b) Mission goals,
    c) Science goals,
    d) Space community priorities,
    e) Traceability between space community priorities and mission goals;

5) Users' Needs:
    a) Measurement needs,
    b) Measurements assessment analysis,
    c) Data needs,
    d) Canadian data needs;
6) Implementation and Operations Concept:
    a) Instrument sections,
    b) Platforms,
    c) Data Production,
    d) Applications,
    e) Data Exploitation;

Appendix A: Nomenclature

Appendix B: Acronyms

DATA ITEM DESCRIPTION

DID-007A – Mission Development Plan

PURPOSE:

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

PREPARATION INSTRUCTIONS:

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 science development plan required;
5. A description of the technology development required;
6. A description of the proposed development and manufacturing approach;
7. A description of the preliminary mission risk assessment;
8. A technology readiness and risk assessment evaluation (see specific instructions below);
9. A description of potential scientific and engineering collaborations;
10. A description of the proposed Canadian scientific and engineering capabilities development strategy;
11. A description of the proposed commercialisation plan; and
12. Recommendations for follow-on activities.

Preparation Instructions for the Technology Readiness and Risk Assessment (TRRA)

The Technology Readiness and Risk Assessment (TRRA) evaluation 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 evaluation 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 evaluation.

The evaluation must include the following:

1. CRITICAL TECHNOLOGY ELEMENTS (CTES)

1) Description of the CTE;
2) Rational 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).

2. TECHNOLOGY MATURITY AND VIABILITY ASSESSMENTS

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

1) Description;
2) Main requirements;
3) Heritage and compliance;
4) TRL achieved;
5) R&D3;
6) Technology Need Value (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).

3. 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
- 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 (including a roadmap) and should refer to a separate Technology Development Plan report if appropriate.

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), the Technology Readiness and Risk Assessment Worksheet (CSA-ST-FORM-0001) for each CTE and rollup using the Technology Readiness and Risk Assessment Data Rollup Tool (CSA-ST-RPT-0002). These worksheets will be provided by CSA.

DATA ITEM DESCRIPTION

DID-009 – Life Cycle Cost Analysis (LCCA)

DID Issue: IR **Date: 2014-02-20**

PURPOSE:

To determine the overall cost of designing, building, testing, operating, maintaining and disposing of a space system.

PREPARATION INSTRUCTIONS:

The LCCA must be structured on the system WBS and must analyze all the costs attributed to the system during its life cycle. It must include the following costs:

1) Initial capital costs, including project planning and management, engineering (design and development), manufacturing, testing, integration, launch and commissioning. Ground segment acquisitions, development and validation must also be included;
2) Operating costs, including operations personnel, consumables, training, simulations, etc.;
3) Maintenance costs if applicable;
4) Risk mitigation allowances;
5) Disposal costs.

DATA ITEM DESCRIPTION

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 organise 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.

DATA ITEM DESCRIPTION

DID-105 – Project Schedule

DID Issue: IR **Date: 2014-01-06**

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 its native tool format (MS Project or PS8 are the two accepted formats), 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. For major subcontracts involving significant new development, subcontractors' master schedules must be provided including the same information as required form the prime Contractor.

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.

The Contractor must report schedule performance status in tabular form, with the following information provided for each WP:

8) Schedule variance (current and cumulative), and
9) Schedule Performance Index (SPI).

The monthly progress status may be reported as a part of the Monthly Progress Reports. Baseline versions of these schedules will be maintained against which the project will be reported. These baseline schedules must not be revised or changed without prior approval from the CSA.

DATA ITEM DESCRIPTION

DID-107 – Progress Report

DID Issue: IR **Date: 2014-01-10**

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:

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 should include the following information, if applicable:

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

10) 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;
11) The work projected for the next period, and estimated date of completion of next milestone;
12) Outline of technical and programmatic issues, with solutions recommended;
13) Contractual issues, including changes to activities and costs;
14) Subcontracts events, status and issues;
15) Equipment ordered, received, made and assembled;
16) Description of trips or conferences connected with the Contract during the period of the report;
17) 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;
18) Product Assurance reporting:
    a) A narrative section describing: significant accomplishments during the reporting period, audits performed, significant problems, recommended solutions, and corrective action status, significant changes in the Product Assurance Organization and Program related organizations,
    b) Summary tables or updates as applicable:
        i) Technical review action items, configuration baseline, non-conformances, failure analysis, audits (internal as well as at the subcontractors and their sub-tiers),
        ii) Reliability analysis status,
        iii) Inspection and Test Status,
        iv) Deviations/Waivers status,
        v) List of Class I Non-conformances,
        vi) List of Class II Non-conformances,
        vii) Product Assurance documentation status,
        viii) Product Assurance Action Item Log,
        ix) Contractor problem status, and
        x) Status of GIDEP/ESA Alerts,
    c) Software assurance highlights:
        i) Assurance accomplishments and resulting metrics for activities such as, but not limited to, inspection and test, reviews, Instrument Provider/subcontractor surveys, and audits,
        xi) Trends in metrics data (e.g., total number of software problem reports, including the number of problem reports that were opened and closed in that reporting period),
        xii) Significant problems or issues that could affect cost, schedule and/or performance, and
        xiii) Plans for upcoming software assurance activities; and
19) Status of all action items from previous review(s) and meeting(s).

DATA ITEM DESCRIPTION

DID-110 – Meeting Agenda

DID Issue: IR **Date: 2013-12-19**

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.

DATA ITEM DESCRIPTION

DID-111 – Minutes of Meetings

DID Issue: IR **Date: 2013-12-19**

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
   c) Space for signatures of the designated representatives of the Contractor, the CSA and the Public Services and Procurement Canada (PSPC), and
   d) Name and address of the Contractor.
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."

DATA ITEM DESCRIPTION

DID-112 – Action Items Log (AIL)

DID Issue: IR **Date: 2013-12-19**

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) Office of Prime Interest (OPI);
8) Person responsible (for taking action);
9) Target/Actual Date of Resolution;
10) Progress update;
11) Rationale for closure;
12) Status (Open or Closed); and
13) Remarks.

The date in column 9) will be the target date as long as the item is open, and the actual date once the item is closed.

DATA ITEM DESCRIPTION

DID-114 – Phase Closure / Final Report

DID Issue: IR **Date: 2014-01-16**

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.

DATA ITEM DESCRIPTION

DID-120 – FIP and BIP Disclosure

DID Issue: IR **Date: 2014-01-16**

PURPOSE:

To fully disclose all FIP and BIP resulting from a Phase 0 contract.

PREPARATION INSTRUCTIONS:

The FIP Disclosure must contain the following information, as a minimum:

1) Introduction including the scope and the purpose;
2) List and description of all FIP resulting from the Phase 0 contract; and
3) List and description of all BIP required by CSA for use of the FIP resulting from the Phase 0 contract.

DATA ITEM DESCRIPTION

DID-130 – CSA's Performance Indicators

DID Issue: IR

PURPOSE:

The goal of the report is to provide data to CSA in order to document the results achieved in one fiscal year. The report will provide the Space Exploration Program with validated, reliable, complete and timely information to support decision-making and program evaluation. Such data are the base on which evidence-based decisions can be made within the space exploration program.

PREPARATION INSTRUCTIONS:

The Contractor must respond to a series of questions pertaining to the outcomes achieved through the Agreement. The questions will be made available through a link provided by CSA. Approximately one month will be provided for the Contractor to respond to the questions. It is foreseen that approximately 5-10 questions will be solicited. Below is an example of the most salient questions.

3) Please enter the number of people working on this specific project. To the best of your knowledge, include students and employees involved in the project at your organization and at sub-contracting organizations*. Please indicate, to your knowledge, how many are male, female or other.*

   Categories provided are: Management; Administration; Scientists; Engineers; Technicians; Health Professionals; Post-Doc Fellows; Graduate Students (Masters and Doctoral) Undergraduate Students (Bachelors); College or Cégep Students (below Bachelors); Others.

4) Please use the provided table, to indicate the names of all Canadian or international organizations (private companies, not-for-profits, universities) who are your subcontractors on this project.

5) Please select in the provided drop down list, the maturity level of the application or technology in association with the project PREVIOUS to receiving CSA funding. Note that the technology maturity levels are defined with a (T) and software application levels are defined with an (A).

6) Has the technology or application flown, or will it fly, on a space mission? All types of missions can be considered, e.g. technology demonstration, science mission, and missions in operation, as long as the mission is in space. Space is defined as Low-Earth-Orbit and beyond.

7) Please indicate published works that meet the following criteria:

   a) Made possible (in part or wholly) by CSA funding for the space-related project in reference to this questionnaire; AND

   b) Produced by the (research) team members based in Canada.

DATA ITEM DESCRIPTION

DID-400A – Scientific Instrument System Requirements Document

DID Issue: IR **Date: 2014-01-23**

PURPOSE:

To define the functional, performance, environmental and other requirements for the system to provide the basis on which the Specifications Documents will be developed.

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 subject item (segment, subsystem, etc.) as a whole and must not contain specific requirements on sub-items. All requirements must be verifiable on the item as integrated.

3) Requirements documents must cite applicable standards and parent requirements, and must make clear the priority sequence of the applicable documents.

4) 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

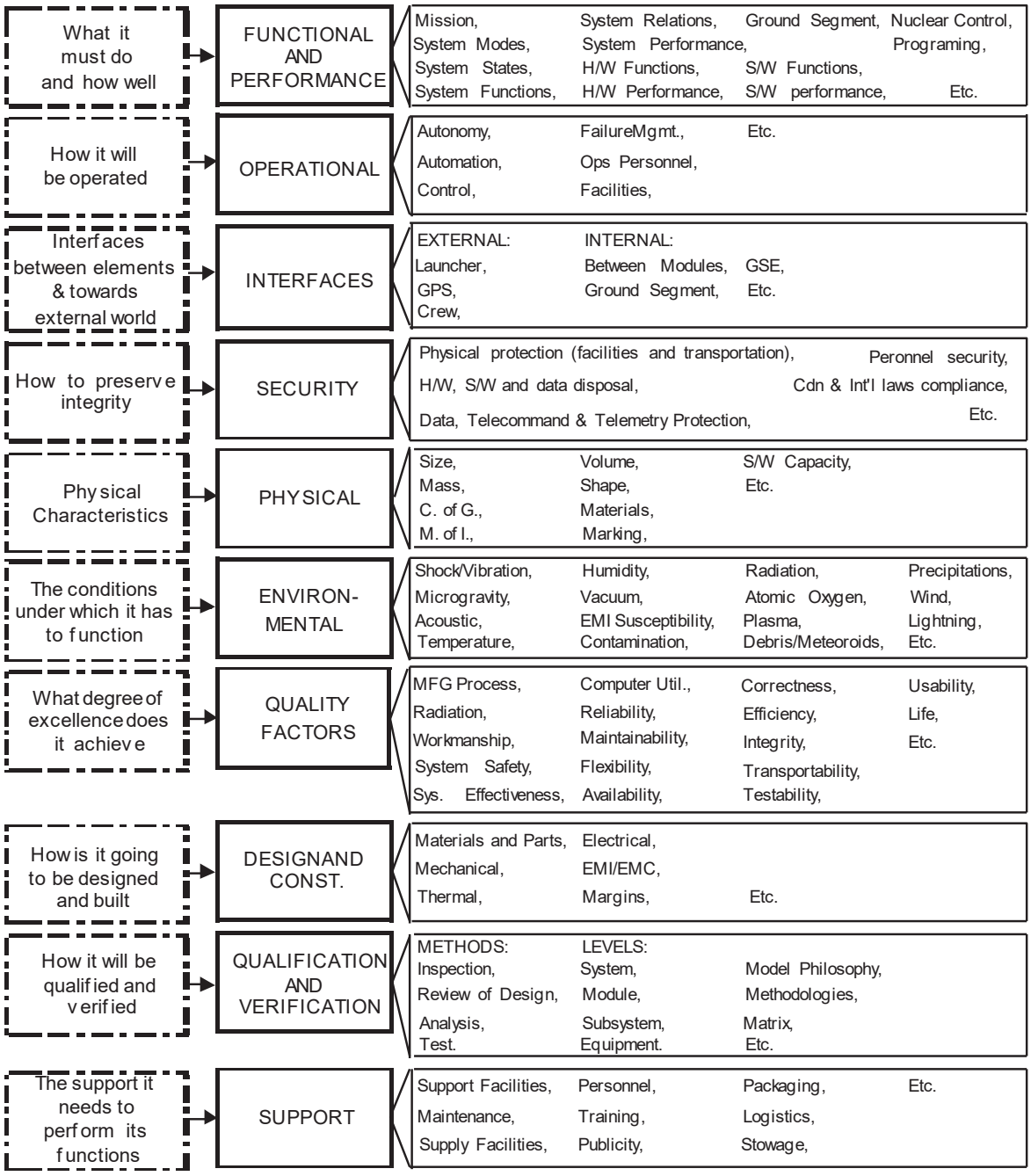
   f) They must be verifiable;

   g) They must specify the conditions under which they apply; and

   h) Performance requirements must be quantified.

5) The Requirements Document must comprise a number of sections, each defining a specific set of requirements. The document must address the listed requirements listed in DID-400A – Figure 1 below, as applicable to the project.

6) More specific requirements that are not clearly identified in DID-400A – Figure 1:
    a) Resource allocation requirements;
    b) System environmental requirements associated with:
        i) Storage, packaging and handling environment;
        ii) External stowage requirements, if any;
        iii) Ground operations environment;
        iv) Integration to launch vehicle environment;
        v) Launch environment;
        vi) Space environment;
        vii) Lunar environment.
    c) Ground Support Equipment requirements, if any (unless done in a separate document);
    d) Power requirements including:
        i) Power consumption;
        ii) Power transients;
        iii) Voltage requirements.
    e) Telemetry and Telecommand requirements including rates and storage;
    f) Radio Frequency;
    g) Software requirements;
    h) Other applicable requirements that are considered omitted by the Contractor and/or the CSA.



DID-400A – Figure 1

DATA ITEM DESCRIPTION

DID-529 – Long Lead Items List

DID Issue: IR **Date: 2014-01-28**

PURPOSE:

To identify hardware and software items with long procurement schedules. It supports cash flow planning by the Government.

PREPARATION INSTRUCTIONS:

The Long Lead Items (LLI) List must identify, as a minimum:

1) All LLIs;
2) The time frame, relative to the project schedule, when these items need to be ordered or fabricated; and
3) The estimated cost of all identified items.

DATA ITEM DESCRIPTION

DID-530 – Technical Performance Measures Report (Budget)

DID Issue: IR **Date: 2014-01-28**

PURPOSE:

The purpose of this document is to identify and track Technical Performance Measures (TPMs) during system development. It is issued periodically to show the current performance expectations of the system with respect to key performance and resource parameters, and the comparison of current predictions versus the defined requirements and allocated resources. It allows trends in the program technical progress to be discerned.

PREPARATION INSTRUCTIONS:

The TPMs must include the following parameters, as appropriate:

1) Physical resources
    a) Mass: this section must indicate the current allocated Spacecraft mass, the current estimated mass, and the current mass margin; mass estimates should be broken down to the unit level.
    b) Power (steady-state and transient peaks): this section must provide estimates of power consumption (maximum, minimum) and available load power (maximum, minimum) against the Requirements Document or Specification.
    c) Volume: this section must indicate the current allocated Instrument volume, the current estimated volume, and the current volume margin; volume estimates should be broken down to the unit level.
2) Computer resources
    a) Processor usage: for each microprocessor used in the Instrument, this section must allocate a processing capacity budget and estimate the average and peak loading on the processor, as well as calculate the processing margin.
    a) Memory usage: for each microprocessor used in the Instrument, this section must allocate a Random Access Memory (RAM) and Electronically Erasable Programmable Read-Only Memory (EEPROM) usage budget and estimate the current memory margin.

3) Communication bandwidth: for each onboard data equipment, this section must allocate a communication bandwidth budget between subsystems (down to the unit level).

4) Radio-frequency link margin: this section must allocate a communication bandwidth budget between the Instrument and the Ground Segment.

5) Command and Telemetry: this section must allocate a Command and Telemetry budget and estimate the current rate and volume of commands and telemetry in each subsystem.

6) Synchronization and timing;

7) **Thermal margins** (including model uncertainty): this section must present the equipment temperature limits (down to the unit level), and the current estimated operational temperature range for the equipment based on an analysis of the mission states.
8) **Mechanism torque margin**: this section must present the torque margin allowed over the minimum design torque.
9) **EMC/EMI**: this section must allocate the Spacecraft Electromagnetic Compatibility / Electromagnetic Interference (EMC/EMI) budget conducted susceptibility, radiated emissions, and radiated susceptibility for the components (down to the unit level). must
10) **Reliability** (probability of success): this section must present an estimate of reliability and a calculation of the reliability margin against the Requirements Document or Specification.
11) **Availability:** this section must present an estimate of the availability of Science data. This must take into account any time (mode and state) the Instrument is unavailable to perform science measurements. Calibration is one example.
12) **Payload-specific performance criteria and parameters**. This must include an error budget, which must present the error budget for the overall instrument performance and the allocations to the various sources of measurement errors.

The report must show a history of changes, and must highlight the change since the last issue.

The report must show the decomposition of the TPM requirement into allocations for subsystems and different sources and should follow the Product Tree. Similarly the report must show the parallel roll-up of current estimates for the TPM values.

The report must show:

a) the historic trend of requirements and estimates,
a) all the margins being carried on the estimates, and
b) the source of the estimates (e.g. allocation, estimation, analysis, measurement).

DATA ITEM DESCRIPTION

DID-600 – Computer-Aided Design (CAD) Models

PURPOSE:

To provide a 2D or 3D virtual model of a product to support the performance of various analyses (mechanical, electrical, thermal) 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 or applicable native format with a pdf export;

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.

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.

DATA ITEM DESCRIPTION

DID-700A – System Conceptual Design Document

PURPOSE:

The System Conceptual Design Document is meant to describe the preliminary system design to meet the system requirements, to assist in completing the requirements, to demonstrate its feasibility and to support programmatic estimates.

PREPARATION INSTRUCTIONS:

The document must include the following:

1) An introduction including the scope, the purpose, a list of assumptions (if any), recalling the major objectives and guidelines for the project;
2) A description of the overall system conceptual design;
3) 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;
4) Trade-offs: criteria definition, analysis, criteria results, decisions;
5) Design decisions: rationales for design choices;
6) Quality factors: Reliability of the instrument and availability of science data. Considering the environment, calibration and other factors that could affect the interruption of science operations and science data availability.
7) Budgets: a summary of the engineering budgets and TPMs, and margins, their allocation to subsystems; (please note that a separate budget document is requested to be produce in this contract, the Contractor can summarize or refer to the budget document)
8) Drawings and schematics (if available/feasible at this stage of the project): 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;
9) Analyses: summarizing the analyses performed, main results and problems encountered; this is a summary of each full analysis report presented separately;
10) Tests: summarizing the tests to be performed to verify the performance and environmental requirements;
11) Operations concepts: summarizing the operations of the system in both nominal and contingency conditions; (please note that a separate CONcept Of Operations (CONOPS) document is requested to be produce in this contract, the Contractor can summarize or refer to the CONOPS document)
12) Maintenance approach: describing the maintenance approach especially for maintainable items such as the spares for manned systems, flight software and ground systems;
13) Matrix: To demonstrate design compliance to requirements by providing clear link between design and requirements. Indication of design compliance, non-compliance and partial compliance.

DATA ITEM DESCRIPTION

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 American National Standards Institute (ANSI)/ American Institute of Aeronautics & Astronautics (AIAA) G-043-1992 - Guide for the Preparation of Operational Concept Documents.

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 organisations;
4) Space segment characteristics including spacecraft monitoring and control, and Instrument modes and states;
5) Ground segment characteristics including Command & Control and Data Reception for the Launch and Early Operation Phase (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.

C PRELIMINARY REQUIREMENTS

This section presents the preliminary 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 will be jointly developed between CSA and the Contractor during this study. Moreover, these requirements are meant as a starting point for developing the instrument. It is thus expected that these requirements will be reviewed, tailored and that additional requirements will be developed during this Phase 0.

C.1 ENVIRONMENTAL REQUIREMENTS

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-ENV-SI-001	Launch CLIPS	**Requirement:** The science instrument must survive the launch environment of TBD launcher. **Rationale:** The current baseline is that the science instrument will launch as part of a CLPS mission.	Applicable	Applicable	Applicable
M-ENV-SI-002	Earth-Moon Transit with CLIPS	**Requirement:** The science instrument must survive the Earth-Moon transit in the TBD transit vehicle. **Rationale:** The current baseline is that the science instrument will launch as part of a CLPS mission. Respective transits and duration are specified in the introduction and operations concept section timelines and can be derived from the applicable launcher references found the in the payload user's Guides of the CLIPS providers.	Applicable	Applicable	Applicable
M-ENV-SI-003	Landing	**Requirement:** The science instrument must survive the lunar landing using TBD lander. **Rationale:** The initial assumption is this is considered a "soft" landing approach.	Applicable	Applicable	Not Applicable
M-ENV-SI-003A	Rover journey	**Requirement:** The science instrument must operate throughout the rover journey at TBD location(s).	Applicable	Not Applicable	Not Applicable
M-ENV-SI-004	Lunar Shadow Ops	**Requirement:** The science instrument may be fully operational for a minimum of 3 consecutive hours in a lunar Permanently Shadowed Region (PSR).	Applicable (TBD)	Applicable (TBD)	Not applicable

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
		Comment: Applicability will depend on TBD mission. If applicable, needed power & thermal resources must be determined.			
M-ENV-SI-005	Extended Lunar survival	**Requirement:** The science instrument may survive multiple (TBD) lunar day and night cycles as per its operational life requirements at the location TBD. **Comment:** Applicability will depend on TBD mission. **Rationale:** The science instrument should survive and may operate at a lower power consumptions rate during night survival. Nominal condition supposes the science instrument should operate a minimum of a year at the surface of the Moon. The science instrument could remain static during extended night stay (e.g. 14 night extended darkness).	Applicable (TBD)	Applicable (TBD)	Applicable
M-ENV-SI-006	Sun and shadow	**Requirement:** The science instrument may survive and operate while having areas subjected to direct sunlight while other areas are facing the cold surface of the lunar environment or empty space at the TBD location. **Comment:** Applicability will depend on TBD mission. **Rationale:** The operations concept and design must take into consideration that the science instrument will not necessarily be exposed to the same thermal environment from one area to another, it is possible that one side will be exposed to the light and the other to the darkness.	Applicable (TBD)	Applicable (TBD)	Not applicable

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-ENV-SI-007	Regolith Exposure	**Requirement:** The science instrument must be fully functional withstanding bombardment, exposure to and accumulation of small-particle lunar dust/regolith. **Rationale:** There is a wide range of particle sizes in the regolith, down to nano-particle sized dust. Lunar regolith and dust can have ferromagnetic properties and accumulate electrostatic charges (e.g. from exposure to solar wind). Due to lack of weathering, these particles are typically very abrasive and jagged. As a result, the lunar dust tends to accumulate and stick on to surfaces, having the following, but not limited to, impacts: a) Accumulates on to surfaces b) Changes/degrades thermo-optical properties of materials; c) Tends to ingress movable parts and joints, potentially clogging/damaging moving mechanisms; d) Prevents seals from closing properly; e) May cause false reading of sensors; f) Remains hard or impossible to be cleaned off completely. g) Others TBD	Applicable	Applicable	Not applicable
M-ENV-SI-008	Vacuum	**Requirement**: The science instrument must be functional in the lunar vacuum environment (nominally, the SI should be functional at a pressure of 1x10-7 Torr or less and in the presence of dust).	Applicable	Applicable	Applicable

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-ENV-SI-009	Radiation	**Requirement:** The science instrument must be functional withstanding and protecting itself from radiations exposure at the TBD mission locations.	Applicable	Applicable	Applicable

C.2 PHYSICAL REQUIREMENTS

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-PHY-SI-001	Mass, baseline	**Requirement:** The science instrument baseline mass must not exceed the weight specified for each category.	Two categories: Less than 3 kg and less than 10 kg.	Less than 10 kg.	Less than 15 kg.
		Comment: A clear mass must be defined during the course of the contract and will become a requirement for next phases. Appropriate margins rules following the space standard and TRL maturity rules can be used as a starting point.			
M-PHY-SI-003	Volume	**Requirement:** The science instrument must be optimized to fit within the smallest volume.	Applicable	Applicable	Applicable
		Comment: A clear volume must be defined during the course of the contract and will become a requirement for next phases. The payload user guides of the CLIPS provider must be consulted for constraints.			
M-PHY-SI-004	Power	**Requirement:** The science instrument power requirements must be defined during the course of the contract and will become a requirement for next phases.	Applicable	Applicable	Applicable
		Comment: Power consumption must be minimized.			

C.3 FUNCTIONNAL REQUIREMENTS

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-FCT-SI-001	Life	**Requirement:** The science instrument must operate a minimum of one lunar day (14 days TBC) at the surface of the Moon at the TBD locations or must operate a minimum of 1 year (TBC) in lunar orbit for the independent flight system.	Applicable	Applicable	Applicable
		Comments: The current baseline is that the science instrument will launch as part of a CLPS mission and these mission for the time being are not considering lunar night survival.			
T-FCT-SI-001	Life	**Requirement:** The science instrument must operate a minimum of 1 year (TBC) at the surface of the Moon at the TBD locations or in lunar orbit for the independent flight system.	Applicable (TBD)	Applicable (TBD)	Non applicable
		Comments: This requirement must be analyzed in terms of what would be the impacts and logical approach and key risks and items to achieve this requirement versus cost and technology development required.			

C.4 INTERFACE REQUIREMENTS

Requirement ID	Title	Requirement / Rationale or Comments	Rover based SI	Lander based SI	SI as Small Independent Flight System
M-INT-SI-001	Interfaces	**Requirement:** The science instrument must have the following interfaces with its host: a. Mechanical b. Electrical c. Thermal d. Data communication. Details of the interfaces and requirements will be developed during the upcoming phases. The science instrument will be installed in the lander for launch, transit, landing and deployment.	Applicable	Applicable	Applicable
		Comment: Details of the architecture and interfaces with the rover/lander, data rates and communications frequencies interfaces standards and documents should be found in the payload user's guides of the CLIPS providers.			

C.5 PERFORMANCE REQUIREMENTS

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-PRF-SI-001	Temporary loss of communication	**Requirement:** The science instrument must be tolerant to temporary loss of communication ranging from a few seconds to a few minutes. **Comment:** The SI operations must keep going whenever possible and safe when communication is lost. The SI state must gracefully and rapidly recover when communication is re-established. Some automated communications recovery sequences might be necessary under some circumstances (e.g. extended communication loss). Exact numbers will be defined in the upcoming phases.	Applicable	Applicable	Applicable
M-PRF-SI-002	Communication delays	**Requirement:** The science instrument control scheme must be tolerant to delays. **Comment:** Exact delay lengths will be defined in the upcoming phases.	Applicable	Applicable	Applicable
M-PRF-SI-002A	Telemetry collection and Communication	**Requirement:** The science instrument must be able to collect Science Data and Health and Safety TM (as well as storage) while transmitting data through the communication interface even in the presence of delays, interruptions.	Applicable	Applicable	Applicable
M-PRF-SI-004	Telemetry data storage	**Requirement:** The science instrument must be able to record 3 days (TBC) of science and health and safety telemetry.	Applicable	Applicable	Applicable

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-PRF-SI-005	Concurrent Telemetry Data collection and storage	**Requirement:** The science instrument must be able to record and, continue to perform science data collection and collect Health and safety Telemetry all simultaneously	Applicable	Applicable	Applicable
M-PRF-SI-006	Data Rate	**Requirement:** The science instrument Health and Safety Telemetry and Science Telemetry data rates requirements must be defined during the course of the contract and will become a requirement for next phases.	Applicable	Applicable	Applicable

C.6 SOFTWARE REQUIREMENTS

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

Requirement ID	Title	Requirement / Rationale or Comments	Rover based Science Instrument	Lander based Science Instrument	Science Instrument as Small Independent Flight System
M-SFW-SI-001	Upgradable from ground	**Requirement:** The SI must have the capability to upgrade its different CSCIs, namely software, firmware and configuration files, from ground. **Rationale:** This will ensure that the software can grow, be fixed and changed as needed.	Applicable	Applicable	Applicable
M-SFW-SI-004	Software Fault tolerance	**Requirement:** The instrument software/firmware must be capable to be remotely reset, updated and re-started after a crash or freeze.	Applicable	Applicable	Applicable
M-SFW-SI-005	Memory Content integrity	**Requirement:** The instrument memory must be verified and corrected for errors to sustain the availability and reliability.	Applicable	Applicable	Applicable

C.7 QUALITY FACTORS

Requirement ID	Title	Requirement / Rationale or Comments	Rover based SI	Lander based SI	SI as Small Independent Flight System
M-QF-SI-001	Reliability	**Requirement:** The science instrument must have a reliability > 0.85 TBC after TBD days.	Applicable	Applicable	Applicable
M-QF-SI-002	Availability	**Requirement:** The science instrument must be capable of meeting its requirements supporting scientific observations with an availability of greater than 99% TBC.	Applicable	Applicable	Applicable

D ACRONYMS AND ABBREVIATIONS

AD	Applicable Document
AI	Action Item
AIAA	American Institute of Aeronautics & Astronautics
AIL	Action Item Log
ANSI	American National Standards Institute
API	Application Programming Interface
BIP	Background Intellectual Property
CAD	Computer Assisted Design
CADM	Configuration and Data Management
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CD-ROM	Compact Disk - Read Only Memory
CF	Contractor's Format
cFS	Core File System
CLPS	Commercial Lunar Payload Service
CM	Configuration Management
ConOps	Concept of Operations
COTS	Commercial off-the-Shelf
CR	Change Request
CSA	Canadian Space Agency
CTE	Critical Technology Element
CWBS	Contractor Work Breakdown Structure
DID	Data Item Description
Doc	Document
DOF	Degrees of Freedom
DSNE	Design Specification for Natural Environments
DTE	Direct-to-Earth
Dwg	Drawing
ECN	Engineering Change Notice
ECR	Engineering Change Request
EEPROM	Electronically Erasable Programmable Read-Only Memory
EM	Engineering Model
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EN	Engineering

ESA	European Space Agency
FAST	Flights and Fieldwork for the Advancement of Science and Technology
FIP	Foreground Intellectual Property
FTP	File Transfer Protocol
FY	Fiscal Year
GDIR	General Design and Interface Document
GER	Global Exploration Roadmap
GIDEP	Government Industry Data Exchange Program
GoC	Government of Canada
GST	Goods and Services Tax
ICD	Interface Control Document
IP	Intellectual Property
IPs	International Partners
kg	kilogram
KOM	Kick-Off Meeting
LAN	Local Area Network
LCC	Life Cycle Cost
LEAP	Lunar Exploration Accelerator Program
LEO	Low Earth Orbit
LEOP	Launch and Early Operation Phase
LLI	Long Lead Items
LOP-G	Lunar Orbiting Platform - Gateway
LSM	Lunar Surface Mobility
M	Million
MAIT	Manufacturing, Assembly, Integration and Tests
MCD	Mission Concept Document
MCR	Mission Concept Review
MDP	Mission Development Plan
MRD	Mission Requirements Document
MRR	Mission Requirements Review
MS	Microsoft
NASA	National Aeronautics and Space Administration
OGD	Other Government Departments
OPI	Office of Prime Interest
Ops	Operations
PA	Project Authority
PBS	Product Breakdown Structure

PDF	Portable Document Format
PDR	Preliminary Design Review
PM	Project Manager
PMBOK	Project Management Body of Knowledge
POC	Point of Contact
PS8	Project Scheduler
PSPC	Public Services and Procurement Canada
PSR	Permanently Shadowed Region
QA	Quality Assurance
RAM	Random Access Memory
RD	Reference Document
R&D	Research and Development
RFD	Request for Deviation
RFP	Request for Proposal
RID	Review Item Discrepancy
RFW	Request for Waiver
ROM	Rough Order of Magnitude
SA	Scientific Authority
SE	Space Exploration
SI	« Système International »
SIP	Science Investigation Priority
SLS	Space Launch System
S&MA	Safety & Mission Assurance
SOW	Statement of Work
SPI	Schedule Performance Index
SRD	System Requirements Document
SRL	Science Readiness Level
SRR	Systems Requirement Review
SST	Space Science and Technology
STDP	Space Technology Development Program
TA	Technical Authority
TB	Treasury Board
TBD	To be determined
TBC	To be confirmed
TN	Technical Note
TNV	Technology Need Value
TPM	Technical Performance Measure

TRRA	Technology Readiness and Risk Assessment
TRL	Technology Readiness Level
WAM	Work Authorization Meeting
WLAN	Wireless LAN
WP	Work Package
WPD	Work Package Description

Attachment 1 to Part 3
Technical and Managerial Bid Preparation Instructions

1. General Information

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

1. Title / Project Identification Page
2. Table of Contents;
3. Executive Summary;
4. Science Merit Criteria;
5. Feasibility Criteria;
6. Managerial Criteria;
7. Bid Appendices.

The structure of the Technical and Managerial Bid, and its sections, are described below. Some of the section headings are followed by numbers in brackets. These numbers represent the Evaluation Criteria that are applicable to that specific section for each bid submitted by a Bidder.

The bid must be submitted electronically in a searchable format such as searchable PDF format and in accordance with Part 3 – Bid Preparation Instructions of the Bid solicitation.

2. Title/Project Identification Page

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

a) The Request For Proposal file number;
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);
d) A short summary of the bid in 8 lines (maximum).

3. Executive Summary

The Executive Summary of the Technical and Managerial Bid should be a stand-alone document suitable for public dissemination, for example, through the Canadian Space Agency (CSA) web site, if the bid is successful. It should not exceed one page in length (8.5” x 11”) and should highlight the following elements:

a) Science instruments and related investigation objectives;
b) Team;
c) Main scientific and technical innovations;
d) Major milestones and deliverables; and
e) Relevance to CSA LEAP program.

4. Technical and Managerial bid

The Bidder should address all items detailed under the letter “D” of each criterion presented in Attachment 1 to Part 4 – Point Rated Evaluation Criteria . In addition, the bid should describe the proposed project as indicated in sections 4.1 to 4.4.

4.1. Science Merit Criteria

4.1.1. Relevance and expected impact (Evaluation Criterion 1)

This section should provide substantiated evidence describing the relevance of the proposed study objectives relative to past, ongoing, and planned Bidder's activities to requirements and objectives as described in the Statement of Work (SOW). The scientific objectives should be defined in the context of the Canadian science priorities described in Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond (RD-01) and of international lunar science objectives or missions. The Bidder should also provide evidence of how the proposed investigation constitutes an advancement in terms of science and technology development. All evidence should be supported by a comprehensive literature review that helps the Bidder define how the study is new and original, has the potential to impact the science discipline, and is aligned with national and international lunar science objectives or missions. Letters of interests from potential partners at the international level (academic or industrial) should be provided stating their expected contributions and/or interest in the project. No international governmental agencies (e.g. NASA, ESA, etc.) are to be contacted at this point.

4.1.2. Suitability of the science measurements and instrument to the scientific objectives (Evaluation Criterion 2)

This section should describe the appropriateness of the science measurements needed to reach the science objectives. In addition, this section should explain the suitability of the selected science mission or science instrument to reach the science objectives. The science mission or science instrument should thus be detailed including a description of the key subsystems and its measurement capacity known at the bid stage. The relationship between the pursued scientific objectives, the needed science measurements and the proposed science mission or science instrument should de described in a comprehensive manner supported by a thorough review of the existing literature relevant to the needed science measurements and the proposed science mission or science instrument. The preliminary key requirements for the proposed science mission or science instrument should be included in this section.

4.2. Feasibility Criteria

4.2.1. Scope, feasibility and risks of the scientific approach (Evaluation Criterion 3)

This section should describe the work plan developed to address all scientific elements specified in the SOW. The work-plan should be described in the body of the bid and appearing in the Work Breakdown Structure (WBS) for the Phase 0. The bid should demonstrate a deep understanding of the required scientific approach and knowledge necessary to realize the proposed instruments. The bid should also detailed the work that will be performed to define the preliminary concept of operations.

The scientific approach should describe how the work would be conducted using analytical methods, procedures, best practices, and the state-of-the-art for pertinent disciplines. Specific needs for testing at analogue sites should also be described where other test methods are insufficient, including test objectives and rationale.

The Bidder should include the current estimate of the Science Readiness Level (SRL) for the proposed science mission or science instrument. The Bidder should also describe how the Phase 0 work plan will result in the establishment of mandatory and target instrument requirements and how the latter will have an impact on the science return.

In addition, the Bidder should provide a description and overall feasibility assessment of the scientific approach and the degree to which it is capable of delivering the goals and scientific objectives. A list of high and medium risks (see AD-01 for definition of high and medium risks) known at this stage associated with the scientific approach should be presented along with a sound mitigation strategy for each identified risk.

4.2.2. Scope, feasibility and risks of the engineering approach (Evaluation Criterion 4)

This section should describe the work plan developed to address all engineering elements specified in the SOW. The work-plan should be described in the body of the bid and appearing in the Work Breakdown Structure (WBS) for the Phase 0. It should provide a detailed description and substantiation of the approach for the technical concept development and the degree to which it is capable of delivering the study objectives. The proposed effort should be well presented and substantiated through well-conceived and feasible concepts and methods (engineering approach) 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 well proven technology using reference from past studies and publications.

The engineering approach should describe how the work would be conducted using techniques, industry standards, best practices, and the state-of-the-art for pertinent disciplines to develop all critical systems. The Bidder should also include in the bid the work that was done in previous development, the availability of Commercial-off-the-Shelf (COTS) technologies if used and the estimated actual Technology Readiness Level (TRL) of the science instrument. Also, it should be indicated if a testing campaign is necessary for the qualification of space systems along with necessary information to assess its feasibility (i.e. how and where the testing will be done, has the facility been contacted to verify availability, has cost been taken into account). The Bidder should include a list of high and medium risks (see AD-01 for definition of high and medium risks) known at this stage associated with the technology along with a sound mitigation strategy.

The selected systems engineering approach should be specified along with a description of the main elements and applicable certifications and standard. If subcontractors will be used, qualifications of their manufacturing process (Quality Assurance (QA)) should be provided in the bid. The Bidder should be cognizant that manufacturing certifications are usually done per the National Aeronautics and Space Administration (NASA) standards, however, if the Bidder wants to use their own certifications (e.g. welding certifications), their certifications should be sent to NASA for concurrence. The subcontractors should have the correct processes and/or policies in place to be able to perform and track the work to the highest standards (e.g. ISO-9000s). Like for the scientific approach, specific needs for testing at analogue sites should also be described where other test methods are insufficient, including test objectives and rationale.

4.3. Managerial Criteria

The managerial section of the Technical and Managerial Bid should demonstrate the effectiveness and commitment of the Bidder to deliver the project on time and within budget. Its sections should address in detail: key-personnel qualifications, team organization and arrangements, previous project experience, and the Management Plan including risk and mitigation.

4.3.1. Team Capability and Experience (Evaluation Criterion 5)

4.3.1.1. Team Expertise

This section should identify the Project Manager and Scientific and/or Technical Lead, and outline their respective qualifications. It should identify the key members of the project's technical, scientific and management teams and state their specific qualifications for the work required. Detailed résumés are to be included in an appendix of the bid (see section 4.4.1 below). Provisions for back-up personnel for key positions are to be stated. The science team should include members from at least two Canadian universities.

Potential partners and/or stakeholders for the Phase 0 should be identified and letters of intent from these should be provided in the bid.

4.3.1.2. Team Organization and Arrangements

This section 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 section should also provide detailed roles and responsibilities of the key human resources. An organization chart should illustrate the structure of the proposed project team.

4.3.1.3. 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, 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 and duration of their contributions.

4.3.2. Project Management Plan (Evaluation Criterion 6)

This section 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 for the Phase 0: Work Breakdown Structure (WBS), Work Packages (WPs) definitions, 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 a scope planning (WBS) and schedule development charts (e.g. Gantt chart, etc.). Equivalent company-developed, project-tailored tools / charts are also acceptable, provided that the information is complete.

4.3.2.1. Work Package Definition

This Management Plan section should define and specify the work to be executed according to the requirements of the SOW. The project should be broken down into WPs. Each WP should focus on specific activities that will form the total Phase 0 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 an example of a WBS.

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 Scheduled End: T0 + 12 weeks	Accountable Manager: Resource A Resources: Resource A, Resource B, Resource C
Estimated Effort: 80 hours	
Objectives: 1. Deliver a functional test setup for the T/R unit	
Inputs: 1. Test plan and procedure 2. Unit drawings 3. Unit Interface Control Documents	
Risks: 1. Material shortages 2. Ressources unavailable 3. Interfaces unknown	
Tasks: 1. Review input documentation 2. Define requirements 3. Produce initial concept 4. Design test setup 5. Fabricate test setup 6. Commission and debug	
Outputs and Deliverables: 1. Fully functional T/R unit test setup 2. Test setup log manual 3. Test setup user manual	

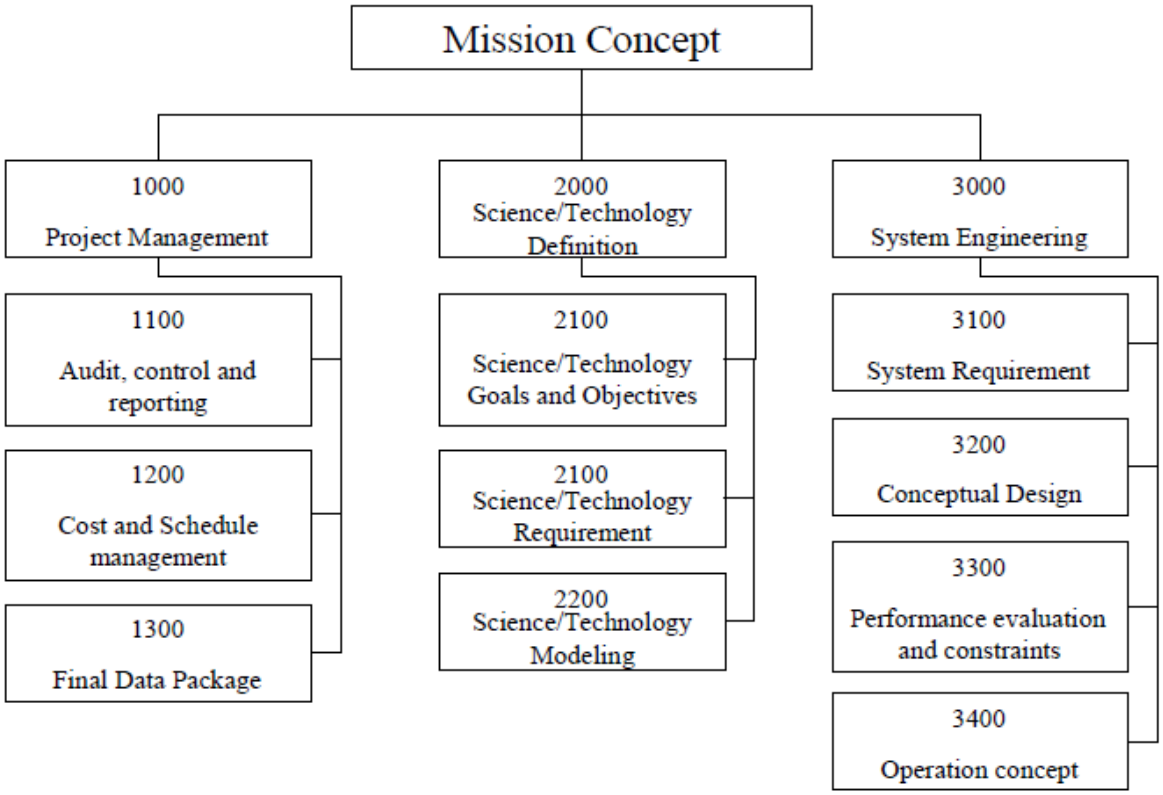


Figure 1: Example of a Work Breakdown Structure

4.3.2.2. Milestones and Deliverables

Milestones and deliverables should be described in detailed in accordance with what is specified in the SOW.

4.3.2.3. Schedule

This Management Plan section should show tasks, milestones, deliverables and dependencies between activities to identify the critical path on a schedule chart for work to be carried out in the Phase 0. For planning purposes, the project expected start date is autumn 2020.

4.3.2.4. Managerial Risk Assessment

This Management Plan section should provide an assessment of the high and medium risks (see AD-01 for definition of high and medium 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. Mitigation strategies should be presented for all high and medium risks.

4.3.2.5. Resources Allocation

This Management Plan section 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 Management Plan.

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

4.3.2.6. Project Management Approach

This Management Plan section 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 SOW.

4.4. Bid Appendices

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

4.4.1. Required Bid Appendices

1) List of acronyms used in the bid
2) Bidder's Criteria Substantiation (see Attachment 1 to Part 4 Point Rated Evaluation Criteria).
3) List of past successful projects that are relevant to proposed work and reference letters including contact information of the reference
4) Resumes: The bid should include resumes (and/or NSERC form 100) of all key resources proposed.
5) List of Contacts: The list of contacts should be presented 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 example format presented in Table 3 should be used.

Table 3: Sample List of Contacts

Role	Name	Telephone	Fax	E-mail
Project Manager				
Principal Investigator				
Lead Engineer or Instrument scientist				
Contracting Authority				
Claims officer				
Communications (for press release)				
Etc.				

4.4.2. Applicable Bid Appendices

The following bid appendices may be provided with the Technical and Managerial Bid:
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.
Only documents that are relevant and will be useful to support the bid should be provided.

Attachment 1 to Part 4
Point Rated Evaluation Criteria

1. POINT RATED CRITERIA

1.1. Science Merit / Feasibility / Management Point Rated Criteria

The evaluation team established by CSA will evaluate the bid based on its clarity, relevance and its conformity to the requirements of the Technical and Managerial evaluation criteria as outlined in this bid solicitation. Bids will be evaluated in accordance with the point rated criteria as specified in Table 1-1 "List of Evaluation Criteria and Associated Ratings" and the Bidder's provided substantiation as detailed in subsection 1.2 of this document: "Bidder's Criteria Substantiation".

Bids which fail to obtain the required minimum number of points as specified in Table 1-1 will be declared non-responsive. Each point rated criterion should be addressed separately.

In the event that two or more responsive bids obtain the same total number of points, the responsive bid with the highest number of points for criterion 4 will be ranked higher. Then, if the responsive bids also have the same number of points for criterion 4, the responsive bid with the highest number of points for criterion 3 will be ranked higher.

The criteria are grouped under the following divisions:

1) Science Merit;
2) Feasibility; and
3) Management.

Section 1.3 "Evaluation Criteria and Benchmark Statements" contains a series of evaluation criteria, each supported by a set of benchmark statements (0, A, B, C, D). Each of these statements has a corresponding relative value:

0 = 0% of maximum point rating;

A = 50% of maximum point rating;

B = 70% of maximum point rating;

C = 90% of maximum point rating;

D = 100% of maximum point rating.

As an example, the maximum point rating for the "Relevance and Expected Impact" criterion is 15 points. If a bid receives a "C" for this criterion in the evaluation process, the score attributed will be:

90% of 15 points = 13.5 points (score).

Table 1-1 identifies:

1. The maximum point rating assigned to each criterion;
2. The maximum point rating possible for each criteria category (*Science Merit, Feasibility*, and *Management*);

3. The minimum point rating required for each criteria category (*Science Merit, Feasibility*, and *Management*);
4. The maximum point rating possible for the overall score.

Table 1-1: List of Evaluation Criteria and Associated Ratings

Evaluation Criteria	Points
Science Merit Criteria	
1) Relevance and expected impact	15
2) Suitability of the science measurements and instrument to the scientific objectives	15
Minimum Score	***18***
Maximum Score	***30***
Feasibility Criteria	
3) Scope, feasibility and risks of the scientific approach	25
4) Scope, feasibility and risks of the engineering approach	25
Minimum Score	***30***
Maximum Score	***50***
Managerial Criteria	
5) Team capability and experience	10
6) Project Management Plan	10
Minimum Score	***12***
Maximum Score	***20***
Maximum Overall Score	***100***

1.1.1. Cross-References to Evaluation Criteria in the bid (Optional)

The Bidder may complete a table as the example given in Table 1-2 by indicating where the information is found in its bid demonstrating how the bid meets the evaluation criteria, in order to assist in the assessment of the bid.

Table 1-2: Cross-References to Evaluation Criteria in the bid

Evaluation Criterion	Section(s) in the bid where the criterion is addressed.
1	
2	
3	
4	
5	
6	

1.2. Bidder's Criteria Substantiation

The Bidder is requested to provide their own substantiation, which should be submitted as an appendix to their Technical and Managerial bid.

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 Self-Evaluation Table is provided in Table 1-3. Enter each criterion number and the substantiation.

Table 1-3: Bidder's Criteria Substantiation.

Company: **Project Title:**	
Criteria **Substantiation**	
*Ex.: **1*** *(criterion number)*	*Criterion substantiation and Bidder's bid cross-reference.*

1.3. EVALUATION CRITERIA AND BENCHMARK STATEMENTS

SCIENCE MERIT CRITERIA

Criterion 1 - Relevance and expected impact

This criterion evaluates the relevance of the proposed science mission or science instrument (proposed study objectives) to the background, objective and scope of the LEAP Science Instruments program element as described in the SOW. This criterion also evaluates the alignment of the bid with the Canadian science priorities as described in the Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond 2017 (RD-01). The expected impact on the science discipline, at the national and international level, is also evaluated.

0)

- The proposed study objectives are not compliant with the background, objective and scope as described in the SOW; OR
- The bid does not meet the requirements of A), B), C) or D).

A)

- The proposed study objectives are described and they are compliant with the background, objective and scope as described in the SOW; AND
- The scientific objectives are aligned with at least one of the Canadian science priorities described in the Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond (RD-01).

B)

- The proposed study objectives are described and they are compliant with the background, objective and scope as described in the SOW. A literature review is presented; AND
- The scientific objectives are aligned with at least one of the Canadian science priorities described in the Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond (RD-01); AND
- The bid explains how the scientific objectives, if realized, would advance the technology and/or knowledge in the proposed scientific discipline for Canada; AND
- The proposed investigation presents how it may contribute to international lunar science objectives or mission(s).

C)

- The proposed study objectives are described and a rationale is provided for the compliance to the background, objective and scope as described in the SOW. A comprehensive literature review is presented and discussed in the context of relevant past and current developments attesting to the novelty of the investigation; AND
- The scientific objectives address two or more Canadian science priorities described in the Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond (RD-01) which is demonstrated with references from past studies; AND
- The bid explains how the scientific objectives, if realized, would advance the technology and/or knowledge in the proposed scientific discipline for Canada; AND
- The proposed investigation demonstrates, with references from international plans and peer-reviewed publications, how it may contribute to international lunar science objectives or mission(s).

D)

- The proposed study objectives are described and a rationale is provided for the compliance to the background, objectives and scope as described in the SOW. A comprehensive literature review is presented and discussed in the context of relevant past and current developments attesting to the novelty, originality and potential impact of the investigation; AND
- The scientific objectives address two or more Canadian science priorities described in the Canadian Space Exploration - Science and Space Health Priorities for Next Decade and Beyond (RD-01) which is demonstrated with references from past studies and peer-reviewed publications; AND
- The bid explains how the scientific objectives, if realized, would advance the technology and knowledge in the proposed scientific discipline for Canada; AND
- The proposed investigation demonstrates, with references from international plans and peer-reviewed publications, how it may contribute to international lunar science objectives or mission(s). Letters of interest from potential international partners are provided.

Criterion 2 – Suitability of the science measurements and instrument to the scientific objectives

This criterion evaluates the clarity and completeness of the bid in describing the relationship between scientific objectives, the needed science measurements and the proposed science mission or science instrument.

0)
- The proposed science mission or science instrument and/or the needed science measurements are not described in the bid; OR
- The bid does not meet the requirements of A), B), C) or D).

A)
- The science measurements addressing the scientific objectives are described; AND
- The proposed science mission or science instrument is described.

B)
- The science measurements addressing the scientific objectives are described and are appropriate; AND
- The proposed science mission or science instrument is described and is appropriate; AND
- The link between the scientific objectives, the needed science measurements and the proposed science mission or science instrument is described.

C)
- The science measurements addressing the scientific objectives are described and are appropriate; AND
- The proposed science mission or science instrument including key subsystems are described and are appropriate; AND
- The link between the scientific objectives, the needed science measurements and the proposed science mission or science instrument is sound and justified with references from past studies and publications.

D)
- The science measurements addressing the scientific objectives are described and are appropriate; AND
- The proposed science mission or science instrument including key subsystems are described and are appropriate; AND
- The link between the scientific objectives, the needed science measurements and the proposed science mission or science instrument is sound and justified with references from past studies and peer-reviewed publications; AND
- Proposed science mission or science instrument preliminary key requirements are provided.

FEASIBILITY CRITERIA

Criterion 3 – Scope, feasibility and risks of the scientific approach

This criterion assesses the scope and suitability of the work plan addressing the scientific elements of the SOW required to meet the proposed study objectives. The scientific approach (needed investigation, trade-off analyses and reviews) that will result in a well-defined science traceability matrix is evaluated. This criterion also assesses the risk associated with the scientific approach.

0)
- No work plan is provided to address the science elements of the SOW; OR
- No risks known at the bid stage are described; OR
- The bid does not meet the requirements of A), B), C) or D).

A)
- A work plan addressing the development of the scientific elements of the SOW is described; AND
- High risks known at the bid stage associated with the scientific approach are identified.

B)
- A work plan addressing the development of the scientific elements of the SOW is described, and the scientific approach detailed in this plan is appropriate; AND
- High risks known at the bid stage associated with the scientific approach are identified and described along with a sound mitigation strategy for each; AND
- The work plan demonstrates that the proposed work will increase the Science Readiness Level through the planned work of the future phases.

C)
- A work plan addressing the development of the scientific elements of the SOW is described, and the scientific approach detailed in this plan is appropriate; AND
- High risks and medium risks known at the bid stage associated with the scientific approach are identified and described along with a sound mitigation strategy for each; AND
- The work plan demonstrates that the proposed work will result in a well-defined science traceability matrix with clear traceability to science objectives.

D)

- A detailed work plan addressing the development of the scientific elements of the SOW is described including the preliminary concept of operations, and the scientific approach detailed in this plan is appropriate; AND
- High risks and medium risks known at the bid stage associated with the scientific approach are identified and described along with a sound mitigation strategy for each; AND
- The work plan demonstrates that the proposed work will result in a well-defined science traceability matrix with clear traceability to science objectives and a well understood impact on science return; AND
- The current Science Readiness Level (SRL) is estimated.

Criterion 4 – Scope, feasibility and risks of the engineering approach

This criterion assesses the scope and suitability of the work plan addressing the engineering elements of the SOW required to meet the proposed study objectives. This criterion also assesses the understanding of the technical principles involved (engineering approach) through the bid technical documentation, substantiation, and risks identification and mitigation. This includes the suitability of the technology selected to meet the study goals.

0)
- No work plan is provided to address the engineering elements of the SOW; OR
- No risks known at the bid stage are described; OR
- The bid does not meet the requirements of A), B), C) or D).

A)
- A work plan addressing the development of the engineering elements of the SOW is described; AND
- The engineering approach and its relevance to the study objectives is described but not supported with references; AND
- High risks known at the bid stage associated with the technology are identified.

B)
- A work plan addressing the development of the engineering elements of the SOW is described for all critical systems and the engineering approach detailed in this plan is appropriate; AND
- The engineering approach and its relevance to the study objectives is described with references from past studies and/or publications; AND
- High risks known at the bid stage associated with the technology are identified and described along with a sound mitigation strategy for each.

C)
- A work plan addressing the development of the engineering elements of the SOW is described for all critical systems and the engineering approach detailed in this plan is appropriate; AND
- The engineering approach and its relevance to the study objectives is described with references from past studies and publications; AND
- High risks and medium risks known at the bid stage associated with the technology are identified and described along with a sound mitigation strategy for each; AND
- A systems engineering approach is presented.

D)
- A detailed work plan addressing the development of the engineering elements of the SOW is described for all critical systems, the engineering approach detailed in this plan is appropriate, and the current Technology Readiness Level (TRL) of the science instrument is estimated; AND
- The engineering approach and its relevance to the study objectives is described with a rationale and references from past studies and publications; AND
- High risks and medium risks known at the bid stage associated with the technology are identified and described along with a sound mitigation strategy for each; AND
- A systems engineering approach is presented along with references, including a description of its method along with applicable certifications and standards.

MANAGEMENT CRITERIA

Criterion 5 - Team capability and experience

This criterion assesses the capability (education, knowledge, experience, and expertise), completeness and complementarity of skill sets of the personnel assembled to carry out the work.

0)
- The bid does not demonstrate that the proposed team has the required skill-set to fulfill all areas of the SOW; OR
- The bid does not meet the requirements of A), B), C) or D).

A)
- The proposed team is lacking some expertise but demonstrates that it is capable of fulfilling the Work under the SOW; AND
- All required key personnel are identified.

B)
- The proposed team is lacking some expertise but demonstrates that it is capable of fulfilling the Work under the SOW; AND
- All required key personnel are identified; AND
- The roles and responsibilities for key team members are defined.

C)
- The expertise of the proposed team demonstrates that it is capable of fulfilling the Work under the SOW; AND
- All required key personnel are identified; AND
- The roles and responsibilities for key team members, including sub-contractors, are defined; AND
- The bid describes previous experience with projects of a similar scope; AND
- At least one key personnel has significant experience (more than 5 years) related to design and development and/or operation of related spaceflight software or hardware; AND
- The science team includes representation from at least one Canadian university.

D)
- The expertise of the proposed team demonstrates that it is capable of fulfilling the Work under the SOW; AND
- All required key personnel are identified and there are qualified back-up personnel identified for all of them; AND
- The roles and responsibilities of all the team members, including all subcontractors, are defined; AND
- The bid describes previous experience with projects of a similar scope and complexity; AND
- Two or more key personnel have significant (more than 5 years) experience related to design and development and/or operation of related spaceflight software or hardware; AND,
- The science team includes representation from two or more Canadian universities.

Criterion 6 - Project Management Plan

This criterion assesses the completeness of the management plan (Work Breakdown Structures, Work Packages, personnel allocation, detailed schedule and milestones, and programmatic risk assessment) and evaluates the effectiveness of the described project management approach in achieving the stated study objectives.

0)

- The management plan does not present a Work Breakdown Structure (WBS) and Work Packages (WPs) definition for the Phase 0; OR,
- The bid does not meet the requirements of A), B), C) or D).

A)

- The management plan presents a Work Breakdown Structure (WBS) and Work Packages (WPs) definition for the Phase 0; AND
- The milestones and deliverables are outlined; AND
- The Phase 0 schedule is presented; AND
- High risks known at the bid stage associated with programmatic elements are identified.

B)

- The management plan presents a Work Breakdown Structure (WBS) and Work Packages (WPs) definition for the Phase 0; AND
- The milestone and deliverables are outlined and compliant with the SOW; AND
- The Phase 0 schedule is realistic and feasible but not all WBS elements are included; AND
- High risks known at the bid stage associated with programmatic elements are identified and described along with a sound mitigation strategy for each; AND
- The management plan includes a Resource Allocation Matrix (RAM) for the key personnel; AND
- A project management approach is described.

C)

- The management plan presents a complete Work Breakdown Structure (WBS) and Work Packages (WPs) definition for the Phase 0; AND
- The milestone and deliverables are outlined and compliant with the SOW; AND
- The Phase 0 schedule is realistic and feasible and all WBS elements are included; AND
- High risks and medium risks known at the bid stage associated with programmatic elements are identified and described along with a sound mitigation strategy for each; AND
- The management plan includes a Resource Allocation Matrix (RAM) for all personnel; AND
- An established project management approach is described along with published references.

D)

- The management plan presents a complete Work Breakdown Structure (WBS) and Work Packages (WPs) definition for the Phase 0; AND
- The milestone and deliverables are outlined and compliant with the SOW; AND
- The Phase 0 schedule is realistic and feasible and all WBS elements are included; AND

- High risks and medium risks known at the bid stage associated with programmatic elements are identified and described along with a sound mitigation strategy for each; AND
- The management plan includes a Resource Allocation Matrix (RAM) for all personnel with clear allocation to each work package; AND
- An established project management approach is described along with published references, including a description of the methodology along with applicable certifications and standards.