



RETURN BIDS TO:

RETOURNER LES SOUMISSIONS À:

Travaux publics et Services gouvernementaux
Canada

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

Québec

H5A 1L6

FAX pour soumissions: (514) 496-3822

LETTER OF INTEREST

LETTRE D'INTÉRÊT

Comments - Commentaires

Vendor/Firm Name and Address

Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution

Travaux publics et Services gouvernementaux Canada
Place Bonaventure, portail Sud-Oue
800, rue de La Gauchetière Ouest
7e étage, suite 7300
Montréal
Québec
H5A 1L6

Title - Sujet DR pour la plateforme MSFP	
Solicitation No. - N° de l'invitation 9F052-180576/B	Date 2019-12-18
Client Reference No. - N° de référence du client 9F052-18-0576	GETS Ref. No. - N° de réf. de SEAG PW-\$MTB-550-15587
File No. - N° de dossier MTB-8-41285 (550)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2020-01-23	
Time Zone Fuseau horaire Heure Normale du l'Est HNE	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Mirfatahi, Kaveh	Buyer Id - Id de l'acheteur mtb550
Telephone No. - N° de téléphone (514) 260-4106 ()	FAX No. - N° de FAX (514) 496-3822
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: AGENCE SPATIALE CANADIENNE Exploration spatiale/ Space Exploration 6767 ROUTE DE L AEROPORT ST HUBERT Québec J3Y8Y9 Canada	

Instructions: See Herein

Instructions: Voir aux présentes

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

REQUEST FOR INFORMATION (RFI) REGARDING MICROFLUIDIC SAMPLE PREPARATION (MFSP)

1. Background and Purpose of the RFI

Public Works and Government Services Canada (PWGSC), on behalf of the Canadian Space Agency (CSA) and collaborative effort of the National Research Council (NRC), is considering the development of a novel microfluidic actuation method. The MicroFluidic Sample Preparation (MFSP) system is intended to perform automated extraction of macromolecules from different sample specimens, and produce clean, concentrated samples that are suitable for on-board / in-situ analysis. The equipment will be deployed on the International Space Station (ISS) to support the identification, characterization and mitigation of risks to humans in space. The MFSP supports Canada's continued commitment to the ISS and contributes to the enhancement of Canada's return on ISS investment.

The CSA is currently developing a space-medicine capability to support the crew on long duration missions. The CSA's long-term objective is to develop in parallel terrestrial and space applications. As part of this call for tenders, the CSA will launch MicroPrep; an innovative technology based on microfluidics and highly-anticipated by international partners to accelerate research aboard the International Space Station (ISS). MicroPrep will take advantage of existing and future instrumentation enabling a wider range of ISS research activities. MicroPrep technology is an integral part of the CSA's space-medicine strategy, and could be called upon to qualify for future space-faring projects such as the Lunar Gateway or longer duration missions to Mars. Therefore, the CSA would like to select a bidder whose business development plan includes the development of biomedical instruments.

The purpose of this Request for Information is to solicit information from Canadian organizations that will help PWGSC and the CSA to refine the capabilities of this system along with the procurement strategy. Respondents are invited to provide comments, concerns and where applicable, alternative recommendations from interested parties regarding how the requirements or objectives described in this RFI could be satisfied. Respondents are also invited to provide comments regarding the content, format and/or organization of any draft documents included in this RFI. Respondents should explain any assumptions they make in their responses.

This RFI contains a draft of the Request for Proposals and the Statement of Work. This document remains a work in progress and respondents should not assume that new clauses or requirements will not be added to any bid solicitation that is ultimately published by Canada. Nor should respondents assume that none of the clauses or requirements will be deleted or revised. Comments regarding any aspect of the draft document are welcome. **The intent is to publish the Request for Proposals for a 6 week period.**

The procurement approach is summarized as follows:

One procurement which includes limitation of expenditures for Phases A, B and C and firm fixed price for optional Phase D.

The Intellectual Property strategy is as follows:

- In accordance with the Policy on Title to Intellectual Property Arising Under Crown Procurement Contracts, the Foreground IP developed under the proposed contract will belong the Crown since the purpose of the present Contract, or the deliverables contracted for, is to deliver a not-yet fully developed component or subsystem that will be incorporated into a complete system at a later

date, as a prerequisite to the planned transfer of the complete system to the private sector, through licensing or assignment of ownership, for the purposes of Commercial Exploitation.

- If the Contractor wishes to make use of the Foreground Information for purposes of its commercial exploitation or further development, the Contractor may make a written request for a license to the client department or agency for whom the Work is being or was performed. If the client department or agency agree to grant the license, it will be on conditions to be negotiated between the Contractor and the client department or agency.

The following CSA documents specifically apply to the procurement of the MSFP System:

Ref	Document identification	Document title
1	CSA-MFSP-RD-0001	Functional and Performance Requirements Document, Platform
2	CSA-MFSP-RD-0002	Product Assurance Requirements, Platform
3	CSA-MFSP-ID-0001	Interface Requirements Document, Platform
4	CSA-MFSP-ID-0002	Interface Requirements Document, Cartridge
5	3190 –Deep Space Gateway Science Workshop	Microfluidic Based Platform for Universal sample Preparation and Biological assays Automation for Life-Science research and Remote Medical Application
6	CSA-MFSP-CO-0001	Operational Concept Document for Commissioning Operations
7	CSA-SE-STD-0001	CSA Systems Engineering Technical Reviews Standard.
8	CSA-ST-GDL-0001	CSA Technology Readiness Levels and Assessment Guidelines.
9	CSA-SE-PR-0001	CSA Systems Engineering Methods and Practices
10	CSA-FORM-0001	CSA Technology Readiness and Risk Assessment Worksheet
11	CSA-FORM-0003	CSA Critical Technologies Elements Identification Criteria
12	SSP 57000	Pressurized Payloads Interface Requirements Document, International Space Station Program
13	SSP 51700	Payload Safety and Requirements for ISS
14	SSP 57057	ISS Payload Integration Template
15	SSP 41170	Configuration Management Requirements for ISS
16	SSP 50989	ISS IT Security Policy for Onboard Systems
17	SSP 50005	ISS Flight Crew Integration Standard
18	SSP 41170	Configuration Management Requirements for ISS
19	SSP 30559	Structural Design and Verification Requirements for ISS
20	SSP 30312 Vol I	Electrical, Electronic, and Electromechanical (EEE) Parts Management and Implementation Plan for the Space Station Program
21	SSP 30312 Vol II	Electrical, Electronic, and Electromechanical (EEE) Parts Management and Implementation Plan for the Space Station Program - Exceptions
22	SSP 30233	Space Station Requirements for Materials and Processes
23	SSP 57008	Unique Pressurized Payload Non-Rack Interface Control Document Template
24	SSP 53119	CSA Small Payloads Interface Control Document for ISS
25		PowerBlade MicroPrep Supplementary Bidder Information

2. Nature of Request for Information

This is not a bid solicitation. This RFI will not result in the award of any contract; therefore, potential suppliers of any goods or services described in this RFI should not earmark stock or facilities, nor allocate resources, as a result of any information contained in this RFI. Nor will this RFI result in the creation of any source list; therefore, whether or not any potential supplier responds to this RFI, will not preclude that supplier from participating in any future procurement. Also, the procurement of any of the goods and services described in this RFI will not necessarily follow this RFI. This RFI is simply intended to solicit feedback from industry with respect to the matters described in this RFI.

This RFI is not a pre-selection process. There will be no short listing of firms for purposes of undertaking any future works, as a result of this RFI. Similarly, participation in this process is not a condition or prerequisite for participation in an eventual RFP.

This RFI is neither a Call for Tenders, nor a Request for Proposal, and no agreement or contract will be entered into with any contractor, based on responses to this RFI. The issuance of this RFI is not to be considered in any way as a commitment by Canada, or as authority for the respondent to undertake any work which could be charged to Canada, nor is this RFI to be considered a commitment to issue eventual RFP's or award eventual contracts in relation to this project.

Canada shall not be bound by anything stated in this RFI. Canada reserves the right to change all or any parts of this RFI as deemed necessary.

3. Nature and Format of Responses Requested

Respondents are requested to provide their comments, concerns and, where applicable, alternative recommendations regarding how the requirements or objectives described in this RFI could be satisfied. Respondents are also invited to provide comments regarding the content, format and/or organization of any draft documents included in this RFI. Respondents should explain any assumptions they make in their responses.

4. Response Cost

Canada will not reimburse any respondent for expenses incurred in responding to this RFI.

5. Treatment of Response

a) Use of Responses: Responses will not be formally evaluated. However, the responses received may be used to develop or modify procurement strategies or any draft documents contained in this RFI. Canada will review all responses received by the RFI closing date.

b) Review Team: A review team composed of representatives of CSA, NRC and PWGSC will review the responses on behalf of Canada. Canada reserves the right to hire any independent consultant, or use any Government resources that it deems necessary to review any response. Not all members of the review team will necessarily review all responses.

c) Confidentiality: Respondents are advised that any information submitted to Canada in response to this RFI may be used by Canada in the development of a subsequent competitive RFP. Respondents should mark any portions of their response that they consider proprietary or confidential. Canada will treat those portions of the responses as confidential to the extent permitted by the Access to Information Act.

d) Activity: Canada may, in its discretion, contact any respondents to follow up with additional questions or for clarification of any aspect of a response.

e) Canadian organizations: Respondents to this RFI must be defined as a Canadian organization such as a Canadian company*, a Canadian not-for-profit organization, a Canadian research center, or be affiliated with a Canadian university.

*A "Canadian company" means a legal person that or was incorporated in Canada, with a place and address of its head office in Canada, a place of business in Canada that employs individuals in Canada and owns assets in Canada.

6. Contents of the Request for Information

Respondents are invited to submit a reply to the RFI that addresses any or all of the topics listed below.

To facilitate the review of the responses to this RFI, respondents are asked to address and present the requested information in the order in which the topics are presented. Such topics are:

6.1 Respondent Information

- a) Please provide background information on your organization, organization management team and experience with similar projects in the area of biomedical hardware and software and/or delivery of space-qualified hardware and software;
- b) Please provide the name, telephone number, and e-mail address of a representative who may be contacted for clarification or other matters related to the response.

6.2 Understanding of the MSFP Procurement Method and Statement of Work

Please provide feedback regarding the requirements:

- a) Is there anything in the statement of work that would preclude you from bidding?
- b) Is there anything in the requirements or anything that would make it impossible to work out a technical solution?
- c) Could you identify areas in the statement of work which require clarification or which appear to be incomplete or as problematic and explain why?
- d) Is there anything in the statement of work that prevents you from completing the work within the requested schedule?
- e) Does the statement of work, including the system functional characteristics and performance requirements, provide sufficient information and clarity to produce a precise financial bid?
- f) In the context of a limitation of expenditure approach, what are the main areas of risk on the technical side of things? What are the main risks in terms of schedule and budget?
- g) What would be the potential actions that you would suggest to mitigate those risks?
- h) Could you please provide general feedback and/or any recommendations, inputs or comments (including technical information) that could assist Canada in developing the procurement strategy?

7. Webinar

The Canadian Space Agency (CSA) is inviting interested parties to a webinar on the CSA Space MicroFluidic Sample Preparation (MFSP) system. This event will be hosted by the CSA in January 2020, in

partnership with the National Research Council Canada. The goal of the webinar is to share with Canadian organizations having a potential interest in the CSA MSFP project information related to this Request for Information (RFI) and subsequent Request for Proposals (RFP). Through this exchange we seek to encourage collaboration between participants and enhance both the feedback secured through the RFI and participation in the subsequent RFP.

The date, time, location and preliminary program for this webinar will be shared in an upcoming amendment to the RFI. It is recommended that you signal your interest for this webinar as soon as possible.

For any questions concerning this document, please contact Kaveh Mirfatahi, contracting authority, Public Works and Government Services Canada at:

Telephone: 514-260-4106
Facsimile: 514-496-3822
E-mail address: kaveh.mirfatahi@pwgsc-tpsgc.gc.ca

8. Submission of Responses

a) Place for Submission of Responses: The Respondent interested in providing a response should send their response to the following location by the time and date indicated in the following paragraph of this solicitation document to:

Kaveh Mirfatahi
Supply Specialist
Public Works and Government Services Canada
Acquisitions Branch, Quebec Region
Place Bonaventure
800 de la Gauchetière Ouest
Suite 7300, Portail Sud-Ouest, Montréal, Québec H5A 1L6

Telephone: 514-260-4106
Facsimile: 514-496-3822
E-mail address: kaveh.mirfatahi@pwgsc-tpsgc.gc.ca

b) Time: The closing date to submit a response is January 30th, 2020, 2:00 pm EST.

c) Responsibility of Responses: Each respondent is solely responsible for ensuring its response is delivered on time to the correct location.

d) Identification of Responses: Each respondent should ensure that its name and return address, the solicitation number and the closing date appear legibly on the outside of the response.

e) Format of response: It would be appreciated if respondents could provide their responses in one printed copy and one electronic copy. The electronic file format of the response must be in either the Adobe Portable Document Format (PDF) or in a file format that is readable by the Microsoft Office Suite.

Provision of an electronic copy is required in order to facilitate the distribution of the RFI responses to both PWGSC and CSA representatives. Responses are to be submitted in one of the two Official Languages of Canada (English or French).

i) Cover Page: If the response includes multiple volumes, respondents are requested to indicate on the front cover page of each volume the title of the response, the solicitation number, the volume number and the full legal name of the respondent.

Solicitation No. - N° de l'invitation
9F052-180576/B
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9F052-180576

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-8-41285

Buyer ID - Id de l'acheteur
mtb550
CCC No./N° CCC - FMS No./N° VME

ii) **Title Page:** The first page of each volume of the response, after the cover page, should be the title page, which should contain:

- (a) the title of the respondent's response and the volume number;
- (b) the name and address of the respondent;
- (c) the name, address and telephone number of the respondent's contact;
- (d) the date; and
- (e) the solicitation number.

iii) **Numbering System:** Respondents are requested to prepare their response using a numbering system corresponding to the one in this RFI. All references to descriptive material, technical manuals and brochures included as part of the response should be referenced accordingly.

All the documentation submitted must be marked with the following:

Name of Respondent
MSFP RFI Response - Reference # 9F052-180576/B
Date (YYYY-MM-DD)

9. Enquiries

Because this is not a bid solicitation, Canada will not necessarily respond to enquiries in writing or by circulating answers to all potential suppliers. However, respondents with questions regarding this RFI may direct their enquiries to:

Contracting Authority: Kaveh Mirfatahi
Telephone: 514-260-4106
Facsimile: 514-496-3822
E-mail address: kaveh.mirfatahi@pwgsc-tpsgc.gc.ca

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This bid solicitation cancels and supersedes previous bid solicitation number 9F052-180576/A dated March 14 2019 with a closing date of June 25 2019 at 2:00 pm EDT. A debriefing or feedback session will be provided upon request to bidders/suppliers who bid on the previous solicitation.

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 Security, 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.

The Annexes include the Statement of Work, the Basis of Payment, the Electronic Payment Instruments, the Federal Contractors Program for Employment Equity - Certification, and any other annexes.

1.2 Summary

Project Title

MicroPrep System for the International Space Station (ISS)

Description

Public Works and Government Services Canada (PWGSC) on behalf of Canadian Space Agency (CSA) located in St-Hubert, (Quebec), is seeking bids for the design of the MicroPrep System. The contract must be completed in four (4) phases: The scope of Phases A, B and C includes the design of the MicroPrep System including the manufacturing and demonstration of functional and performance requirements using Demonstration Models (DM) and an Engineering Model (EM), along with Ground Operations (Command and Data Handling) Software. The scope of the optional Phase D includes the manufacturing, testing, and delivery of one Proto-Flight Model (PFM), a sparring kit of critical components and associated commissioning and maintenance kits, ground commanding and telemetry stations and Ground Support Equipment (GSE). The Phase D scope also includes on-orbit commissioning as well as support to launch, and integration of one PFM into the ISS.

Security Requirements

There are no security requirements associated with this requirements.

Period of Contract

The period of contract will be from the date of issue for a period of approximately thirty-six (36) months. Phase A, B and C 20 months and phase D (D1 and D2) 16 months.

Actual Available Budget

The budget available for the contract resulting from this bid solicitation is **\$6,999,000.00**, all applicable taxes extra. Annex A (Statement of Work) includes a description of the work required. The Maximum amount of funding available for the contract will not exceed **\$6,999,000.00**, all applicable taxes extra. The Maximum amount of funding available for the contract phase A, B and C will not exceed **\$4,798,000.00**, all applicable taxes extra. The Maximum amount of funding available for the contract phase D1 (optional) will not exceed **\$2,001,000.00**, and phase D2 (optional) will not exceed **\$200,000.00**, all 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.

Intellectual property

The intellectual property will belong to Canada, as sole owner.

Trade Agreements

This requirements is not subject to the trade agreements.

Canadian Content

This requirement is limited to Canadian goods and/or services

Controlled Goods Program

This procurement could be subject to the Controlled Goods Program.

Federal Contractors Program (FCP) for Employment Equity

The Federal Contractors Program (FCP) for employment equity applies to this procurement; refer to Part 5 – Certifications and Additional Information, Part 7 - Resulting Contract Clauses and the annex titled Federal Contractors Program for Employment Equity - Certification.

Electronic Bidding

This bid solicitation allows 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) (<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 (2018-05-22) 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: 180 days

2.2 Submission of Bids

Bids must be submitted only to the Public Works and Government Services Canada (PWGSC) Bid Receiving Unit specified below by the date and time indicated on page 1 of the bid solicitation:

By mail or in person, at the following address:

Public Services and Procurement Canada
Acquisitions Directorate - Quebec Region
800, rue de la Gauchetière Ouest, Portal South-west, Suite 7300
Montréal, Quebec H5A 1L6

Bids may also be submitted using the epost Connect service as detailed in the 2003 Standard Instructions.

The following PWGSC Regional Bid Receiving Unit e-mail address is to be used for epost Connect services:

TPSGC.RQReceptionSoumissions-QRSupplyTendersReception.PWGSC@tpsgc-pwgsc.gc.ca

Bids will not be accepted if emailed directly to this e-mail address. This email address is to initiate an epost Connect conversation, as detailed in the 2003 Standard Instructions – section 08.

Due to the nature of the bid solicitation, bids transmitted by facsimile 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 Quebec.

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

2.6 Improvement of Requirement during Solicitation Period

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

2.7 Mandatory Non-Disclosure Agreement Requirement

The Bidder must review the documents identified in attachment 1 to Part 2 to prepare his bid. The bidder must request the documents from the Contracting Authority listed below through e-mail. The above mentioned documents contain information that is confidential or proprietary to Canada or third party. The Bidder must sign a Non-Disclosure Agreement in the form set out in Attachment 1 to Part 2 and return the original duly signed to the Contracting Authority before being provided with **access to e-copy** of the

documents. Bidders must destroy the documents mentioned above at the end of the RFP period, or upon request from the Contracting Authority within thirty (30) days following that request.

2.8 Basis for Canada's Ownership of Intellectual Property

The Canadian Space Agency has determined that any intellectual property rights arising from the performance of the Work under the resulting contract will belong to Canada, for the following reasons, as set out in the [*Policy on Title to Intellectual Property Arising Under Crown Procurement Contracts*](#):

(4.2) - the main purpose of the contract, or of the deliverables contracted for, is to augment an existing body of Canada's background information as a prerequisite to the transfer of the augmented background to the private sector, through licensing or assignment of ownership (not necessarily to the original contractor), for the purposes of commercial exploitation.

2.9 Maximum Funding

The maximum available funding, applicable taxes extra, as appropriate, for the contract for the purposes of this bid solicitation is indicated under the heading Actual Available Budget in Part 1 – Section 1.2 – Summary. Bids valued in excess of this amount will be considered non-responsive, pursuant to Part 4 – Evaluation Procedures and Basis of Selection, Section 4.1.2 – Financial Evaluation. This disclosure does not commit Canada to pay the maximum funding available.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

If the Bidder chooses to submit its bid electronically, Canada requests that the Bidder submits its bid in accordance with section 08 of the 2003 standard instructions. Bidders must provide their bid in a single transmission. The epost Connect service has the capacity to receive multiple documents, up to 1GB per individual attachment.

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

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

If the Bidder chooses to submit its bid in hard copies, Canada requests that the Bidder submits its bid in separately bound sections as follows:

Section I: Technical Bid (2 hard copies and 1 soft copy on USB)

Section II: Financial Bid (2 hard copies and 1 soft copy on USB)

Section III: Certifications (2 hard copies and 1 soft copy on USB)

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

If the Bidder is simultaneously providing copies of its bid using multiple acceptable delivery methods, and if there is a discrepancy between the wording of any of these copies and the electronic copy provided through epost Connect service, the wording of the electronic copy provided through epost Connect service will have priority over the wording of the other copies.

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

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

Canada requests that bidders follow the format instructions described below in the preparation of hard copy of their bid:

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573) (<https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573>). To assist Canada in reaching its objectives, bidders should:

- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

Section I: Technical Bid

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

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

Section II: Financial Bid

3.1.1 Bidders must submit their financial bid in accordance with the Pricing Schedule detailed in the Basis of Payment in Annex B.

3.1.2 Electronic Payment of Invoices – Bid

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Attachment 1 to Part 3 – Electronic Payment Instruments, to identify which ones are accepted.

If Attachment 1 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

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

4.1.1 Technical Evaluation

Mandatory and point rated technical evaluation criteria are included in Attachment 1 to Part 4.

Bidders should complete a self-evaluation (see Attachment 1 to Part 4), and substantiate their evaluation by referring to appropriate sections in their proposal for additional details.

4.1.2 Financial Evaluation

4.1.2.1 Mandatory Financial Criteria

The Bidder must submit an all-inclusive lot price for the Work, which must not exceed the maximum funding available of **\$6,999,000.00** applicable taxes extra.

The Maximum amount of funding available for the contract phase A, B and C will not exceed **\$4,789,000.00**, all applicable taxes extra. The Maximum amount of funding available for the contract phase D1 (optional) will not exceed **\$2,001,000.00**, and phase D2 (optional) will not exceed **\$200,000.00**, all applicable taxes extra.

Bids which fail to meet the mandatory financial criteria will be declared nonresponsive. Bids valued in excess of this amount will be considered nonresponsive.

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

4.2 Basis of Selection

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

1. To be declared responsive, a bid must:
 - a. Comply with all the requirements of the bid solicitation; and
 - b. Meet all mandatory criteria; and
 - c. Obtain the required minimum points specified for each rated criterion for the technical evaluation, and

- d. Obtain the required minimum of twenty-nine (29) points overall for the technical evaluation criteria which are subject to point rating.

The technical rating is performed on a scale of fifty-eight (58) points.

2. Bids not meeting (a) or (b) or (c) or (d) will be declared non-responsive.
3. The selection will be based on the highest responsive combined rating of technical merit and price. The ratio will be 90 % for the technical merit and 10 % for the price.
4. To establish the technical merit score, the overall technical score for each responsive bid will be determined as follows: total number of points obtained / maximum number of points available multiplied by the ratio of 90 %
5. To establish the pricing score, each responsive bid will be prorated against the lowest evaluated price and the ratio of 10 %.
6. For each responsive bid, the technical merit score and the pricing score will be added to determine its combined rating.
7. Neither the responsive bid obtaining the highest technical score nor the one with the lowest evaluated price will necessarily be accepted. The responsive bid with the highest combined rating of technical merit and price, including any bonus points will be recommended for award of a contract.

The table below illustrates an example where all four bids are responsive and the selection of the contractor is determined by a 90/10 ratio of technical merit and price, respectively. The total available points equals 58 and the lowest evaluated price is \$45,000 (45).

Basis of Selection - Highest Combined Rating Technical Merit (90%) and Price (10%)

		Bidder 1	Bidder 2	Bidder 3	Bidder 4
Overall Technical Score		61/70	65/70	54/70	44/70
Bid Evaluated Price		\$55,000.00	\$50,000.00	\$45,000.00	\$46,000.00
Calculations	Technical Merit Score	$50/58 \times 90 = 77.59$	$52/58 \times 90 = 80.69$	$45/58 \times 90 = 69.83$	$39/58 \times 90 = 60.52$
	Pricing Score	$45/55 \times 10 = 8.18$	$45/50 \times 10 = 9.00$	$45/45 \times 10 = 10.00$	$45/46 \times 10 = 9.78$
Combined Rating		$77.59 + 8.18 = 85.77$	$80.69 + 9.00 = 89.69$	$69.83 + 10.00 = 79.83$	$60.52 + 9.78 = 70.30$
Overall Rating		2nd	1st	3rd	4th

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](http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html) 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 procurement agreement of the [Ineligibility and Suspension Policy](http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) (<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](https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#) 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.

Canada will also have the right to terminate the Contract for default if a Contractor, or any member of the Contractor if the Contractor is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list during the period of the Contract.

The Bidder must provide the Contracting Authority with a completed annex titled Federal Contractors Program for Employment Equity - Certification, before contract award. If the Bidder is a Joint Venture, the Bidder must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

5.2.3 Additional Certifications Precedent to Contract Award

5.2.3.1 Canadian Content Certification

SACC Manual clause [A3050T](#) (2018-12-06) Canadian Content Definition

5.2.3.2 Status and Availability of Resources

SACC Manual clause [A3005T](#) (2010-08-16) Status and Availability of Resources

5.2.3.3 Education and Experience

SACC Manual clause [A3010T](#) (2010-08-16) Education and Experience

PART 6 - SECURITY, FINANCIAL AND OTHER REQUIREMENTS

6.1 Financial Capability

SACC Manual clause [A9033T](#) (2012-07-16) Financial Capability

6.2 Controlled Goods Requirement

SACC Manual clause [A9130T](#) (2014-11-27) Controlled Goods Program

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 Contractor's technical bid entitled _____, dated _____.

7.1.1 Optional Goods and/or Services

The Contractor grants to Canada the irrevocable option to acquire the goods and services described at Annex A of the Contract under the same conditions and at the prices and/or rates stated in the Contract. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise the option at any time before the expiry of the Contract by sending a written notice to the Contractor.

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) (<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.

7.2.2 Canada to Own Intellectual Property Rights in Foreground Information

SACC *Manual* clause [K3410C](#) (2015-02-25) Canada to Own Intellectual Property Rights in Foreground Information

7.2.3 K3305C – License to Intellectual Property Rights in Foreground Information

1. Subject to subsection 2, if the Contractor wishes to make use of the Foreground Information for purposes of its commercial exploitation or further development, the Contractor may make a written request for a license to the client department or agency for whom the Work is being or was performed. Such a request should be made within thirty (30) working days following the performance of the Work. The Contractor must give the client department or agency an explanation as to why such a license is required. The client department or agency must respond in writing to the request within a reasonable period of time. If the request is refused the response must provide an explanation for the refusal. If the client department or agency agree to grant the license, it will be on conditions to be negotiated between the Contractor and the client department or agency.

2. When the Work under the Contract involves the preparation of a database or other compilation using information or data supplied by Canada, or personal information (as this term is defined in the [Privacy Act](#), R.S., 1985, c. P-21) collected by the Contractor as part of the Work, then the license referred to in subsection 1 will be restricted to the Intellectual Property Rights in Foreground Information that are capable of being exploited without the use of such information or data or personal information.

7.2.4 K3315C – License to Intellectual Property Rights in Canada-owned Information

If the Contractor wishes to make use of certain Canada-owned information for purposes of the commercial exploitation or further development of the Foreground Information licensed to the Contractor, the Contractor may make a written request for a license to exercise the required Intellectual Property Rights in such Canada-owned information, to the client department or agency for whom the Work is or was performed. The Contractor must give the client department or agency an explanation as to why such a license is required. The client department or agency must respond in writing to any request for such a license within a reasonable period of time. If the client department or agency agree to grant such a license, it will be on conditions to be negotiated between the Contractor and the client department or agency. It is understood that those conditions may include payment of compensation to Canada.

7.3 Term of Contract

7.3.1 Period of the Contract

The period of the Contract is from date of Contract to _____ inclusive (*fill in end date of the period at Contract Award*).

Solicitation No. - N° de l'invitation
9F052-180576
Client Ref. No. - N° de réf. du client
9F052-180576/B

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-8-41285

Buyer ID - Id de l'acheteur
mtb550
CCC No./N° CCC - FMS No./N° VME

7.4 Authorities

7.4.1 Contracting Authority

The Contracting Authority for the Contract is:

Kaveh Mirfatahi
Supply Specialist
Public Works and Government Services Canada
Acquisitions Branch, Quebec Region
Place Bonaventure
800 de la Gauchetière Ouest
Suite 7300, Portail Sud-Ouest, Montréal, Québec H5A 1L6

Telephone: 514-260-4106
Facsimile: 514-496-3822
E-mail address: kaveh.mirfatahi@pwgsc-tpsgc.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.

7.4.2 Project Authority

The Project Authority for the Contract is:

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

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

7.4.3 Contractor's Representative (*Contractor to fill in*)

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

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

7.5 Proactive Disclosure of Contracts with Former Public Servants (*if applicable*)

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.

7.6 Payment

7.6.1 Basis of Payment (Limitation of Expenditure) (Phases A, B, C, Option D-2)

Canada's total liability to the Contractor under the Contract must not exceed \$ _____ (*insert the amount at contract award*). Customs duties are included and Applicable Taxes are extra.

No increase in the total liability of Canada or in the price of the Work resulting from any design changes, modifications or interpretations of the Work, will be authorized or paid to the Contractor unless these design changes, modifications or interpretations have been approved, in writing, by the Contracting Authority before their incorporation into the Work. The Contractor must not perform any work or provide any service that would result in Canada's total liability being exceeded before obtaining the written approval of the Contracting Authority. The Contractor must notify the Contracting Authority in writing as to the adequacy of this sum:

- a. when it is 75% committed, or
- b. four months before the contract expiry date, or
- c. as soon as the Contractor considers that the contract funds provided are inadequate for the completion of the Work,

whichever comes first.

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

7.6.2 Basis of Payment (Milestone Payment) (Option D-1)

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 – Basis of Payment for a cost of \$ _____ (*insert the amount 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.

7.6.3 Method of Payment – Limitation of Expenditure (Phases, A, B, C, Option D-2)

1. Canada will make progress payments in accordance with the payment provisions of the Contract, no more than once a month, for cost incurred in the performance of the Work, up to 90 percent of the amount claimed and approved by Canada if:
 - a. an accurate and complete claim for payment using form [PWGSC-TPSGC 1111](#), Claim for Progress Payment, and any other document required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
 - b. the amount claimed is in accordance with the basis of payment;
 - c. the total amount for all progress payments paid by Canada does not exceed 90 percent of the total amount to be paid under the Contract;

-
- d. all certificates appearing on form [PWGSC-TPSGC 1111](#) have been signed by the respective authorized representatives.
 2. The balance of the amount payable will be paid in accordance with the payment provisions of the Contract upon completion and delivery of all work required under the Contract if the Work has been accepted by Canada and a final claim for the payment is submitted.
 3. Progress payments are interim payments only. Canada may conduct a government audit and interim time and cost verifications and reserves the rights to make adjustments to the Contract from time to time during the performance of the Work. Any overpayment resulting from progress payments or otherwise must be refunded promptly to Canada.

7.6.4 Method of Payment – Milestone Payments (Option D-1)

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

- a. an accurate and complete claim for payment using [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. all the certificates appearing on form [PWGSC-TPSGC 1111](#) have been signed by the respective authorized representatives;
- c. all work associated with the milestone and as applicable any deliverable required has been completed and accepted by Canada.

7.6.4.1 Schedule of Milestones

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

7.6.5 SACC Manual Clause

[A9117C](#) (2007-11-30), T1204 – Direct Request by Customer Department

7.6.6 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);

7.7 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 (if applicable)
2. Applicable Taxes must be calculated on the total amount of the claim before the holdback is applied. At the time the holdback is claimed, there will be no Applicable Taxes payable as it was claimed and payable under the previous claims for progress payments.
 3. The Contractor must prepare and certify **one (1) original and two (2) copies** of the claim on form [PWGSC-TPSGC 1111](#), and forward:
 - a) the **original and one (1) copy** to the Canadian Space Agency at the address shown on page 1 of the Contract under "Invoices" (Financial Services Section) for appropriate certification by the Project Authority identified herein after inspection and acceptance of the Work takes place;and,
 - b) **one (1) copy of the original** progress claim to the Contracting Authority identified under the section entitled "Authorities" of the Contract.
 4. The CSA's Financial Services Section will then forward **the original and one (1) copy** of the claim to the Contracting Authority for certification and onward submission to the Payment Office for the remaining certification and payment action.
 5. The Contractor must not submit claims until all work identified in the claim is completed.

7.8 Certifications and Additional Information

7.8.1 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.

7.8.2 Federal Contractors Program for Employment Equity - Default by the Contractor

The Contractor understands and agrees that, when an Agreement to Implement Employment Equity (AIEE) exists between the Contractor and Employment and Social Development Canada (ESDC)-Labour, the AIEE must remain valid during the entire period of the Contract. If the AIEE becomes invalid, the name of the Contractor will be added to the "[FCP Limited Eligibility to Bid](#)" list. The imposition of such a sanction by ESDC will constitute the Contractor in default as per the terms of the Contract.

7.8.3 SACC Manual Clauses

[A3060C](#) (2008-05-12), Canadian Content Certification

7.9 Applicable Laws

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

7.10 Priority of Documents

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

- (a) the Articles of Agreement;
- (b) SACC *Manual* clauses
 - [K3410C](#) (2015-02-25) Canada to Own Intellectual Property Rights in Foreground Information;
 - [K3305C](#) (2008-05-12) License to Intellectual Property Rights in Foreground Information;
 - [K3315C](#) (2008-05-12) License to Intellectual Property Rights in Canada-owned Information;
- (c) the general conditions [2040](#) (2018-06-21), Research & Development;
- (d) Annex A, Statement of Work;
- (e) Annex B, Basis of Payment;
- (f) the Contractor's bid dated _____.

7.11 Foreign Nationals (Canadian Contractor)

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

7.12 Insurance

SACC *Manual* clause [G1005C](#) (2016-01-28) Insurance

7.13 Controlled Goods Program (if applicable)

SACC *Manual* clause [A9131C](#) (2014-11-27) Controlled Goods Program

7.14 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 7.5.2 of this contract.

3. Communication Activity Coordination Process

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

- a. As soon as the Contractor intends to organize a Communication Activity, send a Notice to the CSA's Directorate of Communications and Public Affairs. The Communications Notice must include a complete description of the proposed Communication Activity. The Notice must be in writing in accordance with 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.

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

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9F052-180576
Client Ref. No. - N° de réf. du client
9F052-180576/B

Amd. No. - N° de la modif.
File No. - N° du dossier
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Buyer ID - Id de l'acheteur
mtb550
CCC No./N° CCC - FMS No./N° VME

ANNEX A

STATEMENT OF WORK

The Statement of Work is hereby attached.



CSA-MFSP-SOW-0001

Canadian Space Agency Space Exploration Projects

**International Space Station
MicroFluidic Sample Preparation (MFSP) Platform**

Statement Of Work (SOW)

**Revision C
December 2019**

FOR SPACE AGENCY USE ONLY

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REVISION HISTORY

Rev.	Description	Initials	Date
IR	Initial Release	LF	Janvier 2019
A		LF	March 2019
B	Revised section 5.1.3	LF	May 2019
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1 INTRODUCTION

1.1 SCOPE

The MicroFluidic Sample Preparation (MFSP) system is intended to perform automated extraction of macromolecules from different sample specimens, and produce clean, concentrated samples that are suitable for on-board / in-situ analysis. The equipment will be deployed on the International Space Station (ISS) to support the identification, characterization and mitigation of space related health risks to humans. The MFSP supports Canada's continued commitment to the ISS and contributes to the enhancement of Canada's return on ISS investment.

This Statement of Work (SOW) defines the work for Phases A, B, C and optional Phase D of the MFSP.

The scope of Phases A, B and C is the design of the MFSP System. The MFSP System is composed of a Platform and single-use Cartridge Devices for sample processing. The Platform will be based on a design developed by the National Research Council (NRC) for earth-bound applications. The MFSP is to use single-use Cartridge Devices designed by the NRC. The Contractor will design the Platform to accept the Cartridge Devices provided as Government Furnished Material (GFM). For the purpose of the contract, Canada will share with the Contractor design documentation of the NRC's (earth-bound version) Platform (Government Furnished Information (GFI)) to ensure integrity of the microfluidic technology. Also, included in Phase C, are the manufacturing and demonstration of functional and performance requirements using Demonstration Models (DM) and an Engineering Model (EM), along with Ground Operations (Command and Data Handling) Software.

The scope of the optional Phase D is the manufacturing, testing, and delivery of one Proto-Flight Model (PFM), a sparing kit of critical components and associated commissioning and maintenance kits, ground commanding and telemetry stations and Ground Support Equipment (GSE). The Phase D scope also includes on-orbit commissioning as well as support to launch, and integration of one PFM into the ISS.

A Phase E Logistic and Sustaining Engineering (L&SE) plan will be prepared and brought to maturity throughout Phases ABCD work. The plan will include pricing, sparing and maintenance approaches for the Canadian Space Agency (CSA) to be able to award an Operations support phase contract at a later date.

The launch of the MFSP Platform System to the ISS is excluded from the scope of work. The CSA is responsible for the launch and any associated coordination activities with NASA. The scope of work also excludes on-orbit operation as well as science utilization of the MFSP Platform System after commissioning.

The MFSP Platform System must meet the requirements as defined in Section 2.1, Applicable Documents. These include the specific Platform Functional and Performance Requirements Document (FPRD) as well as other applicable requirements such as ISS engineering, interface, quality, safety and operational requirements.

1.2 TECHNICAL BACKGROUND

A collaborative effort lead by the National Research Council (NRC) and supported by CSA has permitted the development of a novel microfluidic actuation method, combining regulated pressure control in a centrifugal microfluidic platform as a mean to facilitate integration and automation of complex assays in centrifugal microfluidics and improve reliability of fluidic-based sample preparation.

A programmable air pump and multiple miniature electromechanical valves are placed on a rotating stage and connected to microfluidic Cartridge Devices. The electronic system is designed to ensure that the valves, the pump and the other active elements can be computer-controlled in real time while the platform is rotating at high speed. Electrical power and computer commands can be sent through a slip-ring to switch the states of the electromechanical valves with a temporal resolution of only a few milliseconds. The Platform can thus connect one or more inlets of the Cartridge Devices to either atmospheric pressure (i.e. a regular vent) or to a controlled regulated pressure provided by the pump while the Platform is rotating at high speed.

It is also noteworthy that all the access ports of the Cartridge Devices can be connected to the pneumatic system of the rotating Platform, thus drastically reducing the risk of expelling liquids out of access holes. In addition to the pneumatic control described previously, the Platform also contains a motor controlling the rotation, advanced thermoelectric-based temperature control as well as all electronics and software required to perform automated sequences. The Platform will require at least three (3) fundamental hardware functions to perform the assay:

- a. rotation control,
- b. pneumatic pressure control, and
- c. temperature control.

The purpose of this SOW is to describe the work required to take the technology developed by NRC and create an internal payload on the ISS.

The Platform must be designed to interface with the ISS Expedite the Processing of Experiments for Space Station (EXPRESS) Rack, and fit within the volume of a single or double Middeck Locker (MDL). A custom interface system must be designed to ensure simple and rapid installation of the Cartridge Devices on the Platform following insertion of the raw sample. The electrical and data interface must comply with ISS requirements.

1.3 MISSION CONCEPT

The overall goal of the MFSP mission is to ensure the availability and functionality of a universal sample preparation equipment on-board the ISS that can be used in conjunction with CSA's Bio-Analyzer, NASA's Deoxyribonucleic Acid (DNA) sequencer or leveraged by any other ISS partner to conduct life science experiments.

Two (2) immediate objectives are:

1. **Objective 1:** To provide real-time specific biological samples preparation capability onboard the ISS to increase current science and diagnostic capabilities and as a stepping stone for future missions beyond low Earth orbit.
2. **Objective 2:** To acquire and demonstrate sample-to-answer capability in conjunction with other analytical devices, onboard the ISS.

The MFSP mission will include:

- Design and development of ISS-compliant Cartridge Devices for isolation, purification, concentration or dilution of proteins and nucleic acids in biological samples including but not limited to blood, saliva, urine and cell culture medium;
- Design and development of an ISS-compliant Platform based on the PowerBlade Platform designed by NRC;
- Design and development of ground support infrastructure in the Payload Telescience Operations Center (PTOC);
- Payload integration in conjunction with NASA;
- Launch and commissioning of the MFSP System (ISS-compliant Platform and Cartridge Devices) on ISS;
- Leverage use and interfaces with existing or soon to be available analytical instruments onboard ISS in order to maximize science capacities and achieve sample-to-answer capability;
- Leverage in-process Announcements of Opportunity (AO) (e.g. CSA's Life Science Research Systems (LSRS), NASA's Human Exploration Research Opportunities (HERO)) to identify and target science that can potentially be enhanced by the use of the MFSP System;
- Advertise the MFSP Platform System in future AOs or call for ISS science (e.g. future International Life Science Research Announcements (ILSRAs), Microgravity Research Analog (MRA)).
- Support commissioning, maintenance and regular real-time operations of the MFSP Platform System from the PTOC.

Figure 1-1 shows the mission elements and the associated sequence of events from development to full science operation. After successful commissioning, the MFSP Platform System will be declared operational by CSA and ready to support scientific investigations or ad hoc activities.

Figure 1-2 shows the operation concept including the flight and ground-based mission elements.

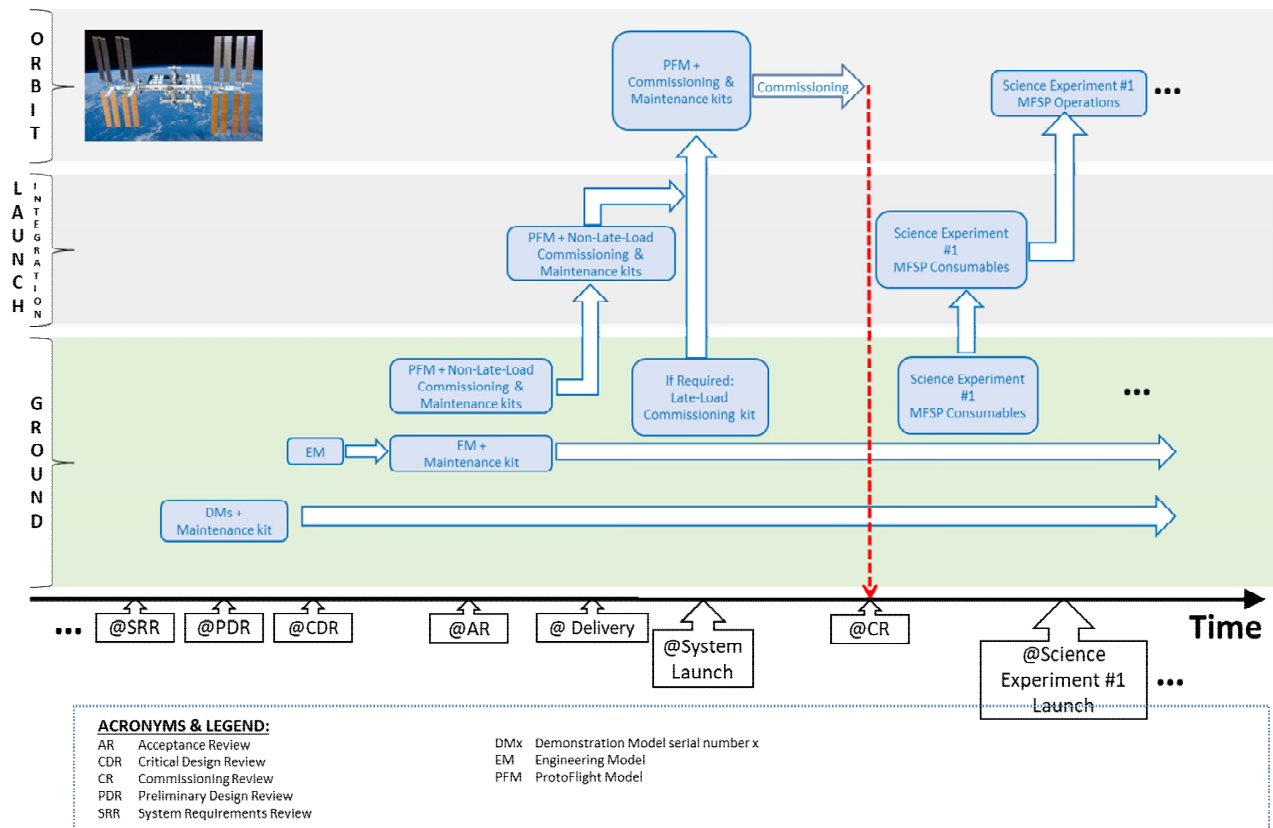
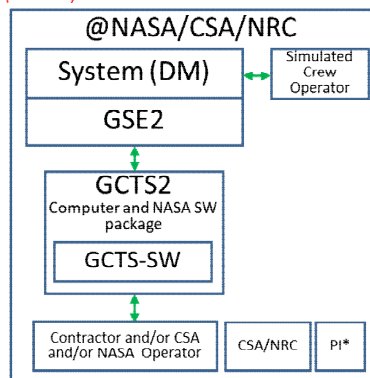
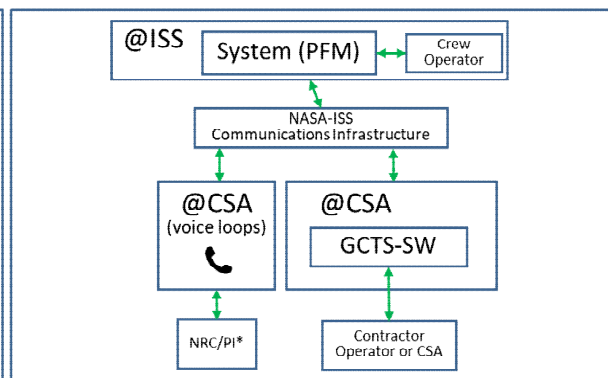


FIGURE 1-1 – MISSION CONCEPT AND TIMELINE

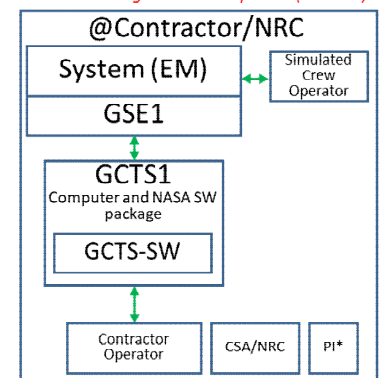
NRC CD Development and Verification Testing, BDC and Crew Training & then for Each Subsequent Science Investigation Development (Phase E):



Verification, Qualification & NASA Integration Tests, SVT, PVT, Operations, Commissioning & then for Each Subsequent Science Investigation/ad hoc activities:



Development and demonstrations, CD SVT, Ground Support to Commissioning Operations & then for Each Subsequent Science Investigation Development (Phase E):



ACRONYMS & LEGEND:

BDC: Baseline Data Collection
CD: Cartridge Devices
CSA: Canadian Space Agency
EM: Engineering Model
PFM: ProtoFlight Model
GCTSx: Ground Command & Telemetry Station serial number x

DMx: Development Model serial number x
GSEx: Ground Support Equipment serial number x
IF: Integration Facility
NASA: National Aeronautic & Space Administration
NRC: National Research Council
PI: Principal Investigator

PVT: Payload Verification Test
SVT: Science Verification Test
SW: Software

* PI presence occurs only after commissioning
↔ Main Interactions

FIGURE 1-2 – MFSP TEST & OPERATION CONCEPT**1.4 DEFINITIONS, LANGUAGE, AND DOCUMENT CONVENTION****1.4.1 Definitions**

The following definitions are applicable to this document.

Cartridge Device (CD)	Hardware developed by NRC to be installed in the Platform to process samples. Refers to the assembly made of the consumable items and ancillary that are required to perform the activities that meet the requirements of this document.
Execution sequence	List of commands that the MFSP platform must read and execute to perform the fluidic manipulations inside the Cartridge Devices and perform the activities that meet the requirements of this document.
Contract	* Public Services & Procurement Canada (PSPC)-awarded contract responding to the requirements set out in the current SOW.
Contract Authority	* The PSPC representative that has the authority to sign Contracts and approve modifications and invoices for the Government of Canada (GoC).
Contractor	Contractor refers to the Canadian prime Contractor responsible for delivering the work as per this SOW.
Demonstration Model (DM)	A DM is built for ground demonstration of the Platform (PowerBlade and GSE only) functionality and Cartridge Device integration, including installation and removal. Commercial parts are used and the DM is used in Phase B, C and D.
Engineering Model (EM)	An EM is fully representative of the PFM (i.e., form, fit and function) and GSE and reflects flight standard design, materials and processes with Commercial-Off-The-Shelf (COTS) parts. The EM will be used for demonstration of all functional and performance requirements at Critical Design Review (CDR) and subsequent phase D CD validation activities at NRC. The EM will be used on ground in support of commissioning activities and may be upgraded to a flight spare.
Proto-Flight Model (PFM)	The PFM is built to full flight design, materials and processes in accordance with the Product Assurance (PA) and Configuration and Data Management (CADM) requirements. PFM is used for verification of all functional, performance, ISS interface requirements and is subjected to qualification level environmental testing.
Ground Commanding and Telemetry Station (GCTS)	Software developed for Operational Ground Control Commanding and Data Handling (C&DH) of the PFM on the ISS, installed in the CSA PTOC and integration verified with the ISS C&DH network. This is also required to complete verification activities with the PFM and is deliverable on a stand-alone laptop computer for operating the EM.
Ground Support and Test Equipment	Any items required to operate or test the DMs, EM, and PFM, such as a stand-alone laptop computer with GCTS, Ethernet and power cables (with flight or flight-like connectors) and a power supply or converter as needed.

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	Packaging and shipping containers to ensure units are not damaged in transport.
System	Assembly of the Platform with Cartridge Device(s), including hardware and software.
Platform	Equipment (hardware and software) developed by the Contractor to process sample contained in the Cartridge Device.
Project	Defined here as the sum of activities specified and under authority of the CSA.
MFSP System	All interacting components of the MFSP including Platform hardware, software, Cartridge Devices and GCTS.
Technical Authority (TA)	* The CSA Scientific/TA for the project is the person responsible for the management of the Work on behalf of the CSA. They, or the delegate, will be the direct interface with the Contractor and will monitor progress on the contract, verify that the contract Work has been completed satisfactorily, and will indicate this by signing off on claims together with the Contract Authority, and participate in negotiating changes to the contract.
Virtual Machine (VM)	A digital representation of the physical object and serves as a basis for simulating the behavior of the MFSP System. The VM will be used to demonstrate the CSA-PTOC to NASA- Huntsville Operations Support Center (HOSC) C&DH& interface requirements prior to formal integrated verification testing.
Work	* The work specifically described in this SOW or resulting from the requirements herein.

** These definitions are part of the General Conditions 2040 or identified in the contract document. They have been added here for sake of completeness and convenience in understanding this document. The definitions presented in 2040 or the contract document, take precedence in case of discrepancy.*

1.4.2 Language

As English is the standard oral and written language for design, development, operation and utilization on the ISS, the Contractor must use English for this Work, and for exchanges with CSA, along with System International (SI) units.

1.4.3 Document Convention

The following verbs, as used in this document, have the specific meaning as indicated below:

“must”	Indicates a mandatory requirement.
“should”	Indicates a preferred, but not mandatory alternative.
“may”	Indicates an option.
“will”	Indicates a statement of intention.

1.5 ROLES AND RESPONSIBILITIES

Many partners share the responsibilities for the success of this effort. Here is a summary of their roles and responsibilities:

CSA:

1. Contractual TA.
2. Main coordinator for the overall Work.
3. Main interface and generates agreement with the ISS Program and the ISS International Partners (IP).
4. Manifests the MFSP Platform System for launch to the ISS.
5. Coordinates all in-flight activities.

NRC:

1. Technical support to CSA for the MFSP Platform System.
2. Main coordinator for the Cartridge Device Work.
3. Designs, constructs, tests, qualifies, certifies, delivers and commissions the Cartridge Devices.
4. Provide microfluidic expertise of the PowerBlade design to the Contractor to ensure adequate performance of the Platform.
5. Provide microfluidic prototype cartridges to the Contractor to ensure interface compatibility with the Platform Demonstration and Engineering Models at technical development stages (phases A, B and C).
6. Provide support for the Platform performance (i.e. cartridge and the cartridge sequences to reach FPRD Platform performances) during integration testing and verification with the ProtoFlight Model in phase D.

NASA:

1. Overall ISS integrator.
2. Technical authority for all ISS processes and acceptability, including Payload Safety Reviews..
3. Provides the Payload Integration Manager (PIM) that will facilitate the integration of the MFSP System into the ISS program.
4. Coordinates launch with launch provider, based on the manifest request from CSA.
5. Provides resources required to support the mission.

Contractor:

1. Designs, constructs, tests, qualifies, certifies, delivers and commissions the Platform.
2. Prepare MFSP Platform System level documentation of the MFSP Platform System, including Cartridge Devices (with support from CSA/NRC).
3. Prepare the End Item Data Package (EIDP) for the MFSP Platform System (i.e. Configuration Management, etc.).
4. Consolidates work performed by NRC for Cartridge Devices to ensure compliance to system level requirements. Inform CSA of any issue or problem.

5. Interface with NASA database for MFSP space qualification data input.
6. Launch package readiness.

Public Services and Procurement Canada (PSPC):

1. Contractual Authority.
2. The only entity allowed to change the scope of Work.

2 DOCUMENTS

2.1 APPLICABLE DOCUMENTS

The following documents latest release versions are applicable and form an integral part of this document to the extent specified herein.

AD No.	Document Number	Document Title
AD-01	CSA-MFSP-RD-0001	MFSP Platform Functional and Performance Requirements Document
AD-02	CSA-MFSP-ID-0001	MFSP Platform Interface Requirements Document
AD-03	CSA-SE-STD-0001	CSA Systems Engineering Technical Reviews Standard.
AD-04	CSA-ST-GDL-0001	CSA Technology Readiness Levels and Assessment Guidelines.
AD-05	CSA-MFSP-RD-0002	MFSP Product Assurance Requirements Document
AD-06	CSA-MFSP-CO-0001	Operational Concept Document for Commissioning Operations
AD-07	CSA-SE-PR-0001	CSA Systems Engineering Methods and Practices
AD-08	SSP 57057	ISS Payload Integration Template
AD-09	CSA-FORM-0001	CSA Technology Readiness and Risk Assessment Worksheet
AD-10	CSA-FORM-0003	CSA Critical Technologies Elements Identification Criteria

3 WORK REQUIREMENTS

The subsequent sections 3 through 8, describe the Work requirements that the Contractor must meet. Some requirements are driven by NASA. As stated in Section 2.1, the latest released versions of the documents identified are applicable. If requirements are conflicting between documents, the CSA must be consulted and the most stringent requirement must be used or as agreed with CSA.

3.1 PROJECT MANAGEMENT

The Contractor must manage the contract to achieve successful performance, scope, quality, and schedule requirements of this SOW.

The Contractor must provide the management, technical leadership, and support necessary to ensure effective and efficient performance of all project efforts and activities. The Contractor must dedicate experienced personnel to the project in all the disciplines required to carry out the work as defined in this SOW.

The Contractor personnel must establish and maintain a close management and technical interface with the CSA to assure a coordinated program effort to meet or exceed the project objectives.

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

The Contractor must implement and maintain the Project Management Plan (PMP) provided with the proposal as per Contract Data Requirements List (CDRL 1).

3.1.1 Scope Planning (*Work Breakdown Structure and Work Packages*)

The project must be planned, controlled and directed according to the Work Breakdown Structure (WBS) and associated WBS Dictionary to be provided with the proposal as per CDRL 2.

The WBS, which describes all the project elements that organize and define the total work scope of the project, must be deliverable-oriented and must include, at the minimum, the major deliverables which represent the main functions of the Platform.

The WBS Dictionary defines the work to be done against each WBS element identified in the WBS, by means of a Work Package Description (WPD) for each such element.

3.1.2 Cost estimation

The Contractor must provide project cost estimates in accordance with DID-034.

3.1.3 Project Schedule

The schedule must be provided with the proposal. Table 3-1 shows the Project Milestones Schedule, as planned by CSA. Contractor may propose different due date for specific milestones, if the CDR meeting is maintained at 18 months after contract award. The proposed schedule presented in the proposal may replace the CSA planned project milestone schedule of Table 3-1 and be used for contractual milestone definition. The Contractor must maintain and deliver the Project Schedule each month as per CDRL 3. The schedule must be based on the WBS. The contract monthly schedule will have precedence over the project schedule in the SOW.

TABLE 3-1 – KEY PROJECT MILESTONES SCHEDULE

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Phases	Milestones	Proposed Due Date
Phase A	Interface Definition Review (IDR)	Contract Award + 3 months
	System Requirement Review (SRR)	Contract Award + 6 months
Phase B	Preliminary Design Review (PDR)	Contract Award + 12 months
	Cartridge Device & Rotor interface demonstration – DM1 & DM2 delivery	Contract Award + 12 months
Phase C	EM & Cartridge Device demonstration	Contract Award + 18 months
	Critical Design Review (CDR)	Contract Award + 18 months
	EM Delivery including Maintenance Kit, GSE and GCTS	Contract Award + 18 months
Phase C2	Phase C closure: <ul style="list-style-type: none"> • CDR action items closure • Payload Safety Review Panel (PSRP) Phase II • PFM Manufacturing Readiness Review (MRR) 	Contract Award + 20 months
Optional Phase D (D1, D2)*	PFM Test Readiness Review (TRR) including Maintenance Kit, GSE and GCTS	Phase D1 option exercised + 6 months
	PFM Test Review Board (TRRB) including Maintenance Kit, GSE and GCTS	Phase D1 option exercised + 8 months
	PFM PSRP III review	Phase D1 option exercised + 9 months
	PFM Acceptance Review (AR)/Delivery to CSA. AR including Commissioning and Maintenance Kits	Phase D1 option exercised + 10 months and no later than December 31, 2022.
	Critical component spares kit	Phase D1 option exercised + 10 months
	PFM Pre-Ship Review	On-dock delivery – 2 weeks
	PFM Delivery (on-dock) to NASA/CSA	Phase D1 option exercised + 10.5 months, as per NASA schedule”
	AR closeout. Phase D2 Kickoff	Phase D2 option exercised.
	Launch	Phase D2 option exercised (indicative)as per NASA schedule

	Commissioning Review	Launch + 1 month (indicative)+ as per NASA schedule
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**Phase D consists of two phases: D1 and D2. Phase D1 includes the manufacturing, testing, Acceptance Review and delivery of the PFM, GSE, commissioning and maintenance kits and associated software. Ownership of the MFSP deliverables will be transferred to CSA upon completion of delivery of all items and successful checkout of the PFM at the NASA CMC facility. Phase D2 includes all the subsequent work including support to launch, support to PFM installation in the ISS and commissioning. The Phase D2 schedule will be driven by the launch date.*

Note: the Contractor may suggest a faster schedule than the indicated timelines, but not slower (with no impact on proposal evaluation).

3.1.4 Project Management Control

The Contractor must provide a management function for the monitoring, control, and reporting of the Work. The Contractor must demonstrate that it has an established project management control System and that it is used to provide timely visibility of the Work's status of costs, schedule, technical, performance and risk issues, in order to allow proactive problem solving in concert with the TA. The management control system must provide for cost effective and timely re-planning of activities to support workarounds. The management control system must track the total costs on a monthly basis. This is in addition to cost management required at the contract level. The Contractor must maintain and provide CDRLs as per the due dates defined in Appendix A.

The management control system must track, control and report project costs on a monthly basis through the Monthly Progress Report (CDRL 4).

3.1.5 Progress Reporting

The Contractor must provide Monthly Progress Reports (CDRL 4) to the CSA Authority, no later than seven (7) working days after the end of the month covered by the report.

3.1.6 Risk Management

The Contractor must have a risk management process to control hardware, software, and documentation. The Contractor must continuously identify and monitor areas of cost, schedule, programmatic and technical risk and must identify and implement risk reduction/resolution/mitigation activities. The Contractor must assess and report the status of each risk element in the Monthly Progress Report (CDRL 4) and at all technical reviews.

3.1.7 Export Control

The Contractor must obtain and manage, as applicable, all the necessary Export Control permits and documentation as well as any Technical Assistance Agreements related to the International Traffic in Arms Regulations (ITAR) for hardware, software and documentation resulting from the Work.

3.1.8 Intellectual Property

The Contractor must deliver with his proposal the disclosure of Background Intellectual Property (BIP) (CDRL 13) planned to incorporate in the Foreground Intellectual Property (FIP) to be developed. The Contractor must explicitly define the FIP generated during the execution of the contract and report this in the Intellectual Property (IP) Disclosure Report (CDRL 13). This document must also identify the Background Intellectual Property (BIP) that is required to use the FIP.

All documents containing proprietary information must identify this on the front cover per Data Item Description (DID)-000.

3.1.8.1 Government Furnished Information (GFI)

The Contractor must utilize the GFI identified in the section Applicable Documents (AD) in the conduct of the contract. The Contractor must implement GFI in the development of the Platform for usage on the ISS. Canada will also provide access to technical expertise from NRC during the contract duration. The Contractor must consider technical recommendation from NRC-CSA in the development of the MFSP Platform System and must justify deviation from the recommendation. The Contractor must document any concern and request decision approval when GFI creates consequence (scope, cost, schedule) above normal design loop iteration process. The GFI includes documents, minutes, access to prototype model and NRC technical expert in microfluidic. The Contractor will be granted limited access to information related to the internal design of the Cartridge Devices.

3.2 PLATFORM MODELS

The Platform must meet the requirements detailed in the Platform FPRD (AD-01), the MFSP Product Assurance Requirements (PAR) (AD-05) as well as all the NASA Interface Requirements required for flight included in AD-08.

The Contractor must prepare and deliver the hardware and software as requested in the Appendix A.

3.2.1 Demonstration Model (DM)

The DM is to be built in Phase B and used to demonstrate the interface of Cartridge Devices to the Platform rotor and demonstrate functional and performance requirements related to centrifugal microfluidic sample preparation. It must replicate the planned physical interface between Cartridge Device and rotor. This demonstration must include all steps for installation, retention and removal of Cartridge Devices. A fit-check of the alignment of the Cartridge Device pneumatic ports to the Platform ports must also be performed and pneumatic commanding demonstrated. The model must also demonstrate Platform rotation and temperature control of the Cartridge Device interfacing active heating zones.

CSA will provide demonstration model Cartridge Devices to the Contractor for the interface development. It is at the discretion of the contractor if multiple versions of the DM will be produce to prove in the most effective concept. All interface mechanical aspects are to be defined with the

DM. The DM must include complete control of the sample preparation process. The DM must be able to accept software control of the process and be upgraded for Phases C development, testing of EM Cartridge Devices and for Phase D verification and validation of PFM Cartridge Devices.

3.2.2 Virtual Machine (VM)

A VM is the digital representation of the physical MFSP Platform unit providing the functionality needed to execute the entire MFSP Platform operating system. The VM is to be delivered in Phase C to the CSA PTOC and the Marshall Space Flight Center (MSFC) HOSC. The VM is to be used to support early integration activities to test and debug the C&DH functions of the MFSP Platform with the PTOC and HOSC ground support systems prior to final verification with the PFM with the Space Systems Integration and Test Facility (SSITF).

3.2.3 Engineering Model

An EM is fully representative of the PFM and built to full flight standards (i.e., form, fit and function), however is not subjected to qualification level environment testing. The EM is to be used to demonstrate all functional, performance and interface requirements in Phase C. The EM is also to be used for MFSP System science and operations validation in Phase D at NRC. The GSE to be used for this demonstration must include a fully functioning GCTS software. At the end of the contract, the EM has the characteristic and performance of the PFM. The EM is used to demonstrate the MFSP System has achieved Technology Readiness Level (TRL) 7.

3.2.4 Proto-Flight Model

The PFM is built to full flight standards in accordance with PA and CADM requirements. The PFM is subjected to full functional and performance, integration and scientific verification, and qualification level environmental testing. The PFM MFSP System will also undergo full science and operations validation and dry-runs in preparation of commissioning.

3.3 COMMISSIONING APPROACH

The Contractor is responsible for commissioning the MFSP Platform System as per the verification requirements outlined in AD-01, AD-05 and to be developed as part of CDRL 18 and 19. The Contractor must procure any commissioning items not furnished by the GoC as Government Furnished Equipment (GFE)/GFM/GFI and their spares in sufficient quantities to ensure that the commissioning of the PFM is completed.

The commissioning activity is defined as a Contractor-designed demonstration of all Platform requirements that can be validated on the ISS, and their ground equivalents for the other models. Flight commissioning items (PFM, Cartridges, consumables and spiked commissioning samples) must be packaged in the launch-ready configuration. The Contractor must support, in coordination with CSA, the NASA required documentation for manifesting the MFSP Platform System. The Contractor must support at CSA, real-time in-flight MFSP System commissioning including the Science Validation Test (SVT) defined by CSA/NRC as well as the ground portion of the SVT. The Contractor must perform commissioning data analysis and debugging until successfully completed. All commissioning-related activities will be led by CSA personnel. The Contractor

will act as support position to CSA operators. The Contractor must provide a Commissioning Plan (CDRL 38) .

The Contractor must provide a Commissioning report (CDRL 41) and conduct a Commissioning Review before proceeding to Phase E.

3.4 TRAINING AND PROCEDURE APPROACH

The Contractor must provide support to CSA to generate, update, submit and obtain approval for ground and/or in-flight Crew training materials (i.e. On-orBit Training (OBT)) and procedures; supplying the text, figures, instructions, diagrams, photographs and video-clips (CDRL 25) as required and determined by NASA.

The Contractor must provide training manuals and conduct operator training to designated CSA and NRC personnel.

3.5 MEETINGS AND REVIEWS

The Contractor must lead and/or support a series of meetings and reviews. Table 3-2 provides a summary:

TABLE 3-2 – MEETINGS AND REVIEWS

Meetings/Reviews	Lead	Date	Location	Participants
Kick-Off Meeting (KOM)	CSA	Within 1 month of Contract Award	CSA	CSA/NRC, Contractor, Sub-Contractors
System Requirements Review (SRR)	Contractor	As per proposed schedule	CSA	CSA/NRC, Contractor
Interface Definition Review (IDR)	Contractor	As per proposed schedule	CSA	CSA/NRC, Contractor
Phase 0/I Safety Reviews	NASA	As per NASA process (Phase A)	NASA	CSA/NRC, NASA, Contractor
Preliminary Design Review (PDR) and DM demo	Contractor	As per proposed schedule	CSA	CSA/NRC, Contractor
Critical Design Review (CDR) and EM demo	Contractor	As per proposed schedule	CSA	CSA/NRC, Contractor
Phase II Safety Reviews	NASA	As per proposed schedule and NASA process (Phase C2)	Teleconference	CSA/NRC, NASA, Contractor
CDR Action Items Closure action items closure	Contractor	As per proposed schedule	Teleconference	CSA/NRC, Contractor
PFM Manufacturing Readiness Review (MRR)	Contractor	As per proposed schedule	Teleconference	CSA/NRC, Contractor
PFM Test Readiness Review (TRR)	Contractor	As per proposed schedule	Teleconference	CSA/NRC, Contractor
PFM Test Results Review Board (TRRB)	Contractor	As per proposed schedule	Teleconference	CSA/NRC, Contractor
Phase III Safety Review	NASA	As per proposed schedule and NASA process, (Phase D1)	NASA	CSA/NRC, NASA, Contractor
Acceptance Review (AR)	Contractor	As per proposed schedule	CSA	CSA/NRC, NASA, Contractor
Pre-Ship Review	Contractor	As per proposed schedule	CSA	CSA/NRC, NASA, Contractor

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Meetings/Reviews	Lead	Date	Location	Participants
Baseline Data Collection with CSA/NASA	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
Bench Review/ Handover to NASA	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
Commissioning Review	Contractor	As per proposed schedule	CSA	CSA/NRC, Contractor, Sub-Contractors
Operational Assessment Review	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
Structures & Mechanical Review Board	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
Human Factor Interface Team (HFIT)	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
ISS Program Label Assessment Team (IPLAT)	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
Operations Training Strategy Team	NASA	As per proposed schedule and NASA process	Teleconference	CSA/NRC, NASA, Contractor
ISS integration verification	NASA	As per proposed schedule and NASA process	NASA	CSA/NRC, NASA, Contractor
Project Monthly Review	Contractor	Monthly	Teleconference	CSA/NRC, Contractor
Project Status Meetings	Contractor	Weekly	Teleconference	CSA/NRC, Contractor
Technical interchange meetings with NASA (e.g. interfaces, safety, etc.)	Subject dependant	Ad-hoc	Teleconference	CSA/NRC, NASA, Contractor

For Contractor-led meetings and reviews the Contractor must provide Meeting Agendas (CDRL 6) and Meeting Minutes (CDRL 7). Minutes will primarily report decisions.

The Contractor must maintain a detailed Action Item Log (AIL), (CDRL 8) throughout the Work to track actions and decisions resulting from meetings and reviews.

For NASA-led meetings and reviews, the Contractor must provide the necessary contributions, which may include documentation, oral presentation, and supporting visual media. The Contractor must assume that agendas, meeting minutes and action items will be provided by NASA.

If acceptable to CSA, the requirement for any of the above mentioned reviews/meetings could be waived when it coincides with other review meetings.

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

The Contractor must produce and deliver to CSA the Meeting/Review Presentation (CDRL 9) before each meeting or review. The Review Data Package (CDRL 10) must be delivered to the CSA prior to each review.

For major reviews, the Contractor must provide written responses to Review Item Discrepancies (RIDs) within ten (10) working days of receipt or as agreed with CSA. The review is considered complete when RID dispositions are provided and agreed upon to the satisfaction of CSA.

3.5.1 Weekly Project Status Meetings

The Contractor must conduct weekly project status meetings with CSA to review the project status and to resolve unforeseen and urgent issues. The selection of participants will depend on the nature of the issue. These meetings must be held by teleconference.

3.5.2 Monthly Project Review Meetings

The Contractor must conduct monthly project review meetings with CSA and NRC to review the project status.

3.5.3 Kick Off Meeting (KOM)

The Contractor must support a KOM at the CSA in the first month after Contract award. The Work must start when the contract starts, not waiting for the KOM to occur. The purpose of the KOM is to introduce the Contractor and CSA teams including NRC, review the scope of work, the schedule, the basis of payment and discuss any other topics as required. NRC experts and a PowerBlade demonstration will be made available for a one (1) week period to the contractor for the review of the design. All key participants under the contract, including representative from each major sub-Contractor, must attend.

3.5.4 Interface Definition Review (IDR)

During Phase A, the Contractor must prepare interface requirements documents (in accordance with AD-02 and CDRL 42) and conduct an IDR meeting at the MFSP Platform System level. The purpose of the IDR is to finalize and approve the Interface Requirements between the Contractor and the Cartridge Device developer (NRC) and to establish the Interface Requirements Baseline (IRB) document with the NASA Payloads Integration Requirements Engineer (PIRE), (CDRL 15). This definition includes details of the hardware and software to be delivered for the DM. The NRC will provide a mockup of the Cartridge Device and Platform interface for the review.

3.5.5 System Requirement Review (SRR)

The Contractor must prepare and conduct an SRR meeting at the MFSP Platform System level. The purpose of the SRR is to demonstrate that the MFSP System requirements are mature and that the system conceptual design will provide a system that meets all system requirements within an acceptable level of risk, that the Concept of Operations and the system requirements are compatible and the project readiness to proceed with the preliminary design. The Contractor, NASA and CSA will finalize the IRB and a Preliminary/Proposed Interface Revision Notice (PIRN) will be released by the PIRE for NASA and International Partners' approval.

The SRR must meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

The SRR Data Package (CDRL 10) must include as a minimum the CDRLs as per the due date and version in the CDRL in Appendix A.

3.5.6 Preliminary Design Review (PDR)

The Contractor must prepare and conduct a PDR meeting at the MFSP Platform System level which includes the completion of system requirements definition activities, the initial design activities and initial analysis activities. The purpose of the PDR is to demonstrate that the preliminary design and analysis (e.g. thermal, structural, etc.) meets all the requirements and is feasible within the cost and schedule constraints, and that the project is ready to proceed with the detailed design. A demonstration during this phase will be performed on the DM units (x2) with an initial software release and a Proto-Cartridge Device provided by CSA/NRC. This demonstration unit will be used by the Contractor for further development in support and up to the EM build. The second DM unit will be delivered to CSA/NRC in support of Cartridge Device development and lab testing.

The PDR must meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

The PDR Data Package (CDRL 10) must include as a minimum the CDRLs as per the due date and version in Appendix A.

3.5.7 Critical Design Review (CDR)

The Contractor must prepare and conduct a CDR meeting at the MFSP Platform System level. The purpose of the CDR is to present the final design and analysis of the MFSP Platform and demonstrate functional and performance requirements with an EM model. The Contractor must demonstrate that the project is within the cost and schedule constraints and ready to proceed with the PFM unit Manufacturing, Assembly, Integration, and Test (MAIT) activities.

The CDR must meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

The CDR Data Package (CDRL 10) must include as a minimum the CDRLs as per the due date and version in Appendix A.

3.5.8 Other Meeting or Review Requested by CSA, Related to BDC or Other

The Contractor must prepare and participate to meeting at the MFSP Platform System level for the purpose of planning and executing Baseline Data Collection (BDC), operational procedures development, PTOC integration activities. Meetings with NRC may also be required to resolve any interface questions or issues between the MFSP Platform and MSFP Cartridge Devices.

3.5.9 Phase 0/I/II Safety Reviews

The purpose of the Safety reviews is to demonstrate to NASA that the safety requirements are met, knowing that safety to the crew and vehicle are the highest-level requirement of the ISS. The Contractor must prepare a Flight Safety Data Package (FSDP) (CDRL 11) and must deliver it to CSA and then to the PSRP, after which the Contractor must schedule, via the PIM, and present at the actual Flight Safety Review (FSR) meeting, which is typically held at Johnson Space Center (JSC).

The CSA-NRC is responsible to prepare a FSDP for the Cartridge Devices.

3.5.10 CDR Action Items Closure

The Contractor must update the documentation to address all Action Items and RIDs submitted at the CDR. Final and approved versions of documents to be under CM control and delivered at Phase C2 closure.

3.5.11 PFM Manufacturing Readiness Review (MRR)

The Contractor must prepare and conduct an MRR and obtain CSA approval for the PFM unit prior to manufacturing the unit. Final versions of design, build, assembly and integration documents to be delivered and under CM control. The PFM MRR Data Package (CDRL 10) must include as a minimum the CDRLs as per the due date and version (see Appendix A).

3.5.12 PFM Test Readiness Review (TRR)

The purpose of a TRR is to demonstrate that the test article hardware or software, test facility, ground support personnel, and test procedures are ready for testing, and for data acquisition, reduction, and control.

At the completion of PFM assembly and integration and before the start of unit verification and validation, the Contractor must conduct a TRR to obtain CSA authorization before the start of formal testing. The Contractor must notify the CSA of the TRR in advance and provide the TRR data package (CDRL 10) including checklist at the TRR.

The Contractor will be provided with Cartridges (GFM) required to conduct the test.

The TRR must meet the objectives; entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

3.5.13 PFM Test Results Review Board (TRRB)

At the completion of PFM verification and validation activities, the Contractor must conduct a TRRB and present all functional, performance, environmental and integration test results.

All analysis is to be updated and finalized to correlate actual validation and qualification test results. Science verification and validation activities must also be presented.

The Contractor must notify the CSA of the TRRB in advance and provide the TRR data package (CDRL 10) including checklist at the TRRB.

3.5.14 Phase III Safety Review

After successful completion of all verification tests, the Contractor must schedule (via the PIM) and present the Phase III Safety Review with the goal of obtaining flight safety certification (reference PAR AD-05). The Contractor must prepare a FSDP (CDRL 11) according to the PSRP requirements as closure milestone of Phase C2. When the package is ready, it must be delivered to CSA and then to the PSRP, after which the Contractor must schedule, via the PIM, and present the actual FSR presentation at NASA. The CSA-NRC is responsible to prepare a FSDP for the Cartridge Devices.

3.5.15 Acceptance Review (AR)

For the EM, the PFM, the Contractor must hold an AR to demonstrate to CSA that the MFSP System has been finalized, can be accepted as built and as tested. All requirements for launch of the PFM must be entered and approved/closed by NASA Subject Matter Experts (SME) in the NASA Veritas database.

The AR must meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

The AR Data Package (CDRL 10) must include as a minimum the CDRLs as per the due date and version in Appendix A.

3.5.16 Pre-Ship Review (PSR)

The Contractor must hold a Pre-Ship Review (PSR) prior to shipment of the MFSP System to the NASA integration facility. The PSR may be combined with the AR.

The Contractor will be provided with Cartridges (GFM), as required. Conditioned stowage related to the GFM Cartridges (heated, cooled or frozen components and reagents) during transportation or on-board the ISS, must be less than 500 mL volume and 100 g mass required per Cartridge Device.

If fluids are to be stored and/or handled at temperatures colder than ambient, then the hardware used to store the fluids must meet the ISS Cold stowage Interface Requirements Document (AD-02). The provisions for cold stowage will be defined and verified by the NRC. For the purpose of commissioning only, the Contractor must submit the appropriate documentation and requests to NASA for manifest launch and stowage on orbit.

The PSR must meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

3.5.17 Baseline Data Collection with CSA/NASA

To support science evaluation of PFM commissioning, the contractor must pack/ship the EM unit to NASA's BDC facility at JSC and perform BDC activities with a crew representative. The contractor must pack/ship the EM unit for return to their facilities.

3.5.18 Delivery, Bench Review and Handover to CSA/NASA

The Contractor must provide resources, logistics, insurance and transport to deliver the MFSP system to CSA, NRC or NASA for bench review and/or final on-dock delivery. This includes performing post-shipping functional checkout of the system at the specified delivery location. The Contractor must be responsible for obtaining access clearance to the necessary NASA facilities. The Contractor must advise and coordinate with CSA accordingly. The Contractor will be provided with Cartridges (GFM) required for commissioning.

3.5.19 Commissioning Review (CR)

After the successful commissioning, the CR demonstrates that ground and flight hardware, ground and flight software, personnel, ground and flight procedures, ground and flight databases, ground and flight documentation are operationally ready. If this review is successful, CSA will declare the MFSP System operational.

The CR must meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (AD-03).

The Contractor must deliver the Commissioning Report as per CDRL 41.

3.5.20 Other Reviews and Meetings

Other reviews and meetings, that may be of less importance from a resources point of view, but nevertheless part of the review cycle or ISS Payload Integration process, must be supported at NASA. These typically include the Operational Assessment Review, HFIT, IPLAT, and the Operations Training Strategy Team (TST) as outlined in SSP57057, AD-08. The list of required meetings and reviews will be established by NASA-assigned PIM through the PIM Schedule.

3.6 LIAISON AND COMMUNICATION REQUIREMENTS

The Contractor must establish channels of communication with the CSA for monitoring of the Work and performance and therefore must provide access to its facility and personnel, at mutually agreeable dates, by representatives of the CSA or other organizations nominated by the TA. The Contractor must provide access to their office facilities and equipment on a temporary basis for the use of the CSA representatives (and the nominated attendees) visiting the Contractor's premises for reviews, meetings, audits, liaison, etc. Office facilities include desk space, telephone access and Internet access. The Contractor must also undertake to arrange at the TA's request for such facilities to be available at the major sub-Contractors. All documentation and data generated by the Contractor and its major sub-Contractors for the Work must be accessible to the TA for review.

3.6.1 External Communications

The Contractor communications external to the project Team must be coordinated and approved by CSA per contract clauses. This includes with the public, other companies or government entities, and conferences.

3.7 PRODUCT ASSURANCE, QUALITY, SAFETY AND MISSION ASSURANCE

3.7.1 Quality Assurance System

The Contractor must have in place and maintain throughout execution of the work a Quality Assurance (QA) System compliant to ISO 9001.

3.7.2 Product Assurance Implementation Plan

The Contractor must implement the Product Assurance Implementation Plan (PAIP) (CDRL 5) which must be compliant to the MFSP Product Assurance Requirements (PAR) (AD-05) to support all tasks under the Contract and subject to periodic review or audit by CSA or its designated representative(s). The approved PAIP must be used as the basis for determining compliance to PA requirements during any audits.

The Contractor must assure the overall MFSP System safety of the design that eliminates, reduces, or minimizes safety risk to an acceptable level. The Contractor must support all reviews of this safety documentation. The Contractor must meet as well the requirements for ground safety operations, as specified by the launch site or worksite used for hardware testing and/or processing. The PAIP, including the requirements compliance matrix, must be provided with the proposal as per CDRL 5.

3.7.3 Right of Access

A CSA PA representative must be provided the right of access, on a non-interference basis, to the Contractor and sub-Contractor Contractor facilities and information, documents and records related to deliverable items. The CSA representative must be provided reasonable facilities and equipment normally available to the Contractor's PA and engineering personnel and any other basic assistance so that CSA personnel can perform their duties with safety and convenience.

3.7.4 Audits

The CSA must have the right to perform audits of the Contractor and sub-Contractors to assess conformance to the expected PA for such Work. Data and documentation generated by the Contractor and sub-Contractor, including design and test data and PA program documentation, are subject to review, evaluation and inspection by the TA. The Contractor must notify the TA of any audits of sub-Contractors or suppliers. The CSA reserves the right to be represented at sub-Contractor and supplier audits performed by the Contractor.

3.7.5 Flight Safety Data Package (FSDP)

The contractor must prepare and submit to the NASA ISS Hazard System (IHS) the FSDP (CDRL 11) which includes as required, Hazard Reports, Hazardous Materials Summary Tables (HMST), Flammability Assessments and other presentations, analyses and reports related to the mitigation and control of hazards as defined in the MFSP PAR (AD-05).

3.7.6 Failure Modes Effect and Critical Assessment (FMECA)

The Contractor must prepare the FMECA report (CDRL 27) in accordance with the PAR (AD-05).

3.7.7 Parts Derating and Stress Analysis Report

The Contractor must perform and deliver a Parts Derating and Stress Analysis report (CDRL 31) for critical components in accordance with the PAR (AD-05).

3.7.8 Material Identification and Usage List (MIUL)

The Contractor must generate the MIUL (CDRL 28) in NASA format.

3.7.9 Declared EEE Parts List

The Contractor must generate Declared Electrical Electromechanical Electronic (EEE) Parts List (CDRL 29). The intent can be met by providing a manufacturing parts list, e.g., electronics parts Bill of Material (BOM).

3.7.10 Declared Mechanical Parts List

The Contractor must generate a Declared Mechanical Parts List (CDRL 30). The intent can be met by providing a manufacturing parts list, e.g., mechanical parts BOM.

3.7.11 Non-Conformance Review Board and Reporting

The Contractor must maintain non-conformance review board minutes and non-conformance reports in accordance with MFSP PAR (AD-05) and (CDRL 39).

3.7.12 Request for Deviation and Waiver

In the event that a requirement cannot be complied with, the Contractor must submit a Request for Deviation (RFD) or a Request for Waiver (RFW) (CDRL 40) as per the processes outlined in the PAR (AD-05).

3.7.13 Configuration Change and Data Management

The Contractor must maintain a CADM process that:

- a) Uniquely Identifies all of the functional and physical characteristics of the MFSP System;
- b) Controls changes to those characteristics;
- c) Provides status on change activity; and
- d) Controls audits.

This process must be documented in the PAIP (CDRL 5).

3.7.14 Configuration Change Control

The CADM process must also include provisions for comprehensively evaluating proposed or requested changes and variances and of assessing the total impact (technical, cost, schedule, risk, safety, etc.) of each change or variance. The Contractor must request approval from the Project Management (PM) before the implementation of any changes that affect requirements, safety, interface, form, fit, or function of the flight hardware or software.

3.7.15 Software Product Assurance

The Contractor must perform the required software product assurance process tasks on all on-orbit and ground command and control software per the PAR (AD-05). This process must be documented in the PAIP (CDRL 5).

3.7.16 End Item Data Package (EIDP)

The Contractor must deliver an EIDP with each unit delivered (PFM and flight spare if applicable) in accordance with the PAR (AD-05). This process must be documented in the PAIP (CDRL 5).

3.8 ENGINEERING**3.8.1 Verification Process**

The Contractor must produce a Test Plan (CDRL 21) describing how requirements will be verified. AD-01 and AD-02 contain MFSP Platform System Verification Matrices, which identify the method to be used for each requirement's verification.

Verification of requirements must be through one, or a combination of the following:

- a) Review of design;
- b) Similarity;
- c) Analysis;
- d) Simulation;
- e) Demonstration/fit-check;
- f) Inspection
- g) Test (functional and performance)
- h) Environmental Qualification or Acceptance Test

3.8.1.1 Review of Design

Verification by review of design is the process of reviewing the design against the requirements which cannot be demonstrated by test or analysis. This method is often used in conjunction with a demonstration.

3.8.1.2 Similarity

Verification by similarity is the process of assessing by review of prior test data that a unit is similar or identical in design and manufacturing to another unit that has been previously qualified to equivalent or more stringent specifications.

3.8.1.3 Analysis

As part of the design process, the Contractor must undertake analyses of technical aspects of the design as specified below.

3.8.1.3.1 Environmental Analysis

The MFSP Platform System must be designed and show by analyses to withstand the environments for launch and on-orbit operations for vibration, shock, Electromagnetic

Interference/Compatibility (EMC/EMI), acoustic and thermal, etc. as identified in AD-01, AD-02 and AD-05.

3.8.1.3.2 Structural Analysis

The MFSP Platform System mechanical and structural performance must be analyzed by means of Structural Mathematical Models (SMM), (CDRL 26) and calculate structural margins of safety with appropriate factors of safety. Individual critical components must be analyzed for margins of safety

3.8.1.3.3 Thermal Analysis

The MFSP Platform System thermal performance must be analyzed to ensure unit performance within the EXPRESS rack during operations as per AD-02. The analysis must also demonstrate touch temperatures of key crew interfaces within appropriate levels with margin.

3.8.1.3.4 Parameter Budget Analysis

The Contractor must perform analysis to provide key parameters, including but not limited to mass, center of gravity, power (inrush, average and peak), heat dissipation, telemetry uplink/downlink rates and packet sizes, etc.

3.8.1.4 Demonstration

Verification by demonstration is the use of actual demonstration techniques in conjunction with requirements such as, serviceability, accessibility, transportability and human engineering features. In general, demonstration is specified as the method of verification for physical attributes which have no numerical requirements associated with them. Demonstration may also be used for compatibility with shipping containers, interface fittings, handling features, etc.

3.8.1.5 Test

Functional and performance testing exercises the electrical and mechanical elements of a unit to establish that the unit under test performs in accordance with the specifications. Functional testing is generally performed at ambient conditions and before and after each environmental test or major shipment to confirm performance prior to the next test or operation.

At the completion of testing, a report or Technical Note (TN) must be provided capturing each units baseline (start of life) performance parameters.

3.8.1.6 Environmental Qualification Test

Environmental testing is conducted on flight hardware units to ensure they perform satisfactorily in an analog environment. Examples of environmental tests are vibration, acoustic, shock, thermal and EMC. Environmental testing may or may not be combined with functional testing depending on the objectives of the test.

3.8.2 Verification Plan (VP)

The Contractor must undertake a review of all the requirements and ensure that all have been captured in the Verification Plan (VP) (CDRL 18), which must be prepared and submitted to CSA for approval.

The Contractor must perform verification activities on the PFM to demonstrate that it complies with the requirements. The VP must be developed for the purposes of assessment and ultimately the validation leading to the acceptance and flight qualification of the MFSP Platform System as defined in section 3.8.1.

3.8.2.1 Validation Activities

The Contractor must validate all MFSP System science objectives and ground operations (PTOC) activities using the PFM. A report or TN must be provided capturing each units baseline (start of life) performance parameters.

3.8.3 Requirements Traceability and Verification Compliance Matrix

The Contractor must prepare a Verification Compliance Matrix (VCM) (CDRL 19) that identifies and traces each requirement identified in documents AD-01 and AD-02 to the Systems Requirements Documents (CDRL 16). In addition, the VCM must identify the verification method(s) to be used to satisfy the respective requirement. Additionally the VCM must be augmented with a compliance statement for each requirement, along with references to the applicable documentation, as well as the verification methods associated with the closure of each requirement.

In addition, the Contractor must submit verification evidence into the NASA Veritas database for approval. All applicable documentation must be provided to the CSA. The Contractor must provide the initial release of the VCM with the proposal as per CDRL 19. The initial release only includes the compliance statement for each requirement whereas updated versions to be provided at technical reviews must also include the verification activities.

At AR, the VCM must be final and identify all evidence delivered and approved for each respective requirement.

This matrix is a living document and may be updated incrementally as the project evolves from requirements through design manufacturing and testing.

4 CONCEPT AND TECHNOLOGY DEVELOPMENT (PHASE A)

4.1 SYSTEM REQUIREMENTS DEVELOPMENT

The Contractor must develop and deliver the MFSP Platform System (hardware and software) Requirements Documents (SRD) (CDRL 16), demonstrating compliance with AD-01 and AD-02 and that the system concept design will meet requirements within an acceptable level of risk. The Contractor must produce the Interface Control Document (ICD) (CDRL 34) for the hardware and software, including internal and external interfaces.

The Contractor must incorporate the Cartridge Device ICD from NRC information, provided and approved at the Interface Definition Review (IDR). Any updates to the ICDs after the IDR, must be approved by NRC and CSA and incorporated into the Contractor's documentation, which will be used to present the MFSP Platform System to NASA.

The Contractor must hold an IDR and present the ICD with support from the NRC for CSA approval. Following the IDR, the ICD will be released and under CM control; further updates must be coordinated with NRC and CSA.

In support of developing the MFSP Platform system requirements, conceptual designs of the interface may be presented for discussion. The selection of a concept for design must be coordinated with NRC and approved by CSA. The Contractor must develop the interface between the rotor and the Cartridge Device from the GFI specified in section 2.1. The Contractor must perform initial integration and analysis of the interface.

In addition, the Contractor must present any trade-offs, analysis or prototype testing used to address any risks in the system and demonstrate the designs intended compliance with the requirements.

The Contractor must hold an SRR and deliver CDRL per Table A-3 in Appendix A.3.

4.2 NASA PAYLOAD INTERFACE CONTROL DOCUMENT (ICD)

NASA payload interface requirements are documented in AD-02 and define the MFSP Platform System hardware and software interfaces with the ISS, including the interface verification requirements. The Contractor must provide support to the NASA PIRE by supplying inputs (CDRL 15) such as payload description, drawings, schematics, diagrams, parts lists, analysis and test reports, etc. Rational for non-applicable requirements must be approved by CSA and NASA. Exceptions, deviations and waivers must be processed in accordance with the PAR (AD-05). etc. as required for the development of the payload unique ICD.

5 PRELIMINARY DESIGN (PHASE B)

The Contractor must develop an initial design of the MFSP Platform that will demonstrate that the verification of requirements is feasible. The design documents include drawings, schematics, architectural diagrams, ICDs, Computer Aided Design (CAD) models, preliminary analysis reports and verification and test plans, as identified in the Data Deliverables Table A-3.

The Contractor must develop the Software Development Plan (SDP) (CDRL 35) and the Software Version Descriptions (SVD) (CDRL 36) documents to reflect the Software (SW) development process implemented. This must include GCTS as well as unit and ground test software.

5.1 MFSP PLATFORM AND CARTRIDGE DEVICES INTERFACE DEMONSTRATION

5.1.1 *Integration Demonstration Model*

The Contractor must build two (2) DMs to demonstrate the performance and functionality of the interface between the MFSP Platform rotor and a GFM development Cartridge Device provided by NRC. A report of the demonstration results must be provided as per CDRL 23.

5.1.2 *Development Cartridges*

The NRC will define, as a minimum two (2) generic Cartridge Devices which will represent the maximum and minimum physical (mass, volume, center of gravity) characteristics of the Cartridge Device envelope. This information will be provided to the Contractor for incorporation into the Contractor's test and verification plans and activities. Cartridge's quantity to be provided by NRC are defined in Appendix B.2

5.2 TECHNOLOGY READINESS AND RISK ASSESSMENT

The Contractor must perform a Technology Readiness and Risk Assessment (TRRA) in accordance with the requirements of the CSA Technology Readiness and Risk Assessment Guidelines (AD-04) to formally document the MFSP Platform System technology status. The Contractor must produce CDRL 14 for the TRRA using the Critical Technologies Elements Identification Criteria Worksheet (AD-10) as well as the Technology Readiness and Risks Assessment Worksheet (AD-09) for each Critical Technology Element (CTE).

5.3 NASA PAYLOAD INTERFACE CONTROL DOCUMENT (ICD)

NASA payload interface requirements defined in Phase A may be updated throughout Phase B based on NASA evaluations of the design. The Contractor must provide support to the NASA PIRE to review these updates and incorporate them into the ICDs, as required.

5.4 OPERATING PROCEDURES AND USERS GUIDE

The Contractor must develop the Operating Procedures and User Guide (CDRL 24), in collaboration with the CSA.

5.5 PRELIMINARY DESIGN REVIEW (PDR)

The Contractor must conduct a PDR of the MFSP System, in accordance with AD-03. The Contractor must integrate into the PDR data package the information related to the Cartridge Device interfaces. The NRC will prepare and present the PDR package for each Cartridge Device design. The Contractor must integrate in the agenda a portion of the PDR meeting duration for the NRC portion. NRC will deliver to CSA the Cartridge data package for PDR.

An initial release of the Declared EEE Parts List (CDRL-29) must be provided prior to PDR. Approval for procurement from CSA must be obtained for any long-lead items which may impact the overall schedule. This is not limited to flight parts, but can include COTS as well.

6 DETAILED DESIGN (PHASE C)

The Contractor is to update and finalize the detailed design and analysis of the MFSP Platform System and demonstrate compliance to requirements. All hardware and software design documents, models, drawings, schematics, ICDs and analysis reports, as identified in the Data Deliverables Table A-3, must be final and under CM control. Manufacturing plans and processes must be completed and released.

6.1 SOFTWARE DETAILED DESIGN

The Contractor must update and finalize all MFSP Platform, GCTS and GSE software and provide Version Description Documents (VDDs) to CSA for approval.

6.2 MFSP SYSTEM INTEGRATION DEMONSTRATION

The Contractor must build an EM model as per 3.2.3 to demonstrate the full functional and performance requirements of the MFSP Platform as per AD-01 and AD-02. The CSA/NRC will provide GFM proto-Cartridge Devices. A report of the demonstration results must be provided as per CDRL 23. This EM model is not required to go through environmental testing; it is left to the discretion of the contractor if said testing will be performed to reduce technical risks.

The contractor must update the two (2) DMs to be functionally equivalent to the EM.

6.3 GROUND COMMANDING AND TELEMETRY STATION INTEGRATED DEMONSTRATION

The Contractor must provide a VM of the Ground Commanding and Telemetry Software (GCTS-SW) and GCTSs and demonstrate operations with virtual integrated testing between the CSA PTOC and HOSC. CSA will support the Contractor to obtain from NASA, the necessary accounts/licenses and/or SW package for Telescience Resource Kit (Trek) and Ku-Forward.

The VM will be used to demonstrate Ground Operations C&DH interfaces between the PTOC and HOSC.

If necessary a second demonstration may be required to confirm resolution of issues.

6.4 NASA PAYLOAD INTERFACE CONTROL DOCUMENT (ICD)

NASA payload interface requirements defined in Phases A and B may be updated throughout Phase C based on NASA evaluations of the design. The Contractor must provide support to the NASA PIRE to review these updates and incorporate them into the ICDs, as required.

6.5 CRITICAL DESIGN REVIEW (CDR)

The Contractor must conduct a CDR of the MFSP System, in accordance with AD-03. The Contractor must integrate into the CDR data package the information related to the Cartridge Device interfaces. The NRC will prepare and present the CDR package for each Cartridge Device design. The Contractor must integrate in the agenda a portion of the CDR meeting duration for the NRC portion. NRC will deliver to CSA the Cartridge data package for CDR.

7 MANUFACTURING, ASSEMBLY, INTEGRATION AND TEST (MAIT), LAUNCH AND COMMISSIONING (PHASE D)

7.1 PROTO-FLIGHT MODEL (PFM) MANUFACTURING, ASSEMBLY, INTEGRATION AND TESTING (MAIT)

The Contractor must manufacture and assemble the MFSP Platform System PFM in accordance with the verified design presented at the CDR and in accordance with AD-05. The Contractor must perform functional and performance verification with the PFM to confirm that it complies with all requirements as specified in AD-01 and AD-02. Analysis reports must be updated to incorporate test results.

The NRC will provide flight Cartridge Devices to be used for science validation activities with the PFM. The NRC will provide Cartridge Devices per Appendix B. For each batch of each type delivered to the Contractor, NRC must deliver reports and documentation, including certificate of compliance. For internal aspect of the Cartridge Device, details will not be provided to the Contractor.

Prior to formal Verification Testing, the Contractor must perform a TRR with CSA/NRC.

CSA must have the right to witness any tests or inspection conducted on the MFSP Platform System. Availability of invitees must not delay the execution of the tests per the Contractor schedule. The CSA will not provide testing facilities or any GFE/Services.

7.2 EXPRESS PAYLOAD HARDWARE INTEGRATED TESTS

The Contractor must perform the EXPRESS payload hardware integrated tests with the PFM. The PFM must be EMI/EMC tested and have power quality characterization performed prior to integrated testing with the NASA SSITF.

The SSITF contains a Flight Equivalent Unit (FEU) of the EXPRESS rack, interfacing through the Payload Operations Integration Center (POIC) ground data systems. A TReK workstation is used to issue commands and view payload telemetry. The opportunity exists to review ground commands and simple crew procedures while interacting with the payload at the SSITF.

The contractor must also perform qualification environmental testing on the PFM to verify requirements for acoustic, vibration, data, thermal, mechanical, and human factors interfaces.

7.3 GROUND COMMANDING AND TELEMETRY STATION INTEGRATED TESTS

The PFM will be used to perform integration verification with the MSFC's MSFC SSITF. The Contractor must deliver the GCTS-SW and deliver GCTSs for this test.

7.4 GROUND COMMANDING AND TELEMETRY FROM CSA

After successfully performing GCTS integration and verification, the Contractor must deliver the GCTS-SW to CSA for installation on a CSA PTOC workstation for Commanding and Telemetry Operations.

7.5 NASA PAYLOAD INTERFACE CONTROL DOCUMENT (ICD)

As PFM verification is completed and approved by CSA, evidence must be entered into the NASA VERITAS database for NASA IRB verification closure.

7.6 OPERATING PROCEDURES AND USERS GUIDE

The Contractor must finalize the Operating Procedures and User Guide (CDRL 24), in collaboration with the CSA.

The Contractor must provide training manuals and train the CSA ground operators and science team on the use of the MFSP Platform System.

7.7 VERIFICATIONS

The Contractor must perform all required verification activities specified in Verification Plan (CDRL 18). The Contractor must perform the SVT, to ensure that the MFSP Platform System can generate science data with representative subjects. The Contractor must update the Requirements Traceability Verification and Compliance Matrix (CDRL19) to include evidence (e.g. test reports, analysis, demonstration) for each requirement as it becomes available and enter evidence in the NASA VERITAS database.

7.8 FLIGHT ACCEPTANCE/CERTIFICATION TESTS

The Contractor must undertake all the necessary tests to obtain the required flight Qualifications and Certifications for the PFM. Test reports must be issued following each test (CDRL 23).

7.9 GROUND SUPPORT FOR TESTS AFTER DELIVERIES

The Contractor must provide GSE and personnel support to perform a functional checkout at the required locations (e.g. NASA, NRC, etc.) after delivery of units to ensure performance has not been affected during transport.

7.10 TEST PROCEDURES AND TEST REPORTS

The Contractor must prepare the Test Procedures (CDRL 22).

The Contractor must prepare the Test Reports (CDRL 23).

7.11 NASA PAYLOAD INTERFACE CONTROL DOCUMENT (ICD)

As PFM verification is completed and approved by CSA, evidence must be entered into the NASA VERITAS database for NASA IRB verification closure.

7.12 PAYLOAD PREPARATION, LATE LOAD, PACKAGING AND LAUNCH

7.12.1 Launch Package

The Contractor must prepare the Launch package for delivery and hand over to NASA on the agreed upon Hardware on Dock (HW/OD) date. The launch package is comprised of the PFM unit, including any maintenance items (developed and manufactured by the Contractor), the commissioning Cartridge Devices including any consumables items (developed and manufacture by NRC) and provided to the Contractor as GFM. The HW/OD date is not applicable to late-load items of the Launch package. The HW/OD is determined and agreed upon through the Payload Integration schedule (i.e. PIM Schedule).

If it is determined that some of the launch package or commissioning items require stowage at cold temperatures, then the cold-stowed hardware will need to be appropriately identified to NASA and cold stowage requirements integrated into the IRB and verified as to its compatibility with NASA-provided cold stowage refrigeration and transportation equipment.

7.12.2 Launch Campaign

The Contractor must support the launch activities at the launch site for any late-load items of the launch package.

Items are considered late-load when they have a short life before being used, and cannot survive the time period between non late-load item delivery to NASA and the launch, which is several months. An example of a late-load item is a set of biological samples that must be kept colder than ambient temperature and have a life of only a few weeks. Late-load items must be delivered to NASA 48 hours before launch, are logistically much more demanding than the non-late-load deliveries, require on-site launch support. Late-load versus non late-load decisions are Contractor/NRC recommended and must be approved by CSA.

8 PHASE E LOGISTIC AND SUSTAINING ENGINEERING PLAN

Phase E contract will be awarded at a later time following optional phase D.

To that aim, the Contractor must produce a Phase E L&SE support plan (CDRL 37) including cost estimate in support of the planning and implementation of future post-commissioning activities. A concept of this support plan and Rough Order of Magnitude (ROM) cost estimate must be produced at PDR. The plan and cost must be updated and refined through CDR and AR. The final version must be delivered after Commissioning Review (CR). Pricing must be on a cost reimbursement basis.

The Phase E L&SE support plan must also include and outline a sparing approach.

The Contractor must include in phase D budget planning for spares in sufficient quantities to ensure that all ground models (including the DMs and EM) are maintained in fully operational condition to support a minimum of two (2) years of operations (hereafter called the “operational period”). Any repairs, replacement, or refurbishment activities must not impose a downtime greater than one (1) month or as negotiated with CSA on a case by case basis. The sparing approach must take into account the criticality of the pieces and the lead time for procurement (less critical pieces do not require sparing while long-lead items must be considered).

The models planned to remain on ground (one (1) EM and two (2) DMs) will exceed the ISS PFM usage. These are necessary for various activities such as debugging, Cartridge Device development, protocols tests and validations, baseline data collection and training for ground personnel etc. Units remaining on the ground must meet the same availability requirement as the ISS PFM. Spare kit must be included in phase D budget.

During Phase E, the contractor may be called on to upgrade the EM to a flight spare. The contractor would be required to upgrade, acceptance test and deliver to NASA this flight spare unit. The Phase E plan must include costing for this activity to be accomplished within four (4) months of go-ahead from CSA. Critical components flight spare kit must be included in phase D budget, and must be procured for the AR.

During Phase E, the contractor may be called on to repair a failed flight unit. The contractor would be required to repair, upgrade, acceptance test and deliver to NASA this flight unit. The Phase E plan must include costing for this activity to be accomplished within four (4) months of go-ahead from CSA. Critical components flight spare kit must be included in phase D budget, and must be procured for the AR.

9 DOCUMENT DELIVERABLES

The Contractor must prepare and deliver the documents as requested in the Appendix A.

9.1 DOCUMENT DELIVERABLES, FORMAT AND CONTENT

The Contractor must ensure that documents delivered comply with the general preparation instructions and applicable DID or Contractor Format (CF) which meets or exceeds the intent of the applicable DID.

Documents must be delivered in the original software application format, plus in Portable Document Format (PDF). One electronic copy of each deliverable document must be transferred to the CSA at the address and in the format specified in DID-0000. No paper copy is to be delivered, except when requested by the TA.

9.2 DOCUMENTS APPROVAL

The term “Approval”, as used in this document and in other documents referred to herein, means written approval by the PM, of documents submitted by the Contractor. Once approved, the document is authorized for further use by the 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 PM’s approval. No request or document for which approval is required may be acted upon or implemented by the Contractor until such approval is provided. Such requests and documents will be reviewed promptly by the PM and the necessary written approval or disapproval will be provided after their receipt by CSA. In the event of a failure by the PM to approve or disapprove the document within fifteen (15) working days, the documents may be deemed approved.

In the event that a request or document is disapproved, the PM will advise the Contractor in writing as to the reasons for such disapproval and will define the additions, deletions or corrections that the PM 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 PM. Approval or disapproval of resubmitted requests or documents will be based solely on those points that were not previously deemed to be acceptable.

9.3 DOCUMENTS 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 PM of a document for review implies 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 PM does not concur with a document submitted for review, the PM will so notify the Contractor within fifteen (15) working days of the document submission. Such notification will include a full explanation of the reasons for the lack of concurrence and will recommend the additions, deletions and/or corrections, which the PM deems are beneficial to 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 and this SOW. If written notification of concurrence is not provided by the 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 PM without comment.

APPENDICES

A DELIVERABLES AND CONTRACT DATA REQUIREMENTS LIST (CDRL)

The section describes the hardware, software and the data deliverables.

A.1 HARDWARE DELIVERABLES

These deliverables must be delivered, on-dock at NASA unless otherwise noted, in their Contractor-provided shipping containers and in launch configurations as follows:

TABLE A-1 – HARDWARE DELIVERABLES

Deliverable	Due Date	Quantity	Delivery On-Dock Location	Notes
Demonstration Model (DM)	PDR CDR	2 2 updated	CSA	If BDC scheduled for Commissioning purposes, 1 DM will be required at JSC BDC facilities.
Functionality Demonstration Tool	EQM TRR	2*	CSA	One for the EQM, and one for the GM. *Defined quantity if tool is reusable, if not, quantity to be determined at PDR.
EM + Maintenance Kit	CDR Phase D	1 1 updated	CSA	EM Maintenance Kit includes equipment such as tools, spares and consumables required to meet the EM maintainability, serviceability and availability requirements. In phase D, the EM is updated to simulate the PFM (if required) and delivered to CSA/NRC to validate PFM Cartridge Devices. After EM & GM delivery the EQM will be located at the Contractor.
PFM +Maintenance Kits	AR	1 PFM	NASA	1 PFM for flight 1 EM for ground activities Maintenance Kits include equipment such as tools, spares and consumables required to meet the maintainability, serviceability and availability requirements.
Critical Components Flight Spares Kit	AR	1 kit	CSA	Critical components kit, to be used to upgrade the EM to a full flight spare. Activity to perform the upgrade and delivery to be performed in Phase E.
Commissioning Kits (non late-load and late-load if any)	Same as PFM for non late-load items. 48 hours before launch for late-load items	1 non late-load items 1 late-load items	1 non late-load items and 1 late-load items to NASA	The PFM is commissioned on the ISS (with its commissioning kit delivered to NASA).
Ground Support Equipment (GSE)	Same as EM and PFM	4	1 for PFM to NASA** 1 for EM to Contractor	A GSE must contain all equipment and interconnecting items to completely operate one MFSP System on the ground, like if it was connected and operated from an

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Deliverable	Due Date	Quantity	Delivery On-Dock Location	Notes
			2 for DMs at NRC and Contractor	EXPRESS rack. A GSE must be delivered in its shipping container.
Ground Commanding and Telemetry Stations (GCTS)	Same as PFM and EM	2	1 for PFM to NASA** 1 for EM to Contractor	This support equipment is for command and telemetry monitoring, through the CSA infrastructure or the Contractor.

Legend:

**These hardware deliveries to NASA might have to be reshipped back to CSA after use at NASA and contractor is responsible for shipping and handling

A.2 SOFTWARE DELIVERABLES

The Contractor must package and deliver the software listed in Table A-2 and the Software EIDP (CDRL 12).

TABLE A-2 – SOFTWARE DELIVERABLES

No.	Deliverable	Due Date	Quantity	Location
1	Virtual Machine	CDR	2	PTOC HOSC
2	MFSP Systems software and firmware and GCTS-SW installed on the delivered hardware	Same date as hardware deliverables	Same quantity as hardware deliverables	Same location as hardware deliverables
3	Systems software and firmware (GCTS-SW) to be installed in CSA PTOC	Same date as hardware deliverables	1	CSA
4	All software (source code, graphic models, CAD models, engineering drawings, system definition files, initialization files, scripts, libraries etc.) required for the delivery of the MFSP system	AR (part of EIDP)	1 of each final version	CSA

All delivered non-COTS software must include executable code, the source listings and source files, compiled files, configuration and parameter files, reloadable Field Programmable Gate Array (FPGA) configuration files, test scripts, design documentation, users' manuals, test results and associated plans and procedures.

All third party software must be accompanied by a license (free of charge) that allows the software to be archived and copied as necessary for all future CSA operations.

All software (i.e., non-COTS and COTS) must be accompanied by a license (free of charge) that allows CSA to use the software for the operational period after completion of commissioning.

A.3 DATA DELIVERABLES

These Data Deliverables must be delivered as per Table A-3. CSA review of advanced draft encouraged, unless otherwise indicated, as follows:

TABLE A-3 – CONTRACT DATA REQUIREMENTS LIST (CDRL)

CDRL No.	Cat.	Deliverable	Due Date	Version	Approval / Review	DID No. or CF ***
1.	PM	Project Management Plan	Proposal, Update as required	IR Final	A	0001 or CF
2.	PM	WBS and Work Package Description	Proposal, Update as required	IR Final	A	0002 or CF
3.	PM	Project Schedule	Proposal, Monthly	IR Update	R	0004 or CF
4.	PM	Monthly Progress Reports	End of month + 5 working days	Final	R	0003
5.	PA	Product Assurance Implementation Plan (PAIP) including PA Requirements Compliance Matrix	Proposal, Update as required	IR Final	A	0029 or CF
6.	PM	Meeting Agendas	Meeting – 5 working days	Final	R	0005 or CF
7.	PM	Meeting Minutes	Meeting + 5 working days	Final	R	0006 or CF
8.	PM	Action Items Log (AIL)	Monthly	Final	R	0007 or CF
9.	PM	Meeting/Review Presentations	Meeting – 5 working days	Final	R	CF
10.	PM	Review Data Package	Review – 10 working days	IR	R	0008
11.	PA	Flight Safety Data Package (FSDP) I, II and presentation FSDP III and presentation	As per NASA process Phase D closure	Final Final	A A	As per NASA format
12.	PA	End Item Data Package (hardware and software)	AR – 10 working days Update as required	IR Final	A	0010 and 0011 or CF
13.	PM	BIP/FIP Disclosure Report	Proposal (BIP) CDR – 10 working days End of Contract (BIP/FIP)	IR update Final	A	0013

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CDRL No.	Cat.	Deliverable	Due Date	Version	Approval / Review	DID No. or CF ***
14.	SE	Critical Technologies Elements Identification Criteria Worksheet, Technology Readiness and Risk Assessment Worksheets and Rollup	Proposal PDR– 10 working days	IR Update	R	0014
15.	SE	Inputs to the NASA Payload Interface Requirements Baseline (IRB)	IDR As requested by NASA	IR Final	A	As per NASA format (VERITAS)
16.	SE	System Requirements Document (hardware and software)	SRR – 10 working days Update as required	Final	A	0017 or CF
17.	SE	Design Documents (hardware and software)	PDR– 10 working days CDR– 10 working days Phase C closure – 10 working days AR – 10 working days	IR Update Final Update if required	R	0018 or CF
18.	SE	Verification Plan	SRR– 10 working days PDR– 10 working days CDR – 10 working days TRR– 10 working days	IR Update Update Final	A	0019 or CF
19.	SE	Verification Compliance Matrix	Proposal SRR– 10 working days PDR– 10 working days CDR– 10 working days AR – 10 working days End of Contract	IR Update Update Update Update Final	A	0020
20.	SE	Design, Assembly and Interface Control Drawings (mechanical and electrical).	IDR – 10 working days PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days End of Contract	Draft IR Update Final Update if required Update if required	R	CF

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CDRL No.	Cat.	Deliverable	Due Date	Version	Approval / Review	DID No. or CF ***
21.	SE	Test Plan (hardware and Software)	SRR– 10 working days PDR– 10 working days CDR– 10 working days CDR closure– 10 working days PFM TRR – 10 working days AR – 10 working days	IR Update Final Update if required Update if required Updates if required	A	0021 or CF
22.	SE	Test Procedure (hardware and software)	CDR – 10 working days TRR UUT – 10 working days	IR Final	A	0022 or CF
23.	SE	Test Reports (hardware and Software)	Test + 10 working days	Final	R	0023 or CF
24.	Ops	Operating Procedures and Users Guide	PDR -10 working days CDR– 10 working days Phase C closure – 10 working days AR – 10 working days CR – 10 working days	IR Update Final Update if required Update if required	R	0024 or CF
25.	Ops	Crew and Ground Operator Training and Procedures, figures, instructions, diagram and video-clips	As required by CSA and NASA CDR– 10 working days Phase C closure– 10 working days AR – 10 working days CR – 10 working days	IR Update Final Update if required Update if required	R	As per required format by CSA/ NASA
26.	SE	CAD Models & Analyses	IDR – 10 working days SRR– 10 working days PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR– 10 working days	Draft IR Update Update Final Update if required	A for Analyses R for Models	0025 or CF
27.	PA	Failure Modes, Effects and Criticality Assessment (FMECA)	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR Update Final Update if required	A	CF

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CDRL No.	Cat.	Deliverable	Due Date	Version	Approval / Review	DID No. or CF ***
28.	PA	Material Identification and Usage List (MIUL)	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR Update Final Update if required	A	NASA format
29.	PA	Declared EEE Parts List	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR Update Final Update if required	R	CF (i.e. manufacturing parts list)
30.	PA	Declared Mechanical Parts List	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR Update Final Update if required	R	CF
31.	PA	Parts Derating and Stress Analysis	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR Update Final Update if required	R	CF
32.		Intentionally left blank				
33.	SE	Product Tree	SRR– 10 working days PDR– 10 working days CDR– 10 working days AR – 10 working days	IR Update Update Final	R	CF
34.	SE	Interface Control Document (ICD) (Hardware and Software)	IDR – 10 working days SRR – 10 working days PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR Update Update Final Update if required Update if required	A	CF
35.	SE	Software Development Plan	SRR– 10 working days PDR– 10 working days CDR– 10 working days	IR Update Final	A	0026 or CF

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CDRL No.	Cat.	Deliverable	Due Date	Version	Approval / Review	DID No. or CF ***
36.	SE	Software Version Description Document	PDR – 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days	IR update Final Update if required	R	0027 or CF
37.	SE	Phase E Plan	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days CR + 10 working days	IR Update Final Update if required Update if required	R	0028 or CF
38.	SE	Commissioning Plan	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days CR– 10 working days	IR Update Final Update if required Update if required	R	CF
39.	PA	Non-Conformance Reports	Non-Conformance As required AR – 10 working days	IR Update Final	A	0030 or CF
40.	PA	Request for Deviation/Waiver	As required	Final	A	0031 or CF
41.	Ops	Commissioning Report	CR+10 working days	Final	R	CF
42.	SE	Interface Requirements Document	IDR – 10 working days	Final	A	0032
43.	PM	Outcomes Report	End of each Fiscal Year	Final	R	0033
44.	PM	Project Cost Estimation	No later than 20 working days after the Phase A contract award No later than 15 working days after the SRR	IR Final	A	0034
45.	SE	Documentation Tree	PDR– 10 working days CDR– 10 working days Phase C closure– 10 working days AR – 10 working days CR– 10 working days	IR Update Final Update if required Update if required	R	526

*** CF= format chosen by the Contractor which meets or exceeds the intent of the applicable DID if provided.

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B GOVERNMENT FURNISHED**B.1 GOVERNMENT FURNISHED INFORMATION (GFI)**

See section 2.1, Applicable Documents.

B.2 GOVERNMENT FURNISHED MATERIAL (GFM)

Cartridges will be provided to the Contractor per this table or per agreement between CSA-NRC-Contractor.

Deliverable	Due Date	Qty	Delivery On-Dock Location	Notes
Sample Cartridges	IDR	2	Contractor	A minimum size and a maximum size Cartridge Devices with platform blade interface. Upon request by the Contractor and approval by CSA, additional Cartridge Devices will be provided
Demonstration Models	PDR -4 months & -2months	8	Contractor	For Platform-Cartridge Device interface testing on MFSP Platform Demonstration model (DM). Cartridges models to be decided at SRR.
EM	CDR -4 months & -2 months-	8	Contractor	For system demonstration of all FPRD reqts and ops procedures on MFSP EM system: 2 for each of 2 Cartridge Device types to be developed by NRC and delivered in 2 batches.
PFM	PFM TRR -4 months & -2 months-	8	Contractor	For verification and qualification with MFSP PFM unit:1 +1 spare for each of the 2 Cartridge Device types to be developed by NRC and delivered in 2 batches.
BDC	BDC -1months	8	Contractor	For BDC activities at NASA with MFSP PFM unit:1 +1 spare for each of the 2 Cartridge Device types to be developed by NRC.
Commissioning (post-acceptance)	AR – 1 month	8	CSA	For commissioning:1 +1 spare for each of the 2 Cartridge Device types to be developed by NRC Cartridges models to be decided at CDR.
PFM flight connectors	CDR	2	CSA/NASA	For power and data PFM model interfaces only. Flight equivalent connectors to be procured by contractor for EM model.
EXPRESS Mid-deck Double Locker Payload Housing	CDR	2	CSA/NASA	For PFM and EM model.

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DID-0000 - General Preparation Instructions

PURPOSE:

This DID specifies

- a) format requirements for project documents and data delivered by the supplier in compliance with the Contract Data Requirements List (CDRL)
- b) document and data delivery methods and communication of submission and receipt

INSTRUCTIONS:

1. GENERAL REQUIREMENTS:

- 1.1. All documents and data must be written in the English language. The term “Documents” includes change requests, change notices and requests for deviations and waivers.
- 1.2. All documents must include the following notification at the bottom of the cover page:

© GOVERNMENT OF CANADA [YEAR]

RESTRICTION ON USE, PUBLICATION OR DISCLOSURE OF PROPRIETARY INFORMATION

This document is a deliverable under contract no. _____. This document contains information proprietary to the Crown, or to a third party to which the Crown may have legal obligation to protect such information from unauthorized disclosure, use or duplication. Any disclosure, use or duplication of this document or any of the information contained herein for other than the specific purpose for which it was disclosed is expressly prohibited except as the Crown may otherwise determine.

- 1.3. Documents and data must be released by the supplier and submitted in native electronic format (Microsoft Word, Excel, MS Project, etc.) and in PDF format. Schedules must be submitted in Microsoft Project format (or equivalent) and PDF format.

2. DELIVERY METHODS:

- 2.1. The method of document and data submission and receipt will be coordinated by CSA and the Contractor:
 - 2.1.1. Documents and data may be delivered via
 - a. e-mail attachments;
 - b. direct transfer (FTP);
 - c. retrieval from the Contractor’s repository, once CSA has received a notification of the document's release and its location in the repository; or
 - d. DVD or CD-ROM media.
 - 2.1.2. Electronic documents and data or notifications of their availability must be sent to the CSA CM Receipt Desk: asc.bibliothequegc-cmlibrary.csa@canada.ca

2.1.3. Emails are to contain:

- a. in the "Subject" line, the MFSP acronym and the CDRL number.
- b. in the email text:
 - 1) Document Number & Title;
 - 2) Document Revision;
 - 3) CDRL Identifier;
 - 4) Security Designation of the contents. Indicate if contents are subject to ITAR, when applicable.

2.1.4. Media or hard copy deliverables are to be addressed to:

CM Library, 6A-100
Attention: CSA <<Project Name>> Project
Canadian Space Agency
6767, Route de l'Aéroport
Saint-Hubert, QC, J3Y 8Y9
CANADA

2.1.5. The DVD/CD-ROM labels must include the following information:

- a. Contractor Name
- b. Contractor CAGE Code
- c. Document Title
- d. Document Number
- e. Document Revision
- f. Document Release Date
- g. Contract Number
- h. CDRL Identifier
- i. Security Designation of the contents. Indicate if contents are subject to ITAR, when applicable.

2.1.6. Media or hard copy deliverables containing classified information, protected information or ITAR information are to be in compliance with the Canadian Government Security Policy, Access to Information Act and the Privacy Act.

DID-0001 - Project Management Plan

PURPOSE:

The Project Management Plan (PMP) is used to guide both project execution and project control.

The PMP is used by the Government to assess the adequacy of the Contractor's plan for management of the work and to provide a basis on which to monitor and assess the progress of the work.

PREPARATION INSTRUCTIONS:

The PMP is used to:

- Guide the project execution;
- Document project planning assumptions;
- Document project planning decisions regarding alternatives chosen;
- Facilitate communications amongst shareholders;
- Define key management reviews as to content, extent and timing; and
- Provide a baseline for progress measurement and project control.

When the Contract has specified delivery of another document that contains aspects of the required information, the PMP should summarize these aspects and refer to the other document.

The PMP must contain the following information, as a minimum:

1. Introduction

- a) Project Objectives;
- b) Scope of the Plan; and
- c) Applicable and Reference Documents.

2. Project Integration Management

This section must describe the processes planned to be used to ensure that the various elements of the project are properly coordinated. It must describe:

- a) The overall project management strategy, including the sub-Contractor roles and responsibilities;
- b) How the plan will be executed; and
- c) Overall change control mechanisms.

3. Project Scope Management

This section must describe the processes planned to be used to ensure that the project includes all the work required, and only the work required, to complete the project successfully. It must address:

- a) Initiation;
- b) Scope Planning;
- c) Scope Definition;
- d) Scope Verification; and
- e) Scope Change Control.

4. Project Time Management

This section must describe the processes planned to be used to ensure timely completion of the project. It must address:

- a) Activity Definition;
- b) Activity Sequencing;
- c) Activity Duration Estimating
- d) Schedule Development; and
- e) Schedule Control.

This section must include the detailed project baseline schedule down to the activity level. The baseline schedule must include all elements of the WBS and must depict all linkages and dependencies.

5. Project Cost Management

This section must describe the processes planned to be used to ensure that the project is completed within the approved budget. It must address:

- a) Resource Planning;
- b) Cost Estimating;
- c) Cost Budgeting; and
- d) Cost Control.

6. Project Quality Management

This section must describe the processes planned to be used to ensure that the project will satisfy the needs for which it was undertaken. It must address:

- a) Quality Planning;
- b) Quality Assurance; and
- c) Quality Control.

7. Project Human Resources Management

This section must describe the processes planned to be used to make the most effective use of the people involved with the project. It must address:

- a) Organisational Planning;
- b) Staff Acquisition; and
- c) Team Development.

8. Project Communications Management

This section must describe the processes planned to be used to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. It must address:

- a) Communications Planning;
- b) Information Distribution;
- c) Performance Reporting; and
- d) Administrative Closure.

9. Project Risk Management

This section must describe the processes planned to be used to identify, analyze and respond to projects risks. It must address:

- a) Risk Identification;
- b) Risk Quantification;
- c) Risk Response Development; and
- d) Risk Response Control.

10. Project Procurement Management

This section must describe the processes planned to be used to acquire goods and services ("products") from outside the Contractor's organisation. It must address:

- a) Procurement Planning;
- b) Solicitation Planning;
- c) Solicitation;
- d) Source Selection;
- e) Contract Administration; and
- f) Contract Closeout.

DID-0002 – WBS and Work Package Descriptions

PURPOSE:

The Work Breakdown Structure (WBS) is used for estimating resources and scheduling the work, and for reporting and controlling costs and schedule.

PREPARATION INSTRUCTIONS:

The Contractor must provide an integrated 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 the work covered by the WPD;
- h) Assumptions;
- i) Output & Deliverables;
- j) Issue date;
- k) Version number.

DID-0003 – Progress Report

PURPOSE:

The Progress Report records the status of the work done to date and in progress during the previous calendar period. The Progress Report is used by the Government to assess the Contractor's progress in performance of the work.

PREPARATION INSTRUCTIONS:

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

Each progress report shall answer the following three questions:

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

Each negative response must be supported with an explanation.

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

- 1) Summary outlook, including technical performance, work performed, schedule and cost status (at CWBS level 2), organization and key personnel changes and areas of concerns;
- 2) Financial status including actual and forecasted expenditures, by month, as compared to the original monthly planned expenditure profile;
- 3) For cost reimbursable contracts: Cost performance status in tabular form, with the following information provided for each Work Package (WP):
 - a) Budgeted Cost of Work Scheduled (BCWS), current and cumulative,
 - b) Budgeted Cost of Work Performed (BCWP), current and cumulative,
 - c) Actual Cost of Work Performed (ACWP), current and cumulative,
 - d) Cost variance (current and cumulative),
 - e) Budget at completion (BAC),
 - f) Estimate at completion (EAC),
 - g) Cost variance at completion, and
 - h) Cost Performance Index (CPI);
- 2) For fixed price contracts: Updated milestones payment plan;

- 3) 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 shall be provided, and
 - g) All other activities having an impact on WP delivery date shall be provided;
- 4) Schedule variances from the plan, including deviations from schedule and proposed corrective actions for significant variances;
- 5) Major meetings schedule update;
- 6) Status of the work in progress, specifically the work performed in the previous calendar period; sufficient sketches, diagrams, photographs, etc. shall be included, if necessary, to describe the progress accomplished;
 - 1) The work projected for the next period, and estimated date of completion of next milestone;
- 7) Outline of technical and programmatic issues, with solutions recommended;
- 8) Contractual issues, including changes to activities and costs;
- 9) Subcontracts events, status and issues;
- 10) Equipment ordered, received, made and assembled;
- 11) Description of trips or conferences connected with the Contract during the period of the report;
- 12) 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;
- 13) PA 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 PA 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) Inspection and Test Status,
 - iii) Deviations/Waivers status,
 - iv) List of Class I Non-conformances,
 - v) List of Class II Non-conformances,
 - vi) PA documentation status,
 - vii) PA Action Item Log,

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- viii) Contractor problem status, and
- 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,
 - ii) 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),
 - iii) Significant problems or issues that could affect cost, schedule and/or performance, and
 - iv) iv) Plans for upcoming software assurance activities; and
- 14) Status of all action items from previous review(s) and meeting(s)

DID-0004 – Project Schedule

PURPOSE:

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

PREPARATION INSTRUCTIONS:

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

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

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

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

Tasks that are not related to any specific deliverable, such as Project Management and Quality Assurance activities, must be grouped separately from the groups of deliverables, and must be shown at the top of the chart. The schedule must be provided in MS project format or equivalent compatible with MS project.

DID-0005 – Meeting Agenda

PURPOSE:

To clarify 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;
- f) Mandatory and desirable attendance; and
- g) Expected duration.

2. DOCUMENT BODY:

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

DID-0006 – Minutes of Meetings

PURPOSE:

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

PREPARATION INSTRUCTIONS:

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

- 1) Title page containing the following:
 - a) Title, type of meeting, date, time and duration.
 - b) Project title, project number, and contract number,
 - c) Space for signatures of the designated representatives of the Contractor, the CSA and the Public Works and Government Services Canada (PWGSC), and
 - d) Name and address of the Contractor;
- 2) Purpose and objective of the meeting;
- 3) Location;
- 4) Agenda (DID-0005);
- 5) Summary of the discussions, decisions and agreements reached;
- 6) List of the attendees by name, position, phone numbers and e-mail addresses as appropriate;
- 7) Listing of open action items and responsibility for each action to be implemented as a result of the review;
- 8) Other data and information as mutually agreed; and
- 9) The minutes must include the following statement:

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

DID-0007 – Action Items Log

PURPOSE:

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

PREPARATION INSTRUCTIONS:

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

- 1) Item Number;
- 2) Item Title;
- 3) Description of the action required;
- 4) Open Date;
- 5) Source of AI (e.g. PDR meeting, RID, etc.);
- 6) Originator;
- 7) Person responsible (for approving closure of the action);
- 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.

DID-0008 – Review Data Packages

PURPOSE:

The Review Data Package is a collection of all documents to be presented by the Contractor for all formal Technical Reviews:

PREPARATION INSTRUCTIONS:

Each Review Data Package must contain the documents identified in the CDRL table in appendix A as due for that review, plus the presentations made at the meeting, the agenda, the minutes, and the AI list.

The Review Data Package must also contain a self-assessment by the Contractor with respect to the entry and exit criteria as defined in AD-03.

DID-0010 – End Item Data Package (EIDP)

PURPOSE:

Data to document the design, fabrication, assembly, integration and testing of the deliverable hardware.

PREPARATION INSTRUCTIONS:

An EIDP must be prepared for each deliverable assembly. The EIDP must be delivered in electronic format with a search function or interface. Upgrade changes performed as a result of the first phase deployment must be clearly identified. The contents of the package must include, but not be limited to, the following information:

- 1) All hardware prototype and GSE including cables
- 2) As-Built data: "As-Built" hardware documentation is a compilation of items describing exactly the configuration of a fabricated serialized assembly including:
 - a) Part number and revision letter of each item
 - b) Part description (title) of each item
 - c) Electronic part reference designation
 - d) Manufacturer
 - e) Procurement specification or Source Control Drawing (SCD) number and SCD revision letter.
- 3) A complete list of the tests performed including a compilation of test data and test results for each test.
- 4) A list of open work/tests
- 5) Listing of the As-Designed drawings & parts list, with reconciliation of As-Designed vs. As-Built for any deltas between them, for each indentured line item of the end item deliverable.
- 6) A summary and copies of all deviations and waivers applicable to the deliverable items.
- 7) A one time delivery, with updates as required:
 - a) A complete and up-to-date top assembly drawing of each type of delivery.
 - b) Complete and up-to-date mechanical and electrical Interface Control Documents (ICDs) (interface drawings and specifications), for each delivery.
 - c) For electronic assemblies, a complete set of circuit schematics and circuit data sheets available for review at the Contractor's premises.
- 8) Certificate of Compliance
- 9) A summary and copies of all Class 1 Non-Conformance.

DID-0011 – Software End Item Data Package

PURPOSE:

Data to document the design, development, integration and testing of the deliverable software.

PREPARATION INSTRUCTIONS:

An EIDP must be prepared for each deliverable software. The contents of the package must include, but not be limited to, the following information:

- 1) As-built product identification, including:
 - a) Identification of software release by program ID, phase, version, date, and build,
 - b) Operating system name and version,
 - c) Programming language name, compiler name, and version,
 - d) Supporting development environment name and version (if any);
- 2) Final VDD;
- 3) List all required software related documentation (under CM control), including the software design documentation, users' manuals, test procedures, scripts and test results;
- 4) All software source codes, executables, configuration and parameter files, reloadable FPGA configuration files;
- 5) All third party software; third party software must be accompanied by a license that allows the software to be archived and copied as necessary for all future CSA operations;
- 6) A list of all COTS software and computers purchased under this contract;
- 7) All COTS software purchased under this contract (original disk or file with license to CSA), GSE software etc.; and
- 8) A list of all open/closed anomalies or liens against this delivery. All flagged or major anomalies should be closed prior to the delivery.

All software must be delivered on media that is directly compatible with the delivered hardware. One set of software must be installed on the delivered hardware. A second set must be supplied on a CD-ROM or DVD disk.

DID-0013 – Background and Foreground Intellectual Property (BIP/FIP) Disclosure Report

PURPOSE:

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

PREPARATION INSTRUCTIONS:

The Contractor must complete Table 1 for the report to be provided with the proposal (BIP). The report to be provided must include Tables 1, 2 and 3 (BIP/FIP).

Background Intellectual Property (BIP)

Table 1 - Disclosure of Background Intellectual Property (BIP) brought to the project

BIP ID#	Project Element	Title of the BIP	Type of IP	Type of access to the BIP required to use/improve the FIP	Description of the BIP	Reference documentation	Origin of the BIP	Owner of the BIP
<i>Provide ID # specific to each BIP element brought to the project e.g. BIP-CON-99 where CON is the contract acronym</i>	<i>Describe the system or sub system in which BIP is integrated (e.g. camera, control unit, etc.)</i>	<i>Use a title that is descriptive of the BIP element integrated to the work</i>	<i>Is the BIP in the form of an invention, trade secret, copyright, design, patent?</i>	<i>Describe how the BIP will be available for Canada to use the FIP(e.g. BIP information will be incorporated in deliverable documents, software will be in object code, etc.)</i>	<i>Describe briefly the nature of the BIP(e.g. mechanical design, algorithm, software, method, etc.)</i>	<i>Provide the number and full title of the reference documents where the BIP is fully described. The reference document must be available to Canada. Provide patent# for Canada if BIP is patented.</i>	<i>Describe circumstances of the creation of the BIP Was it developed from internal research or through a contract with Canada? If so, provide contract number.</i>	<i>Name the organization that owns the BIP. Provide the name of the subcontractor- if not owned by the prime Contractor.</i>

Foreground Intellectual Property (FIP)

Table 2 - Disclosure of the Foreground Intellectual Property (FIP) developed under the Contract

FIP ID #	Project Element	Title of FIP	Type of FIP	Description of the FIP	Reference documentation	BIP used to generate the FIP	Owner of the FIP	Patentability
Enter an ID # specific to each FIP element e.g. FIP-CON-99 where CON is the contract acronym	Describe the system or sub-system for which the FIP element was developed (e.g. a camera, ground control, etc.)	Use a title that is descriptive of the FIP element.	Specify the form of the FIP e.g. invention, trade secret, copyright, industrial design, patent	Specify the nature of the FIP e.g. software, design, algorithm, etc.?	Provide the full title and number of the reference document where the FIP is fully described. The reference document must be available to Canada	BIP referenced in table 1 e.g. BIP-CON-2, 15	Specify which organization owns the FIP e.g. Contractor, Canada* or Subcontractor-. Provide the name of the subcontractor if not owned by the prime Contractor. *If Canada is the owner of the FIP, complete Table 3 below Provide reference to contract clauses that support FIP ownership. Provide reference to WPDs under which the technical work has been performed.	In the case where the IP is owned by Canada, indicate with an "X", any IP elements described is patentable and complete Table 3 only for this IP.

Table 3 - Canada's Owned FIP Additional Information

FIP ID #	Title of FIP	Aspects of FIP that are novel, useful and non obvious	Limitations or drawback of the FIP	References in literature or patents pertaining to the FIP	Has the FIP been prototyped, tested or demonstrated? (e.g. analytically, simulation, hardware)? Provide results	Inventor(s)	Was the FIP disclosed to other parties?
<i>ID# should be same as corresponding FIP element in Table2</i>	<i>Title of FIP should be same as corresponding FIP element in Table2</i>	<i>How is the FIP addressing a problem (useful) and what is thought to be novel in this solution (novel)?</i>	<i>Describe the limitations of present apparatus, product or process</i>	<i>Provide references in published literature or patents relating to the problem or subject if any.</i>	<i>Describe briefly how the process, product or apparatus performed during testing or simulation. Provide reference document # where the performance is compiled if applicable.</i>	<i>Provide name and coordinates of the person(s) who created the FIP</i>	<i>Has any publication or disclosure of the FIP or any of its elements been made to third parties? If so, provide when, where and to whom.</i>

DID-0014 – Technology Readiness with TRRA Worksheets and Rollup

PURPOSE:

The Technology Readiness and Risk Assessment (TRRA) describes in a systematic and objective fashion the technological readiness of a system for a particular spaceflight mission or environment, the criticality of the constituent technologies, and the expected degree of difficulty to achieve the remaining technology development steps.

The TRRA provides for all the Critical Technology Elements (CTE) 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.

Agreement on the appropriate PBS level and identification of the CTE is required prior to the TRRA.

PREPARATION INSTRUCTIONS:

The Contractor must perform a Technology Readiness and Risk Assessment (TRRA) in accordance with the requirements of the CSA Technology Readiness and Risk Assessment Guidelines (AD-04) to formally document the system technology status.

DID-0017 – System Requirement Document

PURPOSE:

To define the functional, performance, environmental and other requirements for a given system, subsystem, unit, module or assembly.

PREPARATION INSTRUCTIONS:

The requirements documents must define the requirements on the subject item.

The Requirements Document must comprise a number of sections, each defining a specific set of requirements. The document must address all of the following requirement areas, as a minimum:

- 1) Functional Requirements;
- 2) Performance Requirements;
- 3) External Interface Requirements (unless done in a separate document);
- 4) Design Requirements;
- 5) Construction Requirements;
- 6) Qualification and/or Verification Requirements;
- 7) Packaging Requirements, if any;
- 8) External Stowage Requirements, if any;
- 9) Operational Requirements, if any;
- 10) Ground Support Equipment Requirements, if any (unless done in a separate document); and
- 11) Other applicable requirements types.

Environmental requirements should address the following, as appropriate:

- 1) Environmental test factors;
- 2) Environmental Design and Test Requirements:
 - a) Structural/Mechanical Design Requirements;
 - b) Electrostatic and EMC Design requirements;
 - c) Transport and Ground Environments.

Requirements must conform to the following standards for quality:

- a) They must be unambiguously clear to the intended readership;
- b) Each requirement must have a unique identifier (e.g. An id number or paragraph number);
- c) They must not define design solutions;
- d) They must be verifiable, preferably by tests or demonstrations;
- e) They must specify the conditions under which they apply; and
- f) Performance requirements must be quantified.

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

DID-0018 – Design Document

PURPOSE:

To describe the features and capabilities of the item as designed. The item could be a system or subsystem.

PREPARATION INSTRUCTIONS:

The Design Document acts as an “answer” to the Requirements Document for the system or subsystem: the requirements state what is needed, and the Design Document describes what is provided to meet these needs. The Design Document serves as the main reference text for users after delivery of the item, describing the full range of performance and functional capabilities of the item, as verified during the test/verification program.¹

Each document must contain, as a minimum:

- 1) Scope:
 - a) System Overview
 - b) Document Overview
- 2) System Design:
 - a) Functional Block Diagram
 - b) External Interfaces
 - c) Subsystems descriptions
 - d) Internal Interfaces
 - e) Functional description
- 3) Mechanical description
- 4) Electrical description
- 5) Operating modes and states
- 6) Environmental considerations derived from the environment requirements as specified in this SOW.
- 7) Acronyms

¹ All 2-D drawings must be submitted in PDF format, with the capability to zoom

DID-0019 – Verification Plan

PURPOSE:

The verification process is defined by the Verification Plan. The plan also defines the planning policies, methods of controls, and organizational responsibilities. From the Verification Plan, the verification procedures are developed. The procedures provide the instruction, including configurations, constraints, and prerequisites, for obtaining data that show compliance with the requirements.

PREPARATION INSTRUCTIONS:

The Verification Plan must:

- 1) define the verification activities that will prove that the system and subsystems meet the all the imposed requirements including functional, performance, interface, environmental, etc.,
- 2) define all verification activities at each phase of the project, including test, analysis, and inspection,
- 3) describe the methods and techniques to be used to measure, evaluate, and verify the system. This is to include characterization of the system behaviour that is not controlled by requirements but is important for understanding of the system, and establishing the actual values of parameters that exceed requirements,
- 4) use an appropriate combination of simulation and analytical tools, mock-ups, laboratory models, engineering models and prototype models,
- 5) define the requirements for supporting facilities, analysis tools and test equipment, both existing and needing to be constructed, including:
 - a) the specific equipment and materials needed;
 - b) the configuration of the equipment to be used;
 - c) the location in which it is to be used;
- 6) define the schedule for verification activities.

For each defined test and analysis activity, the plan must contain:

- 1) a description of the activity;
- 2) the objective, including requirements to be verified;
- 3) supporting hardware and software;
- 4) assumptions and constraints that apply to the activity;
- 5) plans to install, setup, and maintain items in the test or analysis environment;
- 6) a description of the data recording, reduction, and analysis activities to be carried out during and after the activity.

VERIFICATION METHODS DEFINITIONS

The verification program must be accomplished by employing one or more of the methods described in the following sub-sections.

Test

Verification by test is the actual operation of the system, in clearly defined environmental conditions, to evaluate its performance.

Functional Tests

Functional testing is an individual test or series of electrical or mechanical performance test(s) conducted on the system's hardware and/or software at conditions equal to or less than design specifications. Its purpose is to establish that the system performs satisfactorily in accordance with design and performance specifications. Functional testing is generally performed at ambient conditions. Functional testing is performed before and after each environmental test or major move in order to verify system performance prior to the next test/operation.

Environmental Tests

Environmental testing is an individual or series of test(s) conducted on the system's hardware to ensure that the Platform hardware must perform satisfactorily in an analog environment. Examples of environmental tests are vibration, acoustic, thermal, vacuum and EMC. Environmental testing may or may not be combined with functional testing depending on the objectives of the test.

Analysis

Verification by analysis is a process used in lieu of, or in addition to, testing to verify compliance to specification requirements. (e.g. stress, thermal, materials). The selected techniques may include systems engineering analysis (structural, environmental, electrical, etc.), statistics and qualitative analysis, computer and hardware simulations, and analog modelling.

Analysis may be used when it can be determined that:

- a) Rigorous and accurate analysis is possible;
- b) Test is not feasible or cost-effective;
- c) Similarity is not applicable; and
- d) Verification by inspection is not adequate.

Demonstration

Verification by demonstration is the use of actual demonstration techniques in conjunction with requirements such as serviceability, accessibility, transportability and human engineering features. In general, demonstration is specified as the method of verification for physical attributes which have no numerical requirements associated with them. This includes qualitative features such as comfort, accessibility, suitability and adequacy. Demonstration may also be specified for presence or compatibility of shipping containers, handling fixtures, etc.

Inspection

Verification by inspection is the physical evaluation of equipment and associated documentation to verify design features. Inspection is used to verify construction features, workmanship, dimensions and physical condition, such as cleanliness, surface finish and locking hardware. Often inspections are conducted in conjunction with a test or as part of assembly operations documented by manufacturing instructions (MIS).

Validation of Records

Validation of records is the process of using manufacturing records at end-item acceptance to verify construction features and processes for the system hardware. Verification of records is specified whenever it is necessary to compare two or more documents to each other in order to assess compliance with a requirement. Common examples of the way verification of records is used include:

- a) Examining drawings for features required by specifications;
- b) Examining parts lists for ESD sensitive components;
- c) Comparing two or more drawings to assess a mechanical interface;
- d) Checking personnel records for proper training;
- e) Checking facilities records for environmental exposure;
- f) Examining vendor data supplied with parts or materials; and
- g) Verification that analyses meet safety specifications.

Similarity

Verification by similarity is the process of assessing by review of prior test data or hardware configuration and applications that the article is similar or identical in design and manufacturing process to another article that has previously been qualified to equivalent or more stringent specifications.

Review of Design Documentation

Verification by review of design documentation is the process of reviewing the design against the requirements, which as stated may or may not contain specifics to be met by a test, analysis, etc. but must be present in the design. This method is used during the preliminary design and critical design reviews of the development phase.

DID-0020 – Verification and Compliance Matrices

PURPOSE:

The Verification and Compliance Matrix shows the details of the compliance of the system and the verification thereof through the life of the project with respect to each system requirement. It is a living document that is updated at each review with new data. The matrix is tightly coupled with the Verification Plan because it provides the detailed linkage of verification activities to the specific requirements they address. However, it is a separate document from the Verification Plan.

PREPARATION INSTRUCTIONS:

The Requirements Verification and Compliance Matrices must contain, for each requirement:

- 1) The requirement document number and requirement identifier;
- 2) The requirement description;
- 3) Other relevant requirement references;
- 4) Verification method. For the verification methods definition refer to DID 0019;
- 5) Requirement compliance based on verification data presented at the current phase;
- 6) For quantitative requirements, the actual predicted or achieved performance and the margin over the requirement, including statistical analysis when applicable;
- 7) Link to the verification data that justifies the compliance and the quantitative value (document, page and paragraph);
- 8) Comments, for example on plans to rectify non-compliances.

DID-0021 – Test Plan

PURPOSE:

To describe the formal qualification end-to-end test plans for the system, to identify and describe the individual tests that must be performed during validation, and to identify the test resources required.

PREPARATION INSTRUCTIONS:

1. SCOPE

This DID establishes the content, format, and submittal requirements for all test activities. The Contractor must describe the nature and extent of the specific tests proposed for each unit, in accordance with SOW requirements, and as per the Verification Plan.

2. CONTENTS

The Test Plan (TP) may be prepared in the Contractor's format and must, contain the following information, as a minimum:

2.1. General

- 1) Identification number, title, and brief overview of the system to which the TP applies;
- 2) A description of the relationship of this plan to other project management plans;
- 3) Identification and description of general test requirements applicable to all system tests or group of system tests; and
- 4) A schedule of tests.

2.2. Test-specific

- 1) Description of each test to be conducted on the system including:
 - a. Test objective;
 - b. Qualification method as specified in the SRD or ICD or
 - c. Reference to the corresponding SRD or ICD requirement;
 - d. Identification and type of data to be recorded, and
 - e. All assumptions and constraints associated with each test;
- 2) Identification and description of all hardware and software items required to perform validation testing, including identification of the proprietary nature and Government rights associated with each item;
- 3) A description of plans to install, setup, and maintain items in the system test environment; and
- 4) A description of the data recording, reduction, and analysis activities to be carried out during and after system tests.

DID-0022 – Test Procedure

PURPOSE:

To define the procedure to be followed for each test to be performed.

PREPARATION INSTRUCTIONS:

This DID is applicable to systems, hardware and software.

The test procedures must contain the following information, as a minimum:

1. Scope

This section must include a brief description of the test and the objectives of the test.

2. Test Requirements

This section must define the measurements and evaluations to be performed by the test.

3. Test Article

This section must define in detail the test article configuration that is to be tested.

4. Test Facilities

This section must identify the test facilities to be used, including their physical location, coordinates and contact points.

5. Participants Required

This section must provide a listing of the individuals (position titles, trade or profession) required to conduct or witness the test.

6. Test Set-up and Conditions

This section must include description/sketches of test articles in test configuration illustrating all interfacing test/support equipment. Instrumentation/functional logic must be shown where applicable. The section must include any environmental and cleanliness requirements.

7. Instrumentation, Test Equipment and Test Software

This section must provide a listing of the instrumentation, test equipment and software that is to be used during the test.

8. Procedure

This section must define the step-by-step procedure to be followed, starting with the inspection of the test article, and describing the conduct of the test up to and including post-test inspection. Each test activity must be defined in sequence and task-by-task, including test levels to be used and measurements/recordings to be made. It must include any necessary malfunction and abort procedure.

9. Data Analysis

This section must define the methods to be used in the analysis of the results, along with the uncertainty range in the results. Data presentation format must be defined.

10. Acceptance/Rejection Criteria Table

This section must provide data sheets needed during execution of the test specifying acceptance/rejection criteria, including identification of the associated requirements from the Requirements Documents or Specifications. These sheets will be in a tabular form allowing columns for measured values and deviations to be recorded. A computer printout generated by test software is acceptable provided it supplies the same information; however the test criteria must be stated in the Test Procedure.

DID-0023 – Test Report

PURPOSE:

To document the results of all tests done on a hardware unit or software CSCI.

PREPARATION INSTRUCTIONS:

This DID is applicable to systems, hardware and software.

The test report must document all tests performed to verify that the unit or software will meet the functional and operational requirements specified in the Requirements Documents or Specifications applicable to the unit.

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

1. Applicable Documents

This section must include test procedures and system requirements/specifications being tested.

2. Test Article or System Under Test:

This section must define in detail the test article configuration tested.

3. Purpose:

This section must describe the purpose of the test and the specific requirements/specifications that it is intended to verify.

4. Summary of Test Results

This section must present a summary of test results, including non-conformances, where applicable.

5. Test Facilities

This section must identify the test facilities used, including their physical location, coordinates and contact points.

6. Test Set-up and Conditions:

This section must include descriptions/photos/sketches of test articles in test configuration illustrating all interfacing test/support equipment. Instrumentation/functional logic must be shown where applicable. The section must describe the environmental and cleanliness conditions present, as well as operating conditions (e.g. supply voltage).

7. Instrumentation, Test Equipment and Test Software:

This section must provide a listing of the instrumentation, test equipment and software used during the test.

8. Detailed Test Results:

This section must record actual test data obtained on tabular sheets prepared in the Test Procedure (or software-generated) during the test performance, and deviations from the criteria.

9. Test Data Analysis:

This section must document analyses required to relate the detailed results to the requirements to be verified.

10. Non-conformances:

This section will provide all Non-Conformance Reports generated during the tests. The Non-Conformance Reports will be dated and stipulate the latest dispositions.

11. Conclusions and Recommendations:

This section must identify deficiencies, limitations or constraints and propose alternative design solutions to be evaluated in order to resolve problems encountered in testing.

DID-0024 – Operating Procedures and Users Guide

PURPOSE:

To provide detailed step-by-step procedures and guidance for the operation of the system in a comprehensive and useful user manual, supporting the familiarization of Crew, PIs, and any other personnel involved with the regular use, maintenance, repair or disposal of the in-flight System.

PREPARATION INSTRUCTIONS:

General Requirements

The Operating Procedures and Users Guide must be provided in Microsoft Word. Drawings and pictures must be included in these Word documents, not in separate documents.

The Operating Procedures and Users Guide must contain an appendix that analyses End-to-End Operations Workflow, including the real-time operations as well as the offline pre-and post-missions analysis work and the operator training process, including training session preparation, execution and the use of tools to evaluate operator performance and achieve their certification.

The Users' Guide(s) must contain the following information:

- 1) Introduction
- 2) Purpose and scope
- 3) Reference documentation
- 4) Overall System Description
- 5) Detailed System Description
- 6) Description and principles of operation, including configuration for:
 - a. Transportation
 - b. Deployments (if different)
- 7) Assembly procedure:
 - a. Mechanical Interfaces (including cooling/heating connections)
 - b. Electrical Interfaces
 - c. Command and Data Handling (C&DH) Interfaces
- 8) Disassembly procedure
- 9) Operational modes
- 10) Operational procedures (philosophy and detailed instructions):
 - a. Identification of all operations for which the system was designed
 - b. Specification of all constraints pertinent to each procedure, with references to technical documents for justification
 - c. Power On/Off and initiation of the software and termination of system operation

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- d. Calibration
- e. Routine operating procedures
- f. Monitoring of the operation of the system including: fault identification, evaluation, and conditions requiring computer shutdown
- g. Detection, analysis and correction of anomalous behaviour
- h. References to baseline configuration database for each parameter used in each procedure
- i. Operating rules

11) C&DH Procedures

- a. Methods of commanding the system and/or experiment (computer, manual, other)
- b. Methods of collecting and disposing of H&S data
- c. A listing of all available commands with a description and any expected feedback

12) Software User Procedure (philosophy and detailed instructions):

- a. information and user instructions necessary for user interaction with the CSCI(s) including:
 - (1) step-by-step operating procedures, including the use of all pre and post missions analyses tools, and operator training, evaluation and certification tools,
 - (2) identification of all options available to the user,
 - (3) initialization procedures,
 - (4) required user inputs and options,
 - (5) identification and description of system inputs and effects on user interface,
 - (6) termination methods and indicators,
 - (7) restart procedures, and
 - (8) expected outputs.
- b. a listing of all error messages including definition and action to be taken.
- c. Installation instructions

13) Maintenance Procedures and Troubleshooting (philosophy and detailed instructions):

- a. Recovery from faults or interrupts including restart and the collection of information concerning the fault
- b. Description of diagnostic features available to the operator of the system including: available tools, and step-by-step diagnostic procedures
- c. Trouble-shooting table
- d. Periodic maintenance required, including tasks and frequencies
- e. Test equipment and special tools required

14) Repair Procedures (philosophy and detailed instructions)

15) Disposal Procedures (philosophy and detailed instructions)

- 16) Detailed Mechanical Drawings.
- 17) Detailed Electrical Drawings.
- 18) Detailed Software Description.
- 19) Complete Drawing list.
- 20) Complete Parts List.

Operational Data Base

The Operational Data Base (ODB) must contain definitions for the following data:

- 1) Telemetry database format;
- 2) Telecommand database format;
- 3) System Baseline Configuration:
 - a. Definition of all parameters determining on-board database configuration at any time, including conversions and constraints, as installed in real-time, planning, and analysis Platforms;
- 4) Remote Control Station (RCS) Baseline Configuration:
 - a. Definition of all parameters determining the RCS database configuration at any time, including conversions and constraints;
 - b. Values of all system related parameters in the ODB pertinent to procedure execution and on-board system maintenance;
 - c. Constraints on telemetry values for status and health verification; and
 - d. Software configuration status for the system and the RCS.

DID-0025 – CAD Models & Analyses

PURPOSE:

To support the design, establish feasibility of the design to meet the requirements in the design phases, and in some cases provide verification of compliance to requirements where this cannot be demonstrated directly by test or inspection.

PREPARATION INSTRUCTIONS:

All CAD models developed must be delivered:

- a) Mechanical design: e.g., STEP AP203 (.stp)
- b) Electrical design: e.g., .dsn, .sch, Pspice and Gerber formats
- c) Software design: e.g., UML 2.0 or XML (Extensible Markup Language), if applicable

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 designs made up of a large number of CAD models, a drawing tree or indented drawing list or equivalent shall be provided to facilitate review of design. For generic modeling and analyses that don't use a specialty tool, CSA will accept Matlab, Excel and MathCad format data. Where a highly specialized tool is used, the delivery format must be negotiated with the TA. 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.

Analysis documents must contain all analysis work that is performed in support of the design. The analysis material must be sufficiently detailed so that, in combination with the delivered models, CSA or an external reviewer can reproduce the results. The analysis must establish feasibility and verification of the design to meet the requirements.

The data must include references to sources such as equations, material values, parameters and properties.

Each report must contain the following information, as a minimum:

- 1) Objectives of the analysis;
- 2) Reference to the relevant requirements;
- 3) Description of the analysis tools used;
- 4) Description of the model developed to aid the model user (if applicable);
- 5) Identification of the assumption(s) made;
- 6) Description of the main analysis steps and intermediate results;
- 7) Results of the analysis and compatibility with the requirements;
- 8) Identification of potential problem areas and presentation of alternative design solutions; and
- 9) Conclusion.

Delivered models must contain at least example outputs so that the user can check their function, and should contain the main outputs used in the analysis documents.

DID-0026 – Software Development Plan

PURPOSE:

To describe the management and technical approaches that govern the software development process. It describes what products and materials are received and delivered, how requirements are determined, and important aspects of the provider's relationship with the customer. It applies to whole system software or to the software used in any constituent subsystem.

Software includes all software and firmware (*software embedded in hardware*) to be developed, acquired, or incorporated into the system.

PREPARATION INSTRUCTIONS:

The Software Development Plan must cover all deliverable software. The Software Development Plan must address the following:

1. Brief project overview
2. Brief functional characterization of the product and identification of project software life-cycle phases, milestones, and deliverables
3. A WBS for organizing and managing the development of software products consistent with the higher-level WBS
4. Organisational structure, boundaries and interfaces
5. Project staffing and assignment of roles and responsibilities
6. Technical approach to the following activities:
 - i) Articulation and elaboration of software requirements;
 - ii) Design and implementation of the product (including the development environment, tools, methodology and standards);
 - iii) Adaptation of inherited software, including the verification of functionality and the definition of necessary modifications;
 - iv) Identification of work products to be verified and verification methods to be used;
 - v) Integration and test, including design, acquisition, and validation of test environment;
 - vi) Review of the intermediate work products, including detailed technical review;
 - vii) Delivery and operations support;
 - viii) Configuration management of build process, code, documentation, and other work products.
7. Approach to managing the software development risk.
8. An implementation schedule at a level of detail that facilitates tracking the progress.
9. Approach to the development, review, approval, release, revision, and control of documentation.
10. Identification of documents applicable to the software plan and their relationship (document tree).
11. Approach to monitoring development progress, utilizing product and process metrics.
12. Approach to identifying, managing and verifying safety critical software.

DID-0027 – Software Version Description Document (VDD)

PURPOSE:

To identify the contents of a software Configuration Software Configuration Item (CSCI) release and to record the details of all aspects of the system, support software and hardware required to regenerate this CSCI.

PREPARATION INSTRUCTIONS:

The VDD must contain the following information, as a minimum:

- 1) Version Description
 - a) Inventory
 - a. CSCI Source File Listing
 - b. Documentation. This section must list all relevant documents revisions associated with this build version (requirements, ICDs,...)
 - b) Changes Incorporated. This section must list all new functionalities that were added, and/or all problems that were corrected in this version. A list of all modified and created files with the rationale must be included.
- 2) Version Description - Support Items
 - h) Hardware Tools
 - i) Development Platform Hardware Requirements
 - j) Software Tools
 - k) Build Procedures and Development Environment Setup Information. The procedure must provide step-by-step actions with screen shots whereas appropriate to document the complete build process.
 - l) Installation Procedures
 - m) Validation Test Scripts, Data and Results
- 3) Known Errors and Possible Problems
- 4) Notes

DID-0028 – Phase E Logistic and Sustaining Engineering Plan

PURPOSE:

To describe the approach, timing and detailed pricing for ground and in-flight operation, maintenance, repair and disposal, with the goal of providing planning information for the operations phase.

PREPARATION INSTRUCTIONS:

The plan must address the following:

1. For the ground and in-flight operations:
 - a) Support for the regular CSA-led Canadian and international partner's investigations or activities (up to 3 years over the operational period).
 - b) Contribution to NASA required documentation.
 - c) Contractor provides training or updated training material to the Crew and CSA operator so that they know how to operate the System on-orbit and on ground.
 - d) Contractor provides all ground and in-flight hardware/software and the personnel required to support these activities/investigations. This includes hardware/software and personnel support to the EM and the PFM operations on the ground, as well as to support development/test of protocols and ensure that Baseline Data Collection (BDC) is done on the Crew, if required, before and after their flight on the ISS. Science consumable kit will be provided by the activity/investigation.
 - e) For each activity/investigation, the cost of hardware/software launch itself is covered by CSA or the related ISS international partner.
 - f) Each activity/investigation procedure is a joint development by CSA, the NRC, the investigation PI and the Contractor.
 - g) Support for In-flight operations preparations (e.g. checkout or commissioning of newly developed Cartridge Devices).
 - h) Live support of in-flight operations, on-console at CSA on a request basis or on-call over the phone.
 - i) Health & status data monitoring and analysis for maintenance purposes.
 - j) Investigation's operations issues debugging until completed.
 - k) Separate estimates for training a third party in providing all the above support services.

2. For the ground and in-flight maintenance, repair and disposal:
 - a) This is for the regular maintenance (as defined by the Contractor) and repairs (on an as-needed basis) for a minimum of 2 (two) years of regular operations.
 - b) Contribution to NASA documentation required.
 - c) Contractor provides all maintenance/repair/disposal to hardware/software and the personnel required to support these activities. This includes hardware/software and personnel support to the EM and DMs maintenance/repair/disposal on the ground.
 - d) For each maintenance/repair, the cost of hardware/software launch itself is covered by CSA.
 - e) Each maintenance/repair procedure is a joint development by CSA, the NRC and the Contractor.
 - f) Support for In-flight operations preparations (i.e. procedures, steps, etc...).
 - g) Live support of in-flight maintenance, software updates, repairs and disposal, on-console at CSA.
 - h) PFM and EM systems monitoring through health and status data analysis and trending.
 - i) Each maintenance/software update/repair data analysis.
 - j) Maintenance/software update/repair issues debugging until completed.
 - k) Upgrade of EM to a flight spare including all MAIT, verification, acceptance and delivery for launch of the unit.
 - l) Repair and upgrade of a failed flight unit including all MAIT, verification, acceptance and delivery for launch of the unit.

DID-0029 - Product Assurance Implementation Plan (PAIP)

PURPOSE

The Product Assurance Implementation Plan (PAIP) describes the Product Assurance organisation, objectives, and activities planned for the project. The PAIP provides the Government with insight into the Contractor's PA organisation, tasks, and activities and allows the Government to assess compliance with the governing PA requirements specified in CSA-MFSP-RD-0002, CSA Life Sciences Research System Product Assurance Requirements for MFSP.

PREPARATION INSTRUCTIONS

General Requirements

The PAIP must, as a minimum, provide the following information as well as the processes to meet the requirements of CSA-MFSP-RD-0002:

- 1) An overview of the objectives to be achieved by the plan;
- 2) Identification of the organisations in the company responsible for applying the provisions of the PAIP: organisational structure, relationships to other organisations within the project and company as with personnel identification and required skill levels;
- 3) PA plans for monitoring the different phases of the program development, for problem reporting and for ensuring corrective actions are taken;
- 4) Frequency, format, and content of reports submitted by PA to program management to report program progress as well as problems, risks, and proposed solutions;
- 5) A list of applicable general standards and practices which will be followed in the implementation of the plan;
- 6) A list of applicable in-house PA procedures, as well as PA procedures specific to the project and/or applicable to all project participants, with cross-reference to the compliance matrix below;
- 7) A compliance matrix testifying to the compliance with the requirements of CSA-MFSP-RD-0002 which clearly states for each requirement whether the Contractor intends to comply with the requirement and rationale for partial or non-compliance.
- 8) A Parts, Materials and Processes Control Plan that describe the approach, methods, procedures and organisation that will be implemented to assure compliance to the parts/materials/processes program requirements of the CSA-MFSP-RD-0002.
- 9) Details on how government rights to access the premises and the program data will be implemented by the Contractor;
- 10) Detail objectives and tasks to be performed to ensure reliability and availability requirements are adequately implemented.
- 11) Detail the plan and tasks to be performed to ensure that Configuration and Data Management (CADM) is carried out according to the CADM requirements in CSA-MFSP-RD-0002.
- 12) Detail plans for the implementation of the Safety Program and how the program will ensure compliance to the safety requirements of CSA-MFSP-RD-0002.

DID-0030 – Non-Conformance Reports

PURPOSE:

This DID contains the content preparation instruction for Non-Conformance Reports (NCRs) generated under the work described in this SOW.

PREPARATION INSTRUCTIONS:

The NCRs must contain the following information, as a minimum:

1. Originator;
2. Date;
3. Part Number of discrepant item;
4. Description;
5. Operation or test phase during which the discrepancy was observed;
6. Effectivity (SN or Lot number);
7. Description of Non-conformance;
8. Disposition;
9. NCR Board meeting minutes with attendees list;
10. Attachments required to support the disposition;
11. Root cause and corrective action;
12. Verification performed to closeout non-conformance;
13. Closeout summary report or statement;
14. NCR Board approval.

DID-0031 – Request for Deviation / Waiver

PURPOSE:

A Request for Deviation/Waiver must be submitted for non-compliances to the program requirements and/or for equipment performance Class I non-compliances.

PREPARATION INSTRUCTIONS:

A Request for Deviation (RFD) or Request for Waiver (RFW) must contain the following information, as a minimum:

ID	Data	Description	Deviation	Waiver
RFD/RFW Identification				
1.	Organization	Identification of the organization originating the RFD/RFW	X	X
2.	Number	Unique identification and register number	X	X
3.	Revision	Revision status of the RFD/RFW	X	X
4.	Date	Issue date of the RFD/RFW	X	X
5.	Classification	Classification (i.e. major or minor)	X	X
6.	Project	Project under which the nonconforming item is supplied	X	X
7.	Business agreement/ contract identifier	Business agreement / contract identification under which the nonconforming item is supplied (if applicable)	X	X
8.	Order	Order number under which the nonconforming item is supplied (if applicable)	X	X
9.	Originator site	Location of the request for deviation originator (if applicable)	X	X
Identification of Affected Item and Affected Documents				
1.	Item designation	Identification of the nonconforming item per name, manufacturer, part number and serial number (for a waiver), according to its configuration item data list	X	X
2.	Affected item(s)	Identification of the CI(s) (number and name) affected by the deviation of waiver	X	X
3.	Effectivity	Model or serial number (or batch / lot number) of the deviating or non-conforming item	X	X

ID	Data	Description	Deviation	Waiver
4.	Affected document(s)	Identification of the document(s) (specification, design drawing, etc.) to which the item does not conform (document number and revision/issue, paragraph or requirement ID)	X	X
5.	Short description	Title or short description of the RFD/RFW (consistent with the title of the related non-conformance report)	X	X
6.	Detailed description	Description of the deviation from the relevant requirement or design feature. / Description of the non-conformity, supported by sketches and attachments as appropriate. Include information on the origin of the deviation/waiver (design difficulties, non-conformance observed, procurement difficulties, ambiguous specifications, schedule constraints, etc.)	X	X
7.	Non-conformance Report	Identification number of the Non-conformance Report related to the request for waiver		X
8.	NCRB	Identification of the minutes of meeting of the NCRB which decided to raise the RFW		X
Technical and Programmatic Impact Assessment and Decision				
1.	Impact Assessment	Impact on cost, schedule, functionality, performance, reliability and safety	X	X
2.	Consequences of non-approval	Project impact if the deviation/waiver is not approved (cost and schedule)	X	X
3.	Rationale for acceptance	Reason why the proposed deviation/non-conformity can be accepted (supporting analyses, drawings, etc.)	X	X
4.	Adverse effects	Item characteristics affected by the deviation or non-conformity	X	X
5.	Limitation of use	Regarding the intended use		X
6.	Approval	Decision (Approval or Disapproval), names, date and signatures of the relevant authorities (Project Manager, Systems Manager, S&MA Manager)	X	X

DID-0032 – Interface Requirements Documents (IRD)

PURPOSE:

To define requirements on each of the two or more nodes sharing an interface to ensure that when connected physically or virtually they are compatible and together achieve their combined functions. The IRD serves as the parent for the Interface Control Document.

PREPARATION INSTRUCTIONS:

Interface requirements typically cover the following interface characteristics:

- 1) Electrical: power supply levels and consumption digital and analogue signals, EMC;
- 2) Mechanical: loads, attachment locations, attachment methods, volume constraints;
- 3) Thermal transmission: heat loads and lifts, radiative properties, especially for enclosures;
- 4) Data: data to be passed and standards, including NASA C&DH requirements;
- 5) Synchronization: timing and delay requirements;

All requirements applicable at the interface between the subject items must be documented. 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 testable on the item as integrated. Requirements must conform to Systems Engineering standards for quality.

DID-0033 – Outcomes Report

PURPOSE:

The goal of the report is to provide data to the Canadian Space Agency 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 answer a series of questions pertaining to the outcomes achieved through the Agreement. The questions will be made available through a link provided by CSA at the end of each fiscal year (around February), for the duration of the agreement. Approximately one month will be provided for the contractor to answer the questions. It is foreseen that approximately 5-10 questions will be asked. Below is an example of the most salient questions.

Name of Indicator	Questions	Definition	Measure	Explanation (Provide a short narrative related to the numbers entered in the previous column)
1- Number of HQP involved in this agreement	CSA would like to know how many highly qualified personnel (HQP) is working on the agreement. Please provide the number of people working on this agreement that have obtained a Bachelor degree, following the provided categories.	By HQP, we mean those who have obtained a minimum of a Bachelor degree.	Through the link provided by CSA, please indicate how many in each of the following categories: Faculty members Post-Docs Fellows Graduate Students (Masters and Doctoral) Undergraduate Students (Bachelors) College or Cégep Technicians	

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Name of Indicator	Questions	Definition	Measure	Explanation (Provide a short narrative related to the numbers entered in the previous column)
2- # peer-reviewed scientific publications produced by space exploration sciences researchers in Canada funded through this agreement	Please indicate how many peer-reviewed publications are issued from this agreement.			
3- # of Canadian space technologies developed through this agreement that are adapted and used on earth or re-used in space				
4- Number of different organizations involved with the agreement	Please provide the name of Canadian organizations (private companies, not-for-profits, universities) who are your suppliers. Please provide the name of all foreign organizations (private companies, not-for-profits, universities) who are your suppliers.			

DID-0034 – Project Cost Estimation

PURPOSE:

The goal of this DID is to obtain the financial information in a format and with the required level of detail to satisfy Treasury Board (TB) guidelines(<https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=30375>) and CSA's investment governance requirements.

PREPARATION INSTRUCTIONS:

The Contractor must provide a project cost estimates, in accordance with Treasury Board (TB) guidelines, as per the table below "Template for Cost Breakdown", broken down per Work Breakdown Structure (WBS), for all phases leading to the development, implementation, operation and disposal.

In addition, and within the table, the cost breakdown must also be done by Government Fiscal Year beginning on April 1st within the phase breakdown.

Along with the cost estimate, a detailed justification for those costs must be included. For example, it is expected that a product tree and a drawing/document tree be developed in order to reliably estimate costs, as well as having work package tasks defined. Also, the justification must describe the type of analysis (analogous, bottom-up, etc.), as well as the assumptions made .

Quantification of the uncertainty in the estimate must be provided. Cost estimates must provide sufficient granularity to allow cost estimating of the MFSP system across the life cycle of the mission.

The top-down cost estimate must be delivered no later than 20 working days after the Phase A contract award (or authority to proceed (ATP)).

The bottom-up cost estimate must be delivered no later than 15 working days after the System Requirements Review (SRR).

A cost sensitivity analysis must be provided identifying the key driving requirements and their impact on the cost of the projects. De-scoping options must be provided if they result in a significant cost saving with modest impact on the Science Objectives.

Category (per WBS)		Phase A		Phase B	Phase C	Phase D	Phase E	Phase F	Reserve
	GFY (example)	FY20	FY21	Etc.					
Labour	Management								
	Technology Development								
	Design								

	Documentation							
	Reviews							
	Manufacturing							
	Assembly							
	Testing							
	Product Assurance							
	Operations Team Support							
	Total Labour							
Non-Labour	Hardware / Software Procurement							
	Testing, Prototyping							
	Operations Team Support							
	Tools, Equipment and Facilities (incl. for testing)							
	Travel and Living							
	Subcontracts							
	Other Direct Charges							
	Total Non-Labour							
	Subtotal							
	G&A							
Risk	Risk Contingency							
	Fee							
Taxes	GST + PST							
	Total By Phase							
	Total All Phases							

The Contractor must specify the cost reserves forecasted in the Life Cycle Costs (LCC) of the project and what strategy will be used to dispense the funds, or retiring of the risk reserves upon successful mitigation or completion of each stage of the project. This includes the identified and funded schedule reserves.

DID-526 – Documentation Tree

DID Issue: IR

Date: 2014-01-28

PURPOSE:

To establish the hierarchical structure of the documents developed to design, build and test a system and to manage the project.

PREPARATION INSTRUCTIONS:

This Documentation Tree shall be prepared in the form of a tree, establishing traceability from the lowest-level documents to the highest. The applicability of each document to others shall be shown. A hierarchical address code shall be used. Each document shall refer to a specific Configuration Item (CI) within the Product Tree, if applicable; otherwise it shall be identified as “system wide”.

The Documentation Tree must include, as a minimum:

- 5) Requirements Documents and specifications;
- 6) Analyses;
- 7) Technical plans;
- 8) Test reports;
- 9) Design Documents; and
- 10) Other data that applies to the CI.

The Documentation Tree shall be updated as the project evolves through Phases B, C, and D.

D ACRONYMS

AD	Applicable Document
AIL	Action Item Log
AO	Announcement of Opportunity
AR	Acceptance Review
BDC	Baseline Data Collection
BIP	Background Intellectual Property
BOM	Bill of Material
CAD	Computer Aided Design
CADM	Configuration and Data Management
C&DH	Commanding and Data Handling
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CF	Contractor Format
CoFR	Certification of Flight Readiness
CM	Configuration Management
COTS	Commercial-Off-The-Shelf
CR	Commissioning Review
CSA	Canadian Space Agency
CSCI	Computer Software Contractual Item
CSSP	Canadian Space Station Program
CTB	Cargo Transfer Bag
CTE	Critical Technology Element
DID	Data Item Description
DM	Demonstration Model
DNA	Deoxyribonucleic Acid
EEE	Electrical Electromechanical Electronic
EIDP	End Item Data Package
EM	Engineering Model
EoC	End of Contract
EMI/EMC	Electromagnetic Interference/Compatibility
EM	Engineering Model
EXPRESS	Expedite the Processing of Experiments for Space Station
FEU	Flight Equivalent Unit
FIP	Foreground Intellectual Property

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FMECA	Failure Modes Effect and Critical Assessment
FPGA	Field Programmable Gate Array
FPRD	Functional and Performance Requirements Document
FRR	Flight Readiness Review
FSDP	Flight Safety Data Package
FSR	Flight Safety Review
GCTS	Ground Commanding and Telemetry Station
GCTS-SW	Ground Commanding and Telemetry Software
GFE	Government Furnished Equipment
GFI	Government Furnished Information
GFM	Government Furnished Material
GoC	Government of Canada
GSE	Ground Support Equipment
HERO	Human Exploration Research Opportunities
HFIT	Human Factor Interface Team
HMST	Hazardous Materials Summary Tables
HOSC	Huntsville Operations Support Center
HW/OD	Hardware on Dock
ICD	Interface Control Document
IDR	Interface Definition Review
IHS	ISS Hazard System
ILSRA	International Life Science Research Announcements
IP	International Partner
IP	Intellectual Property
IPLAT	ISS Program Label Assessment Team
ICD	Interface Control Drawing
IDR	Interface Definition Review
IRB	Interface Requirements Baseline
IRD	Interface Requirements Document
ISS	International Space Station
ITAR	International Traffic in Arms Regulations
JSC	Johnson Space Center
KOM	Kick Off Meeting
KPP	Key Performance Parameters

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L&SE	Logistic and Sustaining Engineering
LSRS	Life Science Research Systems
MAIT	Manufacturing, Assembly, Integration, and Test
MDL	Middeck Locker
MIUL	Material Identification Usage List
MRR	Manufacturing Readiness Review (MRR)
MFSP	MicroFluidic Sample Preparation
MRA	Microgravity Research Analog
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NRC	National Research Council
OBT	On-orBit Training
PA	Product Assurance
PAR	Product Assurance Requirements
PAIP	Product Assurance Implementation Plan
PD	Payload Developer
PDF	Portable Document Format
PDR	Preliminary Design Review
PEC	Performance Evaluation Criteria
PFM	Proto-Flight Model
PI	Principal Investigator
PIM	Payload Integration Manager
PIRE	Payloads Integration Requirements Engineer
PIRN	Preliminary/Proposed Interface Revision Notice
PM	Project Management
PMP	Project Management Plan
POIC	Payload Operations Integration Center
ProRR	Production readiness Review
PSR	Pre-Ship Review
PSRP	Payload Safety Review Panel
PTOC	Payload Telescience Operations Center
PVT	Payload Verification Test
PWGSC	Public Works and Government Services Canada
QA	Quality Assurance
RFD	Request for Deviation

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RFW	Request for Waiver
RID	Review Item Discrepancy
ROM	Rough Order of Magnitude
SCD	Source Control Drawing
SDP	Software Development Plan
S&MA	Safety and Mission Assurance
SE	System Engineering
SI	System International
SME	Subject Matter Expert
SMM	Structural Mathematical Models
SOW	Statement of Work
SPR	System Performance Report
SRD	System Requirements Document
SRR	System Requirement Review
SSITF	Space Station Integration Testing Facility
SVD	Software Version Description
SVT	Science Validation Test
SW	Software
TA	Technical Authority
TN	Technical Note
TRL	Technology Readiness Level
TRR	Test Readiness Review
TRRA	Technology Readiness and Risk Assessment
TRRB	Test Results Review Board
TST	Training Strategy Team
TreK	Telescience Resource Kit
UUT	Unit Under Test
VCM	Verification Compliance Matrix
VDD	Version Description Document
VM	Virtual Machine
VP	Verification Plan
WBS	Work Breakdown Structure
WP	Work Package
WPD	Work Package Description

ANNEX B

BASIS OF PAYMENT

PHASES A, B and C

LIMITATION OF EXPENDITURE

1. **LABOUR:** at the following firm hourly rates, excluding overhead and profit

Labour Category	Estimated Hours	Firm Hourly Rate

Est.: \$ _____

2. **EQUIPMENT:** at laid down cost without markup
(Specify type of equipment.) Est.: \$ _____

3. **MATERIALS AND SUPPLIES:** at laid down cost without
markup (Specify what categories of materials and supplies.) Est.: \$ _____

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

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

Canada will not pay the Contractor any incidental expense allowance for authorized travel.

5. **SUBCONTRACTS:** at actual cost without markup
(Identify subcontractors, if applicable.) Est.: \$ _____

6. **OTHER DIRECT CHARGES:** at actual cost without markup
(Specify what categories of direct charges.) Est.: \$ _____

With the exception of the firm rate(s) and price(s), the amounts shown in the various items specified above are estimates only. Minor changes to these estimates will be accepted for billing purposes as the Work proceeds, provided that these changes have the prior approval of the Technical Authority, and provided that the estimated cost does not exceed the aforementioned Limitation of Expenditure.

SCHEDULE OF MILESTONES

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

PHASE A

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

Estimated Cost to a Limitation of Expenditure: \$ _____
(Applicable Taxes extra)

PHASE B

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

Estimated Cost to a Limitation of Expenditure: \$ _____
(Applicable Taxes extra)

PHASE C

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

Estimated Cost to a Limitation of Expenditure: \$ _____
(Applicable Taxes extra)

Solicitation No. - N° de l'invitation
9F052-180576
Client Ref. No. - N° de réf. du client
9F052-180576/B

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-8-41285

Buyer ID - Id de l'acheteur
mtb550
CCC No./N° CCC - FMS No./N° VME

PHASE D-1 (Optional)

SCHEDULE OF MILESTONES

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

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

Phase D-1 Total Firm Price \$_____ (All taxes applicable Extra)

PHASE D-2 (Optional)

LIMITATION OF EXPENDITURE

1. **LABOUR:** at the following firm hourly rates, excluding overhead and profit

Labour Category	Estimated Hours	Firm Hourly Rate

Est.: \$ _____

2. **EQUIPMENT:** at laid down cost without markup (Specify type of equipment.) Est.: \$ _____

3. **MATERIALS AND SUPPLIES:** at laid down cost without markup (Specify what categories of materials and supplies.) Est.: \$ _____

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

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

Canada will not pay the Contractor any incidental expense allowance for authorized travel.

5. **SUBCONTRACTS:** at actual cost without markup (Identify subcontractors, if applicable.) Est.: \$ _____

6. **OTHER DIRECT CHARGES:** at actual cost without markup (Specify what categories of direct charges.) Est.: \$ _____

Estimated Cost to a Limitation of Expenditure: \$ _____
(Applicable Taxes extra)

With the exception of the firm rate(s) and price(s), the amounts shown in the various items specified above are estimates only. Minor changes to these estimates will be accepted for billing purposes as the Work proceeds, provided that these changes have the prior approval of the Technical Authority, and provided that the estimated cost does not exceed the aforementioned Limitation of Expenditure.

ATTACHMENT 1 TO PART 2

MANDATORY NON-DISCLOSURE AGREEMENT

MANDATORY NON-DISCLOSURE AGREEMENT (NDA) FOR MICROFLUIDIC SAMPLE PREPARATION (MSFP) PLATFORM

REQUEST FOR INFORMATION (RFI)

PUBLIC WORKS GOVERNMENT SERVICES CANADA (PWGSC) FILE # 9F052-180576/B

BY:

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

TO:

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

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

1. The Supplier acknowledges that the documents in the table below must be treated as confidential and
must not be disclosed or used in any way except in relation with the Purpose of this RFI.

Ref	Document identification	Document title
1	CSA-MFSP-RD-0001	Functional and Performance Requirements Document, Platform
2	CSA-MFSP-RD-0002	Product Assurance Requirements, Platform
3	CSA-MFSP-ID-0001	Interface Requirements Document, Platform
4	CSA-MFSP-ID-0002	Interface Requirements Document, Cartridge
5	3190 –Deep Space Gateway Science Workshop	Microfluidic Based Platform for Universal sample Preparation and Biological assays Automation for Life-Science research and Remote Medical Application
6	CSA-MFSP-CO-0001	Operational Concept Document for Commissioning Operations
7	CSA-SE-STD-0001	CSA Systems Engineering Technical Reviews Standard.
8	CSA-ST-GDL-0001	CSA Technology Readiness Levels and Assessment Guidelines.
9	CSA-SE-PR-0001	CSA Systems Engineering Methods and Practices
10	CSA-FORM-0001	CSA Technology Readiness and Risk Assessment Worksheet
11	CSA-FORM-0003	CSA Critical Technologies Elements Identification Criteria

12	SSP 57000	Pressurized Payloads Interface Requirements Document, International Space Station Program
13	SSP 51700	Payload Safety and Requirements for ISS
14	SSP 57057	ISS Payload Integration Template
15	SSP 41170	Configuration Management Requirements for ISS
16	SSP 50989	ISS IT Security Policy for Onboard Systems
17	SSP 50005	ISS Flight Crew Integration Standard
18	SSP 41170	Configuration Management Requirements for ISS
19	SSP 30559	Structural Design and Verification Requirements for ISS
20	SSP 30312 Vol I	Electrical, Electronic, and Electromechanical (EEE) Parts Management and Implementation Plan for the Space Station Program
21	SSP 30312 Vol II	Electrical, Electronic, and Electromechanical (EEE) Parts Management and Implementation Plan for the Space Station Program - Exceptions
22	SSP 30233	Space Station Requirements for Materials and Processes
23	SSP 57008	Unique Pressurized Payload Non-Rack Interface Control Document Template
24	SSP 53119	CSA Small Payloads Interface Control Document for ISS
25		PowerBlade MicroPrep Supplementary Bidder Information

2. For the purpose of this NDA, Confidential Information includes, but not limited to the documents listed in paragraph 1 above and any documents, Instructions, guidelines, data, material, advice or another information whether received orally, in printed form or recorded electronically or otherwise and whether or not labeled as proprietary, that is disclosed to a person or entity or that person or entity becomes aware of for the purpose of this RFI. The Webinar and all exchanges during RFI periods meet this definition.

3. The Supplier agrees that the Confidential Information listed in paragraphs 1 and 2 above will not be reproduced, copied, divulged, released or disclosed, in whole or in part, in whatever way or form to any person or entity other than a person employed by the Supplier without the prior written consent of the PWGSC's Contracting Authority and for any purpose other than for the preparation of a response to this RFI.

4. The Supplier agrees to immediately notify the PWGSC's Contracting Authority if any person, other than the Supplier's current employees accesses the Confidential Information at any time.

5. Also, regardless of whether it is Confidential Information, the Supplier must at all times treat the information designated as Confidential Information and ensure it cannot be accessed by anyone excepting the Supplier's current employees, which have a legitimate "need to know" for the Purpose of presenting a RFI.

6. The Supplier shall at all times use the same degree of care as it uses to protect its own confidential information of like importance to prevent the unauthorized use or disclosure of Confidential Information, but in no event less than a reasonable degree of care. The Supplier shall not, nor shall it permit its employees to, remove any copyright, confidential, proprietary rights, or intellectual property notices attached to or included in any Confidential Information and shall reproduce all such notices on any copies of the Confidential Information.

7. The Supplier is responsible for any breach of this NDA by any of its employees, and the Supplier shall not, nor shall permit its employees to, modify, disassemble, decompile, or reverse engineer any Confidential Information even if it relates to the Purpose.

8. All the Information contained in the document listed in paragraph 1 above and all other Confidential Information disclosed under this NDA shall remain the property of Canada or a third party, or of any other person or entity to whom it lawfully belongs, as applicable.

9. Without restricting the generality of the foregoing, the Supplier recognizes that no license or conveyance of any rights to the Supplier under any discoveries, inventions, patents, trade secrets, copyrights, or other form of intellectual property is granted or implied by the disclosure of Confidential Information under this NDA.

10. The Supplier must require any proposed subcontractor with a "need to know", to execute a NDA on the same conditions as those contained in this NDA prior to disclosure of the Confidential Information. Copy of subcontractor NDA must be provided to the Contracting Authority.

11. All Confidential Information will remain the property of Canada and must be destroyed within thirty (30) days following that request by the Contracting Authority.

12. The NDA remains in force indefinitely.

13. Nothing in this NDA should be construed as preventing the disclosure or use of any confidential information to the extent that such information:

- (a) is or becomes in the public domain through no fault of the Supplier or any proposed subcontractor;
- (b) is or becomes known to the Supplier from a source other than Canada, except any source that is known to the Supplier to be under an obligation to Canada not to disclose the information; or
- (c) is disclosed under compulsion of a legislative requirement or any order of a Court or other tribunal having jurisdiction.

14. The Supplier agrees that a breach of this NDA may result in disqualification of a Supplier or a Qualified Supplier at any time, or immediate termination of the resulting Contract. The Qualified Respondent also acknowledges that a breach of this NDA may result in a review of the Qualified Supplier's security clearance and review of the Qualified Supplier's status as an eligible Supplier for other requirements.

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

16. At close or early termination of the bid period, the Supplier must immediately deliver the Confidential Information to the Contracting Authority as well as every draft, working paper and note that contains any information related to the Confidential Information. The Supplier must not keep any Confidential Information, either soft or hard copies, once he has submitted his bid.

17. Canada reserves the right to refuse the request for access to Confidential Information.

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

Solicitation No. - N° de l'invitation
9F052-180576
Client Ref. No. - N° de réf. du client
9F052-180576/B

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-8-41285

Buyer ID - Id de l'acheteur
mtb550
CCC No./N° CCC - FMS No./N° VME

Name of Supplier

Name of authorized representative (print)

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

Witness:

Name of the Witness

Solicitation No. - N° de l'invitation
9F052-180576
Client Ref. No. - N° de réf. du client
9F052-180576/B

Amd. No. - N° de la modif.
File No. - N° du dossier
MTB-8-41285

Buyer ID - Id de l'acheteur
mtb550
CCC No./N° CCC - FMS No./N° VME

ATTACHMENT 1 to PART 3 OF THE BID SOLICITATION

ELECTRONIC PAYMENT INSTRUMENTS

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);

ATTACHMENT 1 to PART 4 OF THE BID SOLICITATION

MicroFluidic Sample Preparation (MFSP) Evaluation Criteria

The evaluation is based on a combination of mandatory and point-rated criteria.

1. Mandatory Criteria

These criteria are deemed mandatory by CSA as the minimum necessary competence and capability for undertaking the work. Mandatory requirements are evaluated on a pass/fail basis and compliance to the criteria will be evaluated very strictly. Consequently, no rating is associated with them. Proposals not meeting all mandatory criteria will be deemed non-responsive.

M1: The Bidder must have proven experience in the design, manufacture and test of at least one (1) system of similar or greater complexity that has flown and meets NASA requirements for systems designed to operate on a spaceflight platform, over the last twenty (20) years. The Bidder must have proven expertise in the biomedical field.

This system must be rated for operations in the crew compartment of the International Space Station (ISS), a human-rated space platform. This mandatory criterion assesses the ability of the Bidder to develop a system within the framework of requirements for a spaceflight platform (altitude greater than 100 km, CubeSats and Nanosats excluded).

M2: The Bidder must be ISO 9001 certified as demonstrated by a valid certificate.

Certificate must be valid for the duration of the contract. If expiry of the certificate is within the period of the contract, the Bidder must demonstrate or provide a statement that it will be renewed.

M3: The Bidder must demonstrate that the proposed solution will meet all mandatory product assurance requirements provided in document MFSP PAR CSA-MFSP-RD-0002

For each of the mandatory requirements identified in the following table, the Bidder must provide a compliance statement supported by a detailed substantiation demonstrating compliance along with references in the proposal, or a detailed description of how the Bidder intends to comply. The definitions of "detailed substantiation" and "intent to comply" are available hereunder. Each set of requirements corresponds to specific sections of the Product Assurance Requirements Document (CSA-MFSP-RD-0002).

Product Assurance Requirements for MicroFluidic Sample Preparation (CSA-MFSP-RD-0002)			
Set	Document section	Requirements	Compliance: Intent to Comply (IC) or Detailed Substantiation (DETSUBST)
1	3	Product Assurance Program	IC
2	4	Qualification Program	DET SUBST
3	5	EEE Parts Program	DET SUBST
4	6	Reliability	DET SUBST
5	7	Mechanical Parts, Materials and Processes Program	IC
6	8	Quality Assurance Program	DET SUBST
7	9	Software Product Assurance Program	IC
8	10	FPGA Development	IC
9	11	Safety Program	IC

Detailed substantiation (DET SUBST)

When a detailed substantiation is required, Bidders are requested to provide a detailed description which clearly demonstrates how it complies with the requirements. Cross-references to appropriate sections of the proposal should be provided when applicable and the essence of the referenced information should be summarized in the substantiation.

Intent to comply (IC)

Bidders must confirm their intention to comply with the mandatory requirement. As the mandatory requirement will be a requirement of the Contract, any failure to comply with the requirement of the Contract will result in the Contractor being in Default.

2. Point-Rated Criteria

The proposal will be evaluated according to the point-rated criteria as specified in Table 1.

Proposals must achieve the required minimum score for each rated criterion to be assessed as responsive under the point-rated criteria section; proposals not meeting the minimum required score will be deemed non-responsive. Only those proposals which are responsive (compliant) with all of the mandatory criteria and achieve or exceed the stated minimum scores required for each point-rated criterion will be further considered for award of a contract.

Point-Rated Evaluation Criteria	Max. Score		Min. Score	
R1. Understanding the Platform Functional and Performance Requirements	30	52%	15	26%
R2. Project Management and proposed approach	12	20%	6	10%
R3. Project Team expertise and experience	16	28%	8	14%
Total	58	100%	29	50%

Table 1: Point-Rated Evaluation Criteria and Associated Ratings

The following provides definitions of the expressions employed herein which are used as benchmark statements for the different point-rated technical evaluation criteria:

- ***“Qualified reader”***:
Means a representative of Canada, which in the opinion of Canada, has all the proper expertise and experience to make an informed judgement about the assertions found in the Bidder's bid. Several “qualified readers” will compose Canada's evaluation team, which will include subject-matter experts tasked to evaluate some (or all) of the individual technical selection criteria based on their individual skillsets or responsibilities in relation to this project.
- ***“Fail to demonstrate an understanding”***:
Means that a qualified reader, using his/her expertise and experience, is of the opinion that the description provided would most likely not demonstrate that the proposed solution will achieve the performance requirements. A significant problem or issue or error was identified that prevents the compliance requirements from being met.
- ***“Partial understanding”***:
Means that a qualified reader, using his/her expertise and experience, is of the opinion that the description provided in the bid contains significant flaws or limitations in the adequacy of the proposed solution, technology, methodology.
- ***“Demonstrating an understanding with weakness”***:
Means that a qualified reader, using his/her expertise and experience, is of the opinion that the description provided in the bid has weakness but shows an understanding of the

requirements. Weakness was identified by the qualified reader but compliance to requirements is not questioned.

▪ **“Demonstrating an understanding”:**

Means that a qualified reader, using his/her expertise and experience, is of the opinion that the description provided in the bid has a thorough substantiation and is sufficient to make an informed judgment on the adequacy of the proposed solution, technology, and methodology in relation to the MFSP work and its performance requirements.

▪ **“Credible substantiation”:**

Means that the information provided in the bid clearly demonstrates, through clear rationales, descriptions, examples or verifiable assertions, that the requirements are understood.

A statement that repeats the requirement and responds with an intent to comply in a vaguely formulated manner will likely be evaluated as a partial understanding if ambiguous to the qualified reader.

R1: Understanding of the Platform Functional and Performance Requirements

The Bidder must demonstrate that the requirements are understood. The Bidder must show that the proposed solution will meet the MFSP Functional and Performance Requirements as defined in the applicable CSA document: CSA-MFSP-RD-0001.

The Bidder must provide a requirement compliance substantiation for each set of requirements as listed in Table 2. Each set of requirements corresponds to specific sections of the Functional and Performance Requirements Document (FPRD). Although some sets include multiple “shall”, the Bidder is not requested to address each “shall”. Rather, the Bidder must address each set as a whole. Table 2 must be used as a template for a summary.

The Bidder must describe the proposed conceptual design. The Bidder must present a credible conceptual design that demonstrates an understanding of critical issues to operate on the ISS. The conceptual design is evaluated against specific requirements identified in each set.

MicroFluidic Sample Preparation Functional and Performance Requirements (CSA-MFSP-RD-0001)			
Set	Document section	Requirements	Compliance Substantiation
1	3.2	General & ISS Requirements (separate matrix for PAR, see R2)	
2	3.3.1 3.3.2 3.3.3 3.3.4 3.16	General System Requirements Rotary Module Requirements Cartridge Loading Requirements Cartridge Interface Hard Drives and Batteries	
3	3.3.5	Image Capture Module Requirements	

MicroFluidic Sample Preparation Functional and Performance Requirements (CSA-MFSP-RD-0001)			
Set	Document section	Requirements	Compliance Substantiation
4	3.3.6 3.3.7	Pump and Manifold Modules Requirements	
5	3.3.10 3.3.11 3.8 3.10.7	Software, Control, User interface	
6	3.4 3.5 3.6 3.7 3.9 AD10	EXPRESS Rack and Launch Requirements The Bidder must provide a separate matrix for interface requirements (addressing all tables in the interface document)	
7	3.10.1 3.10.2 3.10.3 3.10.4 3.10.5 3.10.6	Operations	
8	3.12 3.13 3.14 3.15 3.17	Modularity, Upgrades and Expansion, Maintainability, Availability, Uplink and Downlink, and Disposal	
9	3.18 3.19	Packaging and Identification	
10	3.3.9 3.10.8 3.10.9 3.10.10 3.10.11	Safety	

Table 2: Functional and Performance Requirements Compliance Substantiation

Score Benchmark Statements

30 points: An understanding of all ten (10) sets of requirements is demonstrated and a credible substantiation is provided.

The score is based on demonstrating an understanding of each set of requirements and a credible substantiation is provided. For each set where understanding is demonstrated, three (3) points are allocated. Two (2) points are allocated for a demonstrated understanding that has weakness. For partial understanding, one (1) point is allocated for the set. Zero (0) points is allocated if demonstration for understanding of a set is deemed failed.

0 points: No understanding of requirements is demonstrated.

R2: Project Management and Proposed Approach

This criterion assesses the methodology of the Bidder to perform the required work for the contract. This criterion examines the following elements:

The credibility of the Project Management Plan

The Bidder must provide a Project Management Plan (PMP) with his proposal. The PMP must comply with the preparation instructions contained in the Statement of Work (SOW). The Bidder must prepare the PMP by following the Data Item Description 001 (DID-0001) contained in the SOW. The Bidder must describe the processes planned to be used to ensure adequate management of the project. Bidder will receive the score of partial compliance if significant flaws or limitations are identified in the management plan.

The credibility of the Work Breakdown Structure (WBS)

The Bidder must provide a Work Breakdown Structure and Work Package Description (WBS) with his proposal. The WBS must comply with the preparation instructions contained in the Statement of Work (SOW). The Bidder must prepare the WBS by following the Data Item Description 002 (DID-0002) contained in the SOW. The Bidder must demonstrate how the WBS organizes and defines the total work scope of the project, for the following elements: work package scope, required inputs/dependencies, activity description and deliverables. Bidder will receive the score of partial compliance if significant flaws or limitations are identified in the WBS.

The credibility of the Product Assurance Implementation Plan (PAIP)

The Bidder must provide a Product Assurance Implementation Plan (PAIP) with his proposal. The PAIP must comply with the preparation instructions contained in the Statement of Work (SOW). The Bidder must prepare the PAIP by following the Data Item Description 029 (DID-0029) contained in the SOW. The Bidder must describe the processes planned to be used to ensure compliance to Product Assurance Requirements. Bidder will receive the score of partial compliance if significant flaws or limitations are identified in the PAIP.

The risks assessment

The Bidder must provide an assessment of management and technical risks/uncertainties perceived as well as major assumptions upon which the MFSP System contract is based. The Bidder must, for each identified programmatic and technical risk, document the following: probability, consequence/impact to contract, mitigation plan, and response plan if risk materialized. Bidder will receive the score of partial compliance if risk assessment shows limited understanding of management and technical challenges related to ISS payload.

The Technology Readiness Level (TRL) Assessment

The Bidder must provide a Technology Readiness Level Assessment with Technology Readiness and Risk assessment (TRRA) worksheets and rollup with his proposal. It is expected that the

assessment will be a low TRL due the fact that the Bidder is unfamiliar with microfluidic technology. The TRL assessment must comply with the preparation instructions contained in the Statement of Work (SOW). The Bidder must prepare the TRL assessment by following the Data Item Description 014 (DID-0014) contained in the SOW.

The Bidder must address Technology Risk Assessment/Analysis: (1) Critical Technology Element identification, (2) Critical Technology Element technical maturity, (3) Critical Technology Element technical risk and mitigation, (4) Critical Technology Element development to increase maturity. Bidder will receive the score of partial compliance if significant flaws or limitations is identified in the TRL assessment. Bidder will receive the full score if the TRL assessment consists of a thorough and in-depth analysis.

Project Schedule

The Bidder must provide a detailed project Schedule from start of contract to end of Phase D1. This criterion assesses if the schedule provided in the Bidder's proposal is feasible and realistic (activity durations and activity flow are feasible, level of details in the project schedule is adequate, adequate margins are identified). The project schedule must be detailed, well substantiated, realistic and demonstrate that the Bidder can meet the proposed project milestone schedule provided in the SOW. Proposal exceeding the proposed 30 months by more than 2 months will be deemed non-compliant. Bidder will receive the full score if a credible solution is proposed to deliver at least 2 months earlier than the suggested 30 months. Bidders will receive partial compliance if a credible solution is proposed to deliver within the suggested 30 months.

The Bidders must provide a project timetable that sets out tasks, milestones and deliverables. A Gantt chart and/or PERT chart should be used to illustrate the schedule. The bidder must describe the processes planned to be used to ensure timely completion of the project's milestones and this description must include activity definition, activity sequencing, estimate of activity duration, dependencies and schedule control.

Set	Requirements	Compliance Substantiation
1	Project Management assessment, PMP (DID-0001)	
2	Work Breakdown Structure assessment WBS (DID-0002)	
3	Product Assurance management assessment PAIP (DID-0029)	
4	Risks assessment Credibility of described risks	
5	Technology Readiness Level (TRL) Assessment TRRA (DID-0014)	
6	Project Schedule (DID-0004)	

Table 3: Project Management and Proposed approach Compliance Substantiation

Score Benchmark Statements

12 points: A compliance to all six (6) sets of requirements is demonstrated and a credible substantiation is provided.

The score is based on demonstrating compliance with each set of requirements and a credible substantiation is provided. For each set with a pass evaluation, two (2) points are allocated. If a set fails to demonstrate compliance, zero (0) points are allocated. For partial compliance, one (1) point is allocated for the set.

0 points: fails to demonstrate compliance on six (6) sets of requirements.

R3: Project Team expertise and experience

This criterion assesses the expertise and experience of the team assembled to perform the required work for the contract. This criterion examines the following elements.

The Bidder's Space Experience

This criterion assesses the Bidder's experience and expertise in the production, qualification and delivery of a system of similar complexity. The Bidder must provide a description of a previous or current system and demonstrate that this system is a pertinent example with respect to this posting, including as a minimum in the description: the system name, customer name, start and end dates of the development period, a summary of development activities, fabrication and testing activities, a summary of activities and reviews with NASA, as well as the launch date (actual or anticipated). References to publications resulting from the system's utilization / operation should be provided, if available.

To receive full score, the Bidder must have proven experience in the design, manufacture and testing of one (1) system that meets NASA's requirements for internal Payloads on the ISS (whether deployed in an EXPRESS rack or not) obtained within the last fifteen (15) years.

To receive partial compliance score, the Bidder must have proven experience in the design, manufacture and testing of one (1) system that meets NASA requirements for systems designed to operate on a spaceflight platform (altitude greater than 100 km, CubeSats and nanosats excluded), obtained during the last fifteen (15) years.

The Project Manager assessment

The Bidder must identify his Project Manager and outline his/her qualifications. The Bidder's proposed Project Manager must have experience in the management of projects requiring design, manufacture and test of systems and software.

To receive full score, the Project Manager must have at least three (3) years (over the last fifteen (15) years) of demonstrated Project Management experience, and must have managed at least one (1) project in design, manufacture and test of systems and software rated for operations on a human space flight platform.

To receive partial compliance score, the Project Manager must have at least one (1) year (over the last fifteen (15) years) of demonstrated Project Management experience, and must have managed at least one (1) project in design, manufacture and test of systems and software rated for operations on a spaceflight platform.

The Prime System Engineer assessment

The Bidder must identify his System Engineer and outline his/her qualifications.

To receive full score, the System Engineer must have:

1. work experience with NASA delivering projects for human space flight;
2. work experience in the integration and verification of hardware and equipment for ISS systems;
3. work experience with NASA databases (e.g. Veritas);
4. supported as System Engineer at least one (1) project in design, manufacture and test of systems and software rated for operations on a spaceflight platform;
5. at least three (3) years (over the last fifteen (15) years) of demonstrated System Engineering experience on a human space flight platform.

To receive partial compliance score, the System Engineer must have:

1. worked with NASA delivering projects for spaceflight;
2. integrated and verified hardware with ISS systems;
3. at least two (2) years (over the last fifteen (15) years) of demonstrated System Engineering experience, and must have at least one (1) year experience in design, manufacture and test of systems and software rated for operations on a spaceflight platform.

The Prime Safety & Quality Assurance Engineer assessment

The Bidder must identify his Safety & Quality Assurance Engineer and outline his/her qualifications.

To receive full score, the Safety & Quality Assurance Engineer must have:

1. past experience with NASA safety requirements for ISS;
2. worked with NASA databases (e.g.: International Space Station Hazard Database System (IHS))
3. at least two (2) years (over the last ten (10) years) of demonstrated Safety & Quality Assurance experience on space projects.

To receive partial compliance score, the Safety & Quality Assurance Engineer must have:

1. past experience with NASA safety requirements for ISS;
2. at least one (1) year (over the last ten (10) years) of demonstrated Safety & Quality Assurance experience on space projects.

The key resources' assessment

This criterion assesses the capability (education, knowledge, experience, expertise and complementarities) of the key resources (Project Manager, System Engineer, Safety & Quality Assurance Engineer, Technical Specialist Engineers, etc.) , including subcontractors, assembled to carry out the Work. The Bidder must identify the key members of the project's technical and management teams and state their specific qualifications and experience for the work involved. Résumés for each of the individual team members must be provided in appendix to allow a proper evaluation of this criterion. The Bidder must include an organizational chart that illustrates the structure of the proposed project team, including key members and subcontractors.

In the circumstances where subcontractors' resources are being proposed, the same

requirements applicable to the prime contractor are applicable to the subcontractor's team(s). The bid must identify the name and location of each proposed subcontractor and their specific qualifications for the work involved.

To receive full score, at least three (3) key members of the team must have past experience in at least one (1) project involving the following areas: NASA safety requirements for ISS, programming of command and control Software for payloads including telemetry and user interface.

To receive partial compliance score, at least two (2) key members of the team must have past experience in at least one (1) project involving the following areas: NASA safety requirements for ISS, programming of command and control Software for payloads including telemetry and user interface.

The Key resources' allocation

The Bidder must include an FTE table for key resources.

To receive full score, the Project Manager, System Engineer and Safety & Quality Assurance Engineer must be allocated for at least 75% each.

To receive partial compliance score, the Project Manager, System Engineer and Safety & Quality Assurance Engineer must be allocated for at least 50% each.

Assessment of the ability of the Prime Contractor to manage the work

This criterion assesses the capability of the Prime Contractor to manage the work required including portions that are subcontracted. The Prime Contractor must demonstrate that he has the in-house expertise to perform and supervise the design work. In addition, the Contractor must demonstrate that he has in-house expertise to oversee work that is outsourced to a third party.

To receive full score, the Bidder must demonstrate that the Prime Contractor has all the necessary expertise in-house to perform the work, and to supervise all work done by a third party.

The Bidder will receive partial compliance score if the Prime Contractor is missing an internal expertise (either to carry out work in-house or to supervise the work of a third party). The Bidder will receive a score of zero if more than one internal expertise is missing (to perform work in-house and / or to supervise the work of a third party), or if he is unable to demonstrate that the Prime Contractor has the internal expertise to perform work in-house, and to supervise the work of a third party.

Expertise in biomedical technologies assessment

This criterion assesses the Bidder's expertise in biomedical technologies. The Bidder must demonstrate that he has existing products in the field of biomedical technologies related to the MFSP project.

To receive full score, the Bidder must demonstrate that he has existing products in the field of biomedical technologies related to the MFSP project.

To receive partial compliance score, the Bidder must demonstrate they have existing products in the field of biomedical technologies but not related to the MFSP project. The Bidder will receive a

score of zero if they do not have existing product in the field of biomedical technologies.

Set		Requirements	Compliance Substantiation
1	Bidder	Bidder's Space Experience	
2	PM	PM experience & qualification	
3	Sys. Eng.	Sys. Eng. experience & qualification	
4	S&QA	S&QA experience & qualification	
5	Resources assessment	Résumés, qualification of key personnel	
6	Resources allocation	FTE table	
7	Prime Contractor	Ability of the Prime Contractor to manage the work.	
8	Biomedical technologies	Expertise in biomedical technologies	

Table 4: Project team expertise and experience Compliance Substantiation

Score Benchmark Statements

16 points: A compliance to all eight (8) sets of requirements is demonstrated and a credible substantiation is provided.

The score is based on demonstrating a compliance to each set of requirements and a credible substantiation is provided. For each set with a pass evaluation, two (2) points is allocated. If a set fails to demonstrate compliance, zero (0) point is allocated. For partial compliance, one (1) point is allocated for the set.

0 points: fails to demonstrate compliance on the eight (8) sets of requirements.

ATTACHMENT 1 to PART 5 OF THE BID SOLICITATION

FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY – CERTIFICATION

I, the Bidder, by submitting the present information to the Contracting Authority, certify that the information provided is true as of the date indicated below. The certifications provided to Canada are subject to verification at all times. I understand that Canada will declare a bid non-responsive, or will declare a contractor in default, if a certification is found to be untrue, whether during the bid evaluation period or during the contract period. Canada will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply with any request or requirement imposed by Canada may render the bid non-responsive or constitute a default under the Contract.

For further information on the Federal Contractors Program for Employment Equity visit [Employment and Social Development Canada \(ESDC\) – Labour's](#) website.

Date: _____ (YYYY/MM/DD) (If left blank, the date will be deemed to be the bid solicitation closing date.)

Complete both A and B.

A. Check only one of the following:

- ☐ A1. The Bidder certifies having no work force in Canada.
- ☐ A2. The Bidder certifies being a public sector employer.
- ☐ A3. The Bidder certifies being a [federally regulated employer](#) being subject to the [Employment Equity Act](#).
- ☐ A4. The Bidder certifies having a combined work force in Canada of less than 100 permanent full-time and/or permanent part-time employees.

A5. The Bidder has a combined workforce in Canada of 100 or more employees; and

- ☐ A5.1. The Bidder certifies already having a valid and current [Agreement to Implement Employment Equity](#) (AIEE) in place with ESDC-Labour.

OR

- ☐ A5.2. The Bidder certifies having submitted the [Agreement to Implement Employment Equity \(LAB1168\)](#) to ESDC-Labour. As this is a condition to contract award, proceed to completing the form Agreement to Implement Employment Equity (LAB1168), duly signing it, and transmit it to ESDC-Labour.

B. Check only one of the following:

- ☐ B1. The Bidder is not a Joint Venture.

OR

- ☐ B2. The Bidder is a Joint venture and each member of the Joint Venture must provide the Contracting Authority with a completed annex Federal Contractors Program for Employment Equity - Certification. (Refer to the Joint Venture section of the Standard Instructions)