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

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

REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION

Proposal To: Public Works and Government Services Canada

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

Proposition aux: Travaux Publics et Services Gouvernementaux Canada

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

Comments - Commentaires

Title - Sujet
QEYSSat - Phase A

Solicitation No. - N° de l'invitation	**Date**
9F064-170353/A	2018-04-17

Client Reference No. - N° de référence du client
9F064-17-0353

GETS Reference No. - N° de référence de SEAG
PW-$MTB-545-14840

File No. - N° de dossier	**CCC No./N° CCC - FMS No./N° VME**
MTB-7-40157 (545)	

Solicitation Closes - L'invitation prend fin
at - à 02:00 PM
on - le 2018-05-16

Time Zone
Fuseau horaire
Heure Avancée de l'Est
HAE

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

Address Enquiries to: - Adresser toutes questions à:	**Buyer Id - Id de l'acheteur**
Niquette, Caroline	mtb545

Telephone No. - N° de téléphone	**FAX No. - N° de FAX**
(514) 496-3730 ( )	(514) 496-3822

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:
AGENCE SPATIALE CANADIENNE
9F064 # INGEN & DÉMON DE CAPACITÉS
6767 ROUTE DE L AEROPORT
ST HUBERT
Québec
J3Y 8Y9
Canada

Instructions: See Herein

Instructions: Voir aux présentes

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

Delivery Required - Livraison exigée	**Delivery Offered - Livraison proposée**
.	

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

Telephone No. - N° de téléphone
Facsimile No. - N° de télécopieur

Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)
Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)

Signature **Date**

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

Canada

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PART 1 - GENERAL INFORMATION

1.1 Introduction

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

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

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

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

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

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

Part 6 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, Non-Disclosure agreements and other Attachments.

1.2 Summary

Project title

Quantum EncrYption and Science SATellite (QEYSSat) – Phase A

Description

Public Services and Procurement Canada (PSPC) on behalf of Canadian Space Agency (CSA) located in St-Hubert, (Quebec), is planning to perform a feasibility assessment to provide a Quantum EncrYption and Science SATellite (QEYSSat)**.**

Up to two (2) contracts could be awarded.

This current Request for Proposal (RFP) is for Phase A only. If more than one bidder is compliant, up to two separate contracts will be awarded to two different contractors for the Phase A Work. It is important to note that the result of this RFP will impact future phases as once the Phase A contracts are completed successfully and the two contractors deliver a valid solution for Phase A, a second RFP for Phases B/C and D will be released to the two Phase A contractors only. The two Phase A contractors will then compete for the Work of Phases B/C and D and only one contract will be issued for the subsequent phases.

For a generic description of the standard Work and major reviews to be performed under the Phases B/C and D, please refer to document CSA-SE-STD-001 rev A.

In the event that there is only one compliant bid received by Canada for Phase A or that only one contractor delivers a valid solution after Phase A contracts are completed, PSPC could post a second competitive RFP on Buy&Sell for Phases B/C and D.

Period of Contract

The contract issued will be for a period of 6 months for Phase A.

Maximum Funding

The maximum funding available for each Contract resulting from the bid solicitation is $ 750 000.00 per contract (Applicable Taxes extra).

Intellectual Property

The IP will vest with the Contractor

Security Requirements

There is no security requirement associated with this requirement.

Trade Agreements

This procurement is not subject to Trade Agreements.

Canadian Content

The requirement is limited to Canadian services.

Production of and/or access to controlled goods

This procurement is subject to the Controlled Goods Program

Confidentiality of the RFP documents

A “Mandatory Non-Disclosure Agreement” must be signed before having access to the reference documents.

Confidentiality of Contract documents

A “Non-Disclosure Agreement Contract” must be signed before having access to the reference documents.

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.

1.4 Communications

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

PART 2 - BIDDER INSTRUCTIONS

2.1 Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the Standard Acquisition Clauses and Conditions Manual (https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-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 (2017-04-27), Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

Subsection 5.4 of 2003, Standard Instructions - Goods or Services - Competitive Requirements, is amended as follows:

Delete: 60 days
Insert: 240 days

2.1.1 Mandatory Non-Disclosure Agreement Requirement

If a Supplier or a subcontractor wishes to review the documents entitled **RD-01: DDD-QEYS-M-0001** and **RD-02: DDD-QEYS-M-0003**, it must request the documents entitled **RD-01: DDD-QEYS-M-0001 and RD-02: DDD-QEYS-M-0003** from the Contracting Authority listed below through e-mail. The documents entitled **RD-01: DDD-QEYS-M-0001 and RD-02: DDD-QEYS-M-0003** contain information that is confidential or proprietary to Canada or third party. The Supplier or any subcontractor must sign a Non-Disclosure Agreement in the form set out in Annex E and return the original duly signed to the Contracting Authority before being provided with a copy of the documents entitled **RD-01 : DDD-QEYS-M-0001 and RD-02 : DDD-QEYS-M-0003.** All Suppliers must return the documents entitled **RD-01: DDD-QEYS-M-0001 and RD-02: DDD-QEYS-M-0003** at the end of the RFP period, or upon request from the Contracting Authority within thirty (30) days following that request.

2.2 Submission of Bids

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

In person or by mail:

Public Works and Government Services Canada
Quebec Region
Place Bonaventure, 7th Floor
800 de la Gauchetière Street West, Suite 7300
South-West Portal
Montreal (QC), H5A 1L6

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 10 days 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 10 days before the bid closing date. Canada will have the right to accept or reject any or all suggestions.

2.7 Maximum funding

The maximum funding available for each Contract resulting from the bid solicitation is $ 750 000.00 per contract (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.

PART 3 - BID PREPARATION INSTRUCTIONS

3.1 Bid Preparation Instructions

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

Section I: Technical Bid (1 hard copy and 2 soft copies on CD or DVD)

Section II: Financial Bid (1 hard copy and 1 soft copy on CD or DVD)

Section III: Certifications (1 hard copy and 1 soft copy on CD or DVD)

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

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

Canada requests that Bidders follow the format instructions described below in the preparation of their bid:

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

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process Policy on Green Procurement (http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html). To assist Canada in reaching its objectives, Bidders should:

1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and

2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

Section I: Technical and Management 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.

In their management bid, Bidders must describe their capability and experience, the project management team and provide client contact(s).

The required structure and content of the technical and management proposal (Section I) is detailed in attachment 1 to Part 3: Instructions for preparation of technical and management proposal.

The Part 4- Evaluation procedures and Method of selection, contains additional instructions that Bidders should take into consideration while preparing their Bid.

Section II: Financial Bid

Bidders must submit their financial bid in accordance with the Basis of Payment in Annex "B".

3.1.1 The Bidders must present their financial proposal as follows:

(a) A firm, all-inclusive lot price for the Work, which must not exceed the maximum funding available for the contract resulting from the bid solicitation. The total amount of Applicable Taxes must be shown separately, if applicable;

(b) Prices must be in Canadian funds. The total amount of Applicable Taxes must be shown separately, if applicable.

3.1.2 Electronic Payment of Invoices – Bid

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Annex “D” Electronic Payment Instruments, to identify which ones are accepted.

If Annex “D” 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

3.1.4 Price Breakdown

Bidders are requested to detail the following elements for the performance of each task, milestone or phase of the Work, broken down per WPD listed in the Statement of Work (SOW):

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

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

(c) Materials and Supplies: Identify each category of materials and supplies required to complete the Work and provide the pricing basis.

(d) Travel and Living Expenses: Indicate the number of trips and the number of days for each trip, the cost, destination and purpose of each journey, together with the basis of these costs which must not exceed the limits of the National Joint Council (NJC). With respect to the NJC's Directive, only the meal, private vehicle and incidental allowances specified in Appendices B, C and D of the Directive **http://www.njc-cnm.gc.ca/directive/travelvoyage/index-eng.php**, and the other provisions of the Directive referring to "travellers", rather than those referring to "employees", are applicable. The Treasury Board Secretariat's Special Travel Authorities, also apply: **http://www.tbs-sct.gc.ca/pubs_pol/hrpubs/tbm_113/statb-eng.asp**

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

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

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

Section III: Certifications

Bidders must submit the certifications 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, management and financial evaluation criteria.

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

(c) The evaluation team will determine first if there are two or more bids with a valid Canadian Content certification. In that event, the evaluation process will be limited to the bids with the certification; otherwise, all bids will be evaluated. If some of the bids with a valid certification are

declared non-responsive, or are withdrawn, and less than two responsive bids with a valid certification remain, the evaluation will continue among those bids with a valid certification. If all bids with a valid certification are subsequently declared non-responsive, or are withdrawn, then all the other bids received will be evaluated.

4.1.1 Technical and Management Evaluation

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

4.1.2 Financial Evaluation

4.1.2.1 Mandatory Financial Criteria

The Bidder must submit a firm, all-inclusive lot price for the Work, which must not exceed the maximum funding available of $750 000.00 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.

4.1.2.2 Evaluation of Price

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

4.2 Basis of Selection

4.2.1 Basis of Selection- Highest Rated Within Budget

1. To be declared responsive, a bid must:

    a. comply with all the requirements of the bid solicitation;
    b. meet all mandatory technical evaluation criteria;
    c. meet the mandatory financial criteria;
    d. obtain the required minimum of 70 points overall for the technical evaluation criteria which are subject to point rating. The rating is performed on a scale of 100 points;
    e. obtain the required minimum 10 points for each of the following criteria: Team Expertise and Experience, Understanding of the Mission Requirements, Technology Readiness and Risk Assessment and Roadmap, and Work Plan and Technical Methodology

2. Bids not meeting (a) or (b) or (c) or (d) or (e) will be declared non responsive. The 2 responsive bids with the highest number of points will be recommended for award of a contract, provided that the total evaluated price does not exceed the budget available for this requirement.

3. In the event the highest number of points for two or more bidders is identical, the contracts will be awarded to the bidders with the highest rated scores for evaluation criterion P2- Understanding of the Mission Requirements identified in Attachment 1 to Part 4- Evaluation Criteria.

4. In the event the highest rated score for the criterion P2 is identical, the contract will be awarded to the bidder with the lowest overall cost.

PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION

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

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

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

5.1 Certifications Required with the Bid

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

5.1.1 Integrity Provisions - Declaration of Convicted Offences

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

5.2 Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be submitted with the bid but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame specified will render the bid non-responsive.

5.2.1 Integrity Provisions – Required Documentation

In accordance with the section titled Information to be provided when bidding, contracting or entering into a real procurement agreement of the Ineligibility and Suspension Policy (http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

5.2.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the Employment and Social

Development Canada (ESDC) - Labour's website (https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#).

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid list at the time of contract award.

5.2.3 Additional Certifications Precedent to Contract Award

5.2.3.1 Canadian Content Certification

This procurement is limited to Canadian services.

The Bidder certifies that:

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

5.2.3.1.1 *SACC Manual* clause A3050T (2014-11-27), Canadian Content Definition.

5.2.3.2 Status and Availability of Resources

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

5.2.3.3 Education and Experience

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

5.2.3.4 Language Capability

The Bidder certifies that it has the language capability required to perform the Work, as stipulated in the Statement of Work.

5.2.3.5 List of Proposed Subcontractors

If the bid includes the use of subcontractors, the Bidder must provide a list of all subcontractors including a description of the things to be purchased, a description of the work to be performed and the location of the performance of that work. The list should not include the purchase of off-the-shelf items, software and such standard articles and materials as are ordinarily produced by manufacturers in the normal course of business, or the provision of such incidental services as might ordinarily be subcontracted in performing the Work

The Bidder must provide, for each subcontractor, the following:

a) The name of the subcontractor: complete name of its legal entity and place of incorporation;
b) The subcontractor contact: name, title, telephone, fax numbers and email address;
c) A description of the roles and responsibilities of the subcontractor and/or material to be purchased from that subcontractor;
d) A document signed by the subcontractor indicating its agreement to undertake the work as described in the Bidder's proposal.

PART 6 - SECURITY, FINANCIAL AND OTHER REQUIREMENTS

6.1 Security Requirements

There is no security requirement associated with this requirement.

Although there are no security requirements for this RFP and onward contracts, the Bidders should note that security requirements for potential future follow-up contract for phases BCD could be enhanced. Any additional security requirements that could be required in future follow-up contract will be provided to the successful contractors of this RFP as early as possible during the work of the resulting contracts of this RFP.

6.2 Financial Capability

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

6.3 Controlled Goods Program

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 "____" and the Contractor's technical bid entitled _____, dated _____.

7.2 Standard Clauses and Conditions

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

7.2.1 General Conditions

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

7.2.2 Supplemental General Conditions

The following Supplemental General Conditions apply to and form part of the Contract:

4001 (2015-04-01), Hardware Purchase, Lease and Maintenance;
4002 (2010-08-16), Software Development or Modification Services;
4003 (2010-08-16), Licensed Software;
4004 (2013-04-25), Maintenance and Support Services for Licensed Software.

7.2.3 Non-disclosure agreement

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

7.3 Security Requirements

There is no security requirement associated with this requirement.

7.4 Term of Contract

7.4.1 Period of the Contract

The period of the Contract is from date of Contract to _____ inclusive.

7.5 Authorities

7.5.1 Contracting Authority

The Contracting Authority for the Contract is:

Name: Caroline Niquette
Title: Supply Specialist
Public Works and Government Services Canada
Acquisitions Branch
Address: Place Bonaventure, 7th Floor
800 rue de la Gauchetière West, Suite 7300
Portail South-West
Montréal (QC), H5A 1L6

Telephone: 514-712-5113
Facsimile: 514-496-3822
E-mail address: caroline.niquette@tpsgc-pwgsc.gc.ca

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

7.5.2 Project Authority

The Project Authority for the Contract is:

Name: _____

Title: _____
Organization: _____
Address: _____

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

The Project Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the administrative, programmatic and technical content of the Work under the Contract. These matters may be discussed with the Project Authority; however, the Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

7.5.3 Contractor's Representative

Name: _____
Title: _____

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

7.6 Proactive Disclosure of Contracts with Former Public Servants

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

7.7 Payment

7.7.1 Basis of Payment

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid firm lot prices as specified in Annex B, for a cost of $ _____ . 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.

7.7.2 Limitation of Price

SACC Manual clause C6000C (2011-05-16), Limitation of Price

7.7.3 Method of Payment- Milestone Payments

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.

7.7.3.1 Schedule of Milestones

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

7.7.4 SACC Manual Clause

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

7.7.5 Electronic Payment of Invoices – Contract

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

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

7.8 Invoicing Instructions

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

   Each claim must show:

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

2. Applicable Taxes, must be calculated on the total amount of the claim before the holdback is applied. At the time the holdback is claimed, there will be no Applicable Taxes payable as it was claimed and payable under the previous claims for progress payments.

3. The Contractor must 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.

7.9 Certifications and Additional Information

7.9.1 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.

7.9.2 *SACC Manual* Clauses

A3060C (2008-05-12), Canadian Content Certification

7.10 Applicable Laws

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

7.11 Priority of Documents

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

(a) the Articles of Agreement;
(b) the supplemental general conditions:
    4001 (2015-04-01), Hardware Purchase, Lease and Maintenance;
    4002 (2010-08-16), Software Development or Modification Services;
    4003 (2010-08-16), Licensed Software;
    4004 (2013-04-25), Maintenance and Support Services for Licensed Software;
(c) the general conditions 2040 (2016-04-04), General Conditions - Research & Development;
(d) Annex A, Statement of Work;
(e) Annex B, Basis of Payment;

(f) Annex C, Security Requirements Check List;
(g) Annex F, Non-Disclosure Agreement Contract;
(h) the Contractor's bid dated _____.

7.12 Foreign Nationals (Canadian Contractor)

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

7.13 Insurance

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

7.14 Controlled goods Program

SACC Manual clause A9131C (2014-11-27), Controlled Goods Program

7.15 Work Site Access

SACC Manual clause A1009C (2008-05-12), Work Site Access

7.16 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

ANNEX “A”
STATEMENT OF WORK

The Statement of Work (Annex A) appended to the bid solicitation package is to be inserted at this point and forms part of the document.

ANNEX "B"
BASIS OF PAYMENT AND
SCHEDULE OF MILESTONES

1. Bidders must provide a firm price for the overall project:

Phase A
Total Firm Price CAN $.
(Taxes extra, if applicable) _____$

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

No	Milestone	Deliverables	% of Total Price	Date (months after contract award)
1.	Kickoff	As per Appendix A in the SOW	N/A	1 week
2.	Conceptual Design Review (CoDR)	As per Appendix A in the SOW	50	3 months
3.	System Requirements Review (SRR)	As per Appendix A in the SOW	50	6 months

ANNEX “C”
SECURITY REQUIREMENTS CHECK LIST

The Security Requirements Check List (Annex C) appended to the bid solicitation package is to be inserted at this point and forms part of this document.

ANNEX "D"
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);
( ) Wire Transfer (International Only);
( ) Large Value Transfer System (LVTS) (Over $25M)

ANNEX "E"
MANDATORY NON-DISCLOSURE AGREEMENT (NDA)

QUANTUM ENCRYPTION AND SCIENCE Satellite (QEYSSat)
REQUEST FOR PROPOSAL (RFP)

PUBLIC WORKS GOVERNMENT SERVICES CANADA (PWGSC)
FILE # 9F064-170353/A

BY:

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

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

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

1. The Supplier acknowledges that the documents entitled ***RD-01:*** **DDD-QEYS-M-0001 and** ***RD-02:*** **DDD-QEYS-M-0003** must be treated as confidential and must not be disclosed or used in any way except in relation with the Purpose of this RFP.

2. For the purpose of this NDA, Confidential Information includes, but not limited to the documents entitled ***RD-01 :*** **DDD-QEYS-M-0001** ***and RD-02 :*** **DDD-QEYS-M-0003** and any documents, Instructions, guidelines, data, material, advice or another information whether received orally, in printed form or recorded electronically or otherwise and whether or not labeled as proprietary, that is disclosed to a person or entity or that person or entity becomes aware of for the purpose of this RFP.

3. The Supplier agrees that the documents entitled ***RD-01:*** **DDD-QEYS-M-0001 and** ***RD-02:*** **DDD-QEYS-M-0003** will not be reproduced, copied, divulged, released or disclosed, in whole or in part, in whatever way or form any Confidential Information to any person or entity other than a person employed by the Supplier without the prior written consent of the PWGSC's Contracting Authority and for any purpose other than for the preparation of a response to this RFP.

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

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

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

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

8. All the Information contained in the documents entitled ***RD-01:*** **DDD-QEYS-M-0001 and** ***RD-02:*** **DDD-QEYS-M-0003** and all other Confidential Information disclosed under this NDA shall remain the property of Canada or a third party, or of any other person or entity to whom it lawfully belongs, as applicable.

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

10. The Supplier must require any proposed subcontractor with a “need to know”, to execute a NDA on the same conditions as those contained in this NDA prior to disclosure of the Confidential Information.

11. At close or early termination of the bid period, it 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 documents, either soft or hard copies, once he has submitted his bid.

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

13. The NDA remains in force indefinitely.

14. 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 ribunal having jurisdiction.

15. 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.

16. 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.

17. Canada reserves the right to refuse the request for access to documents.

IN WITNESS WHEREOF, this Non-Disclosure Agreement has been duly signed this day of _____, 2018, by an authorized representative of the

_____
Name of Supplier

_____
Name of authorized representative (print)

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

Witness:

_____
Name of the Witness

ANNEX "F"
NON-DISCLOSURE AGREEMENT CONTRACT

I, _____ , recognize that in the course of my work as an employee or subcontractor of _____ , I may be given access to information by or on behalf of Canada in connection with the Work, pursuant to Contract Serial No. **9F064-170353/001/MTB** between Her Majesty the Queen in right of Canada, represented by the Minister of Public Works and Government Services and the Canadian Space Agency, including any information that is confidential or proprietary to third parties, and information conceived, developed or produced by the Contractor as part of the Work. For the purposes of this agreement, information includes but not limited to: any documents, instructions, guidelines, data, material, advice or any other information whether received orally, in printed form, recorded electronically, or otherwise and whether or not labeled as proprietary or sensitive, that is disclosed to a person or that a person becomes aware of during the performance of the Contract.

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

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

I agree that the obligation of this agreement will survive the completion of the Contract Serial No.: **9F064-170353/001/MTB.**

_____

Signature

_____

Date

ATTACHMENT 1 TO PART 3
TECHNICAL AND MANAGERIAL BID PREPARATION INSTRUCTIONS

1.1 TECHNICAL AND MANAGERIAL BID

The details provided in this Attachment complement the information introduced in Part 3 - Bid Preparation Instructions.

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

1. Title / Project Identification Page (see 1.2);
2. Table of Contents (see 1.3);
3. Technical and Managerial Section (see 1.4);
4. Bid Appendices (see 1.5).

The structure of the Technical and Managerial Bid and its subsections are described below. Some of the subsection headings include identifiers. These identifiers represent an evaluation criterion (see Attachment 1 to Part 4) that is applicable to that specific section/subsection for each bid submitted by a Bidder.

1.2 TITLE/ PROJECT IDENTIFICATION PAGE

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

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

1.3 TABLE OF CONTENTS

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

1.4 TECHNICAL AND MANEGERIAL SECTION

The Technical and Managerial Section should describe the technical and managerial aspects of the project as outlined in the following subsections.

1.4.1 Mandatory Evaluation Criteria

The Bidder must have a subsection in its bid for the mandatory evaluation criteria detailed in Attachment 1 to Part 4. The subsection must contain sufficient details to demonstrate that the Bidder meets the mandatory evaluation criteria provided in Attachment 1 to Part 4.

1.4.2 Point-Rated Criteria

The Bidder must have a subsection in its bid for each rated evaluation criterion detailed in Attachment 1 to Part 4. The subsection must contain sufficient details to demonstrate that the Bidder meets the Point-rated evaluation criteria provided in Attachment 1 to Part 4.

1.5 BID APPENDICES

1.5.1 Appendices Required with the Bid

The following items should be addressed in individual appendices as part of the bid:

a) List of Acronyms: All the acronyms used in Section I: Technical and managerial Bid, should be explained;

b) Resumes: The bid should include resumes of the proposed resources and these should be appended to Section I: Technical and Managerial Bid;

c) List of Contacts: The list of contacts should be appended to Section I: Technical and Managerial Bid, in a format suitable for distribution and should include all the Bidder's points-of-contact involved in the bid development and/or during the Contract.

The following example format should be used:

Table 1.6: Bidder's List of Contacts

Role	Name	Telephone	Fax	E-Mail
Project Manager				
Project Engineers				
Contractor's Representative				
Claims (Invoicing) Officer				
Communications (for press release)				
PA Responsible				
Other				

ATTACHMENT 1 TO PART 4
EVALUATION CRITERIA

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

CSA-QEYSSAT-SOW-0001

Canadian Space Agency
Space Science & Technology

QUANTUM ENCRYPTION AND SCIENCE Satellite (QEYSSat)

STATEMENT OF WORK

INITIAL RELEASE
MARCH 20, 2018

NCAGE Code: L0889

Canadian Space Agency | Agence Spatiale Canadienne

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1 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to provide a definition of the work to be performed under Phase A activities for the instrument and mission integration requirements for the Quantum EncrYption and Science Satellite (QEYSSat) mission. Phase A includes the generation and submission of relevant technical documents, leading to a System Requirements Review. This Statement of Work (SOW) identifies the engineering mission-level technical requirements, as well as the program and administrative requirements that shall be addressed during Phase A.

The vendor performing the work shall be hereinafter referred to as the 'Contractor'.

1.2 CONTENT

This Statement of Work defines the work to be performed in terms of document deliverables. It also defines the manner in which the work is to be performed and controlled. The following topics are covered:

- Project Management
- Safety and Mission Assurance
- Engineering
- Meetings and Reviews
- Deliverables

1.3 GENERAL AND BACKGROUND INFORMATION

The QEYSSat demonstration mission will provide a government-owned, space-based platform for federal stakeholders and the Canadian scientific community to test and demonstrate Quantum Key Distribution (QKD) transmission in space. This technology demonstration mission will help Canadian researchers reduce risks inherent to the innovation process by enabling opportunities to conduct tests and experimentations in realistic environments – in space – to advance space-based QKD technology.

The QEYSSat demonstration mission will bring Canada a step closer to an operational quantum communications service from space and a stronger overall cyber security posture for the nation in an age of quantum computing when traditional encryption is rendered obsolete. The development of new quantum technologies has the potential to transform markets, create new industries and produce leading edge jobs. Reliable cryptography is an important component of a truly secure communication infrastructure. Cyber security will strengthen our national sovereignty, security and prosperity by protecting our public and private networks, and other important institutions such as banks, hospitals and other service industries will depend on it.

The QEYSSat demonstration mission will create a quantum link between ground and space using polarized photons and transmit encryption keys to ground based users, using this link. These keys will then allow encrypting and transmitting information securely over the public communication infrastructure. These keys can also be used to re-key the satellite itself, or be distributed to one or more ground stations, with the satellite acting as the trusted node. In achieving this goal, the quantum link will be characterized and tested to gain insights into such things as the applicability of different types of photon sources and transmission schemes from

Low Earth Orbit (LEO). The satellite will be used for concurrent scientific experiments with the long distance quantum link. Of particular interest are tests of the entanglement of photon pairs, with one photon remaining on ground and one being sent to the satellite. The insights that may be gained from this demonstration mission will provide information and risk mitigation strategies relevant to future missions, both application and science oriented.

As part of this mission, the CSA also encourages potential contractors to explore opportunities to include an optional, industry-funded secondary payload – an additional technology component or instrument that is not necessarily related to the objective of the mission – onboard the QEYSSat platform. This would provide the successful contractor of phases BCD an opportunity to launch and demonstrate the space-worthiness of their own innovations in space to achieve "flight heritage," a critical precursor to the commercialization of space technologies.

1.4 MISSION OBJECTIVES

As a technology demonstration, QEYSSat aligns with CSA's Departmental Results Framework, under the CSA's new Space Capacity Development Program (SCDP). SCDP carries out activities ranging from pre-mission research and development to flight demonstration, with the aim of positioning the Canadian space sector for global opportunities. It mainly contributes to the Departmental Results as follows:

- Space research and development advances science and technology: QEYSSat represents a critical and disruptive technology. It will enable researchers to develop and demonstrate a method of sharing quantum encryption keys over greater distances than is now possible and will advance technology that will help meet Canada's priorities related to cybersecurity.

In order to meet this overarching result, it is expected that the mission will achieve the following outputs and outcomes:

- Opportunities offered to advance Canadian innovations in science and technologies, including a space-based global encryption key delivery for security-demanding communications.
- Opportunities offered to the current and future generation of experts (involvement of post-secondary students and young professionals) and strengthen the capacity of future Highly Qualified Personnel.
- Space science and technology readiness in the field of quantum research is advanced;
- Canadian future mission readiness is increased;
- Canadian space sector competitiveness is increased; and

Specifically, the technology demonstration has the following mission objectives:

- Demonstrate Long-Distance Quantum Key Distribution (QKD) from LEO;
- Demonstrate Satellite Re-Keying;
- Test Long-Distance Quantum Entanglement;
- Test Various Quantum Sources on the Ground-to-Satellite Quantum Link.

1.5 SCOPE

The Contractor shall provide the facilities, personnel, materials, and services required to perform this system requirement definition phase of the project. The result of this phase will be the System Requirement Review (SRR). It must further demonstrates that the system conceptual design will provide a system that meets the mission requirements within an acceptable level of risk, that the Concept of Operations and the system requirements are compatible and that the project is ready to proceed with the preliminary design.

The nature and scope of this project requires an interdisciplinary team to address all aspects of this mission, including technology, instrument operations, and future applications of this type of instrument for quantum key distribution through a space asset.

In order to maintain continuity throughout all mission phases, CSA intends to provide a dedicated science funding contract throughout Phases A-E to Institute for Quantum Computing (IQC), which will be separate from the industrial development contracts. This science support contract will allow the Principal Investigator (PI) of this mission to lead the QEYSSat scientific support for the Government of Canada stakeholders, support the development of QKD application and demonstration activities, provide required expertise to the industrial team and support to the CSA project management office. IQC shall provide to the contractor a royalty free access to its background and foreground Intellectual Property (BIP and FIP) as required for the purpose of developing and demonstrating the QKD technology through the QEYSSat mission.

This Statement of Work covers activities for Phase A only. Supporting information, including milestones and assumptions for future phases, can be found in Appendix C. This is useful for cost and schedule planning of future phases, which is within the scope of Phase A.

The QEYSSat mission shall meet the requirements as defined in Section 2.1 (Applicable Documents). These include space segment mission level functional and performance requirements as well as other applicable requirements such as ground segment, quality, safety and operational requirements.

- Secondary Payload:

In addition to QKD demonstration, an opportunity could be taken by industry to demonstrate a secondary payload which would help position Canadian space sector on the global market. The opportunity would be the sole responsibility of the contractor that would win the phases BCD contract. The responsibilities includes securing the funding, ensuring timeliness, mitigating risks, developing, testing and operating the secondary payload.

Throughout the QEYSSat mission development phases, the contractor will also need to demonstrate that the integration of the selected secondary payload does not jeopardize the realization of the primary mission objectives (Section 1.4), that mission requirements adequately integrate that of the secondary payload, and that the technical and management performances (cost, schedule, and risk) are not affected.

1.5.1 Project Milestones and Schedule for Phase A

This section summarizes the schedule for the Phase A activities. For the sake of planning purposes, the date of Contract Award (CA) can be assumed to be August 1, 2018. The Milestone dates given are a maximum limit. This phase is scheduled over a **6-month** period.

TABLE 1-1 - PHASE A MILESTONE REVIEWS

Milestones	Date	Location
Contract Award (CA)	Target: August 2018	N/A
Kick-off Meeting (KOM)	CA + 2 weeks	CSA
Conceptual Design Review (CoDR)	CA + 3 months	Contractor
System Requirements Review (SRR)	CA + 6 months	CSA

TABLE 1-2 - PHASE A MEETINGS

Meetings	Date
QEYSSat Team Teleconference Meeting	Bi-Weekly

1.5.2 Project Phases

QEYSSat mission is notionally divided in the following Phases:

Phase A, System Definition;

Phase B, Preliminary Design;

Phase C, Detailed Design;

Phase D, Manufacturing, Assembly, Integration and Test (AIT) and Launch Preparation, on-orbit Commissioning and Demonstration addressing mission mandatory requirements;

Phase E, Operations, including post-Demonstration activities addressing mission goals;

Phase F, Decommissioning and disposal.

1.6 ASSUMPTIONS

1.6.1 Language

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

1.6.2 Document Convention

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

"shall"	Indicates a mandatory requirement.
"should"	Indicates a preferred, but not mandatory alternative.
"may"	Indicates an option.
"will"	Indicates a statement of intention.

1.7 ROLES & RESPONSIBILITIES

Many partners share the responsibilities for the success of this effort. A summary of their roles and responsibilities is as follows:

- **CSA:**

  Technical Authority (TA).

  Main interface between stakeholders for the overall Work, in particular with Science Team and Principal Investigator (ie. generates agreement with the Science Team and Principal Investigator).

- **Principal Investigator (PI) – Institute of Quantum Computing**

  Leads QEYSSat Science team activities (including System Simulations and Performance Modelling)

  Leads QKD application and demonstration development,

  Leads QEYSSat demonstration phase and operation of Quantum Optical Ground Facilities,

  Provides required science and technical expertise to industrial team, particularly on QKD instrument and Quantum Optical Ground Facilities

  Develops QEYSSat Operational Concept

  Supports QEYSSat Calibration Activities and Data Processing

- **Contractors of phase A:**
- Develops the QEYSSat mission concept design and system requirements with and without the secondary payload;
- Develops the technology readiness and risk assessment (TRRA) and related roadmap;
- Develops the product assurance requirements;
- Supports the PI in the development of the operational concept.

- **Contractor of Phases BCD:**

  Designs, build, tests, certifies, delivers and commissions the system including QEYSSat satellite and Quantum Optical Ground Facilities;

  Overall QEYSSat satellite integrator.

  Provides necessary facilities for the space segment integration, and end-to-end tests.

  Provides Ground Segment as per operational concept.

  Coordinates launch with launch provider, based on the manifest request from the CSA.

  Responsible for the commissioning and supporting the demonstration, operation and de-commissioning phases.

  Responsible for all aspects of the secondary payload, including but not limited to funding, management, development, testing, commissioning, demonstration, and operations.

- **Public Services and Procurement Canada (PSPC):**

  Contractual Authority

  The only entity that has the authority to change the scope of work in contract.

2 DOCUMENTS

2.1 APPLICABLE DOCUMENTS

The following documents and revision level are applicable and form an integral part of this document to the extent specified herein.

TABLE 2-1 – APPLICABLE DOCUMENTS

AD No.	Document Number and Revision	Document Title
AD-01	CSA-MICRO-RD-0003 Rev. 2.0	QEYSSat User Requirements Document ftp://ftp.space.gc.ca/users/QEYSSAT/pub/
AD-02	CSA-ST-GDL-0001 Rev. C	Technology Readiness Levels and Assessment Guidelines ftp://ftp.space.gc.ca/users/TRP/pub/TRRA/
AD-03	ESTEC, TEC-SHS/5574/MG/ap Rev. 6	Technology Readiness Levels Handbook for Space Applications ftp://ftp.space.gc.ca/users/TRP/pub/TRRA/
AD-04	CSA-ST-FORM-0003 Rev. A	Critical Technologies Elements Identification Criteria Worksheet ftp://ftp.space.gc.ca/users/TRP/pub/TRRA/Technology_and_Risk_Assessment_Worksheets%20_and_Rollup_Tool/
AD-05	CSA-ST-FORM-0001 Rev. E	Technology Readiness and Risk Assessment Worksheet ftp://ftp.space.gc.ca/users/TRP/pub/TRRA/Technology_and_Risk_Assessment_Worksheets%20_and_Rollup_Tool/
AD-06	CSA-ST-RPT-0003 Rev. A	Technology Roadmap Worksheet ftp://ftp.space.gc.ca/users/TRP/pub/TRM/

2.2 REFERENCE DOCUMENTS

The following documents and revision level are for reference only. They provide additional information or guidelines that either may clarify the contents or are pertinent to the history of this document.

TABLE 2-2 – REFERENCE DOCUMENTS

RD No.	Document Number	Document Title
RD-01	DDD-QEYS-M-0001	QEYSSat Mission Concept Document Attachment 1
RD-02	DDD-QEYS-M-0003	QEYSSat Mission System Design Document Attachment 2
RD-03	CSA-SE-STD-0001 Rev. A	Systems Engineering Technical Reviews Standard ftp://ftp.space.gc.ca/users/TRP/pub/TRRA/
RD-04	CSA-SE-PR-0001 Rev. B	Systems Engineering Methods and Practices ftp://ftp.space.gc.ca/users/TRP/pub/TRRA/
RD-05	TOR-2011(8591)-21	Mission Assurance Guidelines for A-D Mission Risk Classes http://aerospace.wpengine.netdna-cdn.com/wp-content/uploads/2015/04/TOR-20118591-21-Mission-Assurance-Guidelines-for-A-D-Mission-Risk-Classes.pdf

3 WORK REQUIREMENTS

The following sections describe the Work requirements that shall be accomplished by the Contractor. The Contractor shall approach Phase A with the objective of producing a conceptual design, schedule and cost estimate of the QEYSSat mission, including satellite bus, QKD payload, Quantum Optical Ground Station (QOGS) as well as the information for the secondary payload and indicate how the secondary payload impacts the mission in all aspects (technical, cost, schedule, risks, scope).

Throughout the contract, in all deliverables throughout this SOW, the difference between QEYSSat mission concepts with only the primary payload and one that includes a secondary payload shall be clearly identified.

The contractor shall provide a trade-off analysis of benefits, cost/schedule, and/risk impact of the secondary payload given the primary mission objectives. The CSA will review this information and evaluate whether the secondary payload can be integrated into the QEYSSat mission. Throughout this contract, and in future phases of the mission, the CSA will review this information at major reviews (see Appendix C). These reviews will serve as go-no-go points for the secondary payload based on compatibility with the mission objectives. The requirements for compatibility will be defined in Phase A by the contractor, and will be accepted at SRR by CSA.

Details on prior prototyping and approach to development of QOGS can be found in Appendix E.

The Contractor may propose to implement QEYSSat mission onboard a spacecraft purposed for another mission where QKD would be a hosted payload among other payloads. In this case, QEYSSat payload shall have a primary payload priority throughout development, commissioning and demonstration phases (Phase B/C/D). Other payloads hosted on the spacecraft will be considered secondary payload for the purpose of this work.

The following activities are described in relation to specific deliverables required by this SOW. The Deliverables and Contract data requirements list (CDRL) as well as their associated Data Item Description (DID) can be found in the Appendices.

CSA will make available reference documents as identified in section 2.2, particularly RD-01 and RD-02, if required, but contractor must take necessary steps to protect data and information as defined in annex F, non-disclosure agreement forming part of the contract. The non-disclosure agreement also applies to all documents developed by the contractor during the contract.

All documents provided by the CSA during the contract must be destroyed in a secure way at the end of the contract. No CSA provided document is to be kept by the contractor once the contract is completed.

Also, regardless of whether it is Confidential Information, the Supplier must at all times treat the information developed for this contract as Confidential Information and ensure it cannot be accessed by anyone excepting the Supplier's current employees, and any approved subcontractors, which have a legitimate "need to know" during the course of the contract.

3.1 PROJECT MANAGEMENT

3.1.1 Project Management Plan (PMP)

The Contractor shall provide and implement the Project Management Plan as per CDRL 1, or an equivalent Contractor format document.

The Project Management Plan 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.

The PMP is used to:

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

3.1.2 Work Breakdown Structure (WBS) and Description

The Work shall 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 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.

3.1.3 Project Schedule

Table 1-1 shows the expected Project Milestones Schedule, and Table 1-2 shows the Phase A meetings. The Contractor shall track and update a schedule that shows dependencies between tasks, durations, % complete, critical path, long lead items (if applicable) and constraints. The Contractor shall maintain and deliver the Project Schedule based on the WBS, at review meetings.

3.1.4 Cost Estimate

The Contractor shall evaluate cost projections according to CDRL 3. All assumptions used to create the estimate shall be listed. Any options or de-scope options that are included shall be clearly described.

3.1.5 Project Management Control and Progress Reporting

The Contractor shall conduct bi-weekly project status meetings with the 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 will be held by teleconference.

3.1.6 Risk Management

The Contractor shall identify and monitor areas of cost, schedule, programmatic and technical risk and shall identify and implement appropriate risk responses, such risk transfer, mitigation activities, or acceptance.

3.1.7 Intellectual Property (IP)

The Contractor shall explicitly define the Foreground Intellectual Property (FIP) generated during the execution of the contract and report this in the IP Disclosure Report (CDRL 5). This document shall also identify the Background Intellectual Property (BIP) that is required to use the FIP. The BIP disclosure provided with the proposal as per CDRL 5 shall be updated if applicable.

3.1.8 Phase B/C/D Management Plan

The Contractor shall develop and deliver the Project Management Plan for Phases B/C/D as per CDRL 3 at SRR.

3.1.8.1 Phase B/C/D Development Approach

The Contractor shall provide an overview of the satellite, payload and Quantum Ground Facilities development approach, specifying subsystem providers, key sub-contractors, and the general strategy best suited for this approach. The Contractor shall also list the major tasks required in the development and manufacturing cycles. Any risks that are foreseen should be identified along with an estimate of their probability and mitigation strategies. The Contractor shall document the development and manufacturing approach.

3.1.8.2 Phase B/C/D Suggested Work Breakdown Structure

The Contractor shall provide suggestions as to the WBS and Tasks that could be included in the SOW for the Phase B/C/D.

3.1.8.3 Phase B/C/D Schedule and Milestones

The Contractor shall suggest a preliminary schedule for Phase B/C/D. The timeline shall include key milestones such as Preliminary Design Review (PDR), Critical Design Review (CDR), Integration and Test (including payloads integration onto the bus), Delivery, Launch and Commissioning. This schedule shall show dependencies between tasks, durations, % complete, critical path, long lead items and constraints. Any assumptions used to create the schedule shall be clearly stated. The schedule should be as per CDRL 3, and should take into account the proposed list of meetings and milestones as per section 1.5.1.

The Contractor shall also include a list of milestones for the proposed Phase B/C/D schedule, definitions of the milestones and the expected deliverables associated with each milestone (hardware, software and relevant documentation).

3.1.8.4 Phase B/C/D/E Cost Breakdown

The contractor shall provide a Phase B, C and D Cost analysis according to CDRL 3 for all subsystems and mission phases. All assumptions used to create the estimate shall be listed. Any options or de-scope options that are included shall be clearly described. The Contractor shall also include a Phase E ROM Cost estimate for mission goals (AD-01), beginning after demonstration of the mission requirements, based on assumptions and using comparable from similar projects.

This information will be used to support review of the overall program costs and to establish an initial cash flow.

3.2 SAFETY & MISSION ASSURANCE

3.2.1 Product Assurance Requirements (PAR)

The Contractor shall prepare and deliver to CSA the Product Assurance Requirements (PAR) , applicable to Phase B, C and D of the QEYSSat Mission. The PAR shall be derived from the Mission Requirements Document (AD-01) and System Requirements Document. The PAR should be based on Industry Best Practices and where applicable call out the applicable Industry Standards (Commercial, Military or Space). It shall be delivered in preliminary form with the Conceptual Design Document.

Also, the PAR shall clearly determine the approved methods of implementing those requirements within all organizations in the project

The CSA will review the PAR and will independently evaluate the requirements to the system level. The intent of this review is to balance accepted risk against mission, cost, and schedule constraints while providing the highest level of mission success achievable within those constraints.

Details about the elements to address in the PAR are available in the CDRL 13. It shall be delivered at the SRR.

The Contractor shall also recommend the minimum list of PA CDRL documents required for Phases B, C and D to verify, review and approve the design, product assurance, assembly, integration, testing and safety activities .

3.3 ENGINEERING

3.3.1 Technology Readiness and Risk Assessment (TRRA) and Roadmap

The TRRA is used to assess project status and technical risks, and to guide definition of risk reduction work in the current and following phases. The Contractor shall perform the following TRRA:

1. The first preliminary assessment is to be provided in the Bidder's proposed concept, and submitted with the proposal in Contractor format as per the Evaluation Criteria. The objective is to propose comprehensive Phase A risk mitigation development activities arising from this assessment, as well as related decision points, and to prioritize these activities. The proposed plan shall be executed, maximizing the amount of development work that can be performed during Phase A within the schedule and budget limitations provided in this Request for Proposal (RFP). (See Section 3.3.1.1 for more information).
2. The second (and final) assessment shall be performed on the Phase A concept following the Conceptual Design Review. The objective of this assessment is to propose risk mitigation development needs for future phases.

The final assessment shall be performed in accordance with the requirements of the CSA Technology Readiness and Risk Assessment Guidelines (CSA-ST-GDL-0001) and the Technology Readiness Levels (TRL) Handbook for Space Application (ESTEC, TEC-SHS/5574/MG/ap), to formally document the system technology status. The Contractor shall produce a report for the TRRA using the Critical Technology Elements (CTE's) Identification

Criteria Worksheet (CSA-ST-FORM-0003), Technology Readiness and Risks Assessment Worksheet (CSA-ST-FORM-0001) and provide these worksheets for each CTE.

The Contractor shall provide a Technology Development Plan, also known as the Technology Road Map (TRM) including the required technology developments to meet mission needs, and a plan and timeline to reach TRL 6 and 8. The Technology Development Plan shall be provided in the format of AD-06 and the results of the TRRA in the Stand Alone Report format of CDRL 7, or in Contractor Format if it meets or exceeds the intent of CDRL 7.

3.3.1.1 Phase A Risk Mitigation Activities

The Contractor shall conduct a comprehensive Phase A risks assessment. Based on this assessment, risk mitigation activities, which are a result of the proposed Technology Development Plan submitted by the Contractor in the proposal, may be required. The activities target the CTE's that were identified in the preliminary TRRA conducted on the proposed concept in the Bid. The work plan associated with these activities is described in the proposal submitted by the Contractor, and the Contractor shall continue to track and update the work packages as per CDRL 2 and the schedule. This work is critical to mission success, as it mitigates the technical risk for the subsequent phases. The Contractor may consider re-using the prototypes developed earlier under CSA development activities for future QEYSSat mission; refer to Appendix E for details.

3.3.2 Mission Concept of Operations

The Contractor shall work with the PI to produce a Concept of Operations by elaborating on elements specific to the proposed concept. The concept of operations shall include, when applicable, the information listed in CDRL 8 (Concept of Operations), and can be presented in Contractor Format.

The Contractor shall recommend the commissioning requirements. Commissioning consists of those activities performed to demonstrate that the QEYSSat satellite is ready for use in orbit, which includes the satellite commissioning and the demonstration activities that establishes compliance to the mission requirements. Only once these have been successfully accomplished that the satellite will have completed phase D.

The Contractor shall recommend the operations requirements and top-level operational planning activities for the demonstration phase of the mission.

3.3.3 Mission Conceptual Design

The Contractor shall develop a mission conceptual design of the QEYSSat satellite. This conceptual design shall be presented in the Conceptual Design Document (CDRL 9), and will be reviewed at the Conceptual Design Review in its preliminary form, and at the SRR in its final form.

The Contractor shall demonstrate how the conceptual design can meet the mission requirements. The conceptual design also provides an outline and detail appropriate considerations to be taken in regards to the mission profile. The mission concept shall outline a worse-case scenario, most-likely scenario and an optimal scenario addressing mission requirements. This shall include, but not be limited to:

- Orbit selection
- Coverage Area, Revisit Time
- Ground Station Operations/Telemetry, Tracking & Command (TT&C)
- Ground Station Access, Data Delivery
- Frequency allocation/management

The mission conceptual design is tailored to meet the mission requirements and is feasible within appropriate margins (mass, power, data rate, etc.). It assists in finalizing the design of the system and allocating the requirements to subsystems, to demonstrate its feasibility, to support programmatic estimates. System-level requirements will then be defined to meet the mission conceptual design.

3.3.3.1 Product Breakdown Structure

The Contractor shall establish a product tree to define the functional decomposition of the QEYSSat into subsystems. As this Product Breakdown Structure (PBS) is produced for the TRRA, it may be identical. The PBS shall use a unique identification name for each structure node. This identification name shall be used to identify documents and work packages related to the corresponding node.

3.3.3.2 Trade-off Studies

The trade-off analysis shall demonstrate that the conceptual design is the optimum choice for the mission. The Contractor shall perform analyses and studies to optimize the system design, select between alternative design choices and determine the best allocation of requirements and resources between subsystems. The trade-off analysis shall also include secondary payload options. The Contractor shall identify key components that will drive the development and propose alternative solutions and suppliers. As a minimum, the following shall be considered for each trade-off study:

1. Purpose of the study;
2. Cases considered;
3. Analysis description (alternatively, pros and cons);
4. Analysis results;
5. Decisions/Recommendations

3.3.3.3 Preliminary Verification Compliance Matrix

The integrated Verification Compliance Matrix shall perform the following functions:

1. Establish the traceability from the system requirements, traceable to the QEYSSat Mission (AD-01) and the PAR produced by the contractor (Refer to section 3.2.1);
2. Show the verification method(s) for each requirement as per SE Methods and Practices (RD-04), Section 5.5.2.

3.3.3.4 Analyses

Analyses are required in order to support the understanding of different design choices, budgets and to predict the performance of the different subsystems.

As per CDRL 9, the Conceptual Design Document shall present the analyses performed, main results and problems encountered. The conceptual design document presents a summary of the analyses. Each fully detailed analysis report, in Contractor format, shall also be provided as per CDRL 10.

3.3.3.5 Engineering Budgets and Margins

Budgets play a central role from a systems engineering standpoint. CDRL 9 (the System Conceptual Design) states that budgets shall be presented on a per-subsystem basis.

The Contractor shall create preliminary payload budgets defining the preliminary performance and functional requirements for the QEYSSat payloads taking into account applicable bus interfaces and budget restrictions. The budgets shall include a summary of the engineering budgets and Technical Performance Measurements (TPMs), margins, and their allocation to subsystems.

The budget elements to be provided shall be discussed and agreed upon between CSA and the contractor at the kick-off meeting.

3.3.4 CAD Models

The CAD models produced during Phase A shall be as per CDRL 11.

3.3.5 Verification Approach

The Contractor shall produce a preliminary verification approach, high level test planning, and model philosophy during Phase A. This approach shall meet the requirements detailed in the Requirements Document (AD-01). It shall be in accordance with the SE Methods and Practices (RD-04), subsections deemed relevant by the contractor within Section 5.5. The verification approach shall be delivered in contractor format as per CDRL 14.

A significant part of the verification strategy is the space environmental qualification program. This section applies to Space Segment equipment only and addresses the process through which the System will be qualified for operation in the space environment. The space environmental qualification program comprises two major components:

1. Verification Philosophy
2. Model Philosophy

The recommended approach for the Verification Philosophy and Model Philosophy will be reviewed at the Conceptual Design Review.

3.3.6 System Requirements

The Contractor shall define and develop the QEYSSat systems requirements and document them in the System Requirements Document (SRD) according to the directions, content and properties described in CDRL 12. The SRD shall clearly outline whether each requirement is driven by bus, payload, Ground Station or mission parameters. Where applicable, all requirements shall identify implications to spacecraft bus development and associated bus requirements (i.e. payload vs. bus data storage and processing, attitude control, etc).

3.3.7 Interface Control Document

The Contractor shall provide an Interface Control Document (ICD). The ICD to be developed shall include all relevant external and internal interfaces, particularly involving secondary payload. CDRL 15 may be used as a guideline to define the relevant interfaces for the mission.

3.4 MEETINGS AND REVIEWS

For all meetings, an agenda shall be prepared by the Contractor and submitted to the CSA Project Authority prior to the meeting date. The Contractor shall be responsible for recording the minutes of all meetings and submit them to the CSA's PA within 3 working days after the meeting.

Minutes of meetings will summarize actions to be taken and decisions made regarding items on the agenda. However, the minutes are not an *in extenso* transcription of the discussions that may have taken place. For that reason, the update of the list of actions to be taken and of the list of decisions made at a meeting may serve as the minutes of the meeting.

3.4.1 Kick Off Meeting (KOM)

The contractor shall organize a KOM with the CSA Project Manager at the CSA in the first month after Contract award. The Work shall start when the contract starts, not pending the KOM. The purpose of the KOM is to introduce the Contractor and CSA teams, review the scope of work, the schedule, the basis of payment and discuss any other topics as required. All key participants under the contract, including representatives from each major subcontractor, should attend. Attendance of some team members by telecom is acceptable.

3.4.2 Conceptual Design Review (CoDR)

The purpose of the CoDR is to describe the preliminary system conceptual design proposed to meet the mission requirements. The format of the review meeting will be to review the preliminary Conceptual Design (CDRL 9).

The contractor shall also identify the Critical Technologies from the Technology Readiness Risk Assessment and has a plan for qualification of these items at the part, subsystem and/or system level. The preliminary Product Assurance Requirements (CDRL 13) will be reviewed.

In addition, the Contractor shall submit their Verification Approach (as per CDRL 14) for review, and it shall demonstrate that the chosen model philosophy and proposed test flow will meet the qualification and verification needs of the program.

The criteria to pass this review is the disposition of all action items that have been raised during the review, to the satisfaction of the CSA.

3.4.3 System Requirement Review (SRR)

The contractor shall prepare and conduct an SRR meeting. The purpose of the SRR is to demonstrate the validity of the system requirements and the project readiness to proceed with the preliminary design.

The SRR shall meet the objectives, entry and exit criteria detailed in the Systems Engineering Technical Reviews Standard (RD-03). The SRR shall include as a minimum the CDRLs as per the due date and version in the Table A-1.

The objectives of the SRR are summarized as follows (Reference RD-03):

1. The mission requirements have been logically and fully flowed down to the system requirements.
2. The system, environmental, design and interface requirements have been defined, and are verifiable.
3. The system conceptual design is tailored to meet the system requirements and is feasible within appropriate margins (mass, power, data rate, etc.).
4. The Concept of Operations and the system requirements are clearly compatible, by demonstrating that there are no discrepancies between them.
5. External interface requirements have been defined.
6. Internal interface requirements have been characterized.
7. The preliminary verification approaches, test planning and model philosophy are defined.
8. The technical, cost, schedule and programmatic risks have been analyzed, quantified and viable mitigation plans have been identified;
9. The Safety and Product Assurance (PA) Requirements have been defined by the contractor;
10. Substantiated and validated life-cycle costs and project schedule have been established for the whole project;
11. The execution of the Project Implementation Plan can be reasonably expected to result in the successful completion of the project within imposed constraints, financial, schedule and human resources;
12. If applicable, a formal Joint Implementation Plan with the partner(s) is agreed, signed and in place;

3.5 DOCUMENT DELIVERABLES

The Contractor shall prepare and deliver the documents as requested in the Appendix A, Table A-1.

3.5.1 Document Deliverables, Format and Content

The Contractor shall ensure that documents delivered comply with the general preparation instructions and applicable Data Item Description (DID) as found in Appendix B.

Alternatives to the DIDs document format, its content and its submission methods are acceptable to the CSA. However, the alternative Contractor format shall meet the intent of the stated DID.

Documents shall be delivered in the original software application format, plus in Portable Document Format (PDF). One electronic copy of each deliverable document shall 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.

3.5.1.1 Documents Approval

The TA will provide approval or disapproval within ten (10) working days of receiving the document. In the event that a document is disapproved, the TA will advise the Contractor in writing, as to the reasons for such disapproval. Such notification will include a full explanation of the reasons for the lack of approval and will direct the additions, deletions and/or corrections, which the TA deems are required for approval. With this notification, the TA will provide the allowable delay for re-submission.

APPENDICES

A DELIVERABLES AND CONTRACT DATA REQUIREMENTS LIST (CDRL)

A.1 DATA DELIVERABLES

Data Deliverables shall be delivered as per Table A-1.

LEGEND

- **MILESTONES**
  - **CoDR** = Conceptual Design Review
  - **SRR** = System Requirement Review

- **OTHERS**
  - **CF** = Contractor Format
  - **F** = Final
  - **IR** = Initial Release (90-100% completed)
  - **M** = Monthly
  - **D** = Draft (70-80% completed)
  - **U** = Updated
  - **P** = Preliminary (as per associated DID)

TABLE A-1 - CONTRACT DATA REQUIREMENTS LIST (CDRL)

CDRL No.	Category	Deliverable	Due Date	Version	DID No. or Cont. Format ***
1	PM	Project Management Plan – Phase A	Proposal	Final	0001 or Cont. format
2	PM	WBS and Work Package Description – Phase A	Proposal	Final	0002 or Cont. format
3	PM	Project Management Plan– Phases B,C,D	SRR-10 Days	Final	0001, 0103 and 0002 or Cont. format
4	PM	Meeting Documentation	Meeting	Final	0005 or Cont. format
5	PM	BIP/FIP Disclosure Report	Proposal (BIP) End of Contract (BIP/FIP)	IR Final	0011
6	PM	Benefits Analysis	SRR-10 working days	Final	Contractor format
7	SE	Technology Readiness and Risk Assessment with Stand Alone Report	With proposal (using proposed concept) SRR– 10 working days (using CoDR-approved Concept)	Draft Final	0013 or Cont. format
8	SE	Concept of Operations	SRR-10 working days	Final	0009 or Cont. format
9	SE	Conceptual Design and PAR	Conceptual Design Review SRR – 10 working days	Preliminary Final	0010 or Cont. format
10	SE	Analyses	Conceptual Design Review SRR – 10 working days	Draft Final	Cont. format
11	SE	CAD Models	Conceptual Design Review SRR – 10 working days	Draft Final	0600
12	SE	System Requirements Document (hardware and software)	SRR – 10 working days	Final	0017 or Cont. format

CDRL No.	Category	Deliverable	Due Date	Version	DID No. or Cont. Format ***
13	PA	Product Assurance Requirements (PAR)	Conceptual Design Review SRR – 10 working days	IR Final	0029 or Cont. format
14	SE	Verification Approach	Conceptual Design Review SRR – 10 working days	IR Final	Cont. format
15	SE	Interface Control Document (ICD) (Hardware and Software)	Conceptual Design Review SRR– 10 working days	IR Final	0030 or Cont. format

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

B DATA ITEM DESCRIPTIONS

DID-0000 - GENERAL PREPARATION INSTRUCTIONS **24**
DID-0001 - PROJECT MANAGEMENT PLAN **27**
DID-0002 – WBS AND WORK PACKAGE DESCRIPTIONS **29**
DID-0003 – PROJECT COST ESTIMATES **30**
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DID-0005 –CONCEPT OF OPERATIONS **33**
DID-0006 – SYSTEM CONCEPTUAL DESIGN DOCUMENT **35**
DID-0007 – COMPUTER-AIDED DESIGN (CAD) MODELS **37**
DID-0008 – BACKGROUND AND FOREGROUND INTELLECTUAL PROPERTY (BIP/FIP) DISCLOSURE REPORT **38**
DID-0009 – TECHNOLOGY READINESS AND RISK ASSESSMENT WITH STAND ALONE REPORT **41**
DID-0010 – SYSTEM REQUIREMENT DOCUMENT **44**
DID-0011 - PRODUCT ASSURANCE REQUIREMENT (PAR) **46**
DID-0012 – INTERFACE CONTROL DOCUMENT (ICD) **47**

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 shall be written in the English language. The term "documents" includes change requests, change notices and requests for deviations and waivers.

1.2. All documents shall include the following notification at the bottom of the cover page:

© Contractor's name, 2017

RESTRICTION ON USE, PUBLICATION OR DISCLOSURE OF PROPRIETARY INFORMATION

This document is a deliverable under contract no. _____ This document contains information proprietary to the Name of the Contractor, or to a third party to which the Name of the Contractor 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 shall be released by the supplier and submitted in native electronic format (Microsoft Word, Excel, MS Project, etc.) and in PDF format. Schedules shall be submitted in Microsoft Project format (or equivalent) and PDF format.

2. FILE NAMING INSTRUCTIONS:

Document file names shall contain 4 main components:

- Project Identifier,
- Contract Number,
- Document title and revision number, and
- Date Tracking Number.

WXYZ-TYPE-NUM-CIE_ContractNumber_DocumentTitle_Rev#_sent Date Tracking Number

Project Identifier

The project identifier shall contain:

- WXYZ: a 4- to 8-letter acronym of the project;
- TYPE: a 2-letter acronym according to the Table 2-1 below:

Acronym	Description
MN	Minutes of meeting
PT	Presentation
PR	Progress Report

Table 2-1: Letter Acronym Definition

- NUM: a CDRL category and three digit sequential number (e.g., PM001, SE002, etc.); and
- CIE: name of company (no space, no hyphen).

Contract Number

For example: _9F028-07-4200-03

Document Title and revision number or letter (no space, no hyphen)

For example: _TestProcedure_rev1

Date Tracking Number

This is to reflect the submission date and shall follow the Year-Month-Day format. For example: _sent2012-10-25 (for 25 October 2012).

3. DELIVERY METHODS:

3.1. The method of document and data submission and receipt will be coordinated by CSA and the Contractor:

3.1.1. Documents and data may be delivered via

a. CSA PIE-ISEP document portal;

b. retrieval from the contractor’s repository, once CSA has received a notification of the document's release and its location in the repository; or

c. DVD or CD-ROM media.

3.1.2. Notifications of document availability shall be sent to the CSA CM Receipt Desk: CM_Receipt@asc-csa.gc.ca

3.1.3. If deliverables contain ITAR content, notifications of their availability on contractor repositories shall be sent to: CSA-CM-ITAR@asc-csa.gc.ca

3.1.4. Emails to indicate document availability are to contain:

a. in the "Subject" line, the project/program acronym or equivalent identifier and the CDRL number.

b. in the email text:

1) Document Number;

2) Document Revision;

3) CDRL Identifier;

4) Security Designation of the contents. Indicate if contents are subject to ITAR, when applicable.

3.1.5. 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

3.1.6. The DVD/CD-ROM labels shall 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.

3.1.7. 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 stakeholders;
- 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 shall 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 shall describe the processes planned to be used to ensure that the various elements of the project are properly coordinated. It shall describe:

a) The overall project management strategy;

b) How the plan will be executed; and

c) Overall change control mechanisms.

3) Project Scope Management

This section shall 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.

4) Project Time Management

This section shall describe the processes planned to be used to ensure timely completion of the project.

This section shall include the detailed project baseline schedule down to the activity level. The baseline schedule in the form of a Gantt chart shall include all elements of the WBS and shall depict all linkages and dependencies.

5) Project Cost Management

This section shall describe the processes planned to be used to ensure that the project is completed within the approved budget.

6) Project Quality Management

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

7) Project Human Resources Management

This section shall describe the processes planned to be used to make the most effective use of the people involved with the project.

8) Project Communications Management

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

9) Project Risk Management

This section shall describe the processes planned to be used to identify, analyze and respond to projects risks.

10) Project Procurement Management

This section shall describe the processes planned to be used to acquire goods and services (“products”) from outside the Contractor’s organisation.

DID-0002 – WBS and Work Package Descriptions

PURPOSE:

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

PREPARATION INSTRUCTIONS:

The Contractor shall 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 shall be deliverable-oriented.

The Contractor shall 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 shall include, as a minimum:

a) A unique identifier traceable to the WBS;

b) A title;

c) The name of the individual responsible for completion of the work;

d) The scope of the work package;

e) The start date and duration;

f) Required inputs and dependencies;

g) A description of every activity covered by the WPD;

h) Assumptions;

i) Output and work package acceptance criteria;

j) Issue date;

k) Version number; and

l) List of deliverable with delivery milestone.

DID-0003 – Project Cost Estimates

PURPOSE:

To provide cost estimates for Phases B, C, D and E.

PREPARATION INSTRUCTIONS:

Cost Estimates

1. The cost estimates shall be provided, in Contractor format, as follows:

    a. Bottom-up cost Estimate for Phase B
    b. Bottom-up cost Estimate for Phase C
    c. Bottom-up cost Estimate for Phase D
    d. Cost Estimate for Phase E
    e. Summary cost estimate that combines 1(a), 1(b), 1(c), and 1(d)

Bottom-Up Estimates

2. The estimates named in paragraph 1(a), 1(b), 1(c) and 1(d) of this DID shall be based on a Cost Work Breakdown Structure.

3. For the cost estimates of Part 1, the following information shall be provided for each element of the Cost Work Breakdown Structure, both by phase and by fiscal year, including inflation:

    a. Labor Hours in Person-Hours or Person-Days and in dollars;
    b. Non-Labor costs;
    c. Material costs;
    d. Purchased Equipment;
    e. Material Handling;
    f. Subcontracts Cost Breakdown;
    g. Travel and living;
    h. General & Administrative (G&A) expenses;
    i. Contractor overhead;
    j. Contractor profit; and
    k. Taxes.

4. For each of estimate 1(a), 1(b), 1(c) and 1(d) a numbered list of assumptions shall be provided.

5. Risks (both technical and programmatic) shall be identified and associated dollar value for each risk should risks materialize shall be stated in the cost estimate. In addition, a weighted risk cost estimate shall be included.

DID-0004 – Meeting Deliverables

PURPOSE:

To identify the deliverables required for a meeting.

PREPARATION INSTRUCTIONS:

The meeting shall contain the following deliverables, per contractor format:

m) Presentation, including agenda, delivered 3 business days before meeting;

n) Minutes, including Action Items, delivered 3 business days after meeting.

DID-0005 –Concept of Operations

PURPOSE:

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

PREPARATION INSTRUCTIONS:

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

The Concept of Operations shall contain the following information:

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

7) Operational Scenarios,
8) Commissioning.

DID-0006 – System Conceptual Design Document

PURPOSE:

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

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

PREPARATION INSTRUCTIONS:

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

PRELIMINARY FORM

The preliminary document shall include the following:

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

FINAL FORM

The final document shall include the following:

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

8) Tests: summarizing the tests to be performed to verify the performance and environmental requirements;

9) Operations concepts: summarizing the operations of the system in both nominal and contingency conditions;

10) Maintenance approach: describing the maintenance approach especially for maintainable items such as the spares for manned systems, flight software and ground systems;

11) Matrix: To demonstrate design compliance to requirements by providing clear link between design and requirements. Indication of design compliance, non-compliance and partial compliance.

DID-0007 – Computer-Aided Design (CAD) Models

PURPOSE:

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

PREPARATION INSTRUCTIONS:

All CAD models developed shall be delivered.

Models shall be delivered in the following formats:

a) Mechanical design: STEP AP203 (.stp);

b) Electrical design: .dsn, .sch, Pspice and Gerber formats;

c) Thermal Design: TMG universal file format, or I-Deas Archive file format;

d) Software design: UML 2.0 or XML;

e) Model-based Systems Engineering Model (if required): Artisan Studio.

f) Optical design models: Zemax

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

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

DID-0008 – 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 shall complete Table 1 for the report to be provided with the proposal (BIP). The report to be provided at the end of the contract shall 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
Provide ID # specific to each BIP element brought to the project e.g. BIP-CON-99 *where CON is the contract acronym*	*Describe the system or sub system in which BIP is integrated (e.g. camera, control unit, etc)*	*Use a title that is descriptive of the BIP element integrated to the work*	*Is the BIP in the form of an invention, trade secret, copyright, design, patent?*	*Describe how the BIP will be available for Canada to use the FIP (e.g. BIP information will be incorporated in deliverable documents, software will be in object code, etc)*	*Describe briefly the nature of the BIP (e.g. mechanical design, algorithm, software, method, etc)*	*Provide the number and fill title of the reference documents where the BIP is fully described, The reference document shall be available to Canada. Provide patent# for Canada if BIP is patented.*	*Describe circumstances of the creation of the BIP Was it developed from internal research or through a contract with Canada? If so, provide contract number.*	*Name the organization that owns the BIP. Provide the name of the subcontractor if not owned by the prime contractor.*

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 shall 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?
ID# should be same as corresponding FIP element in Table2	*Title of FIP should be same as corresponding FIP element in Table2*	*How is the FIP addressing a problem (useful) and what is thought to be novel in this solution (novel)?*	*Describe the limitations of present apparatus, product or process*	*Provide references in published literature or patents relating to the problem or subject if any.*	*Describe briefly how the process, product or apparatus performed during testing or simulation. Provide reference document # where the performance is compiled if applicable.*	*Provide name and coordinates of the person(s) who created the FIP*	*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.*

DID-0009 – Technology Readiness and Risk Assessment with Stand Alone Report

PURPOSE:

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

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

The TRRA Report is used to assess project status and technical risks, and to guide definition of risk reduction work in following phases. It is a recommended deliverable at the end of Phases 0, A and B.

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

PREPARATION INSTRUCTIONS:

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

1) Introduction

   This section should include

   (1) Project Description;

   (2) Purpose of Document;

   (3) Scope.

   This section shall include

   (1) Applicable Documents (which shall include the following):

      (a) TRRA Guidelines (CSA-ST-GDL-0001 at latest approved revision).

   (2) Reference Documents (which shall include the following):

      (a) TRL Handbook for Space Applications (TEC-SHS/5574; ESTEC);

      (b) All evidence documents referred to in body of report.

2) Mission Objectives

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

3) Mission Environment

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

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

4) Product Breakdown Structure

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

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

5) Key Performance Parameters (KPPs) for each CTE

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

6) Critical Technology Elements (CTEs)

i) Description of the CTE;

ii) Rational for selecting the CTEs.

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

7) Technology Maturity and Viability Assessments

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

(1) Description;

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

(3) Heritage and compliance;

(4) TRL achieved;

(5) R&D3;

(6) TNV.

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

8) TRRA Summary and Recommendations

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

- PBS # ; Technology Name; TRL (calculated); TNV (user input);

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

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

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

9) Conclusions

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

10) APPENDIX A – Technology Readiness and Risk Assessment Worksheets

This section shall include, or refer to an attachment which includes, all of the completed worksheets: the Critical Technologies Elements Identification Criteria Worksheet (CSA-ST-FORM-0003), the Technology Readiness and Risk Assessment Worksheet (CSA-ST-FORM-0001 for each CTE. These worksheets will be provided by CSA.

DID-0010 – 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 shall define the requirements on the subject item.

The Requirements Document shall comprise a number of sections, each defining a specific set of requirements. The document shall 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 shall conform to the following standards for quality:

a) They shall be unambiguously clear to the intended readership;
b) Each requirement shall have a unique identifier (e.g. An id number or paragraph number);

c) They shall not define design solutions;

d) They shall be verifiable, preferably by tests or demonstrations;

e) They shall specify the conditions under which they apply; and

f) Performance requirements shall be quantified.

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

DID-0011 - Product Assurance Requirement (PAR)

PURPOSE

The Product Assurance Requirements (PAR) describes the Product Assurance organisation, objectives, and activities planned for the project. The PAR provides the Government with insight into the Contractor's PA organisation, tasks, and activities and allows the Government to assess compliance with the mission requirements.

PREPARATION INSTRUCTIONS

The PAR shall address the following elements:

The Project and PA organization requirements,

- PA management ,
- Methods and resource
- Verification at each level from the system to the lower level piece parts.

The organizational structures and standard processes which will be used for Design Assurance.

The requirements and standards for;

- the design,
- Quality Assurance,
- Configuration Management,
- Electronic, Electrical and Electromechanical (EEE) parts reliability, selection, screening, qualification and approval,
- materials and processes,
- reliability,
- software,
- safety,
- Verification and final on-orbit acceptance.

DID-0012 – Interface Control Document (ICD)

PURPOSE:

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

PREPARATION INSTRUCTIONS:

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

Examples of External ICDs are:

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

Examples of Internal ICDs are:

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

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

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

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

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

7. Structural/Mechanical Interfaces
   - 7.1. Applied Loads and Disturbances (including random vibrations, frequency spectrum)
   - 7.2. Acoustics
   - 7.3. Depressurization/Repressurization
   - 7.4. Ground Handling Environment
8. Thermal/Fluids Interfaces
   - 8.1. General Requirements (touch temperature, condensation prevention, etc.)
   - 8.2. Thermal Environment
   - 8.3. Instrument/Subsystems Cooling
   - 8.4. Vacuum Exhaust Interfaces
9. Electrical Power Interfaces
   - 9.1. Electrical Power Requirements, Sources and Allocation
   - 9.2. Power Supply characteristics and limits
   - 9.3. Overload protection and limits
   - 9.4. Power control
   - 9.5. Electrical connectors (types, pinouts, locations, mating and demating)
   - 9.6. Cable schematics
10. Electromagnetic Compatibility (EMC)
    - 10.1. EMC Classifications
    - 10.2. Host system produced interference environment
    - 10.3. Instrument produced interference environment
    - 10.4. Bonding and grounding
    - 10.5. Power and signal circuits isolation
11. Command and Data Handling (C&DH)
    - 11.1. Communications Technology (RS-422, Ethernet, Analog, Discrete, video, laptop, etc.)
    - 11.2. Signal Characteristics
    - 11.3. Response / Telemetry Format
    - 11.4. Request/Command Format
    - 11.5. Processing Requirements
    - 11.6. Connector/Pin Interface
    - 11.7. Data Acquisition, Storage and Management
    - 11.8. Synchronization
    - 11.9. Application Programming Interfaces
12. Environmental Interfaces
    Any environmental factors not addressed elsewhere in the ICD (e.g. radiation, atmosphere, illumination, etc.)

13. Materials and Processes Interfaces
14. Human Factors Interfaces
15. Propulsion Interfaces
16. Pyrotechnic Interfaces
17. Fire Prevention
18. Ground Operations
    - 18.1. Facilities
    - 18.2. Instrument Handling
    - 18.3. Ground Support Equipment (GSE)
    - 18.4. Communications Requirements
    - 18.5. Power Requirements
    - 18.6. Special Equipment
    - 18.7. Storage

C FUTURE PHASES

For planning purposes, the following table provides a preliminary summary of expected reviews and meetings throughout future phases of the project:

TABLE C-1 - PROJECT MEETINGS AND REVIEWS

Meetings/Reviews	Contractor's Role	Date	Location	Participants
Preliminary Design Review	Lead	As per proposed schedule	Contractor	CSA, PI, Contractor
Critical Design Review	Lead	As per proposed schedule	Contractor	CSA, PI, Contractor
Test Readiness Reviews	Lead	As per proposed schedule	Teleconference	CSA, PI, Contractor
Acceptance Review	Lead	As per proposed schedule	Contractor	CSA, PI, Contractor
Pre-Ship Review	Lead	As per proposed schedule	Contractor	CSA, PI, Contractor
Commissioning Review	Lead	As per proposed schedule	Contractor	CSA, PI, Contractor
Demonstration Review	Support	As per proposed schedule	CSA	CSA, PI, Contractor

D PROTOTYPES & GFE

D.1 QKD PAYLOAD ELEGANT BREAD BOARD

Over the last several years CSA has pursued early technology development in support of a future QKD mission (Table D-1). As a result of those efforts there have been a number of prototypes and breadboard models developed at component and sub-system level. CSA intends to make those prototypes and IP available to support QEYSSat activities during Phase A and the follow-up Phases. Currently, the development work led by University of Waterloo's IQC team is on-going to integrate those various components from early development into a functional Elegant Bread Board prototype of the QKD Payload for characterization and testing in a laboratory environment including specialized laboratory test equipment. This work is expected to be completed by April 2018, thus making the QKD Payload prototype available for system requirement definition and de-risk activities during Phase A should that be required by Contractor. While CSA intends to arrange IQC support to these potential prototype activities, these activities are subject to constraints related to schedule, funding and technical limitations of the prototype. If more than one Phase A contract is awarded, the access to the prototype and flow of testing activities are subject to schedule coordination between different contractors. The Contractor shall identify and explain the need of access to the prototype in the proposal. Standard GFE terms and conditions are applicable. The references listed in the Table D-2 provide technical background on the early prototyping work. The level of details provided therein is deemed adequate for the level of details expected from the proposal.

The current payload design is notionally divided into three major subsystems, along with some ancillary elements. The payload block diagram is shown in Figure D-1, and divided into these modules:

1. The Main Telescope, the assembly for Acquisition, Pointing and Tracking (APT), and Integrated Optical Analyzer (IOA) module. This subsystem is collectively named the Optical Front End (OFE)
2. The Detector Module (DM), which is coupled to the OFE through optical fibers for detecting the quantum signals. The required heat sink, such as a radiator, is part of the spacecraft bus.
3. The Detector Power and Control Unit (DPCU), Command and Data Processing Unit (CDPU) and APT Controller Module (ACM), collectively named as the Integrated Electronics
   Assembly (IEA)
4. In addition to these, the payload prototype may also include a beacon laser, a wide field imager and an optical retroreflector.

TABLE D-1 - PAST QKD DEVELOPMENT ACTIVITIES

Project Title/Description	Contractor	Subcontractor	Years
Feasibility Study on Quantum Entanglement Experiments in Space	ComDev	IQC Institut National d'Optique (INO) University of Calgary	2010-2011
Canadian QUANTUM Comm Sat Concepts and Components	U Waterloo (IQC)	N/A	2011-2012
Preparatory Activities for Quantum	ComDev	IQC Neptec Space Flight Laboratory (SFL) INO	2011-2013
STDP Quantum Key Distribution Receiver for QeySsat	U Waterloo (IQC)	Neptec Xyphos INO	2013-2015
FAST Grant: End-To-End Airborne QKD Demonstration	U Waterloo (IQC)	N/A	2014-2017
QEYSSAT Microsat Phase 0 Study	ComDev	IQC SFL	2014-2016
STDP QEYSSAT Detector Assembly	U Waterloo (IQC)	Neptec Xyphos INO	2016-2017
FAST Grant: Demonstration of Technologies for Quantum Communications Space Networks	U Waterloo (IQC)	N/A	2016-2018

TABLE D-2 - QKD PROTOTYPING WORK REFERENCES

Ref. #	Description
1.	https://uwaterloo.ca/institute-for-quantum-computing/qeyssat
2.	Pugh, C.J.; Kaiser, S.; Bourgoin, J.P.; Jin J.; Sultana, N.; Agne, S.; Anisimova, E.; Makarov, V.; Choi, E.; Higgins, B.L.; Jennewein, T. "Airborne demonstration of a quantum key distribution receiver payload", Quantum Physics, Quantum Science and Technology, 2, 2, 024009 (2017). (preprint https://arxiv.org/abs/1612.06396v2 , 9 Jun 2017)
3.	Anisimova, E.; Higgins, B. L.; Bourgoin, J.-P.; Cranmer, M.; Choi E.; Hudson D.; Piche L. P.; Scott A.; Makarov V.; Jennewein T. "Mitigating radiation damage of single photon detectors for space applications" EPJ Quantum Technol. 4, 10 (2017). (preprint https://arxiv.org/abs/1702.01186v2, 8 Jun 2017)
4.	Bourgoin, J.P.; Gigov, N.; Higgins, B.L.; Yan, Z.Z.; Meyer-Scott, E.; Khandani, A.K.; Lutkenhaus, N.; Jennewein, T. "Experimental quantum key distribution with simulated ground-to-satellite photon losses and processing limitations", Physical Review A, Vol. 92, 12 pp, (2015). (preprint https://arxiv.org/abs/1512.05789).
5.	Bourgoin, J.P.; Higgins, B.L.; Gigov, N.; Holloway, C.; Pugh, C.J.; Kaiser, S.; Cranmer, M.; Jennewein, T. "Free-space quantum key distribution to a moving receiver", Optics Express, Vol. 23, 33437-33447 pp., (2015).

	(preprint https://arxiv.org/abs/1505.00292v2).
6.	Jennewein, T.; Bourgoin, J.P.; Higgins, B.; Holloway, C.; Meyer-Scott, E.; Erven, C.; Heim, B.; Yan, Z.; Hubel, H.; Weihs, G.; Choi, E.; d'Souza, I.; Hudson, D.; Laflamme, R. "QEYSSAT: a mission proposal for a quantum receiver in space", Advances In Photonics of Quantum Computing, Vol. 8997, 7 pp. (2014).

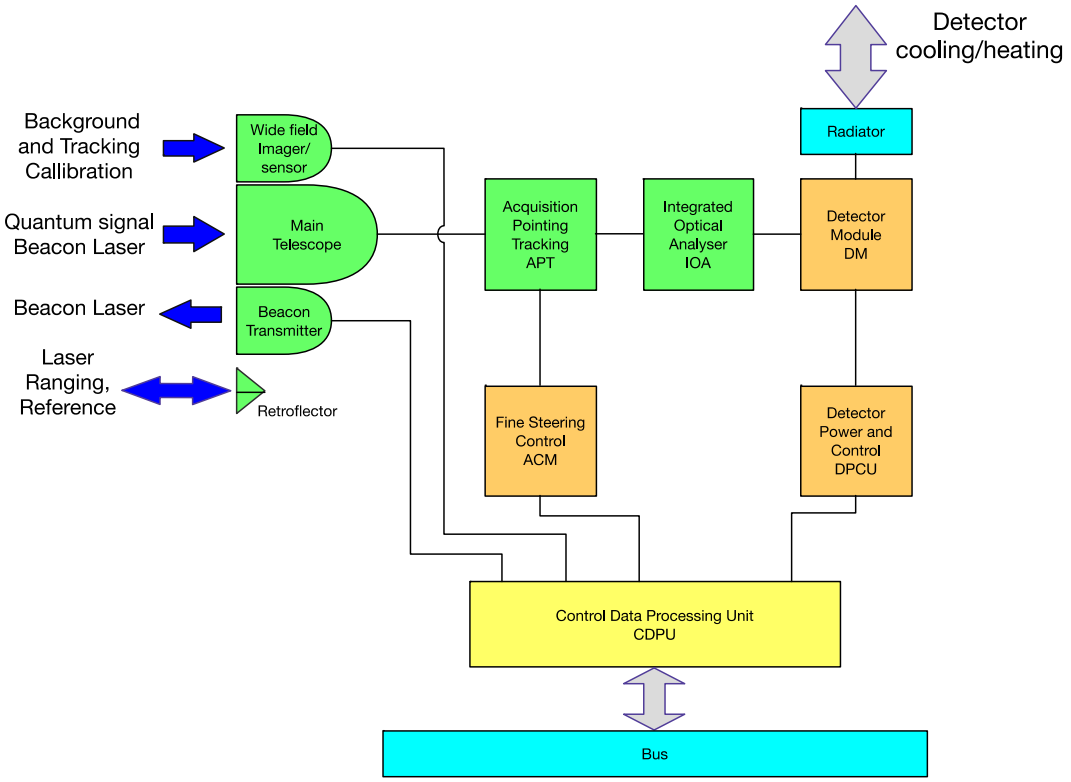

FIGURE D-1 - BLOCK DIAGRAM OF THE CURRENT QEYSSAT PAYLOAD PROTOTYPE

Despite the early development work, the Contractor is also welcome to propose alternative solutions to the QKD Payload to meet mission requirements.

D.2 QUANTUM GROUND STATIONS

The QEYSSat mission nominally requires two Quantum Optical Ground Stations (QOGS) to fulfill the requirement for demonstrating QKD at a large distance. IQC is currently developing the IQC-QOGS based on their successful airborne demonstration (Ref. 2, Table D-2). As a part of Phase A work, the Contractor shall define interface requirements between the IQC-QOGS and the QEYSSat satellite. This effort will be supported by IQC.

The Contractor shall propose a solution for the second, so called, remote QOGS. CSA would like to highlight a possibility of using an Optical Ground Receiver (OGR) deployable prototype developed for optical satellite to ground downlinks under recently announced RFP for Development of enabling space technologies (9F063-160953/A). Further details on the

requirements for this prototype can be found in the following reference: https://buyandsell.gc.ca/procurement-data/tender-notice/PW-MTB-575-14322 (refer to Priority Technology – 14, Optical Ground Receiver - OGR). It is anticipated, but yet to be confirmed, that the OGR prototype will become available for the QEYSSat project after October 2019. Standard GFE terms and conditions are applicable. It should be noted that modifications will be required to convert OGR prototype to the QOGS required for QEYSSat mission.

E ACRONYMS

ACM	APT Controller Module
AIT	Assembly, Integration and Test
APT	Acquisition, Pointing and Tracking
BIP	Background Intellectual Property
CA	Contract Award
CAD	Computer-Aided Design
CDR	Critial Design Review
CoDR	Conceptual Design Review
CDPU	Command and Data Processing Unit
CDRL	Contract Data Requirements List
CMRD	Configuration Management Receipt Desk
CSA	Canadian Space Agency
CTE	Critical Technology Element
DID	Data Item Description
DM	Detector Module
DPCU	Detector Power and Control Unit
FIP	Foreground Intellectual Property
ICD	Interface Control Drawing Document
IEA	Integrated Electronics Assembly
IOA	Integrated Optical nalyzer
IP	Intellectual Property
IQC	Institute for Quantum Computing
KA	Keep-Alive
KOM	Kick Off Meeting
LEO	Low Earth Orbit
N/A	Not Applicable
OFE	Optical Front End
OGR	Optical Ground Receiver
PA	Product Assurance
PAR	Product Assurance Requirements
PBS	Product Breakdown Structure
PDF	Portable Document Format
PI	Principal Investigator

PM	Project Management
PMP	Project Management Plan
PWGSC	Public Works and Government Services Canada
QKD	Quantum Key Distribution
QOGS	Quantum Optical Ground Station
RFP	Request for Proposals
ROM	Rough Order of Magnitude
SE	Systems Engineering
SI	System International
SOW	Statement Of Work
SRD	System Requirements Document
SRR	System Requirement Review
TA	Technical Authority
TRL	Technology Readiness Level
TRM	Technology Roadmap
TRRA	Technology Readiness and Risk Assessment
V&V	Verification and Validation
WBS	Work Breakdown Structure
WPD	Work Package Description

ATTACHMENT 1 – QEYSSat Mission Concept Document

Attachment 1 must be requested from PSPC. In order to obtain a copy of the Attachment 1 (QEYSSat Mission Concept Document) the Confidentiality Agreement in Annex ? of the RFP document must be submitted to the PSPC Contracting Authority.

ATTACHMENT 2 – QEYSSat Mission System Design Document

Attachment 2 must be requested from PSPC. In order to obtain a copy of the Attachment 2 (QEYSSat Mission System Design Document) the Confidentiality Agreement in Annex ? of the RFP document must be submitted to the PSPC Contracting Authority.

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SECURITY REQUIREMENTS CHECK LIST (SRCL)
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE

1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine	2. Branch or Directorate / Direction générale ou Direction
CSA	Space Science and Technology, Eng Development
3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant

4. Brief Description of Work / Brève description du travail

An RFP (Request for Proposal) for QEYSSat mission for two Phase A contracts, ending with the major milestone "System Requirements Review". This project is aimed at building a satellite to demonstrate in space a novel, secure, communications technology.

5. a) Will the supplier require access to Controlled Goods? Le fournisseur aura-t-il accès à des marchandises contrôlées?	☑ No Non	☐ Yes Oui
5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?	☑ No Non	☐ Yes Oui
6. Indicate the type of access required / Indiquer le type d'accès requis		
6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? (Specify the level of access using the chart in Question 7. c) (Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)	☐ No Non	☑ Yes Oui
6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.	☑ No Non	☐ Yes Oui
6. c) Is this a commercial courier or delivery requirement with **no** overnight storage? S'agit-il d'un contrat de messagerie ou de livraison commerciale **sans** entreposage de nuit?	☑ No Non	☐ Yes Oui

7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès

Canada ☑	NATO / OTAN ☐	Foreign / Étranger ☐

7. b) Release restrictions / Restrictions relatives à la diffusion

Canada	NATO / OTAN	Foreign / Étranger
No release restrictions / Aucune restriction relative à la diffusion ☑ AD	All NATO countries / Tous les pays de l'OTAN ☐	No release restrictions / Aucune restriction relative à la diffusion ☐
Not releasable / À ne pas diffuser ☐		
Restricted to: / Limité à : ☐	Restricted to: / Limité à : ☐	Restricted to: / Limité à : ☐
Specify country(ies): / Préciser le(s) pays :	Specify country(ies): / Préciser le(s) pays :	Specify country(ies): / Préciser le(s) pays :

7. c) Level of information / Niveau d'information

Canada	NATO	Foreign / Étranger
PROTECTED A / PROTÉGÉ A ☐	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ ☐	PROTECTED A / PROTÉGÉ A ☐
PROTECTED B / PROTÉGÉ B ☑	NATO RESTRICTED / NATO DIFFUSION RESTREINTE ☐	PROTECTED B / PROTÉGÉ B ☐
PROTECTED C / PROTÉGÉ C ☐	NATO CONFIDENTIAL / NATO CONFIDENTIEL ☐	PROTECTED C / PROTÉGÉ C ☐
CONFIDENTIAL / CONFIDENTIEL ☐	NATO SECRET / NATO SECRET ☐	CONFIDENTIAL / CONFIDENTIEL ☐
SECRET / SECRET ☐	COSMIC TOP SECRET / COSMIC TRÈS SECRET ☐	SECRET / SECRET ☐
TOP SECRET / TRÈS SECRET ☐		TOP SECRET / TRÈS SECRET ☐
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) ☐		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) ☐

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PART A *(continued)* / PARTIE A *(suite)*

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets? ☑ No / Non ☐ Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS?
If Yes, indicate the level of sensitivity:
Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets? ☑ No / Non ☐ Yes / Oui
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate?

Short Title(s) of material / Titre(s) abrégé(s) du matériel :
Document Number / Numéro du document :

PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

☑ RELIABILITY STATUS / COTE DE FIABILITÉ	☐ CONFIDENTIAL / CONFIDENTIEL	☐ SECRET / SECRET	☐ TOP SECRET / TRÈS SECRET
☐ TOP SECRET– SIGINT / TRÈS SECRET – SIGINT	☐ NATO CONFIDENTIAL / NATO CONFIDENTIEL	☐ NATO SECRET / NATO SECRET	☐ COSMIC TOP SECRET / COSMIC TRÈS SECRET
☐ SITE ACCESS / ACCÈS AUX EMPLACEMENTS			

Special comments:
Commentaires spéciaux : _____

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.
REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work? ☑ No / Non ☐ Yes / Oui
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail?

If Yes, will unscreened personnel be escorted? ☐ No / Non ☐ Yes / Oui
Dans l'affirmative, le personnel en question sera-t-il escorté?

PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises? ☐ No / Non ☑ Yes / Oui
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS?

11. b) Will the supplier be required to safeguard COMSEC information or assets? ☑ No / Non ☐ Yes / Oui
Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC?

PRODUCTION

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises? ☑ No / Non ☐ Yes / Oui
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ?

INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data? ☐ No / Non ☑ Yes / Oui
Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS?

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency? ☑ No / Non ☐ Yes / Oui
Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale?

Government of Canada / Gouvernement du Canada

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PART C - *(continued)* / PARTIE C - *(suite)*

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.
Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.
Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

SUMMARY CHART / TABLEAU RÉCAPITULATIF

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ A	PROTECTED / PROTÉGÉ B	PROTECTED / PROTÉGÉ C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRES SECRET
Information / Assets Renseignements / Biens		✓														
Production			APP													
IT Media / Support TI		✓														
IT Link / Lien électronique																

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?
La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

☑ No / Non ☐ Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

☑ No / Non ☐ Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).
Dans l'affirmative, classifier le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquer qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).

ATTACHMENT 1 TO PART 4

Evaluation Criteria

Evaluation Criteria Summary

Item	Evaluation Criteria Title	Mandatory (M) Or Point-Rated (P)	Maximum Score	Minimum Required Score
M1	Corporate Experience with Space Projects	M	N/A	N/A
P1	Team Expertise and Experience	P	20 pts	10 pts
P2	Understanding of the Mission Requirements	P	20 pts	10 pts
P3	Technology Readiness and Risk Assessment and Roadmap	P	20 pts	10 pts
P4	Work Plan and Technical Methodology	P	20 pts	10 pts
P5	Secondary Payload	P	20 pts	0 pts
	Total	N/A	100 pts	70 pts

1. Mandatory criteria

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

Bidder Experience

Except where expressly provided otherwise, the experience described in the bid must be the experience of one or more of the following:

1. The Bidder itself; or
2. The Bidder's affiliates; or
3. The Bidder's subcontractors.

The experience of the Bidder's suppliers will not be considered.

M1. Corporate Experience with Space Projects (Management Criteria)

1) The Bidder must demonstrate that they have been active in business related to the following technologies being procured:
    a. Optical Payload Design, Integration and Test
    b. Satellite Bus, Integration and Test
2) The Bidder must demonstrate experience in design, manufacture, mission assurance and test of systems and software rated for operations of a satellite mission.

This criterion assesses the Bidder’s experience and expertise in similar projects and how the Bidder has been active in the business related to the technology being procured.

For criteria 1), the Bidder must provide a description of at least one or more previous or current projects along with justification to demonstrate that the projects are similar or related to the two technologies being procured.

For criteria 2), the Bidder must provide a description of at least one or more previous or current projects along with justification to demonstrate that the projects are similar or related to its overall ability to deliver similar systems rated for operations in a satellite mission.

Bidders are required to provide a description of at least 2 (two) projects. In the event that the same project is used for both criteria, the Bidder must provide a description of at least one other project that meets either criteria 1) or 2).

The referenced projects must have design, manufacturing and testing phases completed.

2. Point-Rated Criteria

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

For the following criteria, when a detailed substantiation is required, Bidders are requested to provide a detailed statement of 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.

P1. Team Experience with Space Projects (Management Criteria)

This criterion assesses the capability (education, knowledge, experience, expertise and complementarities) of the key resources, including subcontractors, identified to carry out the Work for Phase A, as well as the work required to accomplish the subsequent phases (B/C/D). The Bidder should demonstrate that the skills of the team include those necessary to lead teams located in different locations and through different project phases (such as requirements analysis, design, manufacturing, testing).

The Bidder must identify the Project Manager and outline his/her qualifications. The Bidder's proposed Project Manager must have been a Project Leader on a minimum of three (3) projects OR have a minimum of 5 years (60 months) of demonstrated Project Management experience within last 10 years. The demonstrated experience must be in design, manufacture and test of systems and software rated for operations of a satellite mission.

The Bidder must identify the key members of the projects' technical and management teams and state their specific qualifications and experience for the Work involved. Detailed resumes of key members must be provided in an Appendix. Names of back up personnel for key positions must also be included.

The Bidder should include an organizational chart that illustrates the structure of the proposed project team, as well as their level of effort for the Work under the Contract, as a percentage.

The key members (excluding the Project Manager) must have a combined experience in the following:

a) Optical Payload Design, Integration and Test
b) Satellite Bus, Integration and Test
c) Previous or current projects delivering similar space-qualified systems

The Bidder should address the following 5 (five) capability elements:

(1) At least one Key member has a minimum of three (3) projects OR a minimum of 5 years (60 months) of experience in optical payload design within last 10 years
(2) At least one Key member has a minimum of three (3) projects OR a minimum of 5 years (60 months) of experience in satellite bus within last 10 years
(3) At least one Key member has a minimum of three (3) projects OR a minimum of 5 years (60 months) of experience in delivering space-qualified systems within last 10 years
(4) And organizational chart is included and represents all team resources

(5) The level of effort for Phase A of each member is included

The Bidder must also include the following 3 (three) required elements in its bid:

(1) Project Manager qualification and experience

(2) Key members and subcontractor qualification and experience (if subcontractors are proposed)

(3) Backup personnel qualification and experience.

In the circumstances where sub-contractor resources are being proposed, the same requirements applicable to the prime contractor are applicable to the sub contractor's team(s).

Level A (20 pts)

The Bidder meets the requirements in all three (3) required elements.

-AND-

The Bidder meets 5 (five) capability elements.

Level B (15 pts)

The Bidder meets the requirements in all three (3) of the required elements.

-AND-

The Bidder meets 4 (four) capability elements.

Level C (10 pts) (minimum)

The Bidder meets the requirements in all three (3) of the required elements.

-AND-

The Bidder meets 3 (three) capability elements.

Level D (0 pts)

The Bidder does not meet the minimum requirements of Level C.

P2. Understanding Of The Mission Requirements (Technical Criteria)

The Bidder must propose a preliminary concept that demonstrates an understanding of the mission requirements, and the proposed solution must address all mandatory mission requirements provided in the User/Mission Requirements Document, CSA-MICRO-RD-0003.

The Bidder must provide requirement compliance substantiation for each requirement as listed in Table 2 hereunder. Each requirement corresponds to a specific section of the User/Mission Requirements Document, CSA-MICRO-RD-0003. Goals statements in the mission requirements (QEYS-URD-0010 to QEYS-URD-0080) do not need to be met for purposes of proposal evaluations. Table 2 should be used as a template.

"Substantiation" must be in the form of a detailed statement of 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.

The bidder is also asked to provide information on how they propose to potentially meet mission goals if the CSA decides to address these goals during operations phase of the mission.

Table 2: Mission Requirements - Compliance Substantiation

QEYSSat Mission Requirements (CSA-MICRO-RD-0003)		
Requirement Number	Requirement	Compliance Substantiation
QEYS-URD-0010	Quantum Key Distribution	
QEYS-URD-0020	Mission Duration	
QEYS-URD-0030	Satellite Re-Keying Performance	
QEYS-URD-0040	Satellite Re-Keying Reliability	
QEYS-URD-0050	Short Keys	
QEYS-URD-0060	Long-Distance Quantum Entanglement	
QEYS-URD-0070	Quantum Sources	
QEYS-URD-0080	Photon Detection Records	

Table 3: Mission Goals - Compliance Substantiation

QEYSSat Mission Goals (CSA-MICRO-RD-0003)		
Requirement Number	Goals	Compliance Substantiation
QEYS-URD-0090	Satellite-Based/Ground-Based Quantum Links Interface	
QEYS-URD-0100	Key Confirmation During Satellite Re-Keying	

QEYSSat Mission Goals (CSA-MICRO-RD-0003)		
Requirement Number	Goals	Compliance Substantiation
QEYS-URD-0110	Security Certification	
QEYS-URD-0120	Uplink And Downlink Quantum Channel	

For P2 criterion, when exceeds expectations or meet expectations is required, the Bidders will be evaluated based on the following definitions:

*Definition	Definition Description
Exceeds Expectations	Very consistent, qualified, effective, strong, meticulous, well supported. Has a very good mastery of the topic. All of the elements are dealt with very well using a very logical approach.
Meets Expectations	A few small shortcomings that have an impact to some degree but not in an area of great importance; sufficient; appropriate; effective; well supported; correct; satisfactory; suitable. Has a good mastery of the topic. Most of the elements are dealt with well using a logical approach.

Level A (20 pts)

The proposed preliminary concept exceeds expectations* in all 8 (eight) requirements AND compliance is fully substantiated for all 8 (eight) requirements AND the concept identifies strategy to address 4 (four) mission goals;

Level B (15 pts)

The proposed preliminary concept meets expectations* in 8 (eight) requirements AND compliance is fully substantiated for 8 (eight) requirements AND the concept identifies strategy to address 2 (two) mission goals;

Level C (10 pts) (minimum)

The proposed preliminary concept meets expectations* in 8 (eight) requirements AND compliance is fully substantiated for 8 (eight) requirements;

Level D (0 pts)

The Bidder does not meet the requirements of Level C.

P3. Technology Readiness and Risk Assessment and Roadmap

The Bidder must elaborate its understanding of the related technology by providing an assessment of the technical risks involved with the proposed concept, as defined in section 3.3.1 in SOW. The proposal should as well identify the major assumptions upon which the project is based.

The activity planning for Phase A must be provided, as a minimum, in the form of Work Breakdown Structure (WBS) and Work Package Descriptions (WPD, CDRL 2). All activities must be cross-referenced to the Technology Development Plan such that the approach and methodology is complete and comprehensive.

To be compliant, the Bidder must address the following 3 (three) required elements:

(1) List of CTE's (CSA-ST-FORM-0003 or Contractor format)
(2) TRRA Report (CDRL 14 and 15 or Contractor format)
(3) Work Package Descriptions (CDRL 2)

For P3 criterion, when exceeds expectations, meet expectations or meets some expectations is required, the Bidders will be evaluated based on the following definitions:

*Definition	Definition Description
Exceeds Expectations	Very consistent, qualified, effective, strong, meticulous, well supported. Has a very good knowledge of the topic. All of the main and secondary points are dealt with very well using a very logical approach.
Meets Expectations	A few small shortcomings that have an impact to some degree but not in an area of great importance; sufficient; appropriate; effective; well supported; correct; satisfactory; suitable. Has a good knowledge of the topic. Most of the main and secondary points are dealt with well using a logical approach.
Meets Some Expectations	Shortcomings in at least one major area, or many. The shortcomings may have an impact (even if limited) on some performance aspects. Sometimes makes mistakes. Some knowledge of the topic, but insufficient to deliver the service at the expected level (of quality, proficiency, etc.). Addresses some major points and omits some secondary points (misses some elements that are key to the delivery of service).

Level A (20 pts)

- The Bidder addressed all 3 (three) required elements.

-AND-

- The proposal exceeds expectations* in presenting the technology maturity, associated risks, and required developments to meet mission needs with the proposed solution.

-AND-

- For the given solution, the CTE's identified meet expectations* of the essential development needs.

-AND-

- The proposed risk mitigation activities for Phase A are fully correlated to the TRRA findings, work activities are well defined, well prioritized, decision points are clearly stated, and a clear methodology for the technology development plan is presented.

Level B (15 pts)

- The Bidder addressed all 3 (three) required elements.

-AND-

- The proposal meets expectations* in presenting the technology maturity, associated risks, and required developments to meet mission needs with the proposed solution.

-AND-

- For the given solution, the CTE's identified meet expectations* of the essential development needs.

-AND-

- The proposed risk mitigation activities for Phase A are fully correlated to the TRRA findings, work activities are defined, somewhat prioritized, decision points are stated, and a methodology for the technology development plan is presented.

Level C (10 pts) (minimum required)

- The Bidder addressed all 3 (three) required elements.

-AND-

- The proposal meets some expectations* in presenting the technology maturity, associated risks, and required developments to meet mission needs with the proposed solution.

-AND-

- For the given solution, the CTE's identified meet some expectations* of the development needs, although gaps are present.

-AND-

- The proposed risk mitigation activities for Phase A are somewhat correlated to the TRRA findings, work activities are defined, somewhat prioritized, decision points are stated, and a methodology for the development plan is presented.

Level D (0 pts)

The Bidder does not meet the minimum requirements of Level C.

P4. Work Plan and Technical Methodology

The purpose of the Work Plan is to ensure that Work is performed in the most effective manner. The Work Plan should be based on recognized management tools most applicable to the proposed project, such as a scope planning (WBS and WPD), schedule development charts (e.g. Gantt chart). Equivalent company-developed, project-tailored tools/charts are also acceptable as long as the information provided is complete and comprehensive.

This criterion assesses the suggested technical methodology and its correlation with the work plan as presented in the proposal. It also evaluates the effectiveness of the described methodology in resolving the technical challenges, in attaining the stated technical objectives of the work, in the approach for engineering development, and in meeting mission and product assurance requirements.

To be compliant, the Bidder must provide:

(1) An overview of the technical methodology that it proposes to use. The methodology proposed must describe how the Work would be conducted through the use of

analytical methods, trade studies, procedures, techniques, industry standards, best practices and the state of the art for pertinent disciplines, such as “value engineering”.

(2) The methodology and the Bidder’s work plan must be consistent with the findings of the Technology Readiness & Risk Assessment and the corresponding Technology Development Plan.
(3) Work Breakdown Structure and Work Package Descriptions for all Phase A activities
(4) Schedule development charts (e.g. Gantt chart, etc.) for all Phase A activities that meet the SOW Milestones.

Level A (20 pts)

Bidders addressed all 4 (four) elements mentioned above and detailed substantiation is provided for all 4 (four) of the above mentioned elements.

Level B (15 pts)

Bidders addressed all 4 (four) elements mentioned above and detailed substantiation is provided for at least 3 (three) of the above mentioned elements.

Level C (10 pts) (minimum required)

Bidders addressed all 4 (four) elements mentioned above, and detailed substantiation is provided for at least 2 (two) of the above mentioned elements.

Level D (0 pts)

The Bidder does not meet the minimum requirements of Level C.

P5. Secondary Payload

The Bidder must provide an assessment describing how the secondary payload meets the goals mentioned in Table 5 hereunder.

Table 5: Secondary Payload

QEYSSat Secondary Payload Evaluation	
Required Elements	Compliance Substantiation
Degree of innovation – Evaluates the novelty associated with the new concepts, products and/or know-how to be developed.	High level of innovation is to be substantiated.
Market Assessment – Evaluates the applicant's understanding of the market needs associated with the proposed technology.	Thorough understanding of the market needs is to be substantiated.
Compatibility with primary payload (QKD), Feasibility and Risk Assessment – Evaluates the level of risk that the proposed technology poses to the primary mission objectives.	Low risk is to be substantiated

QEYSSat Secondary Payload Evaluation	
Required Elements	Compliance Substantiation
Development of Industrial Core Capabilities – Evaluates the potential of increasing industrial capabilities through the advancement of knowledge (know-how) or improvement of the state-of-the-art.	High impact on increase of industrial capability is to be substantiated.
Competitive Advantage – Assesses the merit and potential of the proposed technology to positively affect the company's competitive advantage and/or overall market share.	High impact on company's competitive advantage and/or overall market share is to be substantiated.

Level A (20 pts)

Bidder addressed all 5 (five) elements mentioned above AND detailed and convincing substantiation is provided for all 5 (five) of the above mentioned elements.

Level B (15 pts)

Bidder addressed all 5 (five) elements mentioned above AND detailed and convincing substantiation is provided for at least 3 (three) of the above mentioned elements.

Level C (10 pts)

Bidder addressed all 5 (five) elements mentioned above AND detailed and convincing substantiation is provided for at least 2 (two) of the above mentioned elements.

Level D (0 pts)

The Bidder does not meet the minimum requirements of Level C.