



**RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:**

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

**REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government
Services Canada**

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

**Proposition aux: Travaux Publics et Services
Gouvernementaux Canada**

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

Comments - Commentaires

Vendor/Firm Name and Address

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

Issuing Office - Bureau de distribution

Consultant Services Division/Division des services
d'experts-conseils
L'Esplanade Laurier
4th floor, East Tower
140 O'Connor Street
Ottawa
Ontario
K1A 0S5

Title - Sujet ON Reg. Architect and Eng Services		
Solicitation No. - N° de l'invitation EN740-200671/B	Date 2019-08-23	
Client Reference No. - N° de référence du client EN740-20200671		
GETS Reference No. - N° de référence de SEAG PW-\$\$FE-178-77614		
File No. - N° de dossier fe178.EN740-200671	CCC No./N° CCC - FMS No./N° VME	
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2019-10-08		Time Zone Fuseau horaire Eastern Daylight Saving Time EDT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>		
Address Enquiries to: - Adresser toutes questions à: Matende, Robinah		Buyer Id - Id de l'acheteur fe178
Telephone No. - N° de téléphone (613) 296-7948 ()		FAX No. - N° de FAX () -
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: DEPARTMENT OF PUBLIC WORKS AND GOVERNMENT SERVICES CANADA PORTAGE III 11 LAURIER ST Gatineau Quebec K1A0S5 Canada		

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée See Herein	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

THIS PROCUREMENT CONTAINS A SECURITY REQUIREMENT**REQUEST FOR PROPOSAL (RFP)
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SUPPLEMENTARY INSTRUCTIONS TO PROPONENTS (SI)

SI1 INTRODUCTION

1. Public Works and Government Services Canada (PWGSC) intends to retain an individual consulting firm, or joint venture, to provide professional services to modernize laboratory facilities as part of a program of work related to the Laboratories Canada (LC). Science Facility laboratories in Mississauga, Sudbury, Guelph and Ottawa may form part of the overall Contract as determined by the priorities of PWGSC's LC program. The base Contract consists of the laboratory expansion and fit-up of a joint National Research Council (NRC) and Natural Resources Canada (NRCan) facility in Mississauga, Ontario. PWGSC will add incremental Consultant Services to the Contract through Contract option(s) as its Science Partner clients determine their location-specific scope of laboratory modernization.
2. This is a single phase selection process. The nature of the requirement and the anticipated limited number of responses by the industry leads PWGSC to believe that this approach will not unduly force a large number of firms to expend an overall unreasonable amount of effort in response to PWGSC.
3. Proponents responding to this RFP are requested to submit a full and complete proposal. The proposal will cover not only the qualifications, experience and organization of the proposed Consultant Team, but also the detailed approach to the work, and the pricing and terms offered. A combination of the technical and price of services submissions will constitute the proposal.

SI2 PROPOSAL DOCUMENTS

1. All instructions, general terms, conditions and clauses identified in the RFP by number, date and title, are hereby incorporated by reference into and form part of this solicitation and any resultant contract.

All instructions, general terms, conditions and clauses identified in the RFP 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.

2. The following are the proposal documents:
 - (a) Supplementary Instructions to Proponents (SI);

- (b) R1410T (2017-08-17), General instructions (GI) – Architectural and/or Engineering services – Request for Proposal;
- (c) Submission Requirements and Evaluation (SRE);
- (d) the general terms, conditions and clauses, as amended, identified in the Agreement clause;
- (e) Project Brief / Terms of Reference;
- (f) the Security Requirements Check List (SRCL);
- (g) any amendment to the solicitation document issued prior to the date set for receipt of proposals; and
- (h) the proposal, Declaration/Certifications Form and Price Proposal Form.

3. Submission of a proposal constitutes acknowledgment that the Proponent has read and agrees to be bound by these documents.

SI3 CHANGES TO GENERAL INSTRUCTIONS

Section GI16, Submission of proposal of R1410T(2017-08-17), General instructions (GI) – Architectural and/or Engineering services – Request for Proposal, incorporated by reference above, is amended as follows:

- (i) Subsection 2.b. is deleted in its entirety and replaced with the following:
 - b. send its proposal only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit specified on page 1 of the RFP;

- (ii) insert:

- 7. Proposals will remain open for acceptance for a period of not less than 160 days from the closing date of the bid solicitation, unless specified otherwise in the bid solicitation. Canada reserves the right to seek an extension of the bid validity period from all responsive proponents in writing, within a minimum of 3 days before the end of the bid validity period. If the extension is accepted by all responsive proponents, Canada will continue with the evaluation of the proposals. If the extension is not accepted by all responsive proponents, Canada will, at its sole discretion, either continue with the evaluation of the proposals of those who have accepted the extension or cancel the solicitation.

SI4 QUESTIONS OR REQUEST FOR CLARIFICATION

Questions or requests for clarification during the solicitation period must be submitted in writing to the Contracting Authority named on the RFP - Page 1 at e-mail address robinah.matende@tpsgc-pwgsc.gc.ca as early as possible.

Enquiries should be received no later than ten (10) working days prior to the closing date identified on the front page of the Request for Proposal. Enquiries received after that date may not be answered prior to the closing date of the solicitation.

SI5 CANADA'S TRADE AGREEMENTS

This procurement is subject to the provisions of the North American Free Trade Agreement (NAFTA), the World Trade Organization - Agreement on Government Procurement (WTO-AGP), the Canada-European Union Comprehensive Economic and Trade Agreement (CETA), and the Canadian Free Trade Agreement (CFTA).

SI6 CERTIFICATIONS

1. Integrity Provisions – Declaration of Convicted Offences

In accordance with the Ineligibility and Suspension Policy (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Proponent must **provide with its bid, as applicable**, to be given further consideration in the procurement process, the required documentation as per R1410T (2017-08-17), General instructions 1 (GI1), Integrity Provisions – Proposal, **section 3b**.

2. Federal Contractors Program for Employment Equity - Proposal Certification

By submitting a proposal, the Proponent certifies that the Proponent, and any of the Proponent's members if the Proponent 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 proposal non-responsive if the Proponent, or any member of the Proponent if the Proponent is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

Canada will also have the right to terminate the Agreement for default if a Consultant, or any member of the Consultant if the Consultant is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list during the period of the Agreement.

The Proponent must provide the Contracting Authority with a completed Federal Contractors Program for Employment Equity - Certification (see Appendix C - Declaration/Certifications Form), before contract award. If the Proponent is a Joint Venture, the Proponent must provide the Contracting Authority with a completed Federal Contractors Program for Employment Equity - Certification, for each member of the Joint Venture.

3. Licensing, Certification or Authorization

1. The Proponent must be authorized to provide architectural and multidisciplinary engineering services, licensed, or eligible to be licensed, certified or otherwise authorized to provide the necessary professional services to the full extent that may be required by provincial law in any province of Canada.
2. By virtue of submission of a proposal, the Proponent certifies that the Proponent's Consultant Team and Key Personnel are in compliance with the requirements of subsection 1 above and with R1410T G11 (2016-04-04) Integrity provisions –proposal.

SI7 SECURITY REQUIREMENT

1. Before award of a contract, the following conditions must be met:
 - (a) the Proponent must hold a valid organization security clearance as indicated in Supplementary Conditions SC1;
 - (b) the Proponent's proposed individuals requiring access to classified or protected information, assets or sensitive work site(s) must meet the security requirement as indicated in Supplementary Conditions SC1;
 - (c) the Proponent must provide the name of all individuals who will require access to classified or protected information, assets or sensitive work sites.;
2. Proponents are reminded to obtain the required security clearance promptly. Any delay in the award of a contract to allow the successful Proponent to obtain the required clearance will be at the entire discretion of the Contracting Authority.
3. For additional information on security requirements, proponents should refer to the Contract Security Program of Public Works and Government Services Canada ((<http://www.tpsgc-pwgsc.gc.ca/esc-src/introduction-eng.html>) website.

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SI8 - FAIRNESS MONITOR

Canada is engaging a Fairness Monitor to monitor this procurement process.

SI9 - WEBSITES

The connection to some of the Web sites in the RFP is established by the use of hyperlinks. The following is a list of the addresses of the Web sites:

Employment Equity Act

<http://laws-lois.justice.gc.ca/eng/acts/E-5.401/index.html>

Federal Contractors Program (FCP)

<https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html>

Certificate of Commitment to Implement Employment Equity form LAB 1168

<http://www.servicecanada.gc.ca/cgi-bin/search/eforms/index.cgi?app=profile&form=lab1168&dept=sc&lang=e>

Ineligibility and Suspension Policy

<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>

Code of Conduct for Procurement

<http://www.tpsgc-pwgsc.gc.ca/app-acq/cndt-cndct/contexte-context-eng.html>

Lobbying Act

<http://laws-lois.justice.gc.ca/eng/acts/L-12.4/?noCookie>

Buy and Sell

<https://buyandsell.gc.ca/>

Supplier Registration Information

<https://srisupplier.contractscanada.gc.ca>

Consultant Performance Evaluation Report Form

<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/documents/2913-1.pdf>

Canadian economic sanctions

<http://www.international.gc.ca/sanctions/index.aspx?lang=eng>

National Joint Council (NJC) Travel Directive

<http://www.njc-cnm.gc.ca/directive/travel-voyage/index-eng.php>

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SI10 - BREAKDOWN OF THE CONTRACT

Location	Comments	Construction Cost Estimate*
Mississauga	Base Contract	\$21,551,755
Guelph	Optional sub-Project	\$30,886,935
Sudbury	Optional sub-Project	\$16,880,500
Cultural Heritage	Optional sub-Project	\$58,728,150
Potential Construction Cost Estimate (all options included)		\$128,047,340

*Includes sustainability premium, design contingency, construction contingency, escalation contingency, and disbursements. Excludes Consultant fees and risk.

TERMS, CONDITIONS AND CLAUSES

AGREEMENT

1. The Consultant understands and agrees that upon acceptance of the offer by Canada, a binding Agreement shall be formed between Canada and the Consultant and the documents forming the Agreement shall be the following:
 - (a) the Front Page and this Agreement clause;
 - (b) the General Terms, Conditions and Clauses, as amended, identified as:
 - R1210D (2018-06-21), General Condition (GC) 1 - General Provisions – Architectural and/or Engineering Services
 - R1215D (2016-01-28), General Condition (GC) 2 - Administration of the Contract – Architectural and/or Engineering Services
 - R1220D (2015-02-25), General Condition (GC) 3 - Consultant Services
 - R1225D (2015-04-01), General Condition (GC) 4 - Intellectual Property
 - R1230D (2018-06-21), General Condition (GC) 5 - Terms of Payment – Architectural and/or Engineering Services
 - R1235D (2011-05-16), General Condition (GC) 6 - Changes
 - R1240D (2018-06-21), General Condition (GC) 7 - Taking the Services Out of the Consultant's Hands, Suspension or Termination
 - R1245D (2016-01-28), General Condition (GC) 8 - Dispute Resolution – Architectural and/or Engineering Services
 - R1250D (2017-11-28), General Condition (GC) 9 - Indemnification and Insurance
 - (c) Supplementary Conditions
 - (d) Agreement Particulars
 - (e) Project Brief / Terms of Reference;
 - (f) the Security Requirements Check List (SRCL);
 - (g) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
 - (h) the proposal, the Declaration/Certifications Form and the Price Proposal Form.
2. The documents identified above by title, number and date are hereby incorporated by reference into and form part of this Agreement, as though expressly set out herein, subject to any other express terms and conditions herein contained.

The documents identified above by title, number and date are set out in the Standard Acquisition Clauses and Conditions (SACC) Manual, issued by Public Works and Government Services Canada (PWGSC). The SACC Manual is

available on the PWGSC Web site: <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

3. If there is a discrepancy between the wording of any documents that appear on the following 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) any amendment or variation in the Agreement that is made in accordance with the terms and conditions of the Agreement;
 - (b) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
 - (c) this Agreement clause;
 - (d) Supplementary Conditions;
 - (e) General Terms, Conditions and Clauses;
 - (f) Agreement Particulars;
 - (g) Project Brief / Terms of Reference;
 - (h) the document entitled "Security Requirement Check List";
 - (i) the proposal.

SUPPLEMENTARY CONDITIONS (SC)

SC1 SECURITY REQUIREMENT

1. The following security requirement (SRCL and related clauses) applies and forms part of the Agreement.
2. Public Works and Government Services Canada is also known as Public Services and Procurement Canada.
3. For the purposes of SC1 Security Requirement, Contractor means Consultant and Subcontractor means Sub-consultant.

A. SECURITY REQUIREMENT FOR CANADIAN SUPPLIER:

1. The Contractor/Offeror must, at all times during the performance of the Contract/Standing Offer, hold a valid Designated Organization Screening (DOS), issued by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC).
2. The Contractor/Offeror personnel requiring access to sensitive work site(s) must EACH hold a valid RELIABILITY STATUS, granted or approved by CISD/PWGSC.

3. Subcontracts which contain security requirements are NOT to be awarded without the prior written permission of CISD/PWGSC.
4. The Contractor/Offeror must comply with the provisions of the:
 - a) Security Requirements Check List and security guide (if applicable), attached at Annex E;
 - b) *Industrial Security Manual* (Latest Edition).

B. SECURITY REQUIREMENTS FOR FOREIGN SUPPLIERS:

The Canadian Designated Security Authority (Canadian DSA) for industrial security matters in Canada is the Industrial Security Sector (ISS), Public Works and Government Services Canada (PWGSC), administered by International Industrial Security Directorate (IISD), PWGSC. The Canadian DSA is the authority for confirming Contractor compliance with the security requirements for foreign suppliers. The following security requirements apply to the foreign recipient Contractor incorporated or authorized to do business in a jurisdiction other than Canada and delivering outside of Canada the services listed and described in the subsequent contract.

1. The Foreign recipient Contractor must be from a Country within the North Atlantic Treaty Organization (NATO), the European Union (EU) or from a country with which Canada has an international bilateral security instrument. The Contract Security Program (CSP) has international bilateral security instruments with the countries listed on the following PWGSC website: <http://www.tpsgc-pwgsc.gc.ca/esc-src/international-eng.html>.
2. The Foreign recipient Contractor must, at all times during the performance of the contract, hold an equivalence to a valid Designated Organization Screening (DOS), issued by the Canadian DSA as follows:
 - i. The Foreign recipient Contractor must provide proof that they are incorporated or authorized to do business in their jurisdiction.
 - ii. The Foreign recipient Contractor must not begin the work, services or performance until the Canadian Designated Security Authority (DSA) is satisfied that all contract security requirement conditions have been met. Canadian DSA confirmation must be provided, in writing, to the foreign recipient Contractor in an Attestation Form, to provide confirmation of compliance and authorization for services to be performed.

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- iii. The Foreign recipient Contractor must identify an authorized Contract Security Officer (CSO) and an Alternate Contract Security Officer (ACSO) (if applicable) to be responsible for the overseeing of the security requirements, as defined in this contract. This individual will be appointed by the proponent foreign recipient Contractor's Chief Executive officer or Designated Key Senior Official, defined as an owner, officer, director, executive, and or partner who occupy a position which would enable them to adversely affect the organization's policies or practices in the performance of the contract.
 - iv. The Foreign recipient Contractor must not permit access to Canadian restricted sites, except to its personnel subject to the following conditions:
 - a. Personnel have a need-to-know for the performance of the contract;
 - b. Personnel have been subject to a Criminal Record Check, with favourable results, from a recognized governmental agency or private sector organization in their country as well as a Background Verification, validated by the Canadian DSA;
 - c. The Foreign recipient Contractor must ensure that personnel provide consent to share results of the Criminal Record and Background Checks with the Canadian DSA and other Canadian Government Officials, if requested; and
 - d. The Government of Canada reserves the right to deny access to Canadian restricted sites to a foreign recipient Contractor for cause.
 3. CANADA PROTECTED information/assets provided or generated pursuant to this contract must not be further provided to a third party Foreign recipient Subcontractor unless:
 - a. written assurance is obtained from the Canadian DSA to the effect that the third-party Foreign recipient Subcontractor has been approved for access to CANADA PROTECTED information/assets by the Canadian DSA; and
 - b. written consent is obtained from the Canadian DSA, if the third-party Foreign recipient Subcontractor is located in a third country.
 4. The foreign recipient Contractor requiring access to Canadian restricted sites, under this contract, must submit a Request for Site Access to the Departmental Security Officer of the Department of Public Services and Procurement Canada.

5. In the event that a Foreign recipient Contractor is chosen as a supplier for this contract, subsequent country-specific foreign security requirement clauses must be generated and promulgated by the Canadian DSA, and provided to the Government of Canada Contracting Authority, to ensure compliance with the security provisions, as defined by the Canadian DSA, in relation to equivalencies.
6. Subcontracts which contain security requirements are NOT to be awarded without the prior written permission of the Canadian DSA.
7. The Foreign recipient Contractor must comply with the provisions of the Security Requirements Check List attached at Annex E.

SC2 LANGUAGE REQUIREMENTS

1. Communication between Canada and the Consultant shall be in the language of choice of the Consultant Team, which shall be deemed to be the language of the Consultant's proposal.
2. The Consultant's services during construction shall be provided in the language of choice of the Contractor. The successful Contractor will be asked to commit to one or other of Canada's official languages upon award of the Construction Contract and, thereafter construction and contract administration services will be conducted in the language chosen by the Contractor.
3. Other required services in both of Canada's official languages (such as construction documentation) are described in detail in the Project Brief.
4. The Consultant Team, including the Prime Consultant, Sub-Consultants and Specialists Consultants shall ensure that the services being provided in either language shall be to a professional standard.

SC3 FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY - DEFAULT BY THE CONSULTANT

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

SC4 OPTIONAL SERVICES

1. The Consultant grants to Canada the irrevocable option to acquire the following services, described in the Terms of Reference of the Contract under the same conditions and at the prices and/or rates stated in the Contract.

Option 1: All services described in the Project Brief for the Guelph project.

Option 2: All services described in the Project Brief for the Sudbury project.

Option 3: All services described in the Project Brief for the Cultural Heritage project.

Refer to article 6.4 - Consultant Services Summary of the Project Brief for a breakdown of the services required by project.

2. The exercise of the option(s) is at Canada's sole discretion and the inclusion of the option(s) in no way obligates Canada to contract for these services with or through the Consultant.
3. The option(s) may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment. The Contracting Authority may exercise the option at any time before the expiry of the Contract by sending a written notice to the Contractor.

SC5 INVOICING INSTRUCTIONS

1. The Consultant must submit monthly invoices in accordance with R1230D (2011-05-16), GC 5.3.2 - Payments to the Consultant. Should any or all options be exercised, each project is to be invoiced separately as distinct projects.
2. An invoice cannot be submitted until all Work identified on the invoice is completed.
3. Each invoice must be supported by:
 - a. a copy of time sheets to support the time claimed for all time-based resources, on request; and
 - b. a copy of the invoices, receipts, vouchers for all direct expenses, travel and living expenses.

SC6 PERCENTAGE FEE ARRANGEMENT

The percentage fee breakdown has been modified from the General Conditions. Delete R1230D (2011-05-16) GC 5.4 – Payments for Services, paragraph 1 and replace with the following:

1. Payments in respect of the percentage fee arrangement shall be made during the performance of the Services, on the basis of the fee calculations as described in GC 5.2.1.(a), for each of the Services equal to the amounts specified below:
 - a. Payment for Pre-design:
Not part of % fee calculation, time based fee applies.
 - b. Payment for Schematic Design: Upon acceptance of the design concept documents, an amount equal to 23 percent of the fee;
 - c. Payment for Design Development:
Upon acceptance of the design development documents, an amount equal to 31 percent of the fee;
 - d. Payment for Construction Documents:
Upon acceptance of the construction documents, an amount equal to 41 percent of the fee;
 - e. Payment for Tender Call, Tender Evaluation and Contract Award:
Upon award of the Construction Contract, or upon completion of tender evaluation(s) in such cases where Canada does not award a Construction Contract for reasons other than those specified in subsection 6 below, an amount equal to 5 percent of the fee;
 - f. Payment for Construction and Contract Administration:
Not part of % fee calculation, time based fee applies.
 - g. Payment for Final Completion and Post Construction Warranty Review:
Not part of % fee calculation, time based fee applies.

SC7 DISCRETIONARY AUDIT

1. The following are subject to government audit as described in R1215D:
 - a. The amount claimed under the Contract, as computed in accordance with the Basis of Payment, including time charged.

- b. The accuracy of the Consultant's time recording system.
 - c. The estimated amount of profit in any firm-priced element, firm time rate, firm overhead rate, or firm salary multiplier, for which the Consultant has provided the appropriate certification. The purpose of the audit is to determine whether the actual profit earned on a single contract if only one exists, or the aggregate of actual profit earned by the Consultant on a series of negotiated contracts containing one or more of the prices, time rates or multipliers mentioned above, during a particular period selected, is reasonable and justifiable based on the estimated amount of profit included in earlier price or rate certification(s).
 - d. Any firm-priced element, firm time rate, firm overhead rate, or firm salary multiplier for which the Consultant has provided a "most favoured customer" certification. The purpose of such audit is to determine whether the Consultant has charged anyone else, including the Consultant's most favoured customer, lower prices, rates or multipliers, for like quality and quantity of goods or services.
2. Any payments made pending completion of the audit must be regarded as interim payments only and must be adjusted to the extent necessary to reflect the results of the said audit. If there has been any overpayment, the Consultant must repay Canada the amount found to be in excess.

SC8 ESCALATION OF HOURLY RATES

The firm hourly rates detailed in the Price Proposal, will be adjusted annually on the Contract anniversary date by the amount established based on the percentage change in the sum of the monthly indices of the Consumer Price Index, All-items, published in Statistics Canada Table No. 326-0020, <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/cpis01a-eng.htm> for the 12-month period ending three months prior to the end of the Contract anniversary date from the same 12-month period of the preceding year. This will be calculated using the following formula:

A = Sum of indices for the 12 months ending 3 months prior to the anniversary date

B = Sum of indices for the 12 months ending same month as A of the preceding year

Escalation% = $[(A/B) - 1] * 100$

Example:

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Assuming that the contract was signed on July 1, 2013, the anniversary date of the contract would be July 1, 2014 and firm hourly rates would be increased by 1.72% to come up to hourly rates applicable to year 2, based on the following assumptions:

Preceding Year 12 month period = May 2013 - April 2014 Sum of Indices = 1,481.4

Current Year 12 month period = May 2014 - April 2015 Sum of Indices = 1,506.9

Escalation = $((1,506.9 / 1,481.4) - 1) * 100$

Escalation = 1.72%

To determine the Contract year 3 rates in the example, the Contract year 2 rates determined above would be adjusted using the same Statistics Canada Table and same formula with data for the two 12 month periods May 2014 - April 2015 and May 2015 - April 2016, respectively.

SC9 CONTRACTING AUTHORITY

The Contracting Authority for the Contract is:

Name: Robinah Matende
Public Works and Government Services Canada
Acquisitions Branch
Real Property Contracting Directorate
E-mail: robinah.matende@pwgsc-tpsgc.gc.ca

The Contracting Authority is responsible for the management of the Contract, and any changes to the Contract must be authorized in writing by the Contracting Authority.

The Consultant 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.

AGREEMENT PARTICULARS

The Agreement Particulars will be issued at time of award of contract and will identify the fee to be paid to the Consultant for the services determined in the Price Proposal Form.

APPENDIX A – SUBMISSION REQUIREMENTS AND EVALUATION (SRE)

SRE 1	General Information
SRE 2	Proposal Requirements
SRE 3	Submission Requirements and Evaluation
SRE 4	Price of Services
SRE 5	Total Score
SRE 6	Submission Requirements - Checklist

SRE 1 GENERAL INFORMATION

1.1 Request for Proposal (RFP) Definitions

The following definition is added to R1410T Definitions (GI2):

“Key Individuals”: Specific roles or individuals identified as such in the SRE 3.2 – RATED REQUIREMENTS.

1.2 Reference to the Selection Procedure

An 'Overview of the selection procedure' can be found in R1410T General Instructions to Proponents (GI3).

1.3 Calculation of Total Score

For this project the Total Score will be established as follows:

Technical Rating x 90%	=	Technical Score (Points)
<u>Price Rating x 10%</u>	=	<u>Price Score (Points)</u>
Total Score	=	Max. 100 Points

SRE 2 PROPOSAL REQUIREMENTS

2.1 Requirement for Proposal Format

The following proposal format information should be implemented when preparing the proposal.

- Submit one (1) bound original plus five (5) bound copies of the proposal
- Paper size should be - 216mm x 279mm (8.5" x 11")

- Minimum font size – 11-point Times or equal
- Minimum margins - 12 mm left, right, top, and bottom
- Double-sided submissions are preferred
- One (1) 'page' means one side of a 216mm x 279mm (8.5" x 11") sheet of paper
- 279mm x 432 mm (11" x 17") fold-out sheets for spreadsheets, organization charts etc. will be counted as two pages.
- The order of the proposals should follow the order established in the Request for Proposal SRE section

2.2 Specific Requirements for Proposal Format

The maximum number of pages (including text and graphics) to be submitted for the Rated Requirements under SRE 3.2 is as described in each SRE 3.2 criterion.

The following are not part of the page limitation mentioned above;

- Covering letter
- Consultant Team Identification (Appendix B)
- Declaration/Certifications Form (Appendix C)
- Integrity Provisions – Required Documentation
- Front page of the RFP
- Front page of revision(s) to the RFP
- Price Proposal Form (Appendix D)

Consequence of non-compliance: any pages which extend beyond the above page limitation and any other attachments will be extracted from the proposal and will not be forwarded to the PWGSC Evaluation Board members for evaluation.

SRE 3 SUBMISSION REQUIREMENTS AND EVALUATION

3.1 MANDATORY REQUIREMENTS

Failure to meet the mandatory requirements will render the proposal as non-responsive and no further evaluation will be carried out.

3.1.1 Licensing, Certification or Authorization

The Proponent shall be authorized to provide architectural and multidisciplinary engineering services, licensed, or eligible to be licensed, certified or otherwise authorized to provide the necessary professional services to the full extent that may be required by provincial law in the province of Ontario, at time of work.

3.1.2 Consultant Team Identification

The consultant team to be identified must include the following. The information is to be provided as per Appendix B, Team Identification Format.

- a) Proponent (prime consultant)
 - Architectural and Engineering entity
- b) Key Sub-consultants / Specialists Firms
 - Key Sub-consultants must be identified.
- c) Key Individuals
 - Senior Project Manager
 - Lead Architect
 - Architectural Production Leader
 - Chief Lab Design Specialist
 - Lead Structural Engineer
 - Lead Mechanical Engineer
 - Lead Electrical Engineer
 - BIM Manager

Information required: name of firm, key personnel to be assigned to the project. For the Proponent, indicate current license and/or how provincial or territorial licensing requirements would be met. In the case of a joint venture, identify the existing or proposed legal form of the joint venture (refer to R1410T General Instructions, GI9 Limitation of submissions).

3.1.3 Declaration/Certifications Form

Proponents must complete, sign and submit the following:

- Appendix C, Declaration/Certifications Form as required.

3.1.4 Integrity Provisions – Required documentation

In accordance with the Ineligibility and Suspension Policy (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Proponent must provide, as applicable, to be given further consideration in the procurement process, the required documentation as per R1410T, General Instructions GI1, Integrity Provisions - Proposal, section 3a.

3.1.5 Security Requirement

- 1) Proponents must meet the security requirements as outlined under SI7 and SC1.

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- 2) The security information must be provided as per Appendix B – Team Identification Format.

Proponent/ Sub Consultants/ Specialists (Firms)	Security Clearance Required
Proponent (Prime Consultant)	Designated Organization Screening (DOS) Clearance
Sub-Consultant Firms providing Key Individuals	Designated Organization Screening (DOS) Clearance
Key Individuals	Security Clearance Required
Senior Project Manager	X
Lead Architect	X
Architectural Production Leader	X
Chief Lab Design Specialist	X
Structural Engineer	X
Lead Mechanical Engineer	X
Lead Electrical Engineer	X
BIM Manager	X

3.2 RATED REQUIREMENTS

A summary of the SRE 3.2 - Rate Requirements are in the following table.

To be considered further, Proponents must achieve the minimum number of points indicated per criterion, or criterion sub-element, as follows:

Criterion		Evaluation Scale	Minimum Points Required	Available Points
SRE 3.2.1	Experience and Achievements of the Proponent	Scale 1	38 per project	252
SRE 3.2.2	Experience and Expertise of Key Individuals	Scale 2	249	415
SRE 3.2.3	Capacity of the Proponent	Scale 3	144	240
SRE 3.2.4	Internal Governance of the Proponent	Scale 4	87	145
SRE3.2.5	Approach and Methodology of the Proponent	Scale 5	249	415
Pre-Presentation Sub-total			881	1,467
SRE3.2.6	Presentation by the Proponent	Scale 6	150	250
MAXIMUM POINTS AVAILABLE				1,717

3.2.1 Experience and Achievements of the Proponent

1. The Proponent should submit a maximum of two distinct representative projects for each project category identified in paragraphs 3 a) and b) of SRE 3.2.1, four distinct representative projects in total, to substantiate their experience and achievements by providing the information as it pertains to each criterion listed below on a **maximum of five pages** per project, and complete and include the Appendix E – Client Reference Form in accordance with paragraph 6) of SRE
3.2.1 – Experience and Achievements of the Proponent.
2. In the context of this criterion 'client' means the project owner, or its representative, of the funding department or organization who was directly involved in contracting the architectural and engineering service activities of the representative project. Proponents are requested to provide construction costs in Canadian currency for the year completed. Canada will escalate the construction cost to 2018 Canadian currency as identified in SC8 Escalation of Hourly Rates. Construction cost in currencies other than Canadian currency will be converted by the PWGSC based on the rate of exchange published by the Bank of Canada for the completion date of the representative project.
3. At least one of the four representative projects should have been designed using Building Information Modelling (BIM). Canada will evaluate SRE 3.2.1 criteria 5 a) to f) listed below for each of the four distinct representative projects. If more than two representative projects per category are submitted, only the first two will be evaluated. If the same representative project is submitted in each category, only the representative project in first category will be evaluated. To be valid, the representative projects are to have the following characteristics for each category:
 - a. **Science laboratory projects** with the following characteristics:
 - i. is predominantly (>50% of the scope) an adaptive building re-use or re- purposing, with or without spatial expansion; and
 - ii. included individual lab workstations, versatile laboratory casework (storage, benches, seating, etc.), fume hoods, and hazard containment or hazardous materials storage; and
 - iii. had a final or has a current construction cost of at least \$20M (in 2018 Canadian currency); and
 - iv. has completed at least 50% of its construction cost or was completed after December 31, 2007;
 - b. **Complex projects** with the following characteristics:
 - i. was implemented as a construction management, design-build, or public-private-partnership project delivery model; and
 - ii. had a final or has a current construction cost of at least \$30M for individual project (in 2018 Canadian currency); and

-
- iii. has completed at least 50% of its construction phase or was completed after December 31, 2007; and
 - iv. includes a minimum of three of the following complexity characteristics:
 - 1. Control of chemical or biological process(es) (e.g. chemical distillation or reaction, disinfection, material containment, radiation, industrial process, etc.);
 - 2. Constrained spatial environment (e.g. metropolitan area, limited land mass area, etc.);
 - 3. High security requirement of an entire facility (e.g. hospital, laboratory, prison, industrial facility, courthouse, etc.);
 - 4. Layers of circulation or technical programming (e.g. research workspaces, process control, hazardous materials storage, local and centralized safety systems, multiple user groups, etc.): or
 - 5. Process – government, crown corporations or public context (e.g. numerous approval bodies, ministerial or equivalent approval, etc.).
 - 4. For the purposes of the evaluation of the Proponent's experience and achievements:
 - i. If the Proponent is composed of multiple entities, the Proponent is requested to identify who in the teaming arrangement has the requested experience;
 - ii. If the Proponent, or a member of the Proponent's team, refers to its parent company, to a subsidiary, an affiliate or a subcontractor, the Proponent is requested to:
 - 1. Clearly identify the name of the legal entity of the parent company, the subsidiary, the affiliate, or the subcontractor;
 - 2. Clearly describe the role of this entity in delivering the services, such as the experience being claimed for this organization, under the proposed contract;
 - 3. Demonstrate that the entity has the requested experience; and
 - 4. Provide for the entity the name of a contact person in authority, the address, telephone number and email address;
 - iii. If the entity is not directly involved in the delivery of the services under the reference project, the reference project will not be evaluated; and
 - iv. Experience claimed by a subsidiary, an affiliate or a subcontractor will be evaluated as experience by a member of the Proponent's team but not as experience of the Proponent. For a Joint Venture, experience by any member of the Joint Venture will be evaluated as experience of the Proponent.

5. The following criteria will only be evaluated for projects that meet the minimum characteristics of a science laboratory or complex project:

- a. Substantiation of:
 - i. Location and how each representative project is related to the program of work as described in Annex C – Terms of Reference ;
 - ii. Services rendered by the Proponent for each of the following roles and responsibilities. For projects undertaken as a joint-venture, consortium or in association, clearly specify the other participants, whether or not they are part of the Proponent's team, and a high-level description of their respective involvement and responsibilities:
 - i. Managerial Control;
 - ii. Architect of Record;
 - iii. Design Lead
 - iv. Construction Documents Lead;
 - v. Quality Management;
 - vi. Resident Site Services;
 - iii. Degree of involvement for the following stage(s) of the project. For projects undertaken as a joint-venture, consortium or association, clearly specify the other participants and their respective involvement and responsibilities;
 - i. Schematic or concept design;
 - ii. Design Development;
 - iii. Construction documents;
 - iv. Tender and award;
 - v. Field or site supervision; and
 - vi. Post-construction warranty review.
- b. Scale of the project;
- c. The initial estimate of construction and the final construction cost, with a detailed explanation of any variances. In the case of a project underway, initial construction estimate, current expenditures to date, and forecast at completion as detailed during the last reporting period;
- d. The original project schedule and the date of completion, and the actual completion date, with a detailed explanation of any variances. In the case of a project underway, original project schedule, current status and forecasted completion date and explanation of any variances as detailed during the last reporting period;
- e. For the following aspects of the project, the process and methodology undertaken by the Proponent for the:
 - i. Design stage of the project and integration of BIM;

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- ii. Construction stage of the project and integration of BIM;
 - iii. Quality assurance and integration of BIM (integration and management of quality throughout the project);
 - iv. The commissioning and close out stage of the project and integration of BIM. If project is ongoing, provide approach to be taken for commissioning and close out procedures and integration/use of BIM; and
 - v. Change management and integration/use of BIM (integration and management of changes throughout the project);
 - f. Industry/peer recognition, including industry or professional publications, and awards for innovation, design quality, or energy efficiency.

6. Client References

- a. Canada may, but will not have the obligation to contact client references representatives to validate the information provided as part of Appendix F – Client Reference Form. In the event of any discrepancy between the information provided by the Proponent and the information validated by the client reference(s), the Proponent will be given the opportunity to clarify any such discrepancy(ies).
- b. Any portion of the information requested as part of the Appendix F – Client Reference Form that is not validated by a client reference, or any proposed representative project for which no signed client reference was provided or for which the Proponent was unable to establish contact with its client reference representatives within ten days of such a request by Canada, will not be evaluated. For example, if representative project cost or schedule information is not validated then the cost or schedule information will not be evaluated. However, if the client reference does not confirm the reference project meets the minimum criteria for the reference project (as applicable: scope, completion date, minimum cost, delivery method, etc.) then the reference project in its entirety will not be evaluated.
- c. Client references do not apply to the calculation of the page limit.

The SRE 3.2.1 criteria 5 a) to f) will be evaluated for each project in accordance with Scale 1 below.

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Scale 1	0 %	20 %	40 %	60 %	80 %	100 %	Available Points
SRE 3.2.1.5.a) i)	Does not meet the minimum characteristics of a science laboratory or complex project	Sample project is not related to this requirement	Sample project is generally not related to this requirement	Sample project is generally related to this requirement	Sample project is directly related to this requirement	Sample project exceeds the requirement	8 points per project; Total: 32 points
3.2.1.5.a) ii)	Does not meet the minimum characteristics of a science laboratory or complex project	Relevant services provided in less than three specific roles by the Proponent	Relevant services provided in three specific roles by the Proponent	Relevant services provided in four specific roles by the Proponent	Relevant services provided in five specific roles by the Proponent	Relevant services provided in six specific roles by the Proponent	8 points per project; Total: 32 points
3.2.1.5.a) iii)	Does not meet the minimum characteristics of a science laboratory or complex project	Relevant services provided in less than three project stages by the Proponent	Relevant services provided in three project stages by the Proponent	Relevant services provided in four project stages by the Proponent	Relevant services provided in five project stages by the Proponent	Relevant services provided in six project stages by the Proponent	8 points per project; Total: 32 points
3.2.1.5.b)	Does not meet the minimum characteristics of a science laboratory or complex project	Construction cost is > \$30M but ≤ \$40M for complex projects or > \$20M but ≤ \$30M for science laboratory projects	Construction cost is > \$40M but ≤ \$50M for complex projects or > \$30M but ≤ \$40M for science laboratory projects	Construction cost is > \$50M but ≤ \$70M for complex projects or > \$40M but ≤ \$60M for science laboratory projects	Construction cost is > \$70M but ≤ \$100M for complex projects or > \$60M but ≤ \$90M for science laboratory projects	Construction cost is > \$100M for complex projects or > \$90M for science laboratory projects	8 points per project; Total: 32 points
3.2.1.5.c)	Does not meet the minimum characteristics of a science laboratory or complex project	Explanation of variances between initial and final / current construction cost provides extremely poor or insufficient justification	Explanation of variances between initial and final / current construction cost provides weak justification	Explanation of variances between initial and final / current construction cost provides adequate justification	Explanation of variances between initial and final / current construction cost provides good justification	Explanation of variances between initial and final / current construction cost provides comprehensive justification	8 points per project; Total: 32 points
3.2.1.5.d)	Does not meet the minimum characteristics of a science	Explanation of variances between	Explanation of variances between	Explanation of variances between	Explanation of variances between	Explanation of variances between	8 points per project; Total: 32 points

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	laboratory or complex project	original and actual dates of completion provides extremely poor, insufficient justification	original and actual dates of completion provides poor justification	original and actual dates of completion provides adequate justification	original and actual dates of completion provides good justification	original and actual dates of completion provides very good justification	
3.2.1.5.e)	Does not meet the minimum characteristics of a science laboratory or complex project	Process and methodology provided for only one of the five aspects with some detail of processes	Process and methodology provided for two of the five elements with details of processes per aspect	Process and methodology provided for three of the five elements with details of processes per aspect	Process and methodology provided for four of the five aspects with details of processes per aspect	Process and methodology provided for all five aspects with details of inclusive processes per aspect	10 points per project; Total: 40 points
3.2.1.5.f)	Does not meet the minimum characteristics of a science laboratory or complex project OR No recognition or award.	One recognition or award	Two recognitions or award	Three recognitions or awards	Four recognitions or awards	Five or more recognitions or awards	5 points per project; Total: 20 points

3.2.2 Experience and Expertise of Key Individuals

1. The Proponent should submit a summary résumé **no longer than 3 pages** for the Key Individual identified by the Proponent by name, title, and the information as it pertains to each criterion listed in this section.
2. The Proponent should substantiate the experience and expertise of each Key Individual listed below and to be assigned to perform the services in the resulting contract:

a. Senior Project Manager:

The single individual having overall control, and accountability for the overall delivery of the Consultant services. Beyond the traditional responsibilities typically assumed by the Principle in Charge (as referenced in the RAIC Handbook of Practice) with respect to contract performance, the Project Manager shall personally spearhead, on a hands-on basis, the active management of the entire consultant team and its sub-consultants;

b. Lead Architect:

The single individual having overall accountability of all architectural design services and the full coordination of the overall project design with all other relevant disciplines;

c. Architectural Production Leader

The single individual responsible to lead the production of architectural technical documents and the performance and management thereof with all other relevant disciplines;

d. Chef Lab Design Specialist:

The single individual having overall accountability to lead and coordinate the technical performance and management of all science laboratory design services, including work packages, for the project;

e. Lead Structural Engineer:

The single individual having responsibility and design control over all aspects of the project's structural design, and responsible to lead the production of structural design technical documents, including work packages, and the full coordination of the structural design with all other relevant disciplines.

f. Lead Mechanical Engineer:

The single individual having responsibility and design control over all aspects of the project's mechanical design, and responsible to lead the production of mechanical design technical documents, including work packages, and the full coordination of the mechanical design with all other relevant disciplines.

g. Lead Electrical Engineer:

The single individual having responsibility and design control over all aspects of the project's electrical design, and responsible to lead the production of electrical design technical documents, including work packages, and the full coordination of the electrical design with all other relevant disciplines.

h. Lead BIM Manager

The single individual having responsibility and control over all aspects of the project's BIM Model, within the approved parameters of the project.

3. Criteria evaluated are:

a. For all Key Individuals, eight or more years' experience in the role for which they have been proposed and expertise and experience relevant to a complex project that includes a minimum of three of the following complexity characteristics:

- i. Control of chemical or biological process(es) (e.g. chemical distillation or reaction, disinfection, material containment, radiation, industrial process, etc.);
- ii. Constrained spatial environment (e.g. metropolitan area, limited land mass area, etc.);
- iii. High security requirement of an entire facility (e.g. hospital, laboratory, prison, industrial facility, courthouse, etc.);
- iv. Layers of circulation or technical programming (e.g. research

- workspaces, process control, hazardous materials storage, local and centralized safety systems, multiple user groups, etc.): or
- v. Process – government, crown corporations or public context (e.g. numerous approval bodies, ministerial or equivalent approval, etc.).

b. Experience of the Key Individual in the proposed role; and

4. Each Key Individual will be evaluated separately. No person may be proposed for more than one Key Individual role.

The above criteria will be evaluated in accordance with Scale 2 below.

Scale 2	0 %	20 %	40 %	60 %	80 %	100 %	Available Points
SRE 3.2.2.3 a)	Key Individual has demonstrated less than 8 years of experience OR Key Individual's project sample does not include a minimum of three complexity characteristics	Key Individual has demonstrated more than 8 years of experience OR Key Individual's project sample includes a minimum of three complexity characteristics	Key Individual has demonstrated more than 10 years of experience OR Key Individual's project sample includes a minimum of three complexity characteristics	Key Individual has demonstrated more than 12 years of experience AND Key Individual's project sample includes a minimum of three complexity characteristics	Key Individual has demonstrated more than 15 years of experience AND Key Individual's project sample includes four or more complexity characteristics	Key Individual has demonstrated more than 20 years of experience AND Key Individual's project sample includes four or more complexity characteristics	Senior Project Manager (50 points); Lead Architect, and Chef Lab Design Specialist; (40 points each), Architectural Production Leader, Lead Structural, Mechanical, and Electrical Engineer, Lead BIM Manager (25 points each)
SRE 3.2.2.3 b)	Key Individual has not performed in the proposed role for less than 2 of the last 10 years	Key Individual has performed in the proposed role for at least 2 of the last 10 years	Key Individual has performed in the proposed role for at least 4 of the last 10 years	Key Individual has performed in the proposed role for at least 6 of the last 10 years	Key Individual has performed in the proposed role for at least 7 of the last 10 years	Key Individual has performed in the proposed role for the last 10 years	20 points per Key Individual; Total: 160 points

3.2.3 Capacity of the Proponent

1. The Proponent is required to explain, in a **maximum of five pages**, how they intend to provide and maintain the necessary capacity, over the course of the resulting contract and all potential contract options, while managing other business ventures by providing the information as it pertains to each criterion listed below.

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2. Criteria evaluated are:

- a. Capacity to assemble, direct and support a large multi-disciplinary architectural and engineering (A&E) services workforce of a minimum of 50;
- b. Capability to provide a significant program and project management team to support a program of work as described in the RFP Appendix G – Project Brief;
- c. Capability to effectively use Building Information Modelling (BIM) to produce a complex and intricate series of construction documents, as it pertains to the provision of architectural and engineering services for science laboratories, in an accelerated and prioritized implementation framework on diverse project sites, as described in RFP Appendix G – Project Brief.
- d. Capability to interpret and integrate various and possibly competing requirements into a coherent, quality managed design as it pertains to the provision of architectural and engineering services;
- e. Ability to present and highlight proposed solutions in a convincing manner so that formal approvals are obtained to meet scheduling requirements.

The above criteria will be evaluated in accordance with Scale 3 below:

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Scale 3	0 %	20 %	40 %	60 %	80 %	100 %	Available Points
SRE 3.2.2.2 a)	Capacity to dedicate an A&E workforce of less than 50 to the LC. program of work	Capacity to dedicate an A&E workforce of 50 to 64 to the LC program of work while managing other business ventures	Capacity to dedicate an A&E workforce of 65 to 79 to the LC. program of work while managing other business ventures	Capacity to dedicate an A&E workforce of 80 to 99 to the LC program of work while managing other business ventures	Capacity to dedicate an A&E workforce of 101 to 119 to the LC program of work while managing other business ventures	Capacity to dedicate an A&E workforce greater than 120 to the LC program of work while managing other business ventures	50 points
SRE 3.2.2.2 b)	Poor outline of program and project management team over entire program of work	Average program and project management team over entire project	Good substantiation program and project management team over entire program of work	Very good substantiation of program and project management team over entire program of work	Comprehensive substantiation of program and project management team with executive lead team over entire program of work	Comprehensive substantiation of program and project management team with executive lead team and numerous senior resources over entire project	50 points
SRE 3.2.2.2 c)	Poor production capability for program of work of this scale	Average off-site production capability for a program of work of this scale,	Good off-site production capability for a program of work of this scale	Very good off-site, limited on-site production capability for a program of work of this scale	Very good production capability both on-site and off-site for a program of work of this scale	Comprehensive production capability both on-site and off-site for a program of work of this scale	45 points
SRE 3.2.2.2 d)	Poor internal capacity to track, distill, and assemble different project requirements	Average management capability to track, distill, and assemble different project requirements	Good management capability to track, distill, and assemble project requirements	Very good management capability to track, distill, and assemble project requirements	Very good internal capacity to track, distill, and assemble differing, highly complex and competing project	Exceptional internal capacity to track, distill, and assemble differing, highly complex and competing project	45 points
SRE 3.2.2.2 e)	Poor track record of obtaining design approvals from senior officials	Poor track record of obtaining design approvals from senior officials	Limited track record of obtaining design approvals from senior officials	Good track record of obtaining design approvals from senior officials	Very good track record of obtaining design approval of complex projects with multi-jurisdictional bodies, from senior officials	Extensive track record of obtaining design approvals of complex projects with multi-jurisdictional approval bodies, from a, CEO, Minister, etc.	50 points

3.2.4 Internal Governance of the Proponent

1. The Proponent should present, in a **maximum of five pages**, their business strategy for the ongoing management and delivery of a contract resulting from this RFP by providing the information as it pertains to each criterion listed below.
2. Criteria evaluated are:
 - a. A business plan with internal team structure, program-specific organization chart including personnel titles, responsibilities, and reporting relationships, considering the requirement of a contract resulting from this solicitation;
 - b. A decision-making process, including but not limited to:
 - i. Description of process;
 - ii. Efficiencies associated with the described process; and
 - iii. Group/Individual responsible for taking a final decision on behalf of the Proponent.
 - c. An internal resolution process associated with decision-making or issues that may arise within the Proponent Team.

The above criteria will be evaluated in accordance with Scale 4 below:

Scale 4	0%	20%	40%	60%	80%	100%	Available Points
SRE 3.2.4 2a)	Did not submit information which could be evaluated	Extremely poor business plan; lack complete or almost complete understanding of the requirements	Poor business plan; has some understanding of the requirements but lacks adequate understandings in some areas of the requirements	Adequate business plan; demonstrate a good understanding of the requirements	Very good business plan; demonstrate a very good understanding of the requirements	Superior business plan; demonstrate an excellent understanding of the requirements	30 points each, 60 points total
SRE 3.2.4 2b) and c)	Did not submit information which could be evaluated	Extremely poor, insufficient decision and resolution processes; lack complete or almost complete understanding of the requirements	Poor decision and resolution processes; has some understanding of the requirements but lacks adequate understandings in some areas of the requirements	Adequate decision and resolution processes; demonstrate a good understanding of the requirements	Very good decision and resolution processes; demonstrate a very good understanding of the requirements	Superior decision and resolution processes; demonstrate an excellent understanding of the requirements	3.2.4b) 45 points, 3.2.4c) 40 points, 85 points total

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3.2.5 Process and Methodology of the Proponent

1. The Proponent should provide information as it pertains to each criterion listed below, in a **maximum of twelve pages**. Describe process(es) and methodology(ies) the Proponent would apply to foster an integrated and seamless implementation strategy for the LC program of work, delivered in a construction management (CM) delivery model where the design is prioritized and construction occur simultaneously, potentially on multiple concurrent projects.
2. Criteria evaluated in relation to SRE 3.2.5.1 are:
 - a. Integration of their team;
 - b. Integration of team with other stakeholders;
 - c. BIM management and design prioritization/production in response to LC program and CM requirements;
 - d. Time management;
 - e. Cost management;
 - f. Quality management;
 - g. Risk management; and
 - h. Information management and transfer to new team members.

The above criteria will be evaluated in accordance with Scale 5 below:

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Scale 5	0%	20%	40%	60%	80%	100 %	Available Points
SRE 3.2.5.2 a) and b)	Did not submit information which could be evaluated	Extremely poor process and methodology (assigning roles/ responsibilities, service delivery, integration stakeholders); lack complete or almost complete understanding of the requirements	Poor process and methodology (assigning roles/ responsibilities, service delivery, integration stakeholders); has some understanding of the requirements but lacks adequate understandings in some areas of the requirements	Adequate process and methodology (assigning roles/ responsibilities, service delivery, integration stakeholders); demonstrate a good understanding of the requirements	Very good process and methodology (reassigning roles/ responsibilities, service delivery, integration stakeholders); demonstrate a very good understanding of the requirements	Superior process and methodology (assigning roles/ responsibilities, service delivery, integration stakeholders); demonstrate an excellent understanding of the requirements	40 points each, 80 points total
SRE 3.2.5.2 c)	Did not submit information which could be evaluated	Extremely poor process and methodology for design prioritization or reprioritization; lacks complete or almost complete understanding of the requirements	Poor process and methodology for design prioritization, or reprioritization; has some understanding of the requirements but lacks adequate understandings in some areas of the requirements	Adequate process and methodology for design prioritization or reprioritization, demonstrates a good understanding of the requirements	Very good process and methodology for design prioritization or reprioritization; demonstrates a very good understanding of the requirements	Superior process and methodology for design prioritization or reprioritization; demonstrate an excellent understanding of the requirements	100 points
SRE 3.2.5.2 d), e), f) and g)	Did not submit information which could be evaluated	Extremely poor process and methodology for Proponent's team responsibilities and processes with other stakeholders regarding time, cost, quality, and risk management	Poor process and methodology for Proponent's team responsibilities and processes with other stakeholders regarding time, cost, quality, and risk management	Adequate process and methodology for Proponent's responsibilities and processes with other stakeholders regarding time, cost, quality, and risk management	Very good process and methodology for Proponent's team responsibilities and processes with other stakeholders regarding time, cost, quality, and risk management;	Superior process and methodology for Proponent's team responsibilities and processes with other stakeholders regarding time, cost, quality, and risk management	40 points each, 160 points total
SRE 3.2.5.2 h)	Did not submit information which could be evaluated	Extremely poor process and methodology for information management and transfer to new team members	Limited process and methodology for information management and transfer to new team members	Adequate process and methodology for information management and transfer to new team members	Very good process and methodology for information management and transfer to new team members	Superior information process and methodology for information management and transfer to new team	75 points

The evaluation process will establish a pre-presentation sub-total score for each Proponent. Proponents who achieve the minimum score for each of the criteria SRE 3.2.1, 3.2.2, 3.2.3, 3.2.4, and 3.2.5 will be invited to participate in the presentation.

3.2.6 Presentation by the Proponent

1. The presentation is a second step in the evaluation process, which gives the Proponent the opportunity to present their approach to the presentation topics in person in the context of the information provided in this RFP.
2. The Proponent will be offered a maximum of forty minutes to make their presentation on the topics below. Proponents must be available to make the presentation within two weeks following the invitation for presentation.
3. For the presentation portion the Proponent can make use of audio / visual material that it will provide as it sees fit but the Proponent should be able to set-up the material within ten minutes.
4. The Proponent is limited to a maximum of six participants for the presentation. The following Key Individuals should be present for the presentation: Senior Project Manager; Lead Architect; Chef Lab Design Specialist; Lead Mechanical Engineer. The Proponent is responsible to determine the need for two other participants to be present and participate in the delivery of the presentation
5. Presentation:
 - a. The Proponent should present the following four topics:
 - i. Proposed communications plan, including:
 1. Initial communications and consensus building approach (inception stage of project);
 2. Recommended reoccurring communications (pre-scheduled, operational meetings, etc.); and
 3. Close-out communications (ensuring the client and stakeholders agree that the project is at close-out stage).
 - ii. Approach to building consensus (mutual partnering), amongst stakeholder and client groups that may not always agree and their process to encourage open and honest feedback from various perspectives and come to an agreement or plan of action.
 - iii. Organization's defined culture. In absence of a defined culture, how does it ensure its members share common vision on strategic, operational and relational objectives?
 1. How was the culture or shared vision derived?
 2. What are the organization's core values?
 3. How members of the Proponent's team are held accountable?
 - iv. Approach to maximize efficiencies and work place synergy with clients, stakeholders, partners and employees, considering people's

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various levels of skill, experience, knowledge, personalities and values?

- b. The evaluation board may ask clarification type questions immediately following the presentation.

The above criteria will be evaluated in accordance with Scale 6 below:

Scale 6	0 %	20 %	40 %	60 %	80 %	100 %	Available Points
SRE 3.2.6.5 Presentation (overall)	Poor presentation	<p>Presentation was just enough to believe that minimum performance will be met</p> <p>Presentation very poorly coordinated</p> <p>Presentation skills of most Key Individuals and other participants poor.</p> <p>Significant gaps in fluidity</p> <p>Poor ability to respond to questions</p>	<p>Presentation was average but enough to believe that adequate results could be achieved</p> <p>Presentation lacks balanced approach among Key Individuals and other participants</p> <p>Presentation skills of some Key Individuals and other participants weak</p> <p>Lacks fluidity</p> <p>Weak ability to respond to questions</p>	<p>Presentation above average and leads to believe that effective results could be achieved</p> <p>Presentation includes input from several Key Individuals and other participants</p> <p>Presentation skills of Key Individuals and other participants adequate</p> <p>Some gaps in fluidity</p> <p>Adequate ability to respond to questions</p>	<p>Presentation was convincing that effective results will be achieved</p> <p>Presentation includes input from all Key Individuals and other participants</p> <p>Presentation skills of Key Individuals and other participants good</p> <p>Fluidity acceptable</p> <p>Good ability to respond to questions</p>	<p>Presentation was very convincing that extremely effective results will be achieved</p> <p>Presentation includes input from all Key Individuals and other participants</p> <p>Presentation skills of Key Individuals and other participants strong</p> <p>Very good fluidity</p> <p>Strong ability to respond to questions</p>	75

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Scale 6	0 %	20 %	40 %	60 %	80 %	100 %	Available Points
RE 3.2.6.5 a) (i), (ii), (iii), (iv); and b)	Topics were poorly substantiated	<p>Compatibility of Proponent's culture was not well substantiated</p> <p>Significant gaps in communicating benefits of mutual partnering</p> <p>Poor focus on quality service and responsiveness</p> <p>Significant information gaps in response to questions</p> <p>Poor description of standards of behaviour which can be leveraged to support an accountability structure</p> <p>No mention of procedure for monitoring client service level</p>	<p>Compatibility of Proponent's culture was partly substantiated</p> <p>Communicated some elements and benefits of how they invest in mutual partnering</p> <p>Average focus on quality service and responsiveness</p> <p>Many information gaps in response to questions</p> <p>Very little definition of standards of behaviour which can be leveraged to support an accountability structure</p> <p>Procedure for monitoring client service level mentioned</p>	<p>Compatibility of Proponent's culture is substantiated as being compatible</p> <p>Communicated many elements and benefits of how they invest in mutual partnering</p> <p>Good focus on quality service and responsiveness</p> <p>Information gaps evident in response to questions</p> <p>Definition standards of behaviour which can be leveraged to support an accountability structure</p> <p>Procedure for monitoring client service level described.</p>	<p>Compatibility of Proponent's culture is compatible</p> <p>Successfully communicated most detailed elements and benefits of how they invest in mutual partnering</p> <p>Good focus on quality service and responsiveness</p> <p>No apparent information gaps in response to questions</p> <p>Defined standards of behaviour which can be leveraged to support an accountability structure</p> <p>Procedure for monitoring client service level well-articulated</p>	<p>Compatibility of Proponent's culture is fully compatible</p> <p>Successfully communicated detailed elements and proactive approach to how they invest in mutual partnering</p> <p>Excellent focus on quality service and responsiveness</p> <p>No apparent information gaps in response to questions</p> <p>Clearly articulated well defined standards of behaviour which can be leveraged to support an accountability structure</p> <p>Procedure for monitoring client service level very well-articulated</p>	175

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APPENDIX B - TEAM IDENTIFICATION FORMAT

Please see Appendix A - SRE in the Request For Proposal.

The Proponent must submit the name of firms (Proponent and Sub Consultants) and key individuals listed below with its bid.

The required licensing and/or accreditation information and the required security information should be submitted with the proposal, but may be submitted afterwards as follows: if not submitted with the proposal, the Contracting Authority will inform the Proponent of a time frame within which to provide the information. Failure to comply with the request of the Contracting Authority and to provide the information within the time frame provided will render the proposal non-responsive.

The Key individuals, to be included under the following section I (Prime Consultant (Proponent – Architectural and/or Engineering Firm)) or II (Key Sub Consultants / Specialists) are as follows:

- Senior Project Manager
- Lead Architect
- Architectural Production Leader
- Chief Lab Design Specialist
- Lead Structural Engineer
- Lead Mechanical Engineer
- Lead Electrical Engineer
- BIM Manager

Section II (Key Sub Consultants / Specialists) is to be completed for each Key individual listed above who are not included in Section I, if any.

I. Prime Consultant (Proponent – Architectural and/or Engineering Firm):

Firm name (Full legal name of the Proponent, for Joint Venture, the full legal name of each member of the JV).

Indicate current license and/or how provincial or territorial licensing requirements would be met. Include the complete address, telephone number, CISC File Number and Organization Security Clearance:

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Prime Consultant Key Individuals:

For each Key individual, include provincial professional licensing status and/or professional accreditation, the level of Security Clearance, the validity period of Security Clearance and the Security Screening Certificate and Briefing Form File Number or CISC File Number:

.....
.....
.....
.....
.....

II. Key Sub Consultants / Specialists:

Firm name (Full legal name):

Include the complete address, telephone number, CISC File Number and Organization Security Clearance

.....
.....
.....

Sub Consultant Key Individuals

For each Key individual include provincial professional licensing status and/or professional accreditation, the level of Security Clearance, the validity period of Security Clearance and the Security Screening Certificate and Briefing Form File Number or CISC File Number:

.....
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As required, copy above section II format.

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APPENDIX C - DECLARATION/CERTIFICATIONS FORM

Project Title:

Name of Proponent:

Street Address:

Mailing Address:

Telephone Number: ()

Fax Number: ()

E-Mail:

Procurement Business Number:

Type of Organization: _____ Sole Proprietorship _____ Partnership _____ Corporation _____ Joint Venture	Size of Organization: Number of Employees _____ Graduate Architects / Professional Engineers _____ Other Professionals _____ Technical Support _____ Other _____
--	--

Federal Contractors Program for Employment Equity - Certification

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

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

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

Complete both A and B.

A. Check only one of the following:

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

A5. The Proponent has a combined work force in Canada of 100 or more employees; and

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

OR

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

B. Check only one of the following:

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

OR

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

Former Public Servant (FPS) - Certification

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 FPS, proponents 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 proposals is completed, Canada will inform the Proponent 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 proposal 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*

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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 Proponent a FPS in receipt of a pension?

YES () NO ()

If so, the Proponent must provide the following information, for all FPS in receipt of a pension, as applicable:

- (a) name of former public servant;
- (b) date of termination of employment or retirement from the Public Service.

By providing this information, proponents agree that the successful Proponent'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 Proponent a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? YES () NO ()

If so, the Proponent 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.

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Name of Proponent:

DECLARATION:

I, the undersigned, being a principal of the proponent, hereby certify that the information given on this form and in the attached proposal is accurate to the best of my knowledge. If any proposal is submitted by a partnership or joint venture, then the following is required from each component entity.

.....
name

.....
signature

.....
title

I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture

.....
name

.....
signature

.....
title

I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture

.....
name

.....
signature

.....
title

I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture

During proposal evaluation period, PWGSC contact will be with the following person:_____.

Telephone Number: () _____ Fax Number: () _____

E-mail: _____

This Appendix "C" should be completed and submitted with the proposal, but may be submitted afterwards as follows: if Appendix "C" is not completed and submitted with the proposal, the Contracting Authority will inform the Proponent of a time frame within which to provide the information. Failure to comply with the request of the Contracting Authority and to provide the certifications within the time frame provided will render the proposal non-responsive.

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APPENDIX D - PRICE PROPOSAL FORM

INSTRUCTIONS: Complete this Price Proposal Form and submit in a **separate sealed envelope** with the Name of Proponent, Name of Project, PWGSC Solicitation Number, and the words "Price Proposal Form" typed on the outside of the envelope. Price Proposals are not to include Applicable Taxes.

PROPOSERS SHALL NOT ALTER THIS FORM

Project Title:

Name of Proponent:

The following will form part of the evaluation process:

PERCENTAGE FEE

Percentage Fee (R1230D (2018-06-21), GC 5 - Terms of Payment – Architectural and/or Engineering Services)

Percentage Fee will compensate the Consultant for all services except Pre-Design Services, Site Services and Post-Construction Services.

Base Contract - Mississauga

Firm Percentage Fee of _____ %
Indicative Estimate of Construction Cost
(Class D, excluding Applicable Taxes) X \$ 21,551,755
Base Contract Estimated Total Percentage Fee (A) \$ _____

Option 1 - Guelph

Firm Percentage Fee of _____ %
Indicative Estimate of Construction Cost
(Class D, excluding Applicable Taxes) X \$ 30,886,935
Guelph Estimated Total Percentage Fee (B) \$ _____

Option 2 – Sudbury

Firm Percentage Fee of _____ %
Indicative Estimate of Construction Cost

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(Class D, excluding Applicable Taxes)
Sudbury Estimated Total Percentage Fee

X \$ 16,880,500
(C) \$

Option 3 – Cultural Heritage

Firm Percentage Fee of _____ %

Indicative Estimate of Construction Cost

(Class D, excluding Applicable Taxes)

X \$ 58,728,150

Cultural Heritage Estimated Total Percentage Fee

(D) \$

Total Percentage Fee for Evaluation Purposes: A+B+C+D = \$

The actual percentage fee for Required Services will recognize the variability of the Construction Cost Estimate as the project develops (refer to formula specified in SC6 Percentage Fee Arrangement). Payments will be made as specified in GC 5.4 Payments for Services.

TIME BASED FEE

Time Based Fee - R1230D (2018-06-21), GC 5 - Terms of Payment – Architectural and/or Engineering Services)

The Consultant will be compensated for Pre-design Services, Site Services, and Post-Construction Services based on the All Inclusive Hourly Rates below.

Table A

Discipline	Category of Resources / Level	Estimated Number of Hours (a)	All-inclusive Hourly Rate (b)	Extended Fee (a x b)
General Architecture	Senior Architect(s)	150	\$	
	Intermediate Architect(s)	225	\$	
	Junior Architect(s)	150	\$	
	Senior Architectural Technologist	150	\$	
	Intermediate Architectural Technologist	225	\$	
	Junior Architectural Technologist	150	\$	
	Senior Architectural	150	\$	
	Intermediate Architectural	225	\$	
	Junior Architectural	150	\$	
	Co-op Student	150	\$	
Landscape Architecture	Senior Architect	150	\$	
	Intermediate Architect	225	\$	
	Junior Architect	150	\$	
	Senior Architectural Technologist	150	\$	
	Intermediate Architectural Technologist	225	\$	

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	Junior Architectural Technologist	150	\$	
	Senior Architectural Technician/Draftsman	150	\$	
	Intermediate Architectural	225	\$	
	Junior Architectural Technician/Draftsman	150	\$	
	Co-op Student	150	\$	
Interior Designer	Senior Interior Designer	150	\$	
	Intermediate Interior Designer	225	\$	
	Junior Interior Designer	225	\$	
	Senior CAD Technician	150	\$	
	Intermediate CAD Technician	225	\$	
	Junior CAD Technician	150	\$	
	Co-op Student	150	\$	
Functional Programming	Senior Architect	150	\$	
	Intermediate Architect	225	\$	
	Junior Architect	150	\$	
Civil Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
	Senior Technologist	150	\$	
	Intermediate Technologist	225	\$	
	Junior Technologist	150	\$	
	Senior Technician/ Draftsman	150	\$	
	Intermediate Technician/ Draftsman	225	\$	
	Junior Technician/ Draftsman	150	\$	
	Co-op Student	150	\$	
Structural Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
	Senior Technologist	150	\$	
	Intermediate Technologist	225	\$	
	Junior Technologist	150	\$	
	Senior Technician/ Draftsman	150	\$	
	Intermediate Technician/ Draftsman	225	\$	
	Junior Technician/ Draftsman	150	\$	
	Co-op Student	150	\$	
Mechanical Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
	Senior Technologist	150	\$	
	Intermediate Technologist	225	\$	
	Junior Technologist	150	\$	
	Senior Technician/ Draftsman	150	\$	
	Intermediate Technician/ Draftsman	225	\$	

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	Junior Technician/ Draftsman	150	\$	
	Co-op Student	150	\$	
Electrical Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
	Senior Technologist	150	\$	
	Intermediate Technologist	225	\$	
	Junior Technologist	150	\$	
	Senior Technician/ Draftsman	150	\$	
	Intermediate Technician/ Draftsman	225	\$	
	Junior Technician/ Draftsman	150	\$	
	Co-op Student	150	\$	
Laboratory Design and Programming Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technologist/ Technician/ Draftsman	225	\$	
Laboratory Equipment Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technologist/ Technician/ Draftsman	225	\$	
Vertical Transportation Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technologist/ Technician/ Draftsman	225	\$	
Acoustic Design Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technologist/ Technician/ Draftsman	225	\$	
Sustainable Design Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
Lighting Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
Industrial Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
Material Handling Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
Environmental Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	

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Industrial Hygiene Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
Property Management	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
Building Code Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
Building Science Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technician/ Draftsman	225	\$	
Base Isolation Engineer/ Specialist	Senior Engineer/ Specialist	150	\$	
	Intermediate Engineer/ Specialist	225	\$	
	Junior Engineer/ Specialist	150	\$	
	Intermediate Technician/ Draftsman	225	\$	
Geotechnical Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
	Senior Technologist	150	\$	
	Intermediate Technologist	225	\$	
	Junior Technologist	150	\$	
	Senior Technician/Draftsman	150	\$	
	Intermediate Technician/Draftsman	225	\$	
	Junior Technician/Draftsman	150	\$	
	Co-op Student	150	\$	
Door Hardware Specialist	Senior Architect/Technologist	150	\$	
	Intermediate Architect/Technologist	225	\$	
	Junior Architect/Technologist	150	\$	
	Intermediate Technician/Draftsman	225	\$	
Signage and Wayfinding Specialist	Senior Designer/ Specialist	150	\$	
	Intermediate Designer/ Specialist	225	\$	
	Junior Designer/ Specialist	150	\$	
	Intermediate Technician/Draftsman	225	\$	
Transportation and Traffic Engineer	Senior Engineer	150	\$	
	Intermediate Engineer	225	\$	
	Junior Engineer	150	\$	
	Senior Technologist	150	\$	
	Intermediate Technologist	225	\$	
	Junior Technologist	150	\$	
	Senior Technician/Draftsman	200	\$	
	Intermediate Technician/Draftsman	225	\$	
	Junior Technician/Draftsman	150	\$	
BIM Specialists	Co-op Student	150	\$	
	BIM Manager	300	\$	

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	Senior BIM Specialist	200	\$	
	Intermediate BIM Specialist	225	\$	
	Junior BIM Specialist	150	\$	
Air flow, Zonal, and	Senior Modeling Specialist	150	\$	
	Intermediate Modeling Specialist	225	\$	
Fume hood	Senior Modeling Specialist	150	\$	
	Intermediate Modeling Specialist	225	\$	
Building Automation Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Intermediate Technician/Draftsman	225	\$	
Security Specialist	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technician/Draftsman	225	\$	
Information Management and Information	Senior Specialist	150	\$	
	Intermediate Specialist	225	\$	
	Junior Specialist	150	\$	
	Intermediate Technician/Draftsman	225	\$	
Ontario Land Surveyor	Senior Surveyor	150	\$	
	Intermediate Surveyor	225	\$	
Cost Specialist	Senior Cost Specialist (PQS)	150	\$	
	Intermediate Cost Specialist	225	\$	
Time Specialists	Senior Time Specialist	150	\$	
	Intermediate Time Specialist	225	\$	
Project Manager	Senior Project Manager	150	\$	
	Intermediate Project Manager	225	\$	
Total Time Based fee for Evaluation Purposes				\$

Notes:

1. Payment will be based on actual hours spent. Travel time and/or expenses will not be reimbursed separately (Refer to R1230D (2018-06-21), GC 5.12 – Disbursements).
2. All inclusive hourly rate is applicable to both normal working hours and any other shift work as required.
3. The Total Time Based Fee is for evaluation purposes only and has no bearing on Canada's liability to the Consultant.
4. Should the need arise during the period of the Contract to add additional services, the firm hourly rates in the table above shall apply.
5. The rate for a Co-op personnel must not exceed the rate of a junior personnel; both rates must not exceed the rate of an intermediate personnel; all three rates must not exceed the rate of a senior personnel; and all four rates must not exceed the rates of a Key Individual or Key

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Personnel. This will apply to each sub-category contained within each category for each discipline (e.g. the rates for architectural technologists will not be used to compare the rates for architects).

6. The all-inclusive hourly rate shall be the same regardless of the location where the services are being rendered.

7. Estimated number of hours is given for evaluation purposes only.

ADDITIONAL SERVICES

The rates in the Time Based Fee table above may be used for future amendments.

TOTAL COST OF SERVICES FOR PROPOSAL EVALUATION PURPOSES

Total Percentage Fee for Evaluation Purposes \$.....

Total Time Based fee for Evaluation Purposes + \$.....

Total Evaluated Fee \$.....

The following will NOT form part of the evaluation process

DISBURSEMENTS

At cost without allowance for mark-up or profit, supported by invoices/receipts - see clause R1230D (2018-06-21), GC 5 - Terms of Payment– Architectural and/or Engineering Services, section GC5.12 Disbursements.

Base Contract - Mississauga

Amount for Disbursements \$ 40,000

Option 1 – Guelph

Amount for Disbursements \$ 20,000

Option 2 – Sudbury

Amount for Disbursements \$ 30,000

Option 3 – Cultural Heritage

Amount for Disbursements \$ 70,000

MAXIMUM AMOUNT FOR DISBURSEMENTS \$ 160,000

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AGREEMENT PARTICULARS**TERMS OF PAYMENT – CALCULATION OF FEES**

Percentage Fee (R1230D (2018-06-21), GC 5 - Terms of Payment – Architectural and/or Engineering Services) and SC6 – Percentage Fee Arrangement

The Percentage Fee will compensate the Consultant for all services except Pre-Design Services, Site Services and Post-Construction Services.

Percentage Fees		
Required Services		%
Base Contract - Mississauga	All Services except : Pre-design Services, Site Services, Post-Construction Services	_____%
Option 1 Guelph	All Services except : Pre-design Services, Site Services, Post-Construction Services	_____%
Option 2 Sudbury	All Services except : Pre-design Services, Site Services, Post-Construction Services	_____%
Option 3 Cultural Heritage	All Services except : Pre-design Services, Site Services, Post-Construction Services	_____%

The Time-Based Fees (R1230D (2016-01-28), GC 5 – Terms of Payment) to be paid to the Consultant for the services shall be in accordance with the following fee arrangement

Maximum Time-Based Fees		
Required Services		Upset Limit*
Base Contract	Pre-design Services, Site Services, Post-Construction Services	\$ 1,011,616
Option 1 Guelph	Pre-design Services, Site Services, Post-Construction Services	\$ 1,449,799
Option 2 Sudbury	Pre-design Services, Site Services, Post-Construction Services	\$ 792,352
Option 3 Cultural Heritage	Pre-design Services, Site Services, Post-Construction Services	\$ 2,756,635
MAXIMUM TIME-BASED FEES (applicable taxes extra):		\$ 6,010,402

*An estimated Upset Limit has been established by Canada. The Consultant will be paid for actual services performed using the applicable hourly rate(s) in Table A. The maximum amount payable under the Agreement may not exceed the sum Specified without the prior written authorization of Canada in accordance with the terms of the Agreement.

END OF PRICE PROPOSAL FORM

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APPENDIX E – SRCL

(see below)



Government
of Canada

Gouvernement
du Canada

Contract Number / Numéro du contrat

EN740-20200671

Security Classification / Classification de sécurité
UNCLASSIFIED

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		Public Works and Government Services Canada	2. Branch or Directorate / Direction générale ou Direction FSTII	
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 Ontario Region Architectural & Engineering Services				
5. a) Will the supplier require access to Controlled Goods? Le fournisseur aura-t-il accès à des marchandises contrôlées?			<input checked="" type="checkbox"/> No Non	<input type="checkbox"/> 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?			<input checked="" type="checkbox"/> No Non	<input type="checkbox"/> 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)			<input checked="" type="checkbox"/> No Non	<input type="checkbox"/> 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.			<input type="checkbox"/> No Non	<input checked="" type="checkbox"/> 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?			<input checked="" type="checkbox"/> No Non	<input type="checkbox"/> 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 <input type="checkbox"/>		NATO / OTAN <input type="checkbox"/>		Foreign / Étranger <input type="checkbox"/>
7. b) Release restrictions / Restrictions relatives à la diffusion				
No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>		All NATO countries Tous les pays de l'OTAN <input type="checkbox"/>		No release restrictions Aucune restriction relative à la diffusion <input type="checkbox"/>
Not releasable À ne pas diffuser <input type="checkbox"/>				
Restricted to: / Limité à: <input type="checkbox"/>		Restricted to: / Limité à: <input type="checkbox"/>		Restricted to: / Limité à: <input type="checkbox"/>
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				
PROTECTED A PROTÉGÉ A <input type="checkbox"/>		NATO UNCLASSIFIED <input type="checkbox"/>		PROTECTED A PROTÉGÉ A <input type="checkbox"/>
PROTECTED B PROTÉGÉ B <input type="checkbox"/>		NATO NON CLASSIFIÉ <input type="checkbox"/>		PROTECTED B PROTÉGÉ B <input type="checkbox"/>
PROTECTED C PROTÉGÉ C <input type="checkbox"/>		NATO RESTRICTED <input type="checkbox"/>		PROTECTED C PROTÉGÉ C <input type="checkbox"/>
CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/>		NATO DIFFUSION RESTREINTE <input type="checkbox"/>		CONFIDENTIAL CONFIDENTIEL <input type="checkbox"/>
SECRET SECRET <input type="checkbox"/>		NATO CONFIDENTIAL <input type="checkbox"/>		SECRET SECRET <input type="checkbox"/>
TOP SECRET TRÈS SECRET <input type="checkbox"/>		NATO SECRET <input type="checkbox"/>		TOP SECRET TRÈS SECRET <input type="checkbox"/>
TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>		NATO COSMIC TOP SECRET <input type="checkbox"/>		TOP SECRET (SIGINT) TRÈS SECRET (SIGINT) <input type="checkbox"/>
		NATO COSMIC TRÈS SECRET <input type="checkbox"/>		



PART A (continued) / PARTIE A (suite)

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS? ☒ No ☐ Yes
Non Oui

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?
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate? ☒ No ☐ Yes
Non Oui

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?
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail? ☒ No ☐ Yes
Non Oui

If Yes, will unscreened personnel be escorted?

Dans l'affirmative, le personnel en question sera-t-il escorté?

☒ No ☐ Yes
Non Oui

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?
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS? ☒ No ☐ Yes
Non Oui

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

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?
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ? ☒ No ☐ Yes
Non Oui

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?
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? ☒ No ☐ Yes
Non Oui

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



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			CONFIDENTIAL CONFIDENTIEL	SECRET	TOP SECRET TRÈS SECRET
											A	B	C			
Information / Assets Renseignements / Biens																
Production																
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, classifiez 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, classifiez 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).

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APPENDIX F – CLIENT REFERENCE FORM

Note to Proponent: The information in the table below should be provided for each of the four projects and submitted by the Proponent.

Provide the following information for each project that is presented by the Proponent: <i>(Please expand space provided to accommodate extent of information requested)</i>	
Project name / description	
Describe the work performed by the Proponent on the project	
Describe the contracting delivery model used for the project	
Describe the overall "scope" of the project	
Project location	
Project size (m ² or ft ²)	
Initial construction cost (excluding taxes)	
Final/current construction cost (excluding taxes)	
If applicable, explain any discrepancy between initial and final construction cost	
Describe any significant "scope" changes during the project	
Original completion date	
Actual or approved completion date	
If applicable, explain any discrepancy between original and actual/approved completion date	
Contact Information and Testimonial	
Client reference's company name	
Client reference representative's title	

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Provide the following information for each project that is presented by the Proponent: <i>(Please expand space provided to accommodate extent of information requested)</i>	
Client reference representative's telephone number	Area Code (____), Number____-____
Client reference representative's email address	
Name of entity/firm claiming the experience	
Client Reference Representative's Testimonial	<p>To the best of my knowledge, the information cited above is true and factual.</p> <p>_____ <i>Signature</i></p> <p>_____ <i>Date</i></p>

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APPENDIX G – PROJECT BRIEF

(see attachments)

APPENDIX G – Project Brief
Laboratories Canada (LC) Ontario Regional Projects

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1 PROJECT DESCRIPTION

1.1 Intent of Contract

Public Works and Government Services Canada (PWGSC), commonly known as Public Services and Procurement Canada (PSPC), will retain the Services of an architectural and engineering entity, the Consultant, to modernize laboratory facilities as part of a program of work related to Laboratories Canada (LC).

Science Facility laboratories in Mississauga, Sudbury, Guelph and Ottawa may form part of the overall Contract as determined by the priorities of PWGSC's LC program. The Consultant's base Contract is the laboratory expansion and fit-up of a joint National Research Council (NRC) and Natural Resources Canada (NRCan) facility in Mississauga, Ontario.

PWGSC will add incremental Consultant Services to the Contract through Contract option(s) as its Science Partner clients determine their location-specific scope of laboratory modernization.

In the Contract, the Consultant, Sub-Consultant(s), and Specialist Consultant(s) collectively are referred to as the Design Team. Altogether, the scope of the Design Team's Services includes detailed investigation and analysis of Project and sub-Project requirements, validation of design and implementation options, detailed Schematic Design options and support to obtain necessary approvals, detailed Design Development, numerous Design Packages for competitive tender, and Site Services - administration and Site supervision of the construction work.

PWGSC will retain one construction management firm to deliver the work of this Contract. The Construction Manager (CM) will work collaboratively with the Design Team and PWGSC's Departmental Representative (DR). The CM is required to support the development and analysis of implementation options of the initial Mississauga mandate and each sub-Project, managing the work sequencing, Cost, and construction of approved design solutions.

The Consultant is required to respect and apply the PWGSC's high quality standards throughout all aspects of design planning and production, ensuring ongoing and timely quality control of the Design Team's work product and Site Services.

1.2 Terms, Acronyms and Abbreviations

Specifically, defined terms, acronyms and abbreviations used in this Project Brief are capitalised and defined in the Contract or Project Brief Appendix B – TERMS, and Appendix C - ACRONYMS. Words that are not uppercase or italicised have standard definitions as defined in the Oxford English Dictionary.

1.3 Project Information

1.3.1 Abstract

The 2018 federal budget announced significant new investments to support the renewal of federal science in Canada by launching the first phase of an ambitious plan to rebuild federal laboratories. The 2018 budget allocated significant funding to PWGSC over five years, starting in 2018–19 for the development of federal science projects in locations across Canada. In November 2018, Cabinet

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approved the government's vision, funding and science priorities through Laboratories Canada, a program of work sponsored by the new LC Branch within PWGSC.

PWGSC established an LC Program Management Office (LC Office), located in the National Capital Area, with overall responsibility for overall leadership, management, and delivery of the LC program of work.

The LC program will address infrastructure deficiencies and enable collaboration and cutting-edge science by:

- Building new multi-department, multi-purpose, "green" federal laboratories;
- Upgrading science and technology Information Management / Information Technology (IM/IT) systems to facilitate data-sharing and high-capacity computing while ensuring security of government systems;
- Optimizing the impact of investments through shared major scientific equipment; and
- Reducing policy barriers that inhibit scientific collaboration.

Laboratories Canada seeks to renew:

- Federal science laboratories for science and technology departments and agencies (Science Partners);
- Scientific equipment; and
- Science-specific IM/IT tools and services.

The vision of LC is for a world-class national network of modern and multipurpose federal science and technology laboratories that support collaboration, multidisciplinary research and innovation, and evidence-based decision-making.

Achieving this vision will help ensure that federal scientists have the facilities and tools they need to complete leading-edge research. LC will enable governmental and non-governmental partners to work together effectively, and to keep pace with transformative changes shaping the science landscape.

The major elements of the LC include:

- a) Laboratory Design Standards: Retaining an architectural and engineering services advocate consultant team to work with Science Partners and develop standardized laboratory design guidelines, requirements, and topologies, ensuring a common and repeatable approach for laboratory design. The advocate team will support PWGSC and the delivery of large clusters of Science Partners and smaller regional nodes, a hub and spoke network of laboratory facilities;
- b) Science Clusters: An amalgamation of Science Partners whose operations are consolidated into large clusters. Five large Science Clusters were identified and approved in the federal budget, plus specific purpose science and technology facilities. In general, large-scale Science Clusters are purpose-built laboratory facilities and will likely be delivered through Public-Private-Partnerships (P3) contracts.

The TerraCanada Science Cluster and specific-purpose Science Clusters will be smaller, regional Science Facilities. TerraCanada and specific-purpose Science Clusters will advance the government's vision for science by bringing together federal scientists to solve challenges related to sustainable land and resource development, a low carbon economy, and the health and safety of Canadians.

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The large and regional Science Clusters form a hub and spoke arrangement for science innovation; and

- c) Regional Nodes: Modernizing existing or building new laboratory facilities for generally two or more Science Partners with focused science and technology mandates. The TerraCanada Science Cluster and specific-purpose Science Clusters include several regional facilities, some of which are the sub-Projects of this Contract. PWGSC will initiate other regional architectural and engineering services contracts, as appropriate to the Science Partners' requirements, to deliver the remaining TerraCanada and other Science Cluster laboratory facilities.

1.3.2 Cost

PWGSC's Construction Cost Estimate for this Contract and its potential options are summarized below. The Contract Cost Principles will determine all Contract direct and indirect Costs. The final construction Cost of the Contract will depend on the LC program priorities and requirements.

Location	Comments	Construction Cost Estimate*
Mississauga	Base Contract	\$21,551,755
Guelph	Optional sub-Project	\$30,886,935
Sudbury	Optional sub-Project	\$16,880,500
Cultural Heritage	Optional sub-Project	\$58,728,150
Potential Construction Cost Estimate (all options included)		\$128,047,340

*Includes sustainability premium, design contingency, construction contingency, escalation contingency, and disbursements.
Excludes Consultant fees and risk.

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1.3.3 Milestones

1.3.3.1 Mississauga Sub-Project

Milestones for the Mississauga sub-Project and key intermediate activities are listed below.

The actual sequence of design and construction and timing of key intermediate activities will change to optimize the schedule but the Contract milestones remain as indicated.

Contract Milestone	Key Intermediate Activity	Date
Consultant/CM appointment		January 2020
	100% Schematic Design approval	+5 months from Contract award
	100% Design Development approval	+9 months from Contract award
	Final IT/MM and casework installation	Winter/Spring 2022
Substantial Performance		+28 months from Contract award (May 2022)
	Occupancy by Science Partners	Summer 2022
Final Completion		+40 months from Contract award

1.3.3.2 Other Sub-Projects

Subject to LC approval and the authorization to proceed through a Contract amendment issued by the Contracting Authority, the following tables outline the planned milestones and key intermediate activities for the Guelph, Sudbury, and Cultural Heritage sub-Project. The actual sequence of design and construction and timing of key intermediate activities will change to optimize the schedule but the Contract option milestones remain as indicated.

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Guelph and Sudbury Sub-Projects		
Contract Option Milestone	Key Intermediate Activity	Date
Contract Option Approved		To Be Determined
	100% Schematic Design approval	+5 months from Contract Option Approval
	100% Design Development approval	+9 months from Contract Option Approval
	Final IT/MM and casework installation	Starting approximately 5-6 months before Substantial Performance
Substantial Performance		+37 months from Contract Option Approval
	Occupancy by Science Partners	+2-4 months after Substantial Performance
Final Completion		+49 months from Contract Option Approval

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Cultural Heritage Sub-Project		
Contract Option Milestone	Key Intermediate Activity	Date
Contract Option Approved		To Be Determined
	100% Schematic Design approval	+10 months from Contract Option Approval
	100% Design Development approval	+17 months from Contract Option Approval
	Final IT/MM and casework installation	Starting approximately 5-6 months before Substantial Performance
Substantial Performance		+59 months from Contract Option Approval
	Occupancy by Science Partners	+2-4 months after Substantial Performance
Final Completion		+71 months from Contract Option Approval

1.3.3.3 Potential Sub-Project Start/Concurrency

LC is working with Science Partners to finalize Science Facility requirements. The graphic below indicates the potential Sub-Project start time and concurrency of implementation.

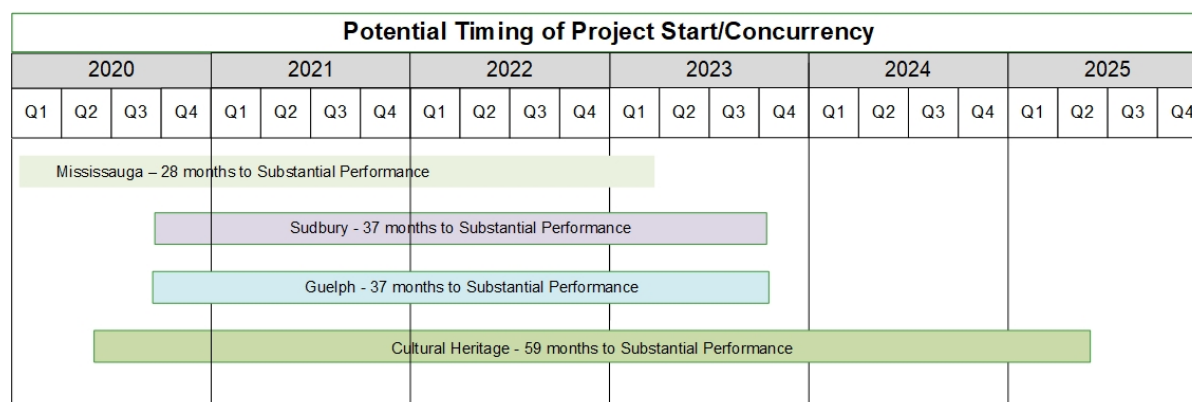


Figure 1: Potential Sub-Project start and concurrency.

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1.4 Project Implementation

1.4.1 Overview

The Project implementation strategy will optimize critical decision making in order to prioritize the design and interim approvals of sub-Projects, allowing construction of sub-Projects to start early and in a streamlined sequence.

To meet these priorities, the Design Team, the CM, DR, along with all Science Partners are expected to work continually in an interactive manner, progressively resolving issues. Building Information Modelling (BIM) will be central to the design and construction process, as will digital and physical mock-ups of key laboratory or building features, to ensure concurrence that the appropriate design and materials are selected for the facility.

The Design Team's overall mandate comprises a number of sub-Projects in different locations, each requiring targeted and specialized investigations and materials testing to inform the structural and seismic design, sustainability strategies, and scope for each design discipline.

The Consultant, as the design authority, is required to understand Science Partners' functional, operational and security requirements and incorporate these into comprehensive design solutions. Further, the Consultant is required to define component and system performance requirements then confirm and document their actual performance once built. To ensure an ongoing focus to comprehensive commissioning of sub-Projects, the Consultant's Services will include those of an independent expert who is specialized in laboratory commissioning. The Consultant's independent commissioning expert is required to, on an ongoing basis, coordinate Design Team disciplines and assemble progressively more detailed commissioning process' documentation, including but not limited to detailed operations and maintenance and energy budgets, 40-year life-cycle analyses, training requirements and actual Design Team led training of building and Science Partner's employees or suppliers to ensure they understand the operational and design intent.

On an ongoing basis, the CM will support the Design Team's budgeting, life-cycle analysis and provide CM led operations and maintenance training of building and Science Partner's employees or suppliers.

1.4.2 Delivery Methodology

PWGSC intends to use a construction management delivery method to concurrently deliver most if not all sub-Projects. The concurrent delivery of sub-Projects requires the Consultant to provide active, assertive, and ongoing project management of each Design Team discipline and constant coordination with the sub-Project Design Team.

The Project will combine Project Team integration and lean design and construction principles, promoting Project first thinking. A joint Project management team comprised of the DR, the Consultant and the CM will align and prioritize Project interests and objectives. There will be one Project management team who collectively will manage the scope of the work on a consensus basis.

A prioritized design approach using multiple, simultaneous Design Packages (DPs) prepared by the Design Team will be tendered by the CM. The CM will participate in meetings and workshops, provide bid-ability and constructability advice, define construction phasing, define the scope and sequencing DPs to the DR and Design Team, and establish and manage, to the approval of the DR, each sub-Project construction schedule and construction budget.

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The CM will provide an on-Site team for the duration of each sub-Project, whose services will be co-located with those of the Design Team, the DR, and when required the Science Partners. The CM and the Design Team's Site team are to have the authority, ability and capacity to immediately respond to evolving situations, daily, coordinating and integrating ongoing construction operations with the design production.

1.4.2.1 Delegated Design and Design Assist

To ensure clarity in the roles and responsibilities of the design process, with the participation and agreement of the CM and DR and as described in Project Brief section 10.2.1 – Design Management Planning, the Consultant is required to develop and update a delegated design Specification and design responsibility matrix. The Specification and matrix are to define the Design Team professional responsible for the design, review, and acceptance of certain components of scope that will be assigned to a design entity other than the Design Team, where the specialist design expertise resides with the manufacturer or supplier, such as designated mechanical, electrical, and architectural systems and components or structural analysis of load bearing components and connections, etc.

The CM will provide design assist services if and when requested by the DR.

1.4.3 Building Information Modelling

The BIM computing requirements necessary for this Contract are significant.

The Design Team and CM need to understand the information technology and multi-media equipment, and the specialized software required for BIM for this Contract, obtain said equipment and software, and plan and execute their collective and coordinated Services as detailed in the Project Brief, notably sections 10 – ADMINISTRATION and DESIGN MANAGEMENT SERVICES through 17 – POST-CONSTRUCTION SERVICES, inclusively.

BIM is an object-based digital representation of the physical and functional configuration, characteristics and attributes of a project. BIM supports an integrated process built around coordinated, reliable digital information about a project from design through construction and into operations. The output of this process is referred to as the Model or Models.

BIM requires the cooperation and collaboration of all stakeholders to be fully utilized and effective. To establish essential parameters and interoperability requirements, the Project Team must recognize that BIM is not simply a design method, a software package, or a 3D Model. Rather, BIM is a comprehensive methodology that integrates established, new, and emerging digital technologies to support the coordinated exchange of information from inception through to construction, commissioning, and operations of each sub-Project.

The Design Team is required to use the Model to capture all sub-Project scope facilitated by a common data environment for visualization, analysis and communication of sub-Project information for and between all stakeholders, including the Science Partners, the Design Team, the CM, the DR, and the property management operations team following Substantial Performance of each sub-Project.

The use of high-resolution scanning and photogrammetry, combined, will create a shared co-ordinate system to provide the metric information necessary to build the Model. The Model represents a shared data resource that will assist in Project decision-making and approval processes, as well as augment productivity, efficiency and quality of the end product delivery. Where available, the Design Team will be provided and is required to use and update the existing conditions Model. However, for most sub-

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Projects, the Consultant is required to develop a sub-Project-specific Model based on existing PWGSC or Science Partner information (CADD files, etc.), or on-Site surveys, or both.

The Design Team is required to update the Model as new investigations of the building and surrounding Site during the design and construction stages reveal greater detailed information about the base building construction.

Early in the design process, the Design Team is to confirm with the DR and Science Partners the interoperability and level of information required for Model Elements in the final, as-built Model. To facilitated the development of the as-built Model, the Design Team is required to incorporate submittals (i.e. shop drawings, etc.) provided by the CM or the CM's subcontractors and suppliers into the Model as they are approved. Likewise, as construction progresses, before and after concealment of each building assembly and Site element, the Design Team is required to complete laser scanning, photogrammetry, and incorporate the point-cloud data and photogrammetry to complete the as-built Model, as it is built.

1.4.3.1 Copyright

The author of a Model Element retains copyright to the Model Element unless otherwise stated.

The author of a Model Element must grant a non-exclusive license to the Project Team to use the Model Element and associated content within the scope established by the authorized uses and Model Elements table as defined in the Project Brief section 10.2.3 – BIM Execution Plan, for the design and construction of the Project and for Canada's operations following the issuance of the certificate of Substantial Performance.

1.4.3.2 Model Ownership

Notwithstanding the copyright of Model Elements, PWGSC has, without exception, the ownership of and the right to use all Models, CAD files, and facility/operations and maintenance data developed for sub-Projects. Further, PWGSC will have access to these assets at any time throughout the Contract.

1.4.4 Design Coordination

Successful integration of laboratory design requirements, security, and IT infrastructure with the base building and versatile laboratory casework is one of the overarching requirements of the Project and its sub-Projects. The Consultant has the ongoing role of managing all members of the Design Team to integrate and coordinate the design of each sub-Project to ensure a high-level of systems and design integration. The CM has an ongoing role to support the Design Team through design review and Cost, time and risk analysis.

The Design Team is required to use a sub-Project-specific Model for visualization of concepts, analysis and integration of design, and the creation of a repository of building data. The Design Team will use the Model to:

- a) Capture lighting, air flow, acoustics and seismic resistance studies among other disciplines;
- b) Support analysis of building performance especially against sustainability and energy criteria;
- c) Coordinate Modeled content across disciplines, specialties and other stakeholder input, identifying design and constructability issues proactively;

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- d) Identify changes between current and previous versions in order that iterative reviews may be focused on the changes;
- e) Document the design of the sub-Project and develop Model-based, coordinated DPs for the CM's tendering;
- f) Facilitate design reviews and approvals, including validation that functional and technical program requirements have been achieved;
- g) Capture building data that serves a direct sub-Project or life-cycle purpose; and
- h) Allow the CM to undertake constructability and work sequencing analysis.

1.4.5 Investigations

Immediately following Contract award, the Design Team along with the DR and CM are required to, for each sub-Project, establish a detailed strategy and program of investigations, whether the subject facility is occupied or not.

The Design Team is required to prepare a preliminary investigation plan in coordination with the DR and the CM to initiate preliminary Site inspections. The purpose of investigations is to gather all information required by the Design Team to advance the design, including:

- a) Confirming existing building and Site conditions, including building envelope condition;
- b) Analyzing existing building structure and materials for seismic reinforcement requirements;
- c) Test and determine the content, type, location and approximate quantity of designated substances located in the building's interior and exterior, validating existing designated substances surveys, if any;
- d) As applicable to the sub-Project, confirming the geology of the Site to provide information in the development of seismic and excavation requirements;
- e) Completing legal, topographic, building (floor plate, elevations, structure, etc.) surveys; and
- f) Other investigations the Consultant recommends as necessary to prepare and advance a coordinated design.

The resulting analysis and report from these investigations will provide information to the Project Team for the development and preparation of design options and DPs.

As part of the investigation program and to support ongoing materials testing and inspections over the life of the sub-Project, the Design Team is required to support the CM's development and ongoing update of a material testing and inspection responsibilities matrix, described in paragraph b) ii) of Project Brief section 10.2.1 – Design Management Planning, which is to identify the component or system requiring testing or inspection, and indicate if material testing or inspection is a joint activity involving the Design Team and CM, or if a third party is necessary, and when said activities are to occur (i.e. conditions, if any).

The Design Team is required to supervise the implementation of investigation and testing work as defined in the materials testing and inspections responsibilities matrix.

To facilitate the investigations in an expedient manner the CM will procure the services of sub-trades and suppliers to complete destructive testing and materials analysis (e.g. steel and concrete testing,

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hazardous materials analysis, etc.) once the CM's procurement strategy and process plan is approved by the DR.

To ensure design accountability and overall responsibility, the Consultant is required to conduct comprehensive legal surveys in the building and Site during investigations. Information gathered is to be incorporated by the Design Team into the Model at the pre-design analysis stage.

1.4.6 Functional Program

In order to advance projects PWGSC may have the functional program developed by another consultant for some or all projects. Should this be the case, the Design Team must review, understand and incorporate the work done.

The Design Team and in particular the Laboratory Design Specialist Sub-Consultant are required to Work with Science Partners to develop and define their functional, operational, and security requirements for each sub-Project. In some cases, outline requirements of the Science Partners may be available. As time progresses, standardized laboratory design guidelines, requirements, and topologies will be available from PWGSC's advocate consultant team.

The Design Team is to prepare a functional program for each sub-Project based on requirements gathered from the Science Partners and PWGSC's advocate consultant throughout the Schematic Design and Design Development stages.

Approximately 8-12 consultative functional programming workshops with Science Partner user groups are required per sub-Project. Specific requirements will be identified in the sub-Project TA. Where appropriate, consolidate common requirements together. Develop a comprehensive functional programming report for each sub-Project. The Design Team, in close collaboration with the DR and CM, is to identify and track key programmatic decisions necessary to advance the design of each sub-Project.

The final functional program and Schematic Design (SD) are interrelated processes, each complementing and updating each other, but most importantly reflecting spatial relationship and requirements for versatile laboratory use, defining new or modified building components and systems. The final functional program is required at the 100% SD for formal approval by the Science Partners.

Minor adjustments to the final functional program will occur throughout the Design Development (DD) stage and during construction. The Consultant is required to track these changes, to record programmatic alterations, to ensure the proper commissioning of the building and to assess performance requirements accurately. Accordingly, the Design Team is required to update the functional program on an on-going basis up to Project Completion.

The CM will have an ongoing requirement to assess the functional program modifications and their impact to the Construction Cost Estimate and Project schedule.

After 100% SD approval, significant programmatic changes, if any, will require the approval by LC's senior management, and possibly the Contracting Authority, prior to proceeding with any change.

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1.4.7 Schematic Design

SD development requires a significant level of coordinated effort that involves both the entire Design Team and the CM. The data collected through investigative work and the functional program will inform design options for each sub-Project.

To ensure design accountability and overall responsibility, the Consultant is required to conduct comprehensive legal surveys in the building and on Site as the demolition, abatement and Site construction proceeds. Information gathered is to be incorporated by the Design Team into the Model and the SD.

1.4.7.1 50% Schematic Design

The 50% SD approval is to encompass the preferred integrated option: finalized core laboratory program, interior circulation, and structural/seismic decisions. To assess potential changes to the overall building massing or configuration, including architectural impacts, the structural/seismic design options are to be 90% SD at the time of overall 50% SD submission.

Site and building design including exterior lighting, security and circulation, universal design for accessibility, sustainability and “green” requirements are integral elements of all design options. The comparison of one option versus another is to consider the potential building massing, or dismantling, or building reconfiguration. The implications of these scope elements will have a significant impact on the CM’s Construction Cost Estimate and Project schedule.

Value engineering (VE) processes, including monthly Project control workshops, will be undertaken by the CM, the Design Team and the DR to determine the Cost-benefit of each option. Numerous workshops focused on individual subjects will provide the Design Team and the CM essential information to refine and integrate system design concepts, construction estimates, and construction activity durations. The expected outcome of the VE process is to maximize sub-Project value by optimizing the design to remove unnecessary scope, while improving functionality, quality, and sustainability.

Per sub-Project, as described in Project Brief sections 10.1.1.4 – Submission Meetings/Presentations, 10.2.2.5 – Presentations and Appendix D – PROCESS MAPS, the Consultant is required to give formal presentations of their 50% SD submission to the LC Office, the Science Partners, and the LC Program Board, making recommendations for structural design options and key programmatic decisions necessary to advance design options.

1.4.7.2 100% Schematic Design

Direction received after the 50% SD submission and the results of subject matter workshops will provide final direction for the 100% SD submission. Information from on-going investigations is to be incorporated by the Design Team into the Model and the SD development. Ongoing analysis and feedback from the CM are essential to ensure feasibility of design options.

Per sub-Project, as described in Project Brief sections 10.1.1.4 – Submission Meetings/Presentations, 10.2.2.5 – Presentations and Appendix D – PROCESS MAPS, the Consultant is required to give formal

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presentations of their 100% SD submission to the LC Office, the Science Partners, and the LC Program Board, making recommendations for overall design options. The DR may require the Consultant to provide additional, optional presentations for other approval bodies.

1.4.8 Design Development

The DD of the approved SD allows the design advancement of base building and Site systems while more intricate aspects of the laboratory design and office fit-up are developed, all being presented for approval in a two-step process, similar to the two-step SD approval processes.

To ensure design accountability and overall responsibility, the Consultant is required to conduct comprehensive legal surveys in the building and on Site as the demolition, abatement and Site construction proceeds. Information gathered is to be incorporated by the Design Team into the Model and the DD development.

1.4.8.1 50% Design Development

The overall sub-Project design is to be sufficiently advanced by the Design Team at the 50% DD stage to start designing critical base building DPs. Building windows, elevators, mechanical and electrical systems and, as needed other base building DPs, as prioritized by the CM, are to commence immediately after the 50% DD submission and related subject matter workshops.

Per sub-Project, as described earlier for the 50%SD, the Design Team is required to give formal presentations of their 50% DD submission making recommendations for advancement of the design.

Base building DPs prioritized by the CM are to incorporate comments or direction from the 50% DD submission processes, which are the same as the 50% SD approval processes.

1.4.8.2 100% Design Development

The Design Team is required to detail the sub-Project design to fully reflect all aspects of the approved functional program, adjusted as required to reflect building limitations or required minor function program changes.

Per sub-Project, as described earlier for the 100%SD, the Design Team is required to give formal presentations of their 100% DD submission making recommendations for advancement of the design

Base building DPs prioritized by the CM are to incorporate comments or direction from the 100% DD approval processes.

1.4.9 Casework and Equipment Integration

Laboratory casework schematic and design development (interior design) activities will follow the progression of the building program definition and design and approvals to ensure full design coordination.

The Design Team is required to fully coordinate and integrate into the Model all architectural and building systems and information technology (IT) with laboratory casework and furniture, fixtures and

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equipment (FF&E) throughout the design stages of the Contract. The CM will provide ongoing review and analysis of the proposed design solutions, making recommendations for alternative products, materials, construction methods, and construction sequencing.

The Design Team is to actively monitor construction advancement. Design Team feedback about the laboratory casework and IT connectivity integration into the built work is required to identify necessary design and /or construction adjustments prior to the actual construction of the work. The Design Team, and to a lesser extent the CM, are to take a leading role to facilitate the timing of on-Site reviews and the feedback process. Timely integration of minor design changes, before advancing construction to the point where it must be rebuilt, is essential.

Significant schedule reduction opportunities are possible by sequencing IT connectivity activities in sections of buildings where fit-up has progressed sufficiently to meet connectivity installation requirements (criteria). Successfully capitalizing on schedule opportunities requires a clear understanding of connectivity infrastructure fit up and installation requirements, temporary partitions or requirements for dust isolation and control, and incorporation of these interdependencies into the CM's construction schedule. The Design Team is required to proactively work with the CM to ensure the CM's understanding of connectivity installation criteria to minimize overall schedule duration.

All laboratory casework, office related FF&E, and IT equipment deliveries are to be carefully planned and delivered in a sequence that fully integrates with ongoing construction operations. The Design Team, with the input of the CM, is required to define delivery requirements and timing within DPs for laboratory casework, office related FF&E, and IT connectivity and equipment.

The Design Team is required to coordinate with the DR, Science Partners and the CM, to schedule suitable dates and times for the delivery of scientific equipment provided by Science Partners to their laboratories.

The CM is required to schedule, coordinate, and supervise the delivery and installation of laboratory casework and FF&E items. The Design Team will validate and confirm the installation of items.

1.4.10 Design Packages and Tendering Strategy

The CM will take a lead role to identify all DP submissions and their timing in order for the Design Team to prioritize their design effort. Prior to commencing Design Package production, the CM in consultation with the Design Team and DR, will define the level (extent) of completion of each DP deliverable which the Design Team is required to design.

PWGSC understands the impact of scope changes on the Design Team's ability to finalize complete and coordinated DPs. Accordingly, if the DR approves scope change after the initial 50% DP submission the Design Team is required to inform the DR and CM of the impact of said change on DP production. The CM will inform the DR and Design Team of the impact of said change on the Construction Cost Estimate and the Project schedule. With the agreement of the DR, the Design Team is required to incorporate the approved scope change into DP addenda where possible or address the change as a change order after DP award.

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Notwithstanding the basic strategy of acceleration and concurrent investigation, design, approval and construction per sub-Project outlined in the proceeding sections, the CM will mobilize at the Site(s) in advance of fully completed DPs.

The CM will prequalify a pool of trades to implement the trade-specific work required for each sub-Project. The Design Team, in consultation with the DR and the CM, will support the CM to define pre-qualification criteria for sub-trades and suppliers.

Tendering to construction trades or suppliers is to normally start after delivery of 100% complete DPs. In some cases, to advance starting Critical Path activities, the CM may tender 90% DPs and obtain competitive unit rates to complete the DP work.

At minimum, each sub-Project could require up to 20 DPs, excluding laboratory casework and FF&E DPs. The actual number of DPs are the CM's responsibility to determine, in consultation with the Consultant and DR. Laboratory casework and FF&E DPs are to reflect the Science Partners' requirements and, to the extent possible, consolidate similar goods into larger solicitations of similar content. The list below is a preliminary summary of DPs, which could be expanded or condensed by the CM:

- a) Site preparation;
- b) Interior protection, demolition and abatement;
- c) Excavation and backfill;
- d) Exterior site work/infrastructure and landscaping;
- e) Exterior walls and foundations;
- f) Structural including concrete/structural steel/rebar and wire mesh;
- g) Roofing;
- h) Windows;
- i) Conveying systems;
- j) Mechanical, including mechanical controls and sub-metering;
- k) Electrical, including electrical controls and sub-metering;
- l) Pre-purchase of mechanical and electrical equipment;
- m) Architectural and specialized laboratory lighting;
- n) Frames and doors;
- o) Door hardware;
- p) Interior finishes;
- q) Millwork;
- r) Furniture, fixtures and equipment;
- s) Laboratory casework; and
- t) Food services.

To optimize the overall Project Schedule, the CM may subdivide DPs into individual tender packages, or tender and award DPs to multiple subcontractors of the same trade.

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1.4.11 Work Restrictions Plan

The CM will, in collaboration with the Design Team and the DR, develop a work-restrictions plan specific to each sub-Project. The purpose of this plan is to identify the restrictions, constraints and requirements that will be imposed on the construction in order that stakeholder approval is received before start of construction. Once stakeholder approval is received, the CM and the Design Team are to work together to incorporate the approved requirements into the DPs. The CM will inform its subcontractors and suppliers of the constraints and requirements, including those that impose a Cost and schedule impact.

The constraints and requirements within the CM's approved work restrictions plan will include, but are not limited to:

- a) Environmental control;
- b) Commissioning and seasonal commissioning;
- c) Scheduling restrictions;
- d) Sequence of work;
- e) Construction safety;
- f) Hours of work;
- g) Delivery of equipment/materials;
- h) Waste disposal;
- i) Air monitoring;
- j) Scaffolding;
- k) Temporary services;
- l) Noise;
- m) Welding;
- n) Security clearances, security of information and physical security of personnel, equipment and the work;
- o) Shutdown of services;
- p) Storage;
- q) Parking;
- r) Access restrictions to site and building(s) during pre-construction, during construction, and post-construction;
- s) Fire watch;
- t) Site plan showing limits of work and staging areas;
- u) Washrooms and lunchrooms; and
- v) Any other element related to the implementation of the work, etc.

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The approved work restrictions plan has a direct bearing on the development of the CM's front-end tender package and the Design Team's Division 1 specification. The CM, DR and the Design Team are to discuss and agree on the exact delineation of the Design Team's Division 1 specification versus the CM's front-end tender package at the start of the design process.

1.4.12 Local Office

While not essential, the Design Team is encouraged to have an office in the National Capital Region (NCR) and / or in the Greater Toronto Area (GTA) to provide all administrative and management Services required in this Contract. Refer to Project Brief section 10.1 – Administration Services for details concerning requirements for meetings and workshops.

Further, the Design Team is required to have a local office or be able to visit the Place of the Work for each sub-Project, daily if required. The Design Team is required to provide the Site Services described in Project Brief section 16 – SITE SERVICES, at the Place of the Work of each sub-Project.

Regardless of office location, the Design Team is required to provide their own cell phones, all video-conferencing and computing equipment and hardware and software, including hardware and software upgrades for their equipment, telecommunications data and bandwidth to support cell phones, computers, Model development, and information transfer, throughout the duration of the Contract, to support daily operations within their office, to/from the NCA and GTA, and to/from the sub-Project Site.

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2 BACKGROUND

The LC vision involves renewing federal science infrastructure as Cost-effectively as possible, and maximizing its overall effectiveness, sustainability and utility for Canadian federal scientists and their collaboration partners. Modern, effective facilities are required to support federal scientists in fulfilling their mandates and objectives.

PWGSC is working closely with federal Science Partners, technology champions, and Shared Services Canada (SSC), to develop state-of-the-art science infrastructure solutions that meet today's science program needs and can be quickly adapted and expanded to support future programs and priorities.

Currently, the federal government operates over two million square meters of laboratory and science-related assets in approximately 1,450 facilities at 175 sites across Canada. There are more than 125 science and technology labs in the National Capital Area, with facilities at multiple sites in both urban and isolated locations.

Within this context, LC emerged as a joint initiative led by the Minister of Science and the Minister of PWGSC, together with leaders from federal science-based departments and agencies, to meet evolving science infrastructure needs on an enterprise-wide basis.

LC proposes the consolidation and modernization of federal science facilities over a 25-year period, through a series of incremental plans that will serve to increase science collaboration, provide flexible and extensible building envelopes, and internal workspaces that reduce overall operating Costs and improve operating efficiency.

LC Office was established to facilitate the implementation of LC. Its responsibilities include planning for the delivery, operations and integration of LC-related infrastructure and science programming.

The role of LC Office in real property operations is to:

- Undertake portfolio-level planning (including routine investment cycle planning) as future investments are considered;
- Develop and oversee real property service performance standards in partnership with science programs;
- Develop and oversee standardized frameworks for all LC Science Facilities to address, for example, financial and revenue models, occupancy agreements, and life cycle management approaches; and
- Capture and disseminate lessons learned from early experiences of LC Science Facilities and collaborative laboratories in another jurisdiction to:
 - Inform future investment decisions for other LC Science Facilities and infrastructure investments; and
 - Create service performance standards and additional operating guidelines and policy, where needed, to support the portfolio of LC Science Facilities.

2.1 Science Facilities - General

LC aims to remove barriers to collaboration and shift from purpose-built facilities for single science programs to flexible, multi-departmental, multi-program facilities that integrate science capabilities.

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Science Facility is the comprehensive term used to describe the real property and infrastructure delivered under LC in its entirety, inclusive of base building, fit-up and surrounding property. LC Science Facilities will enable collaboration through, for example:

- Flexible, modular facility design that includes collaboration space;
- Strategic approaches to operations, maintenance and lifecycle building stewardship; and
- A governance framework that includes active engagement of Science Partners.

Science Facilities will be specialized, state-of-the-art science infrastructure assets with complex operational environments. As such, a number of existing regulatory requirements and standard operating procedures will apply to Science Partners. Science Partners, their science programs and their employees will be occupying LC Science Facilities. A group of science programs that share the same Science Facility are called a Science Cluster.

The development of modular, flexible laboratory infrastructure for multiple occupancies requires a need for allocating operating expenses for each Science Facility. Methods for attributing operating Costs will make use of technology and automation. Measuring devices in building systems will be required and are to be considered during the design phase of each Science Facility. It is envisioned that each room or space in a Science Facility would be equipped with sub-metering to ensure the transparent and accurate measurement of occupant use. This functionality would make Science Facilities the most adaptable and flexible to changing uses of space. The way space is used by Science Partners today may be different from how they are used in the future; therefore, building services and utilities must be attributed to how space is used by occupants.

2.1.1 Guiding Principles

LC investments are to reflect the following guiding principles:

- a) Scientific Innovation - science infrastructure will be designed to enhance the delivery of scientific programs, and promote economic growth and public good;
- b) Collaboration - facility designs will include collaborative spaces and IT-enabled connectivity to maximize program effectiveness;
- c) Functionality and Modernization - facilities will be world-class and designed to comply with leading edge, functional, flexible, collaborative and IM/IT-enabled standards;
- d) Environmental Sustainability - facilities will incorporate innovative technology to meet environmental sustainability goals; and
- e) Universal Design for Accessibility - science infrastructure, including sites, buildings, and relevant facilities and amenities will be designed so that they can be approached, entered, and used by all people, including those with physical, sensory or cognitive disabilities. Further, the Accessible Canada Act, commits Canada to promoting and protecting the rights of persons with disabilities and enabling their full participation in society. Ratification of the United Nations Convention on the Rights of Persons with Disabilities in 2006 underscores the Government of Canada's strong commitment to this goal. The May 2017 report Accessible Canada: Creating new federal accessibility legislation, highlights the fundamental principle of "an inclusive society where all Canadians have an equal opportunity to succeed, and are equal participants.";

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- f) Optimization of Economic and Enterprise Value - facilities will be designed and managed to generate overall economic and public benefits, including both facilities and IM/IT capabilities, serving as an effective platform for evidence-based policy decision-making and science.

2.1.2 Operational Principles

The operational principles set out in for the LC are based upon the assumption that:

- a) Each Science Facility will be designed to meet the science needs of the occupants of that facility while building-in flexibility to adjust over time to changing requirements or occupants. As a principle, the use of space and concept of operations will influence design;
- b) Each Science Facility will be sustainably managed throughout its lifecycle and will be fully funded for operations, maintenance and recapitalization solely through cost recovery from the occupants of each facility;
- c) Each Science Facility will be funded, managed, monitored and reported on as a discrete entity, within a consistent LC framework and overarching portfolio perspective; and
- d) The LC Office, the project management office for the LC initiative, will establish various provisions to help ensure commonality and consistency across LC Science Facilities, where appropriate. This could include, for example, common approaches to financial management, performance measurement and reporting, and achieving operational objectives (e.g., service performance standards, maximizing space utilization in accordance with established and agreed to standards, sustainable and lifecycle approaches to operations and maintenance, and streamlined delivery).

2.1.3 Equipment Management Principles

Equipment management will be an opportunity for achieving LC's mandate to foster collaboration. The draft principles that guide equipment management for Science Facilities include:

- a) There will be one custodian for each piece of equipment in a Science Facility;
- b) LC will use a consistent framework for determining the delineation between base building and equipment;
- c) In the spirit of collaboration, data generated by the use of equipment should be accessible to other occupants through multiple networks to ensure the appropriate privacy and protection of information;
- d) Equipment in Science Facilities should be significantly integrated with IM/IT infrastructure and services, such as "cloud first" computing;
- e) Custodians of equipment that has the following features is required to consult with the custodian of the Science Facility and PWGSC during the design phase of each Science Facility, to ensure that equipment does not negatively affect the base building such that:
 - i. It requires changes to the building design and/or integrity for its installation; or
 - ii. Is not removable without significant impacts to the base building (e.g., cold rooms); or
 - iii. Forms part of the base building function (e.g., fume hoods perform an HVAC function); and

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- f) Shared equipment will be monitored by the custodian of the equipment. The operation and maintenance of standard equipment will be provided by the custodian and will be subject to common asset management standards and practices. However, the operations and maintenance of complex equipment may be provided by the custodian, a Science Partner, or third party.

2.1.4 Security Principles

The principles that will guide security for Science Facilities include:

- a) Security will be managed in accordance with the requirements of the Treasury Board *Policy on Government Security*, including clearly allocating roles and responsibilities among the custodian and occupants;
- b) Security will be assessed, implemented and managed in a coordinated, integrated approach to ensure all requirements are met, while streamlining administration and aiming for common access and openness to the appropriate degree;
- c) Base building security will be assessed, implemented and managed by the custodian according to a threat and risk assessment;
- d) Personnel, IM/IT and other security required by occupants will be assessed in an integrated threat and risk assessment; and
- e) Each Science Facility will have a security office that will:
 - i. maintain security status of all personnel in the facility (e.g., federal security clearance, training). However, Science Partners will continue to be responsible for employees' documentation, identification and updating information;
 - ii. manage program facility zones badges, fingerprint and code access corresponding to the security status of individuals; and
 - iii. have the ability to control an active directory of personnel in the facility in the event of an emergency or the need to change the security access of any site occupant.

2.1.5 Science Facility Exclusions

The following items are excluded from the scope and Cost of a Science Facility:

- a) Science Partners' business continuity operations;
- b) Moveable and benchtop equipment and calibration; and
- c) Computers, additional moving and furniture Costs above a pre-determined allowance.

2.2 Mississauga Science Facility

The Mississauga Science Facility of LC within the TerraCanada Science Cluster is intended to accelerate discovery and development of clean energy materials to be achieved through high performance computing supporting artificial intelligence-driven and robotic platforms. The Mississauga project directly supports the "innovations for a low carbon economy" theme of TerraCanada.

The National Research Council's Advanced Materials Manufacturing Centre is currently under construction in Mississauga. NRC's two-storey, approximately 4,400 m² laboratory and office building

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will support their Security and Disruptive Technologies program. The second floor is being constructed as a shell space to accommodate future requirements. The current sustainability goal for the building is 3 Green Globes. Space for mechanical and electrical requirements for the second floor has been allowed in the penthouse.

With the addition of the LC project to the building program, this Science Facility will accommodate a new Science Partner, Natural Resources Canada. An expanded facility will include a combination of laboratories, lab support spaces, offices, and service areas for use by NRC and NRCan, and possibly other future Science Partners to be a focal point for development of high-performance advanced materials manufacturing. The proximity of this Science Facility and the Xerox Research Center of Canada will enable collaboration in a one-stop design and production of new advanced materials in sufficient quantity for pilot-scale industrial evaluation, process refinement, and in some cases, low-volume commercialization.

Additional space is required to accommodate the LC project which is dependent on NRC's and NRCan's final programmatic requirements.

It is uncertain if the NRC will occupy the building before the work of this sub-Project is underway. Therefore, the extent and orientation of building expansion and construction implementation strategy requires detailed analysis and NRC's and NRCan's advance approval.



Figure 2: Proposed design concept for NCRs Advanced Materials Manufacturing Centre, Mississauga.

2.3 Guelph Science Facility

This sub-Project, located in Guelph, Ontario, will focus on developing novel products, methods and data to better detect, identify, and control risks related to human health, food safety, consumer protection, and domestic and imported products, primarily for the Canadian Food and Inspection Agency (CFIA).

It is envisioned that the Regulatory and Security Science cluster will work closely with the TerraCanada cluster focused on innovation science. There are natural science synergies between the two clusters related to climate change, big data, high performance computing, and life sciences.

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A new, 3, 283m² world-class Science Facility is envisioned. This purpose-built building on the Guelph University campus would accommodate CFIA secure, mission-critical science programs and specialized infrastructure requirements. The facility would provide horizontal efficiencies by co-locating a critical mass of federal government science expertise in a university research setting, providing infrastructure designed to optimize collaboration.



Figure 3: Proposed Regulatory and Security Science Cluster, Guelph.

2.4 Sudbury Science Facility

Under sustainable lands and resource development TerraCanada's science theme, two keys Science Partners, Laurentian University and NRCan's CanmetMINING, will form one centre of expertise to lead in the digital transformation of the mining industry.

This Project, located in Sudbury, Ontario, will focus on energy efficiency and enhanced productivity through transformative equipment and the application of data-driven technologies, artificial intelligence, machine learning, real-time monitoring of ground integrity, and the use of clean energy alternatives, etc. to support digital mining transformation.

Science programs will include digital mining, deep mining, energy saving, and biomining to develop new skills supporting mining digitalization in this new approximately 2,000m² facility. Project implementation details are still in development.

2.5 Cultural Heritage Science Facility

The Science Facility proposed for the National Capital Region is referred to as the Cultural Heritage (CH) Science Cluster. It is intended to serve as a LC pilot to determine how Science Partners can best approach the development of a common facility, and the long-term internal policies needed to guide the sharing and management of space and equipment.

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The CH Science Facility may be located at 1800 Walkley Road, Ottawa, which is a two-storey Crown owned building built in 1995. The Parks Canada Agency (PCA) has purpose-built conservation laboratories in the building that are in good condition. PCA shares the building with Health Canada's Product Safety Laboratory, which occupies approximately 40% of the building. Health Canada is scheduled to vacate their portion of the building in the coming years, which inadvertently weakens the viability of PCA's continued occupancy, although the situation may change.

The Canadian Conservation Institute (CCI) and the Canada Heritage Information Network (CHIN) are located in Ottawa at 1030 Innes Road, a 46-year old building leased by CCI. The building lease expires in 2022, although CCI has the right to extend the lease for an additional three years if necessary.

The CCI, CHIN and PCA would benefit from being located in one Science Facility as there are many similarities in the techniques and instrumentation they use. Their scientists would benefit from exposure to new technologies and techniques as these Science Partners would be able to use and share their unique capabilities in one Science Facility, including access to and use of laboratories for treating oversized objects and fumigation equipment. Creating this Science Cluster will support the national collection institutions, such as the Museum of History, Museum of Nature, Museum of Science and Technology, etc.

Adapting and modernizing the 1800 Walkley Road building to meet the shared needs of the PCA, CCI and CHIN Science Partners would support their science programs over the long-term. The estimated space required for CCI/CHIN is about 6,500m², and for PCA is about 7,000 m².

However, a new facility may be considered to mitigate risks associated with Health Canada's occupancy and the availability of swing space. Feasibility assessments are underway and, in addition to 1800 Walkley Road, consideration is being given a new facility in Ottawa or in Gatineau, Québec. If Gatineau is selected then the CH sub-Project will not be delivered through this Contract.

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3 OBJECTIVES

3.1 Collaborative Project Delivery

- a) Develop a common vision for the Project through a collaborative delivery approach;
- b) Deliver the Project with integrated design and construction solutions to a high standard of design; and
- c) Provide balanced solutions to all Project elements and challenges.

3.2 Flexible and Adaptable Design

- a) Deliver flexible and adaptable, state-of-the-art laboratory design solutions to accommodate evolution of research and functional needs and technologies involved in scientific procedures over the life of the facility, with minimal disruption to ongoing programs;
- b) Design solutions are to promote modularity of space use, flexibility of laboratory furnishings, easily reconfigurable utility systems, and ensure future expandability as part of the Site's master plan; and
- c) Design and build Science Facilities based on a 40-year life-cycle.

3.3 Sustainable Development

- a) Deliver the Project using integrated design principles addressing concepts of sustainable development support the targeting of net-zero-energy, carbon-neutral ready buildings during design stages; and
- b) Include comprehensive consideration of sustainability attributes with environmental factors such as reduction of energy, water, and waste; affordability over the complete facility lifecycle.

3.4 Universal Design for Accessibility

- a) Deliver Science Facilities, including their Sites and amenities, so they can be approached, entered, and used by all people, including those with physical, sensory or cognitive disabilities.

3.5 Project Control

- a) Deliver the Project within the limits of its authorized funding;
- b) Organize, prioritize and deliver the Project within the established time limits, permitting the full use and function as intended, proactively prioritizing Work and managing resources to achieve the prescribed milestones; and
- c) Maximize opportunities and minimize risk while substantiating the viability and Cost and time benefits of design and construction choices.

3.6 Quality

- a) Design and deliver sub-Projects with appealing world-class designs to attract global talent, collaboration with academia, industry, etc.; and

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- b) Ensure the technical performance of all components and systems be tested against the intended design performance and the design life-cycle requirements.

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4 SCOPE

Working in collaboration with the DR and the CM, the Design Team is required to define the scope of sub-Projects using value for money principles, to the approval of the DR, balancing the need for capital investment while maintaining asset life cycle, always considering the perspective of Canadians at large.

The design and work of each sub-Project is required to conform to the 2015 National Building Code of Canada. Although the federal government is not subject to jurisdictions at other levels of government, voluntary compliance with the requirements of provincial and municipal authorities is a requirement of the Contract, unless otherwise directed by the DR. In areas of conflict between authorities the federal authority prevails. In areas of conflict between codes, standards and regulations apply the most rigid requirement.

In planning and designing the work of the Project and the specific scope for each Science Facility, the Consultant is to consider common Project scope elements, which include: investigations; abatement, demolition and protection; temporary work; accessibility requirements; security requirements; and operating requirements.

4.1 Investigations

The Design Team, along with the DR and CM will establish a building-specific strategy and program of necessary investigations required for each sub-Project. The purpose of investigation work is to gather all information required by the Design Team to advance the design, reduce Project risk, and to:

- a) Confirm existing building information, its structure, materials, mechanical, electrical and control systems, and surrounding Site conditions;
- b) Test and determine the content, type, location, and approximate quantity of designated substances located in the building's interior, exterior and subsurface, validating the existing designated substances survey;
- c) Confirm Site and building access requirements and protocols, and use restrictions and constraints;
- d) For new buildings, confirm the geologic and environmental conditions of the Site to provide information in the development of Project and excavation requirements;
- e) Complete legal and topographic surveys; and
- f) Undertake other investigations as necessary, including but not limited to Species-at-Risk studies.

Investigation work will typically be ongoing concurrent with the development of the design and Design Packages. The Design Team is required to prepare an inspection plan in coordination with the DR and CM. The CM will carry out investigations under the supervision of the Design Team discipline requiring the investigation.

4.2 Abatement, Demolition, and Protection

Comprehensive site investigation by the Design Team is required to validate the content, type, location and quantity of designated substances located in each building's interior, exterior and the site.

The resulting gap analysis and report from these investigations, along with the seismic, structural, physical security and functional programming requirements will dictate the degree and scope of

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abatement and demolition. Hazardous materials are required to be abated typically during off-hours, including when invasive investigation work is required.

The Design Team is required to design protection, monitoring and temporary systems for building elements that will remain in situ during construction.

4.3 Temporary Work

Temporary work requirements are to be included in DP documentation. These requirements include interim measures (activities) to modify the temporary work in the transitional periods between DPs or as necessary to ensure the safety and security of the work and the Project Site(s). Elements of temporary work include, but are not limited to:

- a) Temporary protection installation, Monitoring, adjustments and removals as they apply to each building component and system;
- b) Heat, ventilation and humidity with controls;
- c) Protection measures and structural bracing in phased sequence that prioritizes activities to meet the sequence of the work as determined by the CM;
- d) Fire protection to support construction operations;
- e) Maintaining operational capacity for required civil/municipal, mechanical, electrical and life safety systems; including lighting, security, emergency power for heating, lighting, ventilation, fire protection, lightning protection, life safety systems, and exterior services; and
- f) Architectural separation (physical and dust) and structural bracing, underpinning, and supports, including implementation sequence instructions.

The CM will design, install, and maintain all scaffolding necessary for the Project according to building structure and envelope load limits established by the Consultant.

4.4 Universal Design for Accessibility Requirements

The accessibility scope of sub-Project includes an integrated approach of asset stewardship and public use. PWGSC is committed to making its facilities accessible to persons with disabilities. The principal governing regulations, policies and standards are: the Accessibly Canada Act, the Canada Occupational Health and Safety Regulations (COHS), Treasury Board's Policy on the Management of Real Property, Treasury Board's Accessibility Standard for Real Property, the Accessible Design for the Built Environment (Canadian Standards Association (CAN/CSA B651-18 and its supplements)) and the National Building Code of Canada (NBCC).

If it is not possible to integrate accessibility standards in the design the Consultant is to consult with the DR and CM in advance of making such decisions, ensuring the proposed intervention meets the intent of the regulations or provides an alternate solution acceptable to the DR.

4.5 Security Requirements

Security will supplement each Science Facility's functionality, without impeding its operations or impacting the LC guiding or operational principles. Security will be considered holistic for each Science Facility and applied through a layered approach.

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In conjunction with the physical security provisions designed and delivered as part of sub-Projects, design solutions are to support physical security processes and procedures and promote a secure environment. The design will consider the principles of crime prevention through environmental design and support the secure isolation/protection of laboratory systems and processes. The Consultant's design for the security system, physical security elements and other related security features for the base building, laboratory and office fit-up and exterior landscape is to reflect Science Partner requirements for physical, employee and information management protection.

4.6 Operating Requirements

With the support of the CM, the operating requirements for each Science Facility are to be developed and submitted as a separate report accompanying Schematic Design and Design Development submissions. Operating requirements are to be defined by each design discipline and summarized into a comprehensive property management framework including, but not limited to:

- a) Annualized Costs for each utility;
- b) All maintenance contract requirements and projected annual Costs for:
 - i. All interior and exterior mechanical and electrical components and systems, and all control systems;
 - ii. Landscape maintenance by season;
 - iii. Interior and exterior building envelope maintenance (windows, roofing, doors, etc.);
 - iv. Daily housekeeping and janitorial;
 - v. Specialized laboratory cleaning;
 - vi. Loading dock equipment;
 - vii. Waste management and removal;
 - viii. Food services;
 - ix. Security system, security staffing, and as applicable remote supervision; and
 - x. For each identified maintenance contract, maintenance frequency and standards for reliable facility operations;
- c) Science Partner staff requirements (number, type, budget Cost, etc.);
- d) With the input of the DR and municipal officials, annual property taxes.

Undertake and complete life-cycle Cost analysis using criteria, information and software acceptable to the DR. Integrate operating requirements and their annualized Costs with projected life-cycle Cost of systems replacement (HVAC, fume hoods, roofing, etc.) to inform Science Partners of their overall Science Facility operating requirements and Costs.

4.7 Science Facilities

4.7.1 Mississauga

The Mississauga Science Facility requirements are still in development and will be clarified once Science Partners and the LC executive have approved the program scope.

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The basic scope principles of versatile laboratory and office design and fit-up, sustainable design to approach Zero Net Energy, make carbon neutral ready for building operations, and metering and sub-metering and track energy use per laboratory space and the overall building apply to this Project.

4.7.2 Guelph

The Guelph Science Facility requirements are still in development and will be clarified once Science Partners and the LC executive have approved the program scope.

The basic scope principles of versatile laboratory and office design and fit-up, sustainable design to approach Zero Net Energy, make carbon neutral ready for building operations, and metering and sub-metering and track energy use per laboratory space and the overall building apply to this Project.

4.7.3 Sudbury

The Sudbury Science Facility requirements are still in development and will be clarified once Science Partners and the LC executive have approved the program scope.

The basic scope principles of versatile laboratory and office design and fit-up, sustainable design to approach Zero Net Energy, make carbon neutral ready for building operations, and metering and sub-metering and track energy use per laboratory space and the overall building apply to this Project.

4.7.4 Cultural Heritage

The Cultural Heritage Science Facility requirements are still in development and will be clarified once Science Partners and the LC executive have approved the program scope.

The basic scope principles of versatile laboratory and office design and fit-up, sustainable design to approach Zero Net Energy, make carbon neutral ready for building operations, and metering and sub-metering and track energy use per laboratory space and the overall building apply to this Project.

The scope of work could include either expansion and refit of 1800 Walkley Road or construction of a new facility. Whether renovation or new build, the design will have to meet the functional requirements.

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5 CHALLENGES

The Consultant is to consider and proactively work with Project Team members to resolve Project management and implementation challenges. Other challenges will inevitably arise throughout the Contract. Project challenges require the active and ongoing management by the Consultant and those implicated in the Project Team.

5.1 Project Management Challenges

The Design Team is to consider that:

- a) Aggressive Schedule: Implementation of each sub-Project will require an aggressive design and construction schedule, with concurrent design streams and construction;
- b) Design Decisions: Key design decisions based on life-cycle Cost analysis are required to allow construction to proceed in order to meet the schedule;
- c) Level of Effort: Ongoing project management of all the Consultant's resources, Sub-Consultants, and Specialist Consultants is required to design and deliver, potentially, multiple Science Facilities concurrently;
- d) Collaboration: Constant communication between the DR, Science Partners, Design Team and CM are essential to realize efficiencies, minimize disruption, and overcome resistance to change.
- e) Understanding: Science Partners have varying levels of experience with real property design and construction and their requirement to provide design decisions for their programmatic requirements.

5.2 Implementation Challenges

The Design Team is to consider that:

- a) Access to existing, occupied facilities to perform investigation work to advance the design requires detailed planning and advance notification. Destructive testing, if required, is to be constantly supervised and undertaken in a manner to maintain the existing operating environment;
- b) Interior and exterior construction operations in and around occupied buildings is to be preplanned, well documented, and approved by the DR, Science Partners and, as applicable, adjacent building owners;
- c) Municipal, provincial, or federal priorities change over time, which could impact the Design Team's level of effort and approvals;
- d) The identity and reputation of PWGSC is paramount as the Project will be scrutinized by the public and media. The management and implementation of sub-Projects has the potential to undermine the reputation of PWGSC. Specific risks the Design Team and the CM need to consider in Project planning, development, delivery and ongoing coordination by the DR are:
 - i. How the natural environment is managed and cared for;

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- ii. How persons accessing and entering a Site are cared for as per health, safety, security and accessibility;
- iii. How Cost efficiencies are integrated over the short-term and long-term for the better operation and management of each Science Facility; and
- iv. How employee and public access to and use of Science Facilities will be controlled.

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6 CONSULTANT SERVICES

The Consultant is required to provide the integrated Services listed in this section. The Consultant's discipline resources may have the necessary qualifications and expertise to fulfill more than one role.

6.1 Architectural Services

- a) General architecture;
- b) Landscape architecture;
- c) Interior design;
- d) Functional and building programming specialist;
- e) Door hardware specialist; and
- f) Signage and way finding specialist.

6.2 Engineering Services

- a) Civil;
- b) Structural and seismic retrofit;
- c) Mechanical; and
- d) Electrical.

6.3 Specialist Consultant Services

- a) Program and project management;
- b) Building code, life safety and fire protection, and accessibility specialist;
- c) Building Information Modelling (BIM) specialist(s);
- d) Building science specialist;
- e) Physical (building) security specialist;
- f) Information Technology and Multi-Media (IT/MM) specialist;
- g) Building automation specialist with experience in Programming Logic Controller (PLC) and Variable Frequency Drive (VFD) design and operation;
- h) Air flow modeling, zonal modeling, and energy simulation modeling specialist(s) with experience in Zero Net Energy (ZNE) building design,
- i) Fume hood exhaust air flow modelling;
- j) Laboratory design and programming specialist;
- k) Laboratory equipment specialist;
- l) Lighting design specialist;
- m) Sustainable design specialist(s);

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- n) Ontario Land Surveyor;
 - o) Vertical transportation specialist;
 - p) Transportation and traffic specialist;
 - q) Property management specialist;
 - r) Commissioning specialist, independent third-party for architectural, building envelope, engineering, laboratory systems, etc.;
 - s) Acoustic design specialist;
 - t) Base isolation expert;
 - u) Geotechnical engineering;
 - v) Environmental engineering;
 - w) Industrial hygiene;
 - x) Industrial engineering / material handling; and
 - y) Cost estimating specialist(s) and time planning and scheduling specialist(s).

6.4 Consultant Services' Summary

The following is a summary of the Consultant's Services by sub-Project. Services for the Guelph, Sudbury and Cultural Heritage sub-Projects will be added through amendment to the Contract by the Contracting Authority.

LEGEND: Y – Required, O – Optional, N – Not Required

Category	Section	Services	Mississauga	Guelph	Sudbury	Cultural Heritage
6.1 Architectural	6.1(a)	General Architecture	Y	Y	Y	Y
	6.1(b)	Landscape Architecture	N	O	Y	Y
	6.1(c)	Interior Design	Y	Y	Y	Y
	6.1(d)	Functional and Building Programming	Y	Y	Y	Y
	6.1(e)	Door Hardware	Y	Y	Y	Y
	6.1(f)	Signage and Way Finding	Y	Y	Y	Y
6.2 Engineering	6.2(a)	Civil	N	Y	Y	Y
	6.2(b)	Structural and Seismic Retrofit	Y	Y	Y	Y
	6.2(c)	Mechanical	Y	Y	Y	Y
	6.2(d)	Electrical	Y	Y	Y	Y
6.3 Specialist Consultant	6.3(a)	Program and Project Management	Y	Y	Y	Y
	6.3(b)	Building Code, Accessibility, Life Safety and Fire Protection	Y	Y	Y	Y
	6.3(c)	Building Information Modelling (BIM)	Y	Y	Y	Y
	6.3(d)	Building Science	Y	Y	Y	Y
	6.3(e)	Physical (building) Security	Y	Y	Y	Y
	6.3(f)	Information Management and Information Technology (IM/IT)	Y	Y	Y	Y

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Category	Section	Services	Mississauga	Guelph	Sudbury	Cultural Heritage
	6.3(g)	Building Automation (experience in Programming Logic Controller (PLC) and Variable Frequency Drive (VFD) design and operation)	Y	Y	Y	Y
	6.3(h)	Air flow Modeling, Zonal Modeling, and Energy Simulation Modeling Specialist(s) (experience in Zero Net Energy (ZNE) design)	Y	Y	Y	Y
	6.3(i)	Fume hood exhaust air flow modelling	Y	Y	Y	Y
	6.3(j)	Laboratory Design and Programming	Y	Y	Y	Y
	6.3(k)	Laboratory Equipment	Y	Y	Y	Y
	6.3(l)	Lighting Design	Y	Y	Y	Y
	6.3(m)	Sustainable Design	Y	Y	Y	Y
	6.3(n)	Ontario Land Surveyor	Y	Y	Y	Y
	6.3(o)	Vertical Transportation	Y	Y	Y	Y
	6.3(p)	Transportation and Traffic	N	O	O	Y
	6.3(q)	Property Management	Y	Y	Y	Y
	6.3(r)	Commissioning (independent third-party)	Y	Y	Y	Y
6.4 Optional Specialist Consultant Services	6.4(s)	Acoustic Design	Y	Y	Y	Y
	6.4(t)	Base Isolation Expert	Y	O	O	Y
	6.4(u)	Geotechnical engineering	N	Y	Y	Y
	6.4(v)	Environmental engineering	Y	Y	Y	Y
	6.4(w)	Industrial Hygiene	Y	Y	Y	Y
	6.4(x)	Industrial Engineering / Material Handling	O	O	Y	Y
	6.4(y)	Cost estimating specialist(s) and Time planning and scheduling specialist(s)	O	O	O	O

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7 PROJECT TEAM ORGANIZATION

The Project Team is to manage and implement the Project in a collaborative manner. All members of the Project Team are required to work cooperatively at every phase of the design and construction process to ensure a successful result.

All team members are responsible for establishing and maintaining a professional and cordial relationship.

7.1 Science Partners and PWGSC

7.1.1 Science Partners

Each Science Partner will assign a senior resource responsible for the coordination of occupancy planning, functional programming (laboratory, office, IM/IT, etc.), design review, construction review, FF&E and laboratory equipment requirements, and move management.

This person is the single point of contact responsible for all internal management and communication for the Project within the Science Partner's organization.

7.1.2 PWGSC Senior Management

The LC Office Director General (DG) for implementation is accountable for the expenditure of public funds and the delivery of the LC program of work for this Project. The LC Office reports to the LC Program Board, a body of Assistant Deputy Ministers from Science Partners and PWGSC.

7.1.3 Departmental Representative

The LC Office Senior Project Manager is the Departmental Representative for the Consultant's Contract and the CM's contract. The Senior Project Manager is accountable to the LC Office Director General for the management of the Project and its implementation.

7.1.4 PWGSC Design Manager

The PWGSC Design Manager leads a team of internal technical resources which includes a broad range of professional disciplines.

The design management team provides expert advice on coordination and quality assurance for architectural, engineering and interior design disciplines, including design reviews, to ensure technical requirements are suitably defined and incorporated through all phases of the Project.

7.2 Shared Services Canada

Shared Services Canada (SSC), through the LC Office, may provide supplemental IM/IT design requirements and information beyond those defined in the Project Brief section 8.1 - Technical Reference for Office Buildings.

The supply and installation of IM/IT Infrastructure for Science Facilities will be determined by the LC Office to meet the business requirements of the facility.

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7.3 Project Management Support Services

PWGSC will engage an external project management support services (PMSS) firm to provide Project management and administration support for PWGSC. PMSS personnel report to the DR and will assist in the day-to-day management of the Project. PMSS personnel will operate on the Project as an extension of and part of the DR's responsibilities.

7.4 Cost Consultant

PWGSC will engage a cost management firm to provide support to PWGSC, reporting to the DR. The firm's personnel will operate on the Project as an extension of and part of PWGSC's responsibilities, including as an independent assessment of the Consultant and CM's cost and risk management services.

This firm will define information formatting and provide review of Cost and time information prepared by the Consultant and the CM.

7.5 Construction Manager

The CM formally reports to the DR in all contractual matters. The CM will discuss technical matters with the Consultant and the DR. The CM will be part of the integrated Project Team and will participate in meetings and workshops, provide constructability advice and provide recommendations for construction phasing and DPs content and sequencing. The CM will also:

- a) Provide technical support, services and work to PWGSC in accordance with the terms and conditions of the CM's contract;
- b) Lead the construction team that is composed of its own forces and all subcontractors and suppliers retained by the CM;
- c) Act as constructor in charge of the construction Site(s);
- d) Establish and enforce Site health and safety rules for all individuals working on the Site, including members of the Project Team;
- e) Ensure that all individuals, before gaining access to the Site, participate in a Site training and orientation program;
- f) Provide all necessary personnel to perform the services and duties for the sub-Project(s), either by assignment of CM qualified staff or by engagement of services contracted directly by the CM;
- g) Ensure continuity of personnel and maintain a dedicated working team for the life of the sub-Project(s);
- h) Receive and review all sub-Project related documentation provided by the DR and update all future CM deliverables related to scope, budget, and schedule;
- i) Provide ongoing Cost, time, risk, procurement, administrative, and security services;
- j) Work constructively to ensure a collaborative and cooperative team approach with knowledgeable and timely input and contribution to all Project Team members;
- k) In cooperation with the Consultant, ensure at all times the design solution and construction are maintained within the accepted Construction Cost Estimate for the sub-Project(s);
- l) In cooperation with the Consultant, ensure at all times the design solution and construction can, and is, undertaken within the fixed schedule objectives of the sub-Project(s);

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- m) Provide ongoing design management services and, when requested by the DR, design-assist services; and
- n) Organize and attend meetings and workshops with Project Team members or, as needed, separate meetings with the DR.

7.6 Consultant

The Consultant is required to:

- a) Discuss technical matters with the DR and the Construction Manager;
- b) Provide technical support and Services to PWGSC as prescribed in this Project Brief and in accordance with the Contract; and
- c) Obtain, or cause to be obtained, all federal, municipal and other government regulatory requirements and approvals necessary for the Project.

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8 REFERENCE INFORMATION

8.1 Technical Reference for Office Buildings

This PWGSC publication can be found at the following website:

<http://publications.gc.ca/site/eng/9.839370/publication.html>

The publication includes design requirements applicable to this Contract.

8.2 Studies

Information will be provided either after Contract award.

8.3 Base Building Life-Cycle Parameters

The LC Office engaged KPMG to develop draft base building life-cycle parameters. The DR will provide the Consultant the KPMG report (LC Estimate of Base Building Lifecycle Costs- final draft 2019 03 16), or report updates, after Contract award.

8.4 NMS User's Guide

<https://nrc.canada.ca/en/certifications-evaluations-standards/canadian-national-master-construction-specification/nms-users-guide>

8.5 PWGSC Standards

Refer to Project Brief Appendix G – PWGSC STANDARDS

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9 REQUIRED SERVICES

9.1 General

The Consultant must take into account the preceding sections of the Project Brief in providing the required Services as described in the following Project Brief sections and appendices.

The Consultant, as an expert in matters of design planning and implementation, must, per sub-Project:

- a) Provide comprehensive and continuous design planning, analysis, management and implementation Services throughout the Contract until the completion of seasonal commissioning activities and the DR has approved/signed the Certificate(s) of Completion. The Consultant's Services include any warranty related call-backs and repairs required after the issuance of the Certificate(s) of Substantial Performance;
- b) Submit deliverables to the DR for review and approval at various intervals as stated within each Project Brief section;
- c) Actively participate with the CM and the DR, placing decision making for the Project as the first priority; and
- d) Immediately notify the DR and the Design Team in writing of any potential increases or decreases in the scope of work that could affect the ability to meet the Project objectives.

All monthly plans, reports, or their updates must accompany each Consultant's invoices for Services rendered for the period in question. The invoice will not be due and payable until the completed monthly plans/updates are submitted to the DR.

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10 ADMINISTRATION and DESIGN MANAGEMENT SERVICES

The following Services are required for the duration of the Contract.

10.1 Administration Services

10.1.1 Meetings and Workshops

Meetings, workshops and presentations all require advance preparation and follow-up actions by the Consultant. In summary:

- a) For the Mississauga, Guelph and Sudbury sub-Projects, project and design meetings will alternate each time between the NCR and GTA, either at the LC Office in 140 O'Connor Street Ottawa, Ontario or at PWGSC's regional office located at 4900 Yonge St, Toronto, Ontario;
- b) For the Cultural Heritage sub-Project, Project and design meetings will take place at the LC Office in Ottawa, Ontario;
- c) Construction and commissioning meetings may take place in the NCR, but most will occur at the Place of the Work of each sub-Project; and
- d) All presentations and all workshops for all sub-Projects will take place at the LC Office in Ottawa, Ontario.

Meetings and workshops per sub-Project will occur as per Project Brief section 10.1.1.6 – Frequency of Meetings and Workshops.

10.1.1.1 Project Meetings

The Consultant must co-chair Project meetings with the DR to review and discuss the overall Project (all sub-Projects) and the activities of the Project Team(s).

The Consultant must prepare and deliver the agenda, notice to invitees and minutes. The Consultant must issue final meeting minutes within 2 working days of meeting. The Consultant must create and maintain a database containing meeting action items and issues. The top five risks from this database will accompany the final minutes of each meeting.

Attendance at these meetings will vary in accordance with the stage of sub-Projects and includes the Consultant, DR and other Project Team members or Design Team members as required and according to the work/issues in question.

PWGSC's Advocate Team may attend some meetings to provide the Consultant information developed regarding laboratory design guidelines, requirements, and topologies, or to gather this information from the Consultant to use for the broader LC program.

The purpose of these meetings is to:

- a) Monitor the overall Project progress against Project objectives;
- b) Monitor sub-Project progress against the approved scope, Construction Cost Estimate, cash flow and prioritized construction schedule;
- c) Assess design and construction productivity against agreed on performance requirements;

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- d) Ensure clear communication between all participants; and
- e) Identify opportunities or issues, assigning responsible individuals and dates for resolution.

10.1.1.2 Design Meetings

The Consultant must co-chair sub-Project design meetings with the DR to review and discuss the activities of the Design Team. These meetings will occur at PWGSC's Toronto offices.

The Consultant must prepare and deliver the agenda, notice to invitees and minutes. The Consultant must issue final meeting minutes within 2 working days of meeting. The Consultant must create and maintain a database containing meeting action items and issues. The top five risks from this database will accompany the final minutes of each meeting.

Attendance at these meetings will vary in accordance with the stage of sub-Project design and usually include the Consultant, DR, CM, PWGSC's Design Manager or subject matter experts, or any entity or person contracted or employed by the Consultant for the specific Services as identified by the Consultant and according to the matter in question. The CM will prepare in advance of each meeting to discuss in an open manner all sub-Project related matters that affect the CM's ability to support the sub-Project development or complete the sub-Project as approved.

The purpose of these meetings is to:

- a) Monitor design progress against the approved scope and Construction Cost Estimate, and construction schedule;
- b) Ensure clear and efficient communication between all participants;
- c) Ensure effective design and DP prioritization and coordination;
- d) Identify opportunities or problem issues, assigning responsible individuals and dates for resolution; and
- e) Ensure effective quality management, including integration of approval body requirements.

10.1.1.3 Construction and Commissioning Meetings

The CM will chair Project construction and commissioning meetings during the construction stage of the sub-Project, held either on the sub-Project Site or at the PWGSC's Toronto office, as agreed to by the DR.

The CM will prepare and deliver the agenda, notice to invitees and minutes. The CM will issue the final meeting minutes within 2 working days.

The CM will create and maintain a database of action items and issues. This database forms part of the CM's risk management services. The top five risks from this database are to accompany the final minutes of each meeting.

Attendance at these meetings will vary in accordance with the stage of sub-Project construction and usually include the Consultant, DR, CM, other Project Team members if required, or any entity or person contracted or employed by the Consultant or CM for the specific matter in question.

The purpose of these meetings is to:

- a) Monitor the progress and administration of the prioritized construction against the approved

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sub-Project scope, Construction Cost Estimate and construction schedule;

- b) Ensure efficient communication between all participants;
- c) Ensure effective construction coordination with Site and building operations;
- d) Ensure effective and efficient Site coordination of all design disciplines and subcontractors and suppliers;
- e) Identify opportunities or problem issues, assigning responsible individuals and dates for resolution; and
- f) Ensure effective quality management.

10.1.1.4 Submission Meetings/Presentations

For each 50% and 100% SD and DD submission, and as required during sub-Project implementation, the Consultant must co-chair submission meetings with the DR and make a formal presentation to the LC Office, the Science Partners, and the LC Program Board. The intent of these meetings / presentations is to prepare the Consultant for the specific audience. The Consultant must conduct dry-run presentations to the LC Office to gather feedback and fine-tune the presentation. The Consultant must then give its presentation formally to Science Partners, and then the LC Program Board. Submission meetings/presentations will take place at LC downtown Ottawa office and include the Consultant and design disciplines relevant to the presentation, the DR and other Project Team members.

10.1.1.5 Workshops

Various workshops will occur throughout the Contract, tailored to the stage of sub-Project development. Project control workshops will occur routinely throughout the Contract. The Consultant must attend these workshops with the DR and be able to discuss in an open manner sub-Project matters that affect DPs and delivery of the sub-Project. Workshops include, but are not limited to:

- a) Subject Matter Workshops: These workshops are for technical design matters and sub-Project challenges. These workshops are required at 50% SD, 90% SD, 50% DD, 90% DD, and at other stages of sub-Projects, as required by the DR. Following a general SD and DD submission overview workshop by the Consultant, individual subject matter specific workshops will occur. The Consultant must issue final workshop minutes within 2 working days of workshop, update the database containing action items and issues, and append the top five risks identified at the workshop to the final workshop minutes. Individual subject matter workshops may include:
 - i. Landscape architecture (if required);
 - ii. Mechanical systems;
 - iii. Electrical systems;
 - iv. Physical security;
 - v. IT and multi-media;
 - vi. Acoustics;
 - vii. Lighting;
 - viii. Laboratory accommodations and flexibility; and

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- ix. Model quality and design coordination;
- b) Functional Program Workshops: These workshops are to identify the functional, operational, and security requirements of Science Partners, and their long-term property management requirements, as outlined in the Pre-Design, SD and DD sections of this Project Brief. The Consultant must chair these workshops and issue workshop minutes within 2 working days of each workshop.
- c) Laboratory Casework and FF&E Workshops: These workshops are for Science Partners to work through their detailed laboratory space requirements and flexible use with the Consultant and the Consultant's laboratory design and equipment Specialist Consultant(s). These workshops will be held during the SD, DD, and DP phases of sub-Projects. The Consultant must chair these workshops and issue workshop minutes within 2 working days of each workshop. During these workshops, the Consultant may choose to address several of the following topics:
 - i. Laboratory casework;
 - ii. Commercially available FF&E;
 - iii. Other laboratory requirements;
 - iv. IT and multi-media connectivity integration;
 - v. Procurement and installation requirements; and
 - vi. Mock-ups;
- d) Constructability Workshops: These workshops are for construction related matters as they relate to the design progress or Site conditions. The Design Team disciplines relevant to the discussion topics must attend these workshops. Workshop discussion points could include materials selection, work sequencing, temporary roadways, design prioritization, design completion status, design coordination, tender-ability, tender sequencing, or other matters that could influence the ability to build the work.

The CM will chair and take a leading role in conducting these workshops, which forms part of the CM's design management services. The CM will prepare and deliver the workshop agenda, notice to invites and minutes. The CM will issue final workshop minutes within 2 working days of workshop, update the database containing action items and issues, and append the top five risks identified at the workshop to the final workshop minutes.
- e) Project Control Workshops: These workshops are to address sub-Project control matters (Cost, schedule, risk and implementation). The primary workshop objectives are to:
 - i. Promote open discussion of Project control issues between the Design Team and the CM;
 - ii. Ensure the Design Team and CM have the same basis of understanding for Project Cost elements (inclusions, exclusions, assumptions, and basis of costing), schedule activities (design and construction), activity durations, and Float use and allocation;
 - iii. Determine and update responsibilities, scope, related matrices, and workflow for delegated design and materials testing and inspections; and
 - iv. Re-review and openly discuss the time, Cost, risk and design management Services of the Design Team and CM with the DR.

The Design Team must attend these meetings. The CM will chair and take a leading role in

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conducting these workshops, which forms part of the CM's cost and time management services. The CM will prepare and deliver the workshop agenda, notice to invites and minutes. The CM will issue final workshop minutes within 2 working days of workshop, update the database containing action items and issues, and append the top five risks identified at the workshop to the final workshop minutes;

- f) Risk Management and Lessons Learned Workshops: These workshops are to address program and sub-Project related risks and provide a forum for ongoing learning and improvement of PWGSC's project delivery processes. The DR will chair and organize these workshops, prepare and deliver the workshop agenda, notice to invitees and minutes. The Design Team and CM must actively participate at these workshops. Workshops will typically be a half-day and may be combined with other meetings or workshops. Workshop discussion topics may include topics such as short, mid and long-term opportunities and risks, the cumulative effect of opportunities and risk, lessons learned at different sub-Project stages, and ways to reduce or eliminate workflow processes; and
- g) Value Engineering Workshops: These workshops are to address complex matters related to excessive sub-Project Cost or time. The goal of these workshops is to find alternative ways or means of obtaining value for money, while respecting the general intent of the sub-Project scope. The DR will chair and organize these workshops, prepare and deliver the workshop agenda, notice to invitees and minutes. The Design Team and CM must actively participate at these workshops. The length of these workshops will be determined on a case-by-case basis but are usually one working day per workshop.
- h) Partnering Workshops: These workshops are to occur at the start of the Project to provide a form for meeting all Project Team stakeholders, understanding their Project hopes and concerns, and establishing agreed Project Team values. The DR will chair and organize these workshops, prepare and deliver the workshop agenda, notice to invitees and minutes. The Design Team and CM must actively participate at these workshops. Workshops will typically be a half-day.

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10.1.1.6 Frequency of Meetings and Workshops

	Pre-design stage	SD stage	DD stage	DP stage	Construction and commissioning stages
Meetings:					
Project	Monthly				
Design	Weekly				Until all DPs are awarded
Construction and Commissioning	None			Every two weeks until sub-Project completion	
Submission	None	6	6	As required	
Workshops:					
Subject Matter Specific	None	Per submission	Per submission	To be determined	
Functional Program	8-12		As required	None	
Casework and FF&E	As required			Every Casework and FF&E DP	As required
Constructability	Monthly			Every Base-Building DP	As required
Project Control	Monthly				
Risk Management and Lessons Learned	Every 4 months				
Value Engineering	None	To be determined		None	
Partnering	1	None			

10.1.2 Response Time

The Design Team must be available to attend meetings or respond to inquiries within one-half Working Day, or within a timeframe agreeable to the DR.

10.1.3 Media

The Design Team and any entity or person contracted or employed by the Design Team will not respond to any requests for Project / sub-Project or LC program-related information, requests for interview, or questions directly or indirectly from the media or a third-party pertaining to any aspect of the Project / sub-Project unless specifically requested to do so by the DR. Such inquiries must be directed to the DR without providing a response to the inquiry.

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10.1.4 Security of Information

Except as they relate to the direct provisions of Services and work under this Contract, the Design Team and any entity or person contracted by or employed by the Design Team are forbidden to discuss issues pertaining to any Project / sub-Project, or the overall LC program, including, but not limited to, a Project's /sub-Project's layout, design, content and security provisions.

The Design Team is required to take all necessary steps to ensure that documents and records, or any information, are not copied, provided to, discussed, or disclosed in any manner whatsoever, to any person or entity, other than PWGSC and LC personnel possessing the appropriate security level and authorization, unless expressly authorized by the DR.

10.1.5 Official Languages

The Project requires Services in both official languages. The Consultant must provide bilingual (English and French) Services orally. These Services include, but are not limited to, presentations, interviews and meetings.

If and when requested by the DR through a Contract disbursement, the Consultant must ensure deliverables required to be produced in both official languages are of a professional standard and is responsible for the accuracy, completeness and consistency of translation. Both languages are considered equal in status, that is, neither is considered to be of lesser standing because it is a translation of the other.

10.1.6 Security Clearances

10.1.6.1 General

Proper planning and active management are essential for all security screening processes.

The DR will assign a Security Officer (SO) who will be the central point of contact for the Consultant security clearances. All personnel employed on this Project will be subject to a security check and must conform to the security requirements stipulated in the Contract. Only personnel with a valid security clearance will be permitted to provide Services for this Project.

The Consultant must have a Corporate Security Officer (CSO) in charge of screening all Consultant and Design Team personnel. This person must keep track of all applications, the status/availability of each person and their security clearance application, and follow up as required with the SO.

If an applicant has a current valid clearance with PWGSC, the CSO will provide the SO with the applicant's complete name and date of birth.

If an applicant does not already have a valid security clearance, the applicant must complete, sign, and submit the following forms to the SO:

- a) TBS/SCT 330-23 Personal Security Screening Form (<http://www.tbs-sct.gc.ca/tbsf-fsct/330-23-eng.asp>); and
- b) TBS/SCT 330-60 Security Clearance Form (<http://www.tbs-sct.gc.ca/tbsf-fsct/330-60-eng.asp>).

Forms are to be filled out in advance and sent to SO in original format. Only after preliminary verification of the forms submitted and retained by the SO, will the SO request security screening of the

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individual be submitted to Personnel Security Screening Division (PSSD) of the Canadian Industrial Security Directorate (CISD) for processing. If forms are not complete, signed and original (copies, PDFs, or faxes are not permitted) the SO will notify the Consultant's CSO in writing.

The Consultant must ensure that it provides sufficient information to permit government authorities to conduct a background inquiry.

10.1.6.2 Finger Printing

New security clearance applications require individuals to provide their fingerprints. The SO can take individual's fingerprints at the PWGSC Security Office in Ottawa, Ontario, or as directed by the DR.

Applications for security clearance renewals may or may not require fingerprinting; however, if required would be on a random basis as determined by the SO, CISD, or the RCMP.

10.1.6.3 Processing Time

The processing time to obtain a security clearance for reliability or site access is estimated at eight weeks from the time the application (complete with no errors and/or omissions) is received by the SO. For those who will be required to hold a Secret level clearance, this may take approximately three to six months. These timeframes are for applicants who are domestically based and who have not travelled outside of Canada for an extended period. Timeframes for clearances could be considerably longer for non-domestic applicants.

The Consultant must be aware that processing time for applicants with criminal convictions may take longer and could extend to six months or longer depending on the nature of the conviction. An interview with such applicants may be required as part of the security clearance process.

Replacement or substitute personnel must undergo the process identified above.

10.1.6.4 Access to Construction Site

- a) The CM will issue a sub-Project security card for those who will access the construction Site(s) with instructions to wear the security card in plain view at all times;
- b) The CM will ensure that only those who have a CM building security card can access the Site;
- c) The CM will check all personnel daily to ensure personnel are wearing their photo ID passes at all times; and
- d) The CM will conduct spot checks. If the Consultant or Design Team's personnel or any entity or person contracted or employed by the Consultant or Design Team is found in breach of security, the facility clearance of the employer of the entity may be revoked and/or personnel without clearance will be removed from Site.

10.1.7 Contract Deliverables

Where submissions include summaries, reports, Drawings, Specifications, presentations and schedules, the Consultant must provide six hard copies along with an electronic copy in editable native format and Portable Document Format (PDF), unless otherwise indicated by the DR.

All reports, Drawings, Models, data, simulation and analysis outputs and other graphical material must

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be submitted to the DR in both PDF and an editable, non-PDF format (original software of operation) and if applicable, interoperable with a BIM and related third-party software

10.1.7.1 Acceptable Native Format

Native format for deliverables means:

Deliverable	Acceptable Native Format
Written reports and studies	MS Word
Consultant Fee updates	MS Excel
Presentations	MS PowerPoint and/or MS Visio
Drawings	DWG (from Autodesk REVIT or similar)
Design Schedules	Microsoft Project or Primavera P6 or newer
Change management and daily logs	MS Word
Organizational Charts	Adobe Illustrator or MS Visio
National Master Specifications (NMS)	MS Word
Building Information Model	Software selected by Consultant to perform the Services for the Contract to the requirements of Industry Foundation Classification – IFC4 – ISO 16739:2013

10.1.7.2 Writing Style

The Design Team must use a writing style that presents information in a logical, objective, clear and concise manner. The Design Team must write reports so that the reviewer can easily locate references and respond to related information contained in the report. Reports will include the following sections:

- A cover page indicating the sub-Project title, nature of the report, Consultant's Contract number and author name, PWGSC Contract name and reference number, and a date in a non-ambiguous format, i.e. February 6, 2019 or 2019-02-06;
- A table of contents;
- An executive summary;
- An introduction;
- A methodology section explaining the methods and tools used, such as weightings, comparative analysis;
- A conclusion or synopsis; and
- Appendices containing supporting material referenced in the report, supplementary and supporting information.

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10.1.7.3 Report Content

The Consultant must:

- b) Ensure that the executive summary is an accurate and complete summary of the report following an identical structure, including only key points, results and recommendations;
- c) Use an organizing system, such as MS Word Document Map, for ease of reference and cross-referencing;
- d) Use correct grammar including complete sentences to avoid ambiguity and facilitate translation when required. The use of technical terms, industry jargon and cryptic phrasing must be avoided;
- e) Write efficiently, with only essential information included in the body of the report and supporting information in an appendix, if required; and
- f) Analyze and ensure all relevant correspondence against accepted goals, objectives and the requirements identified in this Project Brief.

10.2 Design Management Services

10.2.1 Design Management Planning

The Consultant must prepare a Design Management Plan (DMP) governing the Consultant's and the Design Team's activities. Specific to this Contract, the DMP must define the standard(s), approach(s) and methodology(ies) for:

- a) Communications by type (i.e. submittal, memo, report, etc.) within the Design Team and the CM, DR, Science Partners, and other stakeholders, including durations for turn-around/response;
- b) Scope analysis, validation, coordination, and definition within DPs and during project delivery, which must include:
 - i. Development of a delegated design Specification and design responsibility matrix, with the participation and agreement of the CM and DR, to account for the Design Team professional responsible for the design, review, acceptance, and workflow of certain components of scope to be assigned to a design entity other than the Design Team. Include:
 - 1. In the Specification:
 - a. References to applicable associations, regulating bodies, standards, etc. at the Place of the Work;
 - b. Intent of design delegation and applicable scope elements, which may include:
 - i. Design of structural analysis of load bearing components and connections;
 - ii. Design of fire safety, life and health safety, and associated compliance during demolition and construction;

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- iii. Design of designated mechanical, electrical, and architectural systems and components where the specialist design expertise resides with the manufacturer or supplier; and
 - iv. Design of other structural, architectural, electrical, mechanical, civil, and other scope;
 - c. Scope elements excluded from delegated design which the CM is required to undertake;
 - d. Definition of Design Team professional(s);
 - e. Definition of the delegated design professional (e.g. architect, engineer, etc.) and their required expertise, certification, or accreditation;
 - f. Submittal technical requirements, review and acceptance process / workflow, and associated timelines;
 - g. Products and manufacturing requirements and workflow; and
 - h. Execution, field review and certification (performance verification) requirements and workflow;
- 2. In the design responsibility matrix, identify scope elements usually carried out by the CM's subcontractor or supplier and scope elements the Design Team will complete. Include:
 - a. Design Team design responsibility(ies);
 - b. Scope element description (e.g. crane base design/building loading, attachment of construction structures, wall/floor loading capacity; pipe rack weight, bends, and reaction forces; stairs and ladders; cutting/coring openings; stud gauge/size; steel to steel connections; shoring; miscellaneous metals: stepovers, walkways, etc., piles, micropiles, etc.);
 - c. Review responsibility (Design Team, CM subcontractor or supplier, or CM retained design professional); and
 - d. Related information, notes or comments;
- ii. With the participation and agreement of the CM and DR, support the CM's development and ongoing update of a material testing and inspection responsibilities matrix, which is to:
 - 1. Identify component or system to requiring testing, inspection, or both testing and inspection (e.g. structural steel, rebar, concrete, roofing, firestopping, acoustics, building envelope, drainage, compaction, waterproofing, insulation, sustainability-related, elevators, elements and sequencing related to temporary work, etc.);
 - 2. Indicate:
 - a. If material testing or inspection is a joint activity involving the CM and Design Team, when said activities are to occur (i.e. conditions, if any), and workflow between those involved in the process(es);

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- b. If the CM is to undertake materials testing or inspection itself or retain a third party; and
 - c. How said inspection or testing relates to performance requirements in Design Team prepared Specifications and the contractual mandate of the Design Team as the design authority;
- c) Quality control of design workflow and production, coordination and integration of design disciplines and the use of BIM, clash/interference detection review and workflow, document and report standards, submittal validation, turnaround times, and inspection and performance verification;
- d) Fee management, reassessment, time authorization against Contract Baseline amount;
- e) Time management for design production, activity durations, and Float quantification, allocation and authorization against Contract time Baseline; and
- f) Human-resource deployment of named and additional resources specific to this Contract. Besides the approach and methodology for resource allocation and management by sub-Project, and by sub-Project stage. Include:
 - i. The roles and responsibilities of the Consultant's team resources and each resource from Design Team members, including expected resourcing levels per area of expertise, by sub-Project stage, to meet the requirements of the Project throughout the Contract;
 - ii. Design Team organization charts and how positions interact/relate to other members of the Project Team(s);
 - iii. A staffing plan and describe:
 - 1. How and when resources/skills will be deployed, including response time to the Site;
 - 2. Timeline for resources/skill sets;
 - 3. Transition period required for succession of all positions;
 - 4. A forward-looking work plan reflective of all Design Team Services required over the next three-month, six-month, 12-month periods; and
 - 5. How Project information will be transferred to new personnel; and
 - 6. Any other human resource-relevant information concerning the provision of the Design Team's Services for the Contract.

The approved DMP will form the Baseline for measurement of the Consultant's Services.

10.2.1.1 DMP Deliverables

The Consultant must:

- a) Excluding the delegated design Specification and design responsibility matrix, submit a draft DMP to the DR for review within 30 working days of the Contract award, or as agreed by the DR;
- b) Revise and resubmit a final DMP within 15 working days of reviewing the DR's review and acceptance;

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- c) Update and resubmit to the DR the human resource subsection of the DMP every three months, or more often if requested by the DR. Obtain written DR approval for Design Team resourcing prior to deploying/changing resource strength;
- d) With the agreement of the DR and CM, submit the delegated design Specification and design responsibility matrix;
- e) Update and resubmit the delegated design Specification and design responsibility matrix as and when required, to the approval of the DR; and
- f) Update the DMP and submit to the DR for review and acceptance as and when required to reflect any change.

10.2.2 Design Approvals

10.2.2.1 Authorities Having Jurisdiction - Federal

A list of authorities and their federal jurisdiction is included below.

Authority	Federal Government Jurisdiction
National Capital Commission (NCC)	Real property sub-Project approval within NCA; and Federal Land Use and Design Approval (FLUDA) – LEVEL 2
Environment and Climate Change Canada (ECCC)	<i>Species at Risk Act</i> (2002); <i>Canadian Environmental Assessment Act 2012</i> (CEAA 2012); and The Federal Policy on Wetland Conservation (1991).

10.2.2.2 Authorities Having Jurisdiction - Other

A list of other authorities and their jurisdiction is included below. All PWGSC projects are to comply with the jurisdictional requirements of other authorities. The Design Team must observe codes, regulations, by-laws, and decisions of all authorities having jurisdiction. In the case of overlap, the Design Team must apply the most stringent requirement. All Design Team Services must comply with the applicable Ontario construction health and safety Acts and Regulations, in addition to the related Canada Occupational Safety and Health Regulations.

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Ontario Provincial Authority	Jurisdiction
Ministry of Labour (MOL)	Employment Standards; Designated Substance Management; Workers Compensation; and <i>Ontario Construction Health and Safety Act</i> , and its related regulations
Ministry of the Environment and Climate Change (MOECC)	<i>Environmental Protection Act</i> : 3R Regulations; Building discharges into the air, water and ground; and Transportation and disposal of designated substances, including contaminated soils, water, asbestos, lead, etc.
Technical Standards and Safety Authority (TSSA)	Construction hoists, elevators, escalators, dumbwaiters, pressure vessels
Electrical Safety Authority (ESA)	Electrical equipment & distribution

Local Municipalities	Jurisdiction
	Planning and design submissions; Building, demolition and plumbing permits and inspections (<i>Ontario Building Code Act</i>); Fire safety, equipment and access for fire-fighting equipment; and Occupancy Permits

10.2.2.3 Federal and Provincial Authorities

PWGSC is a Responsible Authority as defined in the Canadian Environmental Assessment Act 2012. PWGSC will fulfill its obligations as a Responsible Authority to ensure that sub-Projects will not cause significant adverse environmental effects on federal land.

In support of the DR, and to meet the PWGSC's Responsible Authority obligations, the:

- a) Design Team must facilitate and participate in any discussion or negotiation required to obtain sub-Project approvals with federal and provincial authorities and ensure that the technical and legal compliance of sub-Project designs follow the said approvals and conditions; and
- b) The CM will ensure that all work and construction operations comply with said approvals and conditions.

All communication with federal and provincial authorities will be through the DR. The DR will deal with federal and provincial approval fees on a case-by-case basis and may request the CM to pay such fees as a disbursement to the CM's contract.

10.2.2.4 Municipal Authorities

On behalf of PWGSC, the Design Team must prepare and provide to the CM all documentation for building and other permits necessary for approval by municipal authorities. The CM will manage the building permit application process itself. All communication with the municipal authority related to

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permits and permit payment will be through the CM. The CM will involve the Design Team and together participate in any discussion or negotiation necessary to obtain permits and assist in resolving issues before the tender of each DP. Submissions by the CM will begin with the Schematic Design when Site plan approval is required or well-advanced DPs for construction permits, with subsequent filings as required by the municipal authority and for design revisions in response to reviews.

The CM will apply for interim and final use or occupancy permits and resolve all outstanding issues relating to permit approval. The CM will also provide municipal authorities access to the Site as and when they require access and obtain reports of their findings, which are to be given to the DR for review and handling as necessary.

The Design Team must address and respond to all issues by municipal officers through the CM including:

- a) Purpose of review and approval: to obtain Site plan and building code compliance (permits);
- b) Submission format: Drawings, Specifications, oral presentations for Site plan applications, SD and advanced DP design submissions;
- c) Submission schedule: SD for Site plan approval; advanced DPs for building permit approval; and
- d) Expected turnaround time: from four weeks to three months.

10.2.2.5 Presentations

10.2.2.5.1 General

Presentations for approval bodies are required in advance for review by the DR and subsequent revision by the Consultant as described in Project Brief Appendix D – PROCESS MAPS. The Consultant must prepare, submit for DR approval, and formally present sub-Project information.

10.2.2.5.2 Building Information Modelling

Approvals and presentations must be derived from and facilitated by Models and Model-based data. The importance of the Model for visualization, real-time analysis and coordinated information sharing is paramount. Science Partners will benefit from this data source.

The Design Team must facilitate collaborative sessions to present and navigate the Model. The Design Team must provide the necessary technical and support services for Science Partner information sessions in an interactive and audience-responsive manner.

Models must be submitted to the DR for review and approval of functional and technical sub-Project requirements.

The Consultant and CM will derive information for permitting submittals from the Model.

10.2.3 BIM Execution Plan

10.2.3.1 Overview

BIM will be the primary collaboration and communications medium for the Project Team. Unless otherwise agreed by the DR, the Design Team will use the Model to convey design and the CM, associated trades, and sub-trades will use the Model to interpret the design and to co-ordinate and construct the work.

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The Consultant must establish a BIM management team within 20 working days of Contract award. The BIM management team will be responsible to develop a BIM Execution Plan (BXP) specific to each sub-Project or suitable to all of them.

The BXP must outline the strategy and schedule to implement sub-Project-specific BIM standards and best practices for the creation and use of shared Models and Model Elements by the Project Team. The BXP must define the use and extent of high-resolution scanning and photogrammetry, combined, to create a shared co-ordinate system and provide the metric information necessary to build the Model.

The BIM management team must re-evaluate the BXP monthly and provide recommendation for updates to and for the DR's approval. Incorporate individual roles, responsibilities, and workflow for delegated design and design assist as requirements are developed and approved. Models developed in accordance with the BXP are for use by Project Team(s).

The DR will provide the Design Team with existing information, CADD files, and where existing, 3D model files. The Design Team must adapt the existing reference files and survey the existing conditions of the Site(s) to develop a sub-Project-specific Model, based on geo-referenced data from remote sensing (e.g. terrestrial laser scanning), photogrammetry, Site inspections, on-Site hand measures, and historical research.

The Design Team must, throughout design development and Project delivery, develop best practices and protocols for the digitization of existing conditions and the integration of that data through BIM, including development of a level of accuracy specification for the Model which all Design Team disciplines are to follow.

The BXP must consider and address:

- a) The sub-Project implementation strategy and how the Model will support the sub-Project delivery activity;
- b) Strategy for compliance with sub-Project BIM requirements and how compliance will be managed for the entire Design Team, the CM, and delegated design professionals. Indicate the required workflow between those involved to confirm compliance (i.e. who-does-what, and when);
- c) Strategy for software compatibility, plug-in software for specialty design Services (e.g. acoustics, sustainability analysis, air flow and zonal Modelling, construction sequencing, etc.), file formats, hosting, transfer, and access of data between CM sub-trades (use of Model server, extranet, access security, etc.);
- d) The evaluation of the options to match the IT technical needs of the size and complexity of sub-Projects;
- e) Interaction with the Design Team, CM and the CM's delegated design professionals;
- f) List of sub-contractors using digital fabrication;
- g) Proposed Model software used by the CM and sub-contractors;
- h) Strategy to assure all trade information is Modeled and coordinated;
- i) Proposed Model workshops and training integrated into sub-Project schedule;
- j) Model resources, users and their responsibilities, qualifications, experience, and contact information (Design Team, DR, CM, CM's sub-contractors and suppliers);

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- k) Authorized uses for Model Elements, including required Level of Development (LOD) and level of information required for interoperability in the final, as-built Model;
- l) A Model Element Table, identifying element authorship and LOD;
- m) The appropriate LOD, level of information, and detailed Modelling protocols for the federated Model;
- n) Additional Model uses appropriate to the optimal design development and delivery of sub-Projects;
- o) Modelling methods and protocols needed to reliably extract quantities from the Model, including authorized uses at design and construction submittals and milestones; and
- p) Modelling and information-sharing strategy to comply with security requirements. Secure data must not be shared in the common data environment. As applicable, classified and/or protected information could potentially be incorporated within the Model.

10.2.3.2 Model Structure

The BXP must define within the Model structure:

- a) Common file naming for all members of the Project Team;
- b) Segmentation of Models (e.g. by building, by floors, by zones, by areas, and / or by disciplines);
- c) Coordinate system (geo-referenced / origin point) to be used to for Model integration;
- d) Set up of BIM space, including protocols for the use of grids, levels, pins, locks and constraints;
- e) Creation of room or space objects for all inside volumes;
- f) Accuracy, completion, correctness when placing, creating, or modifying object elements;
- g) Stages of Modelling and the progression of Model development by each member of the Design Team;
- h) Template requirements;
- i) Capturing deviations or special circumstances;
- j) How Models must share a common coordinate system, given that design discipline-specific Models and division of a Model by another classification are anticipated and acceptable;
- k) How Models must be made to a level of integrity to allow for modification or dimensional movement to accommodate on-Site measurement;
- l) How Model parameters must function as they are intended and named; and
- m) How object categories (physical elements) must use the appropriate object class (intended object type) and how:
 - i. Every object is described, where it is located, and if possible and agreement of the CM when it is installed, who installs it, and a process chart associated with its installation (movement and process);

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- ii. Objects must be associated with the correct Level (i.e., a wall at level 1 is to be drawn/placed at level 1, with element properties indicating its association to level 1, plus or minus an offset, if required);
- iii. Industry Foundation Class (IFC) space objects are required to support non-proprietary or “OpenBIM” standards and assure interoperability;
- iv. Model Element authors must ensure all objects determined as “room bounding” are functioning correctly, and all rooms are properly enclosed; and
- v. Model Element authors must maintain a room schedule to verify proper enclosure and data completeness.

10.2.3.3 BXP Deliverables

The Consultant must:

- b) Submit a draft BXP to the DR for review within 40 working days of the Contract award, or as agreed by the DR; and
- c) Re-evaluate the BXP monthly. If changes are required or recommended by the Design Team or CM, the Consultant must prepare and submit to the DR for review and approval a summary of proposed changes within 10 working days, or as agreed by the DR.

10.2.4 Design Management Implementation

10.2.4.1 DMP Services

Throughout the Contract, the Consultant must provide ongoing Services in accordance with the latest version of the Consultant’s Design Management Plan relating to communication management, scope management including revisions to the delegated design Specification and design responsibility matrix, quality management, fee management, time management, and human resource management.

10.2.4.2 Approvals

Throughout the Contract, the Consultant must provide ongoing Services to obtain, or cause to obtain, the approvals required to advance and complete each sub-Project.

10.2.4.3 BIM Services

10.2.4.3.1 Overview

The Consultant must:

- a) Use BIM and the Model in developing sub-Projects and the BXP;
- b) Assure that all BIM criteria is incorporated into Sub Consultant or Specialist Consultant contracts or agreements affecting the Consultant’s Services;
- c) Use the standards developed in the Design Management Plan (DMP) to minimize the risk of claims arising from the use of the Model or Model Elements;

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- d) Adopt the parameters for Level of Development (LOD) established in the BIMForum Level of Development 2018 Specification, available at: <http://bimforum.org>;
- e) Model all elements required to perform Model-based program validation, coordination, scheduling and Costing as required for and to the LOD determined in the BXP;
- f) Share the Models for the tendering processes. The use of Models by other parties is for reference only unless otherwise stated;
- g) Deliver Models that are detailed sufficiently for design reviews and Model-based validation through a rule-sets Model-checking tool (e.g. Solibri Model Checker or equivalent);
- h) Use the Model as follows:
 - i. Site analysis including but not limited to planning setbacks, site gradients and drainage patterns, map access and circulation patterns, view corridors and privacy patterns, solar shadow studies, and security planning;
 - ii. Programming, spatial program validation, space and equipment validation, including all space and equipment data in the Model with consistent field name designations and text values. At each submittal stage, space and equipment information must be derived from the Model and validated;
 - iii. Design authoring for connecting the 3D geometry of digital architectural representations with database/ intelligent Model Elements with assigned properties, quantities, means and methods, Costs and schedules. As the design progresses and specific materials and components are selected, replace all generic assemblies by intelligent Model Elements with assigned material properties, sizes, and other element specific information to identify building components such as wall, floor, roof, window, etc.;
 - iv. Lighting analysis for analytical Modelling software within the Model to determine the behaviour of lighting systems, including artificial (indoor and outdoor) and natural (daylighting and solar shading) lighting, speciality and architectural lighting, emergency evacuation lighting;
 - v. Acoustic analysis for acoustic Modelling software within the Model to determine the behaviour of materials and geometry on reinforced and non-reinforced sound via performance simulations;
 - vi. Sustainability (LEED, Green Globes) evaluation for assessment of the design challenges and benefits associated with implementing a sustainable design strategy enhancing the effectiveness (ability to impact design), efficiency (Cost and schedule of decisions), and integration of heritage assets;
 - vii. Design reviews linked to the Consultant's quality management plan, providing a comprehensive review process including clash detection and weekly resolution that includes data focused Project parameters which can be accessed remotely (e.g. Autodesk 360 or equivalent) and incorporate visualization and immersive technologies (e.g., Oculus Rift or equivalent virtual-reality technology);
 - viii. Visualization for communication for the production of still images, interactive and immersive models, and high-resolution animations;
 - ix. Generation of Drawings - all drawings produced for use by the Project Team must be

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derived from the Model as views and follow the PWGSC Computer Aided Drafting and Design (CADD) Standards. All Drawings will be linked to the Model by a digital object identifier. Drawings produced for public consultation or communication may require additional information and graphic enhancement;

- x. Structural Modelling and analysis / BIM-enabled structural design for a BIM-enabled structural design process, including but not limited to, the analysis and optimization of structures for effective and economic solutions to design, fabricate and construct utilizing the information in the existing conditions Model and information gathered via the exploratory work and investigations program;
- xi. Energy, air flow, zonal analysis, and automation analysis to optimize the proposed Zero Net Energy building design. Derive analytical Modelling from the Model and developed to a LOD appropriate for the design phase and the tools used for analysis. Energy simulation must be based on information extracted from the Model;
- xii. Mechanical-Electrical-Plumbing-Fire Suppression (MEPF) virtual balancing and testing for analysis of the MEPF design options through simulated testing and balancing;
- xiii. Site Management for the use of the Model for all aspects of planning and documenting investigation work, temporary work, as found conditions and new installations prior to and after to concealment validation, as well as, verification and certification of the as-balanced, tested, and commissioned systems;
- xiv. As-built Model for incorporation of the native files from all Submittals from the CM to serve as a detailed reference of the as-built conditions; and
- xv. Record Model that shows the as-built location of building and site elements containing accurate attribute data on major equipment and systems for facilities management.

The CM will:

- a) Use BIM and the Model in developing the Project as stipulated in the CM ToR and BXP;
- b) Assure that the BIM requirements are incorporated into the CM's sub contracts affecting the CM's services and work;
- c) Use the standards developed in the CM's Construction Management Plan (CMP) to minimize the risk of claims arising from the use of the Model or Model Elements;
- d) Prioritize MEPF overhead coordination. Retain an MEPF coordinator to undertake constructability reviews of the Model to identify components items 'beyond-the-clash'. These are items such as, but not limited to: compromised fire ratings from multiple penetrations; pipes out of walls; height access issues causing undue safety hazards; potential clashes with content that is not in the Model;
- e) Establish which sub-contractors will assign an individual to the role of BIM co-ordinator to coordinate their work with the CM's BIM manager;
- f) Establish with the approval of the DR, which subcontractor(s) and supplier(s) will provide the CM with a Model and Model Elements representing their scope of work. The CM's BIM manager will review for accuracy and co-ordinate the information provided by the subcontractor(s) and supplier(s) prior to submitting to the Consultant. As part of this process, the CM's BIM Manager will use digital coordination tools and software to identify and track problems with

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constructability, including clash detection. Interference / clash reports will be provided by the CM for review and resolution by the Design Team. Resolved information must be integrated into federated Models by the Consultant's BIM Manager, for review by the Project Team;

- g) Manage classified or protected information within the Model in accordance with the security classification guide for the Contract; and
- h) Use the Model for:
 - i. Constructability and design assist as and when requested by the DR;
 - ii. Site use planning, temporary facilities, and field management;
 - iii. 4D scheduling and planning to generate accurate sequencing of construction for mechanical and electrical equipment rooms and laboratory spaces, or to the extent agreed by the DR; and
 - iv. Digital and digitally assisted fabrication.

10.2.4.3.2 Model Management

The Consultant's BIM manager must co-ordinate the ongoing development of the Model and must serve as the primary BIM point-of-contact for the Project Team. As applicable to the sub-Project, the CM's BIM manager will co-ordinate, manage, and verify all Models submitted by subcontractors and suppliers prior to integration with the common data environment by the Consultant. All BIM managers must have access to the Model and common data environment at all phases of sub-Projects.

The common data environment is the collection of all data developed through sub-Project design and delivery. The Consultant must ensure that the common data environment represents all relevant and up-to-date information at all phases of sub-Projects; therefore, will include data from multiple sources and in multiple formats.

2D Drawings must be derived from the Model as views. Each Drawing will be linked to the Model by means of a digital object identifier (e.g. QR codes).

The Consultant must create a Model Element table to define reliance and assure that users of Models do not infer more precision or information than the designer of the system or component intends at a given point in the design process. The Consultant must use its Model Element table to coordinate between disciplines and give the Project Team an overview of who needs to provide what information at what time in order to meet milestones.

The Consultant must also:

- a) Have or obtain the trained personnel, hardware, and software needed to successfully use BIM as outlined in this Project Brief and further explained in the BXP;
- b) Assure the reliability of information incorporated into federated Models through a quality management process established in the BXP and the Consultant's DMP;
- c) Manage classified or protected information within the Model in accordance with the security classification guide for the Contract;
- d) Derive Model Elements from the following sources:

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- i. BIM authoring software element: Model objects must contain parts and components as opposed to simple 3D geometry and be assigned as a part of a family or group;
 - ii. Manufacturer's model elements created by and acquired from manufacturers: LOD of Manufacturer's Model Elements will be appropriate to the sub-Project phase; and
 - iii. Custom created Model elements: Created with BIM authoring tool templates and assigned as a part of a family or group;
- e) Co-ordinate the information in Models and Model Elements of all members of the Design Team, into a single federated Model, weekly, to avoid uncoordinated design progression;
- f) Use digital coordination tools and software to identify and track problems with constructability, including clash detection; and
- g) Publish weekly interference / clash reports for review by the Design Team, CM and DR for resolution by the Design Team weekly with validation by the Consultant, including spatial coordination and clash detection as follows:
- i. Architecture and Structure: Below-grade spaces, proposed floor plates with major penetrations, floor-to-floor heights, beam clearances, heavy utilities locations, floor loads, core and vertical shafts, beam depths and required clearances, soffit-mounted equipment, slab thickness, columns, column caps and seismic bracing. Provide adequate space for construction and maintenance access to structural elements, building equipment, and distribution systems;
 - ii. Architecture and MEPF: Structural and space elements, flow and isolation requirements, proposed functional area configurations, floor-to-floor heights, fire containment, vertical and horizontal transportation. Possible future expansions must be considered in consultation with the DR and must be clash-free;
 - iii. MEPF/HVAC and Architecture, Structure, Information Technology and Multi-Media (IT/MM): Main distribution and collection systems, configurations and sizes for piping, ducts, conduits, raceways, outlet boxes, IT/MM equipment racks, wiring and end devices (all types), fans, diffusers, intakes, exhausts, and all other related equipment. Clearance reservations for equipment maintenance, filter removal and equipment removal and replacement must be modelled with the equipment;
 - iv. Architecture and Fire Protection: Fire zone compartmentalization and fire detection and suppression pipe and end device location, egress paths and exit distance requirements, equipment, and pipe and end device penetrations;
 - v. Major Non-HVAC Equipment and Architecture, MEPF, HVAC, Structural: Major equipment positioning and location requirements, specialist service distribution and waste collection, and public communications and building controls. This includes equipment adjacencies and guards, barriers, pipes, venting and air intake and exhaust locations and other limitations;
 - vi. Architecture, HVAC and Interiors: Merges must include ductwork, piping and end devices, ceilings, Laboratory casework, FF&E, signage, and HVAC;
 - vii. Space Validation: There must be no space gaps. Bounding boxes used to represent room and zone spaces must match with architectural requirements and data values, and all must be coordinated;

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- viii. General Model Quality Checking: All assemblies must be properly joined to prevent “space leaks” in areas defined by enclosing walls and floors and ceilings. Bounding boxes must not conflict;
- ix. Security: Security zoning, internal building and external Site;
- x. Accessibility Compliance: Wheelchair clearances, internal building and external Site pathways; and
- xi. Site and MEPF: Landscape architecture and architectural lighting with building envelope, MEP, civil/municipal, security, and signage.

10.2.4.3.3 BIM Deliverables

The Consultant must:

- a) Submit to the DR weekly clash detection reports as defined in the BXP; and
- b) Develop the Model in conformance with the prescribed standards and BXP.

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11 PRE-DESIGN SERVICES

11.1 Intent

The objective of the Pre-Design (PD) stage is to review and integrate sub-Project requirements, identify and evaluate conflicts or problems, and to develop and receive approval on sub-Project scope, delivery process, schedule, and estimate that is required to deliver the sub-Project in a cohesive and timely manner. The DR will review the Consultant's deliverables throughout the PD stage.

On-Site investigations are required to collect information required to advance the sub-Project design. The purpose is to confirm, analyze, test and determine various conditions either known or unknown. The findings will serve to further define the sub-Project investigation program and ultimately the activities of the SD.

In order to respond to the aggressive schedule, the Consultant must prioritize the analysis of sub-Project elements and produce interim PD reports for review by the DR and CM, and advance these elements into SD before completion of the PD stage.

PD stage Design Packages must follow the requirements of Project Brief section 14, Design Package Services. The Consultant must ensure design interferences within the Model are identified and resolved weekly in accordance with Project Brief section 10.2.4 - Design Management Implementation. The Consultant must revise and optimize the individual work flow of each Design Team member to meet schedule requirements and shorten durations.

11.2 Existing Documentation

Per sub-Project, documentation exists from previous investigation and improvement work, building condition assessments, lessons learned from similar projects, as well as information on approval process, standards, policies, etc. These documents provide information to understand the general condition of the property. Other reports building elements, components and Drawings may be available from the DR for the Consultant's review if identified as necessary by the gap analysis.

11.2.1 Activities

The Consultant must review, understand and apply requirements found in PWGSC's publication *Technical Reference For Office Buildings* and the draft KPMG base building life-cycle parameters, and also consider the studies/information listed in Project Brief Section 8 – REFERENCE INFORMATION, throughout the planning and provision of Services for this Contract.

The Consultant must review existing documentation and conduct interviews with operational staff to understand the general condition of the property and facilities. This review is to inform the scope of the Consultant's Site investigation program. The Consultant must, per sub-Project:

- a) Conduct site reconnaissance, inspections, surveys, measurements, studies, evaluations, functional and technical programming, etc., to acquire all relevant information;

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- b) Interview building operations' and Science Partners' personnel to understand and confirm existing conditions and facility use;
- c) Review and confirm life-cycle assumptions and analysis process(es) with the DR; and
- d) Summarize the documentation reviewed and provide an initial gap analysis per discipline within 10 weeks of Contract award, or as agreed by the DR. As information is discovered through investigations, research and analysis, update the gap analysis quarterly until the end of Design Development. Include an overall summary in the Pre-Design Report.

11.3 Investigations

The Consultant must plan and undertake a systematic verification of the Sub-Project facility, Site, installations, and associated infrastructure. With ongoing consultation with the CM, the Consultant must prepare and prioritize a detailed sub-Project investigation program to identify as-found conditions.

11.3.1 Activities

The Consultant must:

- a) Prepare a detailed sub-Project-specific investigation program to:
 - i. Identify individual investigation requirements;
 - ii. Identify information that can be acquired during the investigation;
 - iii. Verify the location of IT/MM connectivity equipment affected by the sub-Project;
 - iv. Collect details of all FF&E and laboratory casework components, systems and integrated systems; and
 - v. Identify building system requirements to support construction activities;
- b) As applicable to the sub-Project and as described in this section, include:
 - i. Life safety, regulatory and code analysis;
 - ii. Geotechnical analysis;
 - iii. Environmental analysis;
 - iv. Civil and municipal analysis;
 - v. Legal and topographical surveys;
 - vi. Building envelope analysis;
 - vii. Acoustics analysis;
 - viii. Structural analysis
 - ix. Mechanical analysis;
 - x. Electrical analysis; and
 - xi. Other analyses as appropriate;
- c) Obtain the DR's approval prior to proceeding with the implementation of the program or any individual investigation;

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- d) Continuously supervise the implementation of each investigation by the CM or others during the day, the night, the week or the weekend;
- e) Provide an inspection report documenting each inspection within two weeks of each investigation; and
- f) Incorporate into the Model all findings resulting from each investigation within two weeks of each investigation.

11.4 Regulatory Analysis

Regulatory analysis must identify health and safety deficiencies to inform the sub-Project design and identify opportunities in the SD, DD and DP stages.

11.4.1 Activities

The Consultant must complete a preliminary sub-Project regulatory analysis, as part of the PR report, including:

- a) A summary of regulatory and statutory requirements;
- b) A description of Authorities having jurisdiction;
- c) The identification of applicable codes, regulations, plans, policies and standards, including those for seismic and structural assessment;
- d) A summary of the constraints and issues of the code analysis; and
- e) A summary of the interim life safety requirements required during construction (e.g. water supply requirements; sprinklered scaffolding; fire compartment zones, containment and protection; etc.).

11.5 Geotechnical Analysis

The Consultant must carry out Modelling and analysis based on existing information and information obtained through the investigations program to analyse each of the building design options.

11.5.1 Geotechnical Design Memorandum

The Consultant must integrate into the Model all geotechnical requirements. As input to the Design Team, the Consultant must prepare a Geotechnical Design Memorandum (GDM), as part of the PD report, including but not limited to:

- a) Type of foundations and optimum founding elevation based on the various building options;
- b) Bearing resistance for shallow and deep foundations and an estimate of total and differential settlements;
- c) Methods of foundation installation;
- d) Frost protection;
- e) Underground structures;
- f) Stabilization of existing foundation members (e.g. underpinning);

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- g) Excavation methods and sequencing in soils and rocks and any limitations due to adverse soil and rock conditions;
- h) Finite element analysis or other describing settlement and deflection of existing structures during excavation and final constructed works;
- i) Lateral support parameters for earth retaining structures;
- j) Stress release of the bedrock due to excavation;
- k) Impact and mitigation of all works on the existing adjacent structures (e.g. buildings, infrastructure, etc.);
- l) Mitigating effects of excavation on adjacent structures;
- m) Pavement for roads and parking lots;
- n) De-watering of excavations;
- o) Slope stability in soils and rocks;
- p) Seismic parameters;
- q) Soil stabilization and improvement;
- r) Soil compaction;
- s) Instrumentation; and
- t) Vibration impacts and mitigation alternatives;

The Consultant must identify a minimum of three options or alternative remedial measures to deal with deficiencies and meet geotechnical requirements for the following:

- u) Seismic base isolation;
- v) Conventional reinforcement; and
- w) Combination of base isolation and conventional reinforcement options;

For each of the three options noted above, the Consultant must:

- x) Describe installation alternatives;
- y) Describe excavation and underpinning methods;
- z) Describe foundation details;
- aa) Describe, in broad terms, the pros and cons of each option and how well each one responds to sub-Project requirements;
- bb) Provide input into the CM's Construction Cost Estimate including life-cycle Costs associated with each option;
- cc) Describe, in broad terms, design and construction scheduling implications associated with each option; and
- dd) Provide recommendation on next steps, additional study requirements, etc.

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11.6 Environmental Analysis

The Consultant must analyse the environmental design requirements for each sub-Project design options, as part of the PD report, including:

- a) Conducting a bird nesting survey, tree survey, and ecological characterization of the Site;
- b) Carry out building materials, soils and groundwater sampling and testing to validate and update existing environmental information, or as agreed by the DR;
- c) Assessing and implementing further exploratory investigations to determine identify the proposed management of designated substances, soil, groundwater movement, and environmental protection;
- d) Provide preliminary analysis, and reporting as well as development and auditing of solid waste and waste water management plans, waste reduction strategies and other strategies to meet sustainable strategies during demolition and construction;
- e) Determine sub-Project-specific permitting requirements, when permits must be in place, and who is responsible to apply for and obtain said permits; and
- f) Incorporate existing and new information into the Model.

11.7 Site Analysis

11.7.1 Landscape Architecture Analysis

The Consultant must conduct and report on the sub-Project landscape architecture analysis, as part of the PD report, including:

- a) Analysis of existing conditions of the Site including all above and below grade landscape features, signage and way-finding (regulatory, directional, information), exterior lighting, security features (e.g. surveillance cameras, etc.), landscape furniture, amenities, vegetation, grading, soil and soil structure condition, drainage and irrigation, and mechanical, electrical and fire protection infrastructure;
- b) Coordination of exterior signage and way-finding strategy with interior signage and way-finding strategy to demonstrate integration of the outdoor experience leading to the indoor circulation.
- c) Analysis of land patterns and spatial organization including initial planning and design principles, relationships between the landscape, buildings, built infrastructure, support functions, operation and maintenance, etc.;
- d) Circulation and universal design for accessibility analysis for pedestrians and their vehicles. Include parking areas, delivery and loading areas, gathering places, events staging areas, etc.;
- e) Visual impact analysis that considers views within the sub-Project boundaries and to and from key vantage points;
- f) Identification of opportunities and strategies to limit and protect the impact to landscape features of future work and winter maintenance (snow removal or storage, etc.);
- g) Identification and description of the landscape features within and adjacent to the sub-Project Site that require protection;

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- h) Identification of information gaps in the recording of landscape features with recommendations as to further investigations or studies;
- i) Identification of landscape design objectives and approach; and
- j) A gap analysis evaluating comparatively the existing conditions, the landscape design objectives and approach and other sub-Project requirements.

11.7.2 Civil/Municipal Analysis

The Consultant must conduct and report on the sub-Project civil and municipal analysis, as part of the PD report, including:

- a) Analyse infrastructure, subsurface and above grade services, including capacities and limitations for storm water drainage, foundation drainage, tunnels, fire protection, power, water, and telecommunications;
- b) Field verify watermain and sewer invert and size to the extent required to permit a professional assessment of the impact of the Project mandate on the municipal infrastructure;
- c) Determine the degree of onsite testing, if any, and follow the technical requirements of the local municipality;
- d) Create a hydraulic Model and determine the appropriate simulations to run. The hydraulic Model must assess the existing water distribution system response to:
 - i. Maximum day demand with fire flow, minimum operating pressure 138kPa;
 - ii. Peak rate (maximum hourly demand), minimum operating pressure 276kPa;
 - iii. Incorporate into the Model the location and performance of the existing water main distribution network; and
 - iv. Approach for foundation drainage improvements.

11.7.3 Legal and Topographic Survey

The Consultant must carry out an audit of current PWGSC or Science Partner survey data, if any, and perform additional surveys as required. The Consultant must validate and update the survey information as part of the PD report and incorporate survey information in the Model.

11.8 Architectural Analysis

11.8.1 Building Program Analysis

The Consultant must analyze the building program requirements for each of the building design options, as part of the PD report, including:

- a) Review, analyze and validate the Science Partners' functional and technical program, if any;
- b) Coordinate with the CM who will be responsible to provide early advice on construction challenges arising from the functional requirements;
- c) Compare and review the expectations and requirements outlined in sub-Project background documents prepared by the Science Partners or PWGSC advocate consultant documents, if any;

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- d) Study the differences between the background documents and the functional and technical program; and
- e) Test the capacity of the facility to accommodate the functional and technical program;

11.8.2 Functional Program Analysis

The Consultant must analyze sub-Project requirements and prepare sub-Project-specific functional program requirements for each of the building design options, as part of the PD report, which includes:

- a) Functional program report and room data sheet format. Revise as required to the approval of the DR;
- b) Functional program and spatial requirements for proposed functions;
- c) Office, support and other special purpose space requirements;
- d) Unique and common laboratory topologies and requirements;
- e) Building system requirements including flexible approach to evolving use and occupancy of current and future Science Partners;
- f) Interoperability requirements of building system components (e.g. architectural elements, mechanical and electrical elements, sensors, end devices, metering and sub-metering, security and occupancy sensors, etc.) in the final, as-built Model;
- g) Programmatic options including circulation paths;
- h) Standardized laboratory design guidelines, requirements, and topologies from PWGSC's advocate team;
- i) Science Partner or PWGSC reports, studies;
- j) Room data sheets updates;
- k) Physical security zoning and requirements including design approach;
- l) Site requirements;
- m) IM/IT and multi-media requirements including design approach (e.g. IM/IT risers and pathways, zone telecom closets, central or specialized computer rooms, carrier entrance room, multi-media requirements in auditoriums, meeting rooms and laboratories, etc.);
- n) Laboratory casework and FF&E requirements including design approach;
- o) Acoustic requirements including speech security and privacy for offices, meeting rooms and laboratories, base building mechanical and electrical rooms and operations spaces; and
- p) Vibration and electro-magnetic interference control and requirements within laboratories.

11.8.3 Sustainable Design Analysis

The Consultant must analyse the sustainable design expectations for Net Zero Energy buildings and requirements for each of the building design options, as part of the PD report, including:

- a) Provide sustainable design opportunities, building and individual laboratory energy measurement strategies, preliminary budgets (i.e. energy, water, waste, etc.). Identify the

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requirements for life cycle Costing for a sustainable design allowance to demonstrate that investment in sustainable technologies and processes meet PWGSC and Science Partner objectives;

- b) Identify which LEED or Green Globe water efficiency credits, energy credits, material credits, indoor environmental quality credits will be pursued. For those credits identified, provide a short description on how they will be achieved;
- c) Identify any environmental features that would affect the sustainable design strategy;
- d) Review potential for environmental impacts and application of the *Canadian Environmental Assessment Act*; and
- e) In consultation with the CM, develop preliminary budgets for sustainable design strategies, hazardous waste disposal strategies, and environmental clean-up.

11.9 Acoustic Design Analysis

The Consultant must analyse the acoustic design requirements and their effect on mechanical and other building systems for each of the building design options, as part of the PD report, including:

- a) Consideration of Science Partners' functional and technical program
- b) Analyze acoustic requirements for architectural, mechanical, electrical systems to support the functional requirements, particularly with respect to laboratory environments, meeting rooms, office and public (conference) spaces;
- c) Where possible and through the DR, review the in-situ installation of acoustic installations in other Science Partner projects. Discuss with designers, testing agencies and constructors the lessons learned from these installations;
- d) Analyze how similar installations could be designed and constructed, considering design (Modelling) requirements; and
- e) Identify gaps between existing conditions and functional program requirements for speech security and privacy.

11.10 Building Envelope Analysis

The Consultant must carry out building envelope analysis based on the existing information and information obtained through the investigations program, in coordination with structural and mechanical systems analyses, to develop and analyse building design options. The Consultant must report on the building envelop analysis for each of the building design options as part of the PD report.

11.11 Structural Analysis

The Consultant must prepare a structural analysis that is iterative and use increasing levels of sufficiently detailed static and dynamic methods and assumptions. The Consultant must analyse the (existing or proposed) building construction and characteristics to develop and analyze a sub-Project-specific structural Modelling framework.

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The Consultant must prepare 50%, 90% and 100% structural Modelling framework and Modelling analysis reports, and must also prepare and present the said framework and analysis iterations in PowerPoint presentations to the DR and Science Partners.

11.11.1 Structural Modelling Framework

The Consultant must develop a structural analysis framework for creating an analytical Model to support analysis using both detailed static and dynamic methods. The framework and subsequent Model must:

- a) Communicate the relationship between and methodology that will be followed for the structural analysis and the Model;
- b) Define the various components of the structure, identifying how:
 - i. Properties will be estimated or measured;
 - ii. Interconnection of the assemblies will be determined; and
 - iii. The above will be Modeled;
- c) Identify uncertainties such as material properties, gaps in understanding of structural system construction, condition and behaviour and how they will be minimized and Modeled, and the implications of these uncertainties on the accuracy of the Model and results;
- d) Identify where simplified analysis or Modelling of members, assemblies and connections can be used in the analysis;
- e) Identify loading, acceleration and deformation conditions and define how they will be Modelled including:
 - i. Gravity load breakdown and distribution on members;
 - ii. Wind load and distribution;
 - iii. Seismic load;
 - iv. Environmental loads;
 - v. Blast loading, if determined by the DR to be relevant (blast from both explosives during rock excavation and acts of terrorism based on CSA S850-12) from various blast scenarios and loading resulting from progressive collapse; and
 - vi. Existing crack and damage patterns;
- f) Define boundary conditions, their potential impact on the analysis and results, and how or whether they will be Modeled in the analysis;
- g) Define a parametric analysis that will be used to calibrate the Model:
 - i. Identify how anticipated upper and lower bounds of material properties, component behavior, and boundary conditions will be determined;
 - ii. Define upper and lower boundaries for key parameters to bracket actual behavior; and
 - iii. Provide the design and Model input assumptions for review and approval of the DR;

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- h) Define how operational and functional components (OFC) such as roof parapets; assemblies over exit ways; decorative columns, arches and partitions; ceiling systems, mechanical and electrical systems and fixtures will be analyzed and Modeled;
- i) Define the OFC risk analysis to perform, based on CSA S832;
- j) Meet the requirements of NBCC 2015;
- k) Demonstrate how information from the assessment of the foundation, including geotechnical rock information and Modelling, will be incorporated into the structural Modelling and analysis;
- l) Be capable of:
 - i. Analyzing the effects existing and adjacent structures;
 - ii. Analyzing and evaluating the effectiveness of various different seismic isolation and upgrade techniques; and
 - iii. Assessing the impact of seismic loads on non-load bearing assemblies and other OFC's; and
- m) Define a regulatory review that will be completed to establish an appropriate design standard and target reliability level for the seismic evaluation.

11.11.2 Structural Modelling Analysis

Upon the approval of the structural Modelling framework by the DR, the Consultant must continue to refine and test the analytical Model using information gathered from investigations by:

- a) Considering parametric analysis to calibrate the Model, relating the damage predicted by the Model to the observed condition of the existing structural system, exterior and interior building finishes. This includes:
 - i. Identifying additional testing or investigations that are necessary to address anomalies in behavior or gaps in understanding that become apparent during calibration of the Model;
 - ii. Updating and incorporating into the detailed investigations program as required; and
 - iii. Revising the Model as required and re-calibrate;
- b) Describe the preliminary seismic upgrade options (e.g. base isolation, conventional reinforcement, and combined base isolation/conventional reinforcement);
- c) Define the extent of work involved and effectiveness of seismic upgrade options;
- d) Describe in sufficient detail the inter-relationships between the structural system:
 - i. Building envelope;
 - ii. Architectural finishes and, if any, heritage fabric;
 - iii. Building functions;
 - iv. Building systems;
 - v. Life cycle Cost;
 - vi. Design life span; and

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- vii. Maintainability;
- e) Identify the technical justification for each preliminary option and analysis with respect to Project objectives;
- f) Describe the past performance of the structural system, including identifying pertinent information gathered from the detailed exploratory work and investigations program; and
- g) Ensure consensus of the Science Partners on the development of the analytical Model. Obtain approval from the DR.

11.12 Mechanical Analysis

The Consultant must analyse the mechanical design expectations for Net Zero Energy buildings and requirements for each of the building design options as part of the PD report, including:

- a) Conduct an analysis of existing or new building systems, approach and guidelines to support and service the mechanical requirements for construction including the construction yard and the enclosed scaffold environment (heating, ventilation and fire protection). Take into consideration availability of water, gas and electrical utilities and include analysis and confirmation of available utility limitations, tie-in locations, and capacities to support temporary construction requirements;
- b) Identify new or temporary mechanical systems necessary to implement the sub-Project;
- c) Complete an analysis and approach to quality control monitoring of temperature and relative humidity during construction in occupied or partially occupied buildings, including zoning and isolation of temporary and existing systems;
- d) Analyse the capacities of existing mechanical HVAC and plumbing systems and the potential opportunities and limitations considering the sub-Project's program, the necessity to relocate, replace and upgrade underground utilities and any required reconstruction of the Site;
- e) Identify building automation requirements and extent and methodology of air flow and zonal Modelling, including interoperability requirements of building system components (e.g. mechanical and sensors, end devices, metering and sub-metering, etc.) in the final, as-built Model;
- f) Identify energy simulation Modelling requirements to achieve Zero Net Energy (ZNE) building design;
- g) Identify the methodology, criteria and assumptions for life-cycle Cost analysis, including life-cycle duration per building system, economic discount rate, inflation rate, and fuel Cost escalation;
- h) Incorporate into the Model and analyze the entry points for mechanical services and opportunities or limitations considering the Site and adjacent and dependent buildings;
- i) Incorporate into the Model existing outdoor air supply and exhaust systems and determine a preliminary proposal(s) to meet the sub-Project's requirements for outdoor air supply and exhaust;

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- j) Determine strategies for the separation of mechanical systems, both temporarily and permanently, that provide security such as telecommunications and laboratory HVAC and plumbing requirements;
- k) Determine the opportunities for innovation to achieve integrated building, sub-system, and localized energy metering systems;
- l) Identify decommissioning requirements and:
 - i. Incorporate into the Model the existing components of infrastructure for decommissioning as part of the sub-Project; and
 - ii. Propose a strategy, timelines and procedures to decommission and isolate the building or parts thereof;
- m) Identify utilities (buried or otherwise), HVAC, plumbing and fire protection connection:
 - i. Provide a narrative description of existing systems connections and capacities;
 - ii. Understand the new system requirements and provide a narrative description;
 - iii. Review, understand and report on the impact on various adjacent buildings to remain operational throughout implementation of the sub-Project; and
 - iv. Review existing information and perform Site audits of existing systems distribution infrastructure layouts and chases. Incorporate into the Model existing infrastructure horizontal and vertical pipe and duct runs. Use typical floor Drawings and sketches to identify locations and constraints. Model systems and provide narrative description of findings as well as constraints; and
- n) Identify security requirements:
 - i. Provide options for controlling/containing all air borne contaminants based on programmatic and security requirements;
 - ii. Incorporate into the Model Site Drawings with footprint of all buildings showing the common services and utilities, how they connect to the sub-Project facility, and how these will be dealt with during implementation of the sub-Project; and
 - iii. Incorporate into the Model all services (utilities, air intakes/exhausts) that will remain, be added and/or be modified.

11.13 Electrical Analysis

The Consultant must analyse the electrical design expectations for Net Zero Energy buildings and requirements for each of the building design options as part of the PD report, including:

- a) Conduct an analysis of existing building systems, approach and guidelines to support and service the electrical requirements for construction including the construction yard and the enclosed scaffold environment (lighting, power, fire alarm, and lightning protection). Include analysis and confirmation of available system limitations, tie-in locations, and capacities to support construction requirements;
- b) Conduct a short circuit, device evaluation, and coordination study of the electrical system;
- c) Conduct an arc flash study in accordance with CSA Z462: Workplace Electrical Safety; and

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- d) Include the following within the PD report:
- i. Condition, loads, capacities, routing of existing /proposed electrical and IT systems;
 - ii. Risks associated with the relocation, replacement, reuse and upgrade of electrical and IT systems;
 - iii. Existing fire detection and alarm systems for life safety and building protection. Identify systems, panel locations and other features that potentially contribute to an integrated life safety approach;
 - iv. Lighting levels and other electrical requirements based on the sub-Project's program requirements, ensuring that architectural lighting and requirements of the Canada Occupational Health and Safety Regulations and Illuminating Engineering Society of North America are respected;
 - v. Electrical supply authority's requirements and capacity including requirements for loop systems conductors, labour fees and disbursements, and duct bank requirements;
 - vi. Identify decommissioning requirements and:
 - 1. The existing components of infrastructure for decommissioning as part of the sub-Project;
 - 2. Propose a strategy, timelines and procedures to decommission and isolate the building or parts thereof; and
 - 3. Identify designated substances to be addressed and the related procedures;
 - vii. Identify normal, emergency and UPS electrical distribution requirements and:
 - 1. Provide narrative description of existing and new electrical distribution;
 - 2. Provide a narrative description of the new electrical requirements;
 - 3. Provide tables and calculations related to full load measurements of existing distribution system;
 - 4. Provide tables and projections of future theoretical requirements capacities;
 - 5. Provide a comparison graph to demonstrate power requirements over the year timeline (existing and future load results);
 - 6. Define the opportunities and requirements for integrated building, sub-system, and localized energy metering systems; and
 - 7. Provide narrative description and sketches of findings incorporated into the Model as well as constraints on electrical distribution infrastructure layouts and conduits and chases;
 - viii. Identify lighting and lighting control requirements and:
 - 1. Provide narrative of the existing and new requirements;
 - 2. Model key chases and constraints of existing infrastructure (conduits/chases); and
 - 3. Provide narrative of existing and proposed lighting control system, its functionality as related to lighting, and integration with the control and metering of other power systems;

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- ix. Identify fire alarm system requirements and:
 - 1. Provide narrative of the new requirements;
 - 2. Model locations of existing infrastructure and constraints; and
 - 3. Provide narrative on current fire alarm system functionality and its interconnection with remote monitoring station(s). Indicate constraints and exceptions;
- x. Identify public address system requirements and:
 - 1. Provide a narrative of existing and new system requirements; and
 - 2. Model and create a list of existing equipment, if any, for removal;
- xi. Identify lightning protection system requirements and:
 - 1. Provide narrative on existing and new system type and capacity;
 - 2. Model and provide narrative explanation of the system resulting from the verification and assessment of grounding; and
 - 3. Identify lightning protection systems and their interconnection;
- xii. Identify IM/IT and multi-media requirements and:
 - 1. Understand scope of existing carrier infrastructure and connectivity; and
 - 2. Model and provide narrative explanation of temporary connectivity components and systems to monitor Site construction operations; and
- xiii. Identify interoperability requirements of power, lighting and lighting control, fire alarm public address, lighting protection, IM/IT and multi-media components, etc. in the final, as-built Model

11.14 Commissioning and Property Management Analysis

The Consultant must review and identify all design disciplines involved in commissioning and outline the requirements sub-Project-specific Commissioning Plan, as part of the PD report, including:

- a) The extent of commissioning requirements to be identified in the functional program;
- b) Information required to develop a Sub-Project-specific commissioning plan; and
- c) Property management Building Management Plan (BMP) information, operating requirements, and life-cycle information as per Project Brief section 4.6 – Operating Requirements, to:
 - i. Develop detailed operations and maintenance and energy budgets;
 - ii. Identify 3rd party services contracts during operations;
 - iii. Identify type and extent of Science Partners' internal building operations and security staffing; and
 - iv. Information and assumptions necessary to undertake whole-building life-cycle analyses.

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11.15 Pre-Design Deliverables

The Consultant must:

- a) Provide an investigation plan within 20 working days of Contract award;
- b) Update the investigations program quarterly, or more frequently if warranted; and
- c) Provide a pre-design report which consolidates completed investigations reports, progress of on-going investigations and discipline specific deliverables gathered from the activities identified above. The pre-design report must illustrate an analysis of the sub-Project requirements and also serve as a benchmark sub-Project control document to Monitor progress of the sub-Project. The body of the pre-design report is to include, as a minimum, the following sections:
 - i. Executive summary;
 - ii. Glossary of terms;
 - iii. Summary of reviewed documentation;
 - iv. Summary of investigations;
 - v. Regulatory analysis;
 - vi. Geotechnical analysis;
 - vii. Environmental analysis;
 - viii. Site analysis;
 - 1. Landscape architecture analysis;
 - 2. Civil/municipal analysis;
 - 3. Legal and topographic survey analysis;
 - ix. Architectural analysis;
 - 1. Building program analysis;
 - 2. Functional program and room data sheet format;
 - 3. Functional program analysis and as-built Model interoperability requirements;
 - 4. Sustainable design analysis;
 - x. Acoustic design analysis;
 - xi. Building envelope analysis;
 - xii. Structural analysis;
 - xiii. Mechanical analysis and as-built Model interoperability requirements;
 - xiv. Electrical analysis and as-built Model interoperability requirements; and
 - xv. Commissioning, property management, and life-cycle analysis;
- d) Include, as a minimum:
 - i. Comment on the CM's updated Class "D" estimate;
 - ii. Identification of opportunities to accelerate sub-Project delivery;

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- iii. Identification of potential conflicts with the implementation of phased DPs; and
- iv. Analysis of risk implications and preliminary mitigations strategies for managing risk during the Consultant's subsequent required Services stages of the sub-Project.

11.16 Response to Pre-Design Report

The Consultant must:

- a) Review and analyse all the comments provided by the Project Team;
- b) Prepare and submit a written response to the DR within 20 working days to all the submission comments; and
- c) Integrate comments into the subsequent submissions as directed by the DR.

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12 SCHEMATIC DESIGN SERVICES

12.1 Intent

It is expected that the SD will overlap with the Services occurring during the PD and potentially DD stages.

The objective of the SD stage is to develop and analyze design options with particular attention to versatile laboratory topologies, structural design, and physical security design, weighing them against the sub-Project requirements and constraints, including but not limited to the functional program, time and Cost constraints, and in partially occupied buildings with on-going operations, etc., to:

- a) Confirm scope and direction of the schematic design; and
- b) Provide sufficiently developed design options to permit the preparation of tender-ready DPs.

All design options will be reviewed and approved by the DR at a minimum of 50% and 100% unless otherwise indicated.

The SD stage will be a continuous process feeding the DD stage as the Project evolves. In order to respond to the aggressive schedule, it is important to prioritize sub-Project elements and review those elements already prioritized during PD stage. Prioritized design elements will require advance SD deliverables for review and approval to proceed to DD. It is essential to continue consultation with the CM and DR to prioritize those elements and to update the DP requirements, in order to develop Cost estimates and schedules.

The Consultant must develop and present separately a minimum of three complete, distinct and viable options until 50% SD. The three options must be integrated solutions, which incorporate the planning strategies to meet the functional program, the sustainable design approaches, the physical security, and the mechanical system options. In support of the three options, each discipline and technical specialty of the Consultant must provide a preferred approach for each option that best suits an integrated approach. Sub-options for discipline solutions must also be presented to facilitate explanation of merits of the preferred approach. Each option must be complete with sufficient detail to allow comparison, analysis against sub-Project requirements.

Each submission must be illustrated in graphic form including BIM Modelling, and narrative formats such as reports, drawings as well as PowerPoint presentations. The Consultant must indicate a preferred option and sub-option and indicate the advantages and disadvantages of each option. Between 50% and 100% SD the Consultant must further define the preferred option to advance the design.

The Consultant must ensure design interferences within the Model are identified and resolved weekly. The Consultant must revise and optimize the individual work flow of each Design Team member to meet schedule requirements and shorten durations.

SDs must include a narrative that supports the viability and functionality of the sub-Project. Sufficient detail is required to indicate all key elements of the functional program are met. Each submission is to provide more detail and refinement than the previous submission.

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SDs will be presented in an integrated and coordinated Model with colour-coded spatial analysis to summarize the SD, determining and resolving the interference between building systems. Rendered Model and fly-through presentations are required for specific key architectural and laboratory design elements.

The CM will participate in the design process, provide constructability reviews and design-assist services if and when requested by the DR, and review design options.

At 100% SD the functional program must be sufficiently developed and presented for approval, along with the preferred design option. A combination of two or more SD options may be identified by the DR and Science Partners as their preferred SD option, in which case the Consultant will be responsible for revising the SD accordingly into the DD stage.

The requirements for the SD apply for decommissioning and temporary work except the number of interim submissions and review periods will be reduced to optimize the schedule. Decommissioning and temporary work will have its own timeline to be completed as per the schedule prepared by the CM and agreed to by the DR and Consultant.

The CM will define the Consultant's DP framework (the format and number of packages) and the prioritization of when the DPs are required. The prioritization of the DPs will ensure the optimal sequence of construction to achieve the shortest overall construction period and maximum Cost control.

12.2 Design Services

12.2.1 Regulatory

The Consultant must prepare and submit the following regulatory requirements within the SD report. The Consultant must define:

- a) Detailed Site and building code requirements and requirements;
- b) Fire and life safety strategy, exemptions, including smoke control and the means of egress and exit;
- c) Universal design for accessibility Site and building analysis, strategy and exemptions; and
- d) Applicable laboratory standards and regulations.

12.2.2 Geotechnical

The Consultant must develop, in support of and in full coordination with the Design Team, recommendations that align with the structural and physical security analysis of the design options required at 50% SD, and with further development of the preferred design option, and submit geotechnical requirements within the SD report.

The Consultant must review all documentation provided by the DR, gathered to date from the investigations program, and identify any missing geotechnical information required to evaluate the design options and the SD options developed by the Design Team, and carry out additional studies or investigations as required.

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The Consultant must incorporate into the Model and provide documentation and specifications for:

- a) Excavation methods and supports, including design details such as rock anchor spacing, shotcrete, etc.;
- b) Existing services/structures that may interfere with proposed works;
- c) Mitigation measures required to deal with special issues;
- d) Excavation support including proposed alternatives;
- e) Subsurface conditions;
- f) Underpinning and support including detailed design information;
- g) Protection of existing buildings including design details;
- h) Dewatering concepts or mitigation;
- i) Foundation system concepts and design;
- j) Geotechnical instrumentation monitoring;
- k) Backfill requirements; and
- l) Waterproofing design.

The Consultant must also complete a:

- m) Vibration management plan including blast and vibration criteria, monitoring, control, reporting, incident/exceedance management and defining roles and responsibilities;
- n) Construction monitoring plan that is coordinated with structural monitoring; and
- o) Pre-construction survey.

12.2.3 Environmental

The Consultant must prepare and submit the following environmental requirements within the SD report and Model. The Consultant must:

- a) Identify overall and specific environmental issues and management of designated substances and solid and liquid waste for the sub-Project;
- b) Analyze each SD option for the scope and risks associated with hazardous materials and water movement, waste and water management, and environmental protection and permitting requirements;
- c) Develop a preliminary demolition management plan, and if required a soil, groundwater and methane management plan, for hazardous and non-hazardous materials;
- d) Develop mitigation measures for environmental protection and follow-up on and finalization of environmental permitting requirements and applications;
- e) Define landscape capping processes and requirements; and
- f) Prepare and submit to the DR a sub-Project-specific Mitigation Measures Form (MMF).

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12.2.4 Site

12.2.4.1 Landscape

The Consultant must prepare and submit in the SD report and incorporate in the Model distinct SD options in coordination with Design Team, stakeholders and Authorities having jurisdiction, and is to include for each option:

- a) Landscape architectural approach for each option;
- b) Complete graphic and narrative description of each option including but not limited to:
 - i. All landscape works proposed in each option and identify new interventions;
 - ii. Colour-coded landscape architectural plans indicating the requirements of the functional program and proposed materials. Provide a narrative that indicates the degree of compliance with the functional program and overall Site plan;
 - iii. Grading Drawings, sections and elevations and explanatory sketches;
 - iv. Planting Drawings and listings;
 - v. Integration of all landscape features and infrastructure existing and new signage and way finding (regulatory, directional, information), architectural and security lighting, security features (surveillance cameras, bollards, lockable pull-boxes, etc.), landscape furniture, Site amenities, vegetation, grading, soil and soil structure condition, drainage, storm water management and irrigation, and mechanical, electrical and fire protection infrastructure;
 - vi. Coordination of exterior signage and way-finding strategy with interior signage and way-finding strategy to demonstrate integration of the outdoor experience leading to the indoor circulation.
 - vii. Description of the inter-relationships between the landscape and the buildings and build infrastructure and materials;
 - viii. Identification of conflicts and discrepancies;
 - ix. Proposed new furniture design and materials;
 - x. Detailed Modelling of each option;
 - xi. Model renderings;
 - xii. Material samples; and
 - xiii. Key factors that drive Project Cost, schedule, risk and procurement;
- c) Lighting Drawing indicating proposed lighting fixtures and materials;
- d) Signage Drawing indicating way finding strategy including regulatory, directional, information signs;
- e) Circulation and universal design for accessibility Drawing detailing strategies and exceptions, including pedestrian pathways and vehicular routes. Include parking areas, delivery and loading areas, gathering places, event staging areas, etc.;

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- f) Sustainability design strategies, updated scoring for, as applicable, LEED or Green Globes;
- g) Comparative analysis of options; and
- h) Identification of a preferred option that best integrates all other disciplines and best balances the planning framework and functionality with sub-Project scope, time and Cost constraints.

12.2.4.2 Civil/Municipal

The Consultant must prepare and submit the following civil and municipal requirements within the SD report and Model. The Consultant must:

- a) Confirm information or previous assumptions to support design assumptions;
- b) Complete hydraulic analysis of proposed alterations to the municipal and Site water distribution systems and confirm the anticipated maximum available fire flow to the facility;
- c) Calculate and compare Site flows to building Site fire flows;
- d) Obtain approval from the municipality fire service (department) for proposed isolation, removal or reconfiguration of the water mains, all temporary and permanent fire hydrants;
- e) Obtain approval from the municipality for proposed isolation, removal or reconfiguration of all storm water systems and all sanitary sewer systems; and
- f) In full coordination with the Design Team, propose design options for all below and above grade infrastructure and services within the Model, including sizing, materials and capacities. Each option must provide Drawings and sections complete with backup data to support each option.

12.2.5 Architectural

The Consultant must coordinate all sub-Project objectives and scope in coordination with the Project Team, stakeholders and Authorities having jurisdiction, complete an integrated options analysis and submit the following architectural requirements within the SD report and Model.

The Consultant must demonstrate each SD option:

- Meets the functional program;
- Meets Science Facility principles as per Project Brief section 2.2 – Science Facilities - General;
- Meets the sub-Project design intent; and
- Meets sustainable design requirements.

The Consultant must test for coordination and interference within the Model and ensure a comprehensive and fully coordinated design and design approach.

The Consultant must include for each option:

- a) Architectural vision;
- b) Complete graphic and narrative description including but not limited to:
 - i. All works proposed in each option;

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- ii. Colour-coded architectural floor plans, Drawings for every level of the sub-Project indicating the requirements of the functional program and proposed materials. Provide a narrative that indicates the degree of compliance with the functional program, including area calculations, and options in narrative and graphic formats proposing mitigation of these conflicts or anomalies;
- iii. Modelling for each option;
- iv. Interior and exterior Model renderings and fly-bys of selected areas;
- v. Material samples;
- vi. Interiors including circulation (public and Science Partner business), material handling circulation and storage, vertical and horizontal paths, service shafts and other vertical and horizontal interventions;
- vii. Analysis of circulation, signage and way finding requirements from the exterior grounds to the entrance(s), as well as interior way finding, circulation and exit path(s) for all users (e.g. staff, visitors). Includes coordination with the landscape design for exterior design concepts.
- viii. Preliminary signage and way finding strategy that includes exterior and interior spaces and transitions (including complete circulation paths from entering the grounds to exiting the building) for all users. Include all regulatory, directional, and information signage concepts and strategy. Includes coordination with the landscape design for exterior signage design.
- ix. Services including vertical conveyancing, plumbing, HVAC, fire detection and suppression, electrical, telecommunications, building automation;
- x. Building sections indicating the composition of walls, floors, roofs, foundations, windows and doors;
- xi. Interior and exterior elevations;
- xii. Physical security components;
- xiii. Universal design for accessibility analysis, strategies and exceptions;
- c) Impact analysis of structural upgrade, physical security and primary mechanical components to the building interiors and building envelope of each option;
- d) Acoustic strategies including the approach to construction of the acoustic provisions; and
- e) Sustainability measures, design opportunities, strategies and scoring for, as applicable, LEED or Green Globes.

Further, the Consultant must prepare and compile a comparative analysis of all design options and include in the SD report and identify a preferred option that best integrates all other disciplines and best balances Science Facility functionality with sub-Project scope, time and Cost, constraints.

12.2.5.1 Building Program

The Consultant must update and complete functional and technical program based on:

- The elements identified in the gap analysis prepared during the pre-design phase;

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- Standardized laboratory design guidelines, requirements, and topologies from PWGSC's advocate team;
- Advancement of the design;
- Lessons learned from other laboratory projects and the information from PWGSC's advocate design team; and
- Notable structural, physical security, and laboratory design options.

The final functional program and SD are interrelated processes while building systems and sustainability requirements are defined, requiring the Consultant to refine the functional program throughout the SD stage. A 50% functional program is required to coordinate the structural analysis and building program. A final functional program is required at 100% SD for formal approval by the LC Office and Science Partners. For each option, the Consultant must include within the SD report:

- a) Updated functional program, including room data sheets (RDS) incorporating functional programming and all IT and multi-media, laboratory casework, and FF&E requirements known to date;
- b) Provide a room numbering plan (draft and final);
- c) Circulation flows for Science Partner employees, public and security;
- d) Food services requirements;
- e) Laboratory casework and FF&E component definitions;
- f) IT and multi-media equipment, pathways, and their connection with the base building;
- g) Strategy and protocol to manage and control Model definition for base building, laboratory casework and FF&E, and IT and multi-media;
- h) Options that resolve functional program spatial and functional conflicts;
- i) Area calculations that include summaries of building areas and all the accommodation areas and functions in the functional program; and
- j) Building and laboratory storage analysis (to include circulation routes between storage rooms).

12.2.5.2 Laboratory Casework and FF&E

The Consultant must, with input from the Project Team, assemble and develop the requirements for laboratory casework and FF&E components and submit in the SD report, including:

- a) A preliminary laboratory casework and FF&E components report (minimum of two iterations) to include but not be limited to:
 - i. Standardized laboratory design guidelines, requirements, and topologies from PWGSC's advocate team;
 - ii. Schematic laboratory casework and FF&E types to accommodate a flexible and adaptable fit (reconfiguration) within the overall design and functional program;
 - iii. Evaluation of the laboratory casework and FF&E component requirements against the functional program which will form part of individual laboratory spaces;

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- iv. A narrative of the integration of the laboratory casework and FF&E component strategy and how it will complement sub-Project Science Facility principles and objectives;
- v. A laboratory casework and FF&E component analysis and strategy for reconfiguration of items, storage requirements if any, to ensure long-term operational efficiency;
- b) A Building Component Matrix (BCM):
 - i. The BCM is a listing and means of identifying laboratory casework and FF&E items, used to follow these items through the DD and DP stages, including item information in the Model, and tracking items through delivery and installation. Each component must be tagged with a code number which is linked in the Model to an attributes list. The list must identify the type, finish, dimensions, connectivity requirements, and other characteristics of the item;
 - ii. Develop the format of the BCM and include, per laboratory casework and FF&E item:
 - 1. Item room number and location;
 - 2. Dimensions;
 - 3. Sample manufacturer, make, and model number;
 - 4. Generic description including mandatory requirements and finishes;
 - 5. Work Breakdown Structure (WBS) category;
 - 6. Procurement group number;
 - 7. Delivery requirements; and
 - 8. Installation requirements;
 - iii. Design dynamic CAD blocks for all non-standard commercially available or custom-made items and incorporate the blocks into the Model. Include component dimensions and link directly to the BCM. Update CAD blocks as changes are made to the block structure and item layout Drawings;
- c) Casework and equipment plan(s) depicting flexible and adaptable configurations;
- d) Model updates which coordinate and integrate the laboratory casework and FF&E with IT, multi-media and security system design requirements, mechanical design requirements, and with all the other elements of the Consultant's design.

12.2.5.3 Sustainable Design

The Consultant must, in coordination with the Design Team, develop sustainable design strategies that support the functional program and sub-Project objectives for Zero Net Energy design. The Consultant submit in the SD report sustainability approaches for each design option and include:

- a) Opportunities, strategies and, in consultation with the CM, preliminary sustainability budgets. With the CM, demonstrate the life cycle Costing that indicates the benefits to PWGSC and Science Partners of the proposed sustainable designs;
- b) As applicable, LEED or Green Globes strategies and credits that will be pursued and describe how they will be achieved; and

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- c) A draft sustainability scorecard and comparative analysis of each sustainable design approach, outlining the benefits and complexities of one approach over another and their associated Cost implications.

12.2.5.4 Acoustic Design

The Consultant must, with the input of the Project Team, develop and submit in the SD report:

- a) Acoustic requirements per discipline to support the design options being prepared;
- b) Outline impacts to laboratory operations and the requirement for (degree of) speech security / privacy in laboratories, offices, and public or auditorium spaces. Identify speech security or acoustic specialty materials or installation requirements required;
- c) To the extent required and agreed by the DR, develop sub-Project-specific acoustic Models of specific spaces;
- d) Consider and if appropriate partial or complete mock-ups (Modelling, physical or both) in order to determine the best integrated design approach;
- e) With the CM, assess potential constructability impacts; and
- f) Identify construction inspection and performance testing processes and their frequencies, along with final testing.

12.2.6 Building Envelope

The Consultant must, in coordination with the Design Team, stakeholders and Authorities having jurisdiction, develop building envelope design options to support sustainable design objectives, the functional program, and structural and mechanical SD options. The Consultant must submit in the SD report options for:

- a) Envelope and materials including, if required, stabilization or replacement;
- b) Water management, including roof water shedding and window conditions;
- c) Substructure and foundations;
- d) Building envelope sections including walls, foundation, roofing, windows, skylights and light wells (if any), component assemblies between the interior and exterior, etc.;
- e) Integration with structural and mechanical systems;
- f) Cleaning requirements;
- g) For masonry assemblies, re-pointing requirements, pinning, grouting, plastic repairs, scaling, consolidation, removal of inserts and parget, stone / brick replacement; types and amounts of deterioration; causes/mechanisms; options for repair, estimated quantities of stone /brick replacement;
- h) The impact on indoor environment, e.g., temperature, humidity, air pressure and flows and mitigation;
- i) Concept for temporary support for monitoring scope and equipment;
- j) Special construction and dismantling; and

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- k) In consultation with the CM, architectural and structural team leaders, requirements for envelope quality control testing.

12.2.7 Structural

The Consultant must, in coordination with the Design Team, perform a detailed assessment, perform analytical Modeling of the structural system, complete an options analysis of proposed seismic upgrade options, recommend a seismic upgrade approach, and include within the SD report.

12.2.7.1 Structure Modeling and Analysis

The Consultant must:

- a) Perform structural analysis using the analytical Model developed in pre-design. Analyze for dead, live, snow, wind, seismic (60%, 75%, and 100% of NBCC requirements), environmental loads, progressive collapse and:
 - i. Identify vulnerable building elements (e.g. envelope components, OFC, etc.) that will be temporarily supported, strengthened or dismantled prior construction activities that create vibrations such as rock excavation or hoe ramming;
- b) Complete a design option analysis that include:
 - i. Structural reinforcement;
 - ii. Resolution of spatial, functional and operational conflicts;
 - iii. Limitation of vibration and noise for excavation and construction adjacent to and within occupied buildings and infrastructure;
 - iv. Identification of components that would be at risk from excavation and options for mitigation;
 - v. Description of the inter-relationships between the structural systems and building envelope and architectural finishes;
 - vi. Model analysis including description of methodology and confirmation of seismic approach complete with backup calculations and Model details for each option;
 - vii. Determination of the loading conditions based on the provisions identified in the regulatory analysis;
 - viii. Determination of the specific seismic loading conditions;
 - ix. Identification of structural deficiencies;
 - x. Determination of allowable loads that can be imposed by the scaffold systems;
 - xi. Comparative analysis of options including impact on building functions, impact on building systems, design lifespan, life cycle Cost, constructability and maintainability;
 - xii. Impact analysis of different target reliability levels (60%, 75% vs. 100% NBCC 2015 seismic load requirements);
 - xiii. OFC analysis;

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- xiv. Phasing approach to seismic upgrades, include temporary bracing scope and sequencing;
- xv. Detailed calculations in support of preliminary conclusions;
- xvi. Documentation of all major assumptions and describe how they were arrived;
- xvii. Limitations and uncertainties with respect to material properties and structural system construction and behavior;
- xviii. Identification of required information still outstanding;
- xix. Identification of a preferred option that resolves the structural and seismic requirements and that best balances functionality with sub-Project scope, time and Cost, constraints; and
- xx. Recommendations for immediate action, if required;

12.2.7.2 Structural Assessment

The Consultant must perform and submit in the SD report a detailed assessment and analysis of the structural Model, which includes:

- a) Description of the structural system, its construction, components and materials;
- b) Description of the condition and past performance of the structural system, including deterioration locations and types, if any, and impact on long-term health of the structural system;
- c) Description of the inter-relationships between the structural system and building envelope and architectural finishes, and a discussion of the impact of these relationships on both the structural system and the building envelope and architectural finishes;
- d) Description of the framework developed for the structure Modelling and analysis;
- e) Description of the analytical Model including:
 - i. Method of calibration and comparison with actual behavior and other Models;
 - ii. Limitations of the Model; and
 - iii. Confirmation of target reliability level for seismic upgrade NBCC 2015 and strategies;
- f) Description and discussion of the results of the structural analysis, including:
 - i. Analysis results for gravity, wind, environmental, seismic loading scenarios, including appropriate load combinations; and,
 - ii. Identification of structural deficiencies based on analysis results;
- g) Summary and prioritization of identified structural deficiencies and issues that need to be addressed before and during construction work, including explanations for why these deficiencies and issues must be addressed and their sequencing;
- h) Recording of existing conditions in the Model and on Drawings (plans, elevations, sections) showing: areas and quantities of damage/poor performance colour-coded to explanatory text, with photographs;
- i) Appendices with analysis details, computer runs; and

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- j) Scope of options to address seismic requirements with technical justification for each.

12.2.8 Mechanical

The Consultant must, in coordination with the Design Team, develop, Model, and submit in the SD report three distinct and viable mechanical options that support the functional program, structural, building envelope and sustainable design SD options. The options analysis must include:

- a) Building service strategies including elevators, plumbing, HVAC, fire protection, building automation, security (including CBRN protection), acoustical isolation or speech privacy and intelligibility, protection of fresh air intakes, relief dampers/systems;
- b) Mechanical requirements during construction;
- c) SD for mechanical components and systems for Site and building services including plumbing, HVAC, fire suppression and detection, energy management and controls, building metering, and laboratory sub-metering, and security. Provide recommendations complete with supporting justification, implications and indicate interoperability requirements for the as-built Model;
- d) SD options with analysis of energy consumption, operating and maintenance Costs for life cycle analysis in conjunction with the CM. Review with the CM and DR assumptions about a life cycle duration and Costs of facility alteration, improvement, demolition, recycling and demolition. The Consultant must use an approach agreed on with the CM and DR for all energy simulations. Analysis will illustrate monthly and annualized energy consumption and Cost of each building system, and overall annual operating and maintenance Costs over a calendar year. Life cycle analysis must be integrated with sustainability and commissioning requirements;
- e) Detailed analysis and design for tie-in methodology, Model tie-in locations for temporary and permanent services, including metering as required. Identify in the Model the interim and final underground utility relocations, replacements and upgrades ensuring that all connected building remain in continuous operation;
- f) Narrative and Drawings derived from the Model which indicate each of the proposed mechanical systems and components and how/where they tie into systems in connected buildings, including:
 - i. The advantages, disadvantages and recommendations for mechanical systems and components;
 - ii. System schematics describing each mechanical system and component, including metering requirements, locations and interoperability requirements for the as-built Model;
 - iii. Preliminary, annualized energy analysis for each system proposed;
 - iv. Building control strategies for each system, including building zones, individual laboratory controls, air flow analysis and Modelling, with supporting analysis and interoperability requirements for the as-built Model;
 - v. In conjunction with the DR and Science Partners, identify whether full-time operating personnel are required to operate and maintain any mechanical equipment or if specialized personnel retained through maintenance contracts are required for on-going operations; and

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- vi. Determine whether personnel are required because of code requirements or because of the nature and size of the sub-Project;
- g) The per capita supply of outdoor air for each option, per laboratory or fire compartment, and relevant assumptions;
- h) The air delivery rate to each occupied and laboratory space including relevant assumptions;
- i) The location of each entry point for mechanical services in the building and for each laboratory;
- j) The connection and separation, relocation and replacement of services;
- k) Water supply requirements for domestic fire protection systems, laboratory-specific requirements, including estimated annual water consumption, its Cost, and the associated sewer surcharge Cost;
- l) The area required for mechanical functions and identify all mechanical spaces within and serving the sub-Project;
- m) The requirements for all mechanical rooms;
- n) Incorporate into the Model all systems, showing all pipes, ducts and equipment; and
- o) List of all equipment/excel spread sheet (minimum information for each item: equipment number, location, service).

12.2.9 Electrical

The Consultant must develop, Model and submit in the SD report viable options that support the functional program, structural, sustainable and mechanical design SD options. The options analysis must include:

- a) The proposed electrical design in sufficient detail for PWGSC's and the Science Partners' assessment. Include the feasibility of proposed systems complete with energy consumption, metering, and design loads in consideration of sustainable design and commissioning requirements;
- b) Normal, Emergency and UPS electrical distribution:
 - i. Provide a narrative explanation and description of each option;
 - ii. For each option, include the major and minor pros/cons in tabular format;
 - iii. Provide details explanations for theoretical load calculations for normal, emergency and UPS power needs. Include major load groups, their associated load management priorities, and their connected, demand loads and final loads;
 - iv. Provide a narrative on existing supply authority loops, emergency generators and UPS capacity versus the new required loads. Detail the emergency power load management strategy. Determine if the requirements can be met;
 - v. Incorporate into the Model options and provide single line sketches derived from the Model with block diagram configuration of the system and equipment capacity, and metering and sub-metering requirements. Include safety label information, in accordance with CSA Z462, for all panel boards, motor control centres, switchgear, and major electrical equipment. Confirm with DR requirement for bilingual labelling; and

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- vi. Provide a narrative for decommissioning the existing system, if applicable;
- c) Lighting and Lighting Controls:
 - i. Incorporate into the Model lighting and lighting controls;
 - ii. Provide options of the new lighting and, if applicable, integrated with existing to maintain. Incorporate into the Model and provide floor Drawing and sketches;
 - iii. Provide a detailed narrative of options for lighting technologies and controls as well as pros/cons and final recommendations. Pay particular attention to sustainability objectives. Review in detail with the DR and Science Partners
 - 1. To the extent possible, incorporate simplified control systems (switches and occupancy sensors) in independent of technology-driven (complex) control systems;
 - iv. Provide tables of intended lighting levels associated to major and minor areas and laboratory-specific requirements;
 - v. Provide a detailed narrative of the lighting control intention and strategy; and
 - vi. Provide a narrative for decommissioning the existing system, if applicable;
- d) Fire Alarm System:
 - i. Provide options for a new or expanded system, including laboratory-specific subsystems;
 - ii. Provide detailed narrative of system with indication of the type and stages. Explain functionality of system and its interrelation with security and remote command centres;
 - iii. Provide narrative on code requirements;
 - iv. Incorporate into the Model and provide single line block diagram which indicates the configuration of the system and subsystems as well as the main components capacity;
 - v. Provide a narrative for decommissioning the existing system; and
 - vi. In consultation with the CM, provide a narrative and strategy for temporary fire alarm system during construction;
- e) Public Address System:
 - i. Provide a narrative and recommended best options on new system;
 - ii. Provide a narrative for public address requirements, use, and means of control;
 - iii. Incorporate into the Model and provide single line block diagram of different systems and configurations; and
 - iv. Provide narrative on decommissioning the existing system, if applicable;
- f) Lightning Protection System:
 - i. Define and incorporate into the Model lightning protection system. Provide final options with typical elevations and floor Drawings;
 - ii. Provide narrative for lightning protection system, grounding requirements and impact, if any, on specialized laboratory systems. Indicate constraints, interconnection between system components and best option approach; and

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- iii. Provide narrative on decommissioning the existing system, if applicable, and a final list of lightning protection devices for demolition;
- g) IT, Multi-Media, and Security:
 - i. Provide a narrative explanation and description of IT, multi-media, and security systems design, architectural layout and zoning options, telecom closet requirements including mechanical cooling and mechanical equipment location, carrier entrance room configuration and mechanical cooling requirement and mechanical equipment location;
 - ii. For each option, include the major and minor pros/cons in tabular format;
 - vii. Explain functionality of each system, connectivity requirements within offices, laboratories, and with other Science Facilities to support data transfer and video-conferencing, including an annualized estimate of IT system, multi-media system, security system, and carrier connectivity (fibre lease) Costs;
 - viii. Provide narrative on applicable codes and document applicable IT standards (e.g. such as bend radius, number of bends, accessibility, maximum security junction box height, junction box sizes, etc.);
 - iii. Provide explanations for emergency and UPS (back-up) power needs. Discuss operations and maintenance requirements, need for specialized contracts, and estimated annual maintenance Costs;
 - iv. Derive from the Model design options and provide single line diagrams with block configuration of each system, equipment location, and capacity; and
 - v. Derive from the Model floor plans identifying telecom closets, IT risers and raceways, location of and interconnection with carrier entrance room, and carrier network pathway and requirements on the Site.
- h) For all systems, Indicate spare and expansion capacity of proposed system and components;
- i) In conjunction with the DR and Science Partners, identify whether full-time operating personnel are required to operate and maintain any electrical equipment or if specialized personnel retained through maintenance contracts are required for on-going operations;
- j) In consultation with the CM, provide a complete energy analysis and consumption for the proposed options, and operating and maintenance Costs for life cycle analysis. Review with the CM and DR assumptions about a life cycle duration and Costs of facility alteration, improvement, demolition, recycling and demolition. The Consultant must use an approach agreed on with the CM and DR for all energy simulations. Analysis will illustrate monthly and annualized energy consumption and Cost of each building system, and overall annual operating and maintenance Costs over a calendar year. Life cycle analysis must be integrated with sustainability and commissioning requirements; and
- k) Incorporate into the Model and provide a narrative of all decommissioning and temporary utilities during construction.

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12.2.10 Commissioning and Property Management

The Consultant must develop and submit in the SD report preliminary commissioning, property management and operating requirements, and life-cycle analysis per SD option, as per Project Brief section 4.6 – Operating Requirements, for the sub-Project, which include:

- a) An assessment of internal Science Partner staffing and skill requirements to operate and maintain building systems, and compilation of estimated annual labour Costs;
- b) Scope and frequency for all maintenance requirements in accordance with building code, regulatory requirements, specialty equipment requirements;
- c) Recommendations for specialized maintenance contracts and compilation of estimated of annual contract Costs;
- d) Compilation of all utility Costs, including water and sewer and IT carriers' connectivity;
- e) Estimate of annual municipal property and other taxes;
- f) Complete life-cycle analysis of each building system and the overall facility;
- g) An outline Building Management Plan summarizing all Science Facility Cost elements identified in the proceeding articles;
- h) A design intent brief outline to be prepared by each design discipline, containing simple non-technical language with graphics to use as a property management and building operations reference document, to be refined with subsequent design stages, which summarizes:
 - i. The operational intent and design life-cycle for every building system, indicating how the operational requirements were translated into the design intent for the sub-Project;
 - ii. An explanation of what a system or component does, the areas it serves, why the system or components were selected and, in general terms, how the design and operating concepts of the systems and components are accomplished, including:
 - 1. General zoning and control strategies, sequences and reset schedules;
 - 2. Outline of seasonal (switch-over/isolation) procedures;
 - 3. Emergency procedures during a fire event, power or equipment failure;
 - 4. Reduced and simplified Drawings illustrating system configurations, including single line and plan Drawings of each system;
 - 5. Interfaces between systems; and
 - 6. Monitoring and maintenance requirements;
 - iii. A record of, and rationale for, design decisions made throughout the sub-Project and how these design decisions impact or change the operational intent for the Science Facility;
- i) The design intent report will provide the basis for standard operating procedures (SOPs) as prescribed by the *Canadian Labour Code*, which the Consultant or the Consultant's Specialty Consultant must prepare and finalize prior to Substantia Performance of the sub-Project, and revise during the warranty period to reflect the as-commissioned and as-adjusted components and systems, including their control sequences;

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- j) A draft Commissioning Plan for all components, systems and integrated systems, include testing and verification requirements for components, dynamic systems testing, and integrated life-safety systems testing and certification.

12.3 Approvals

The Consultant must:

- a) Prepare and deliver 50% and 100% SD presentations to the LC Office, Science Partners, and Authorities having jurisdiction to obtain SD stage approval;
- b) Recommend an option that best balances the requirements of the sub-Project with functionality, viability, Science Facility principles, schedule, and Cost parameters;
- c) Identify the advantages and disadvantages of each option based on:
 - i. Construction schedule and implementation plan;
 - ii. Construction Cost;
 - iii. Functional, operational and security requirements;
 - iv. Impact and benefits on the environment and sustainability objectives;
 - v. Impact on the rest of the sub-Project;
 - vi. Impact on future building operations and potential for expansion; and
 - vii. Impact on other buildings, the underground utilities, and Site operations;
- d) In the National Capital Region and with DR support, prepare and submit NCC FLUDA documentation and obtain NCC FLUDA approval; and
- e) Integrate recommendations and feedback from submissions and presentations into subsequent design submissions.

12.4 Schematic Design Deliverables

At a minimum, the Consultant must:

- a) Coordinate all Services of the Design Team and with the CM;
- b) As described in Project Brief sections 12.1 - Intent and 12.2 – Design Services, develop SD options, sub-options, analysis and recommendations;
- c) Integrate ongoing PD information submitted before the completion of each SD sub-phase;
- d) Prepare and submit presentation materials associated with approval processes;
- e) Maintain full production during the submission review processes;
- f) Ensure draft and final reports contain integrated and viable SD options that:
 - i. Comply with the requirements of the functional program and all applicable plans, policies, practices, standards and guidelines;

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- ii. Include Drawings that illustrate the functional relationships of the sub-Project and its scale and character and include scope narratives, with consideration of impacts to construction planning and scheduling, construction Cost, and construction risk;
 - iii. Present graphic and narrative options to resolve conflicts, anomalies and other issues and present the advantages and disadvantages of each option; and
 - iv. Consolidate the SD proposals, findings, analysis and recommendations;
- g) Revise the final draft in response to the compiled review comments and submit a final submission to the DR for acceptance;
- h) Based on the prioritized construction planning and scheduling by the CM, proceed with DD stage activities and the preparation of identified DPs before acceptance of the 100% SD submission, as approved by the DR;
- i) Prepare and submit concise reports for each discipline consolidating information gathered to illustrate an integrated analysis of the Design Team's design options. Include commissioning and property management information. Place supporting information and reports (e.g. investigations, etc.) as appendices. Include as a minimum:
 - i. Executive summary;
 - ii. Glossary of terms;
 - iii. Summary of information gathered and documentation reviewed, with an annotated bibliography;
 - iv. Summary of investigations;
 - v. Regulatory requirements;
 - vi. Geotechnical requirements and options;
 - vii. Environmental requirements and options;
 - viii. Site requirements and options;
 - 1. Landscape architecture requirements and options;
 - 2. Civil/municipal requirements and options;
 - 3. Legal and topographic survey information;
 - ix. Architectural requirements and options;
 - 1. Building program requirements and options;
 - 2. Functional program requirements, options, and as-built Model interoperability requirements;
 - 3. Sustainable design requirements and options;
 - x. Acoustic design requirements and options;
 - xi. Building envelope requirements and options;
 - xii. Structural requirements and options;
 - xiii. Mechanical requirements, options, and as-built Model interoperability requirements;

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- xiv. Electrical requirements, options, and as-built Model interoperability requirements;
- xv. Commissioning, property management requirements and options, and life-cycle analysis per SD option; and
- xvi. Time, Cost and risk analysis and compilation of information provided by the CM.

12.5 Response to Schematic Design Report

The Consultant must:

- a) Review and analyse all the comments provided by the Project Team;
- b) Prepare and submit a written response to the DR within 20 working days to all the submission comments; and
- c) Integrate comments into the subsequent submissions as directed by the DR.

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13 DESIGN DEVELOPMENT SERVICES

13.1 Intent

It is expected that the DD will overlap with some Services occurring during SD, ongoing PD investigations and Design Packages (DPs).

The objective of the DD stage is to further refine and develop the selected SD option, which may be a combination of elements from each SD option. The Consultant must address and resolve all design conflicts and anomalies and ensure full coordination and optimal design iteration and work flow of the Design Team.

The Consultation must obtain written authorization from the DR before proceeding with DD Services for the various sub-Project elements. All DD stage deliverables will be reviewed and approved by the DR at 50% and 100% unless otherwise indicated.

The DD stage will follow the same process as the SD (50% and 100% submissions) and must be a continuous process feeding the DPs stage as the sub-Project evolves. To respond to the aggressive schedule, it is important to prioritize the sub-Project design, review those design activities already prioritized during PD and SD stages, and identify additional or new design priorities. The Consultant must advance the design deliverables for design activities or group design activities leading to early DP production, advancing early construction.

Ongoing consultation is required with the CM and DR to identify, understand, and prioritize the Design Team's design activities and clarify DP scope and timing requirements. The CM will continually participate in the design process, providing Cost and schedule analysis and support decision making. The Consultant must ensure design interferences within the Model are identified and resolved weekly. The Consultant must revise and optimize the individual work flow of each Design Team member to meet schedule requirements and shorten durations.

The requirements for the DD apply to decommissioning work, if any, and temporary work except the scope and content of submissions will be reduced as approved by the DR.

The Consultant must apply for and ultimately obtain, as applicable, LEED or Green Globes certification on behalf of PWGSC and the Science Partners.

13.2 Design Services

13.2.1 Regulatory

The Consultant must, in collaboration with the Design Team, refine, Model, and submit in the DD report:

- a) Fully defined Site and building code analysis and requirements;
- b) Fully defined fire and life safety strategy;
- c) Fully defined universal design for accessibility Site and building strategy; and
- d) Fully defined laboratory standards and regulations.

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13.2.2 Geotechnical

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report geotechnical design solutions which include:

- a) Excavation method and support including detailed design such as rock anchor spacing, shotcrete, etc.;
- b) Excavation support including proposed alternatives;
- c) Subsurface conditions;
- d) Protection of existing or adjacent buildings including design details;
- e) Underpinning and support including detailed design information;
- f) Dewatering design and mitigation;
- g) Foundation system design details;
- h) Existing services and structures which may interfere with proposed works;
- i) Mitigation measures required to deal with special issues;
- j) Addressing design disciplines that include geotechnical components;
- k) Geotechnical instrumentation monitoring coordinated with structural monitoring;
- l) Backfill requirements;
- m) Waterproofing design;
- n) Vibration management, finalizing the plan including blast and vibration criteria, monitoring, control, reporting, incident/ exceedance management and defining roles and responsibilities;
- o) Construction monitoring, finalizing the plan which is coordinated with structural monitoring; and
- p) Pre-construction survey, finalizing remaining Site measurements and data collection.

13.2.3 Environmental

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report environmental design solutions which include:

- a) Specific environmental design requirements for the sub-Project;
- b) Scope refinement, advanced design, and confirmation of risks associated with hazardous materials and water movement, waste and water management, and environmental protection and permitting requirements;
- c) A final demolition management plan, and if required a soil, groundwater and methane management plan, for hazardous and non-hazardous materials;
- d) Final mitigation measures for environmental protection, obtain environmental permitting;
- e) Final landscape capping processes and requirements; and

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- f) Follow-up on, and if required update, the sub-Project-specific Mitigation Measures Form (MMF).

13.2.4 Site

13.2.4.1 Landscape Architecture

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report environmental design solutions which include:

- a) Planting Drawings and listings;
- b) Tree and landscape protection and monitoring;
- c) Detailed design and dimensioning for all landscape features and infrastructure, including signage (coordinated with interior signage and way finding strategy and design) and way finding, exterior lighting, security elements, landscape furniture, Site amenities, vegetation, grading, cut and fill, soil and soil structure, drainage, storm water and irrigation;
- d) Temporary construction requirements;
- e) Details of the inter-relationships between the landscape and the buildings and build infrastructure and materials;
- f) Details of proposed new furniture design and materials;
- g) Customized Model renderings and sample boards to support approval processes;
- h) Construction phasing and sequencing dependencies;
- i) Site and building lighting indicating proposed lighting fixtures and materials;
- j) Signage indicating way finding strategy including regulatory, directional, information signs;
- k) Circulation and universal design for accessibility for pedestrians and their vehicles;
- l) Circulation for vehicles, include parking areas, delivery and loading areas, gathering places, events staging areas etc.; and
- m) Sustainability strategies, update score card as required

13.2.4.2 Civil/Municipal

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report civil/municipal design updates based on the selected SD option, including:

- a) Site and building service connections with references to building outlines, Site parking, access roads and sidewalks, including existing and proposed grades and existing and proposed drainage;
- b) All manholes with invert elevations, valves, hydrant locations, duct banks, proposed pipe sizes and slopes and pipe invert elevations at the building foundations;

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- c) All pipe capacities and estimated storm and sanitary flows. Where the proposed system connects to existing sewers describe the impact of the connection on the existing system. Create a summary sheet; and
- d) All trench and duct bank details including profiles and elevations of below grade services.

13.2.5 Architectural

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report architectural design solutions which include:

- a) Detailed and coordinated design narratives for all members of the Design Team;
- b) Detailed Site Drawing;
- c) Floor Drawings for each floor, including mezzanines, indicating all required accommodation, circulation, stairs, elevators, ancillary spaces, service areas. Include building grid lines and indicate key dimensions;
- d) Detailed elevations of all exterior facades indicating all doors and windows. Indicate finished and structural floor and ceiling heights and concealed spaces. Include building grid lines and indicate key dimensions;
- e) Cross sections indicating floor levels, room heights, corridor elevations, interior elevations of significant spaces including laboratories, meeting rooms and other spaces. Include building grid lines and indicate key dimensions;
- f) Comprehensive interior and exterior Model renderings;
- g) Detailed services locations and layouts including elevators, plumbing, HVAC, fire protection, electrical, telecommunication rooms and risers/pathways, security, building automation;
- h) Detailed wall sections and special design features with sufficient illustration and explanation including physical, acoustic and physical security features to permit design approval;
- i) Reflected ceiling Drawings for all floors;
- j) Architectural features, including materials, millwork, finishing details and samples sufficient to permit choice of materials and finishes;
- k) Drawings, elevations, sections, typical details for built in furniture, laboratory casework, and equipment, all schedules (room, door, window etc.);
- l) Detailed integration and coordination of IT, multi-media and security system equipment, including security features built in furniture and laboratory casework;
- m) Ensure complete coordination of laboratory casework and furniture layout with both IT connectivity and mechanical design and layouts;
- n) Acoustical design that includes wall, floor and ceiling sections and details for all spaces requiring acoustic security. Include required acoustical ratings for doors, transfer ducts, conduits and other assemblies;
- o) Lighting design for interior;

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- p) Site and security lighting;
- q) Sample boards for all finish materials including but not limited to wall, flooring, and carpet colour options;
- r) Detailed signage and way finding strategy that includes exterior and interior spaces and transitions (including complete circulation paths from entering the grounds to exiting the building(s)) for all users. Include all regulatory, directional, and information signage; and
- s) Special construction and demolition including, if applicable, hazardous materials abatement.

13.2.5.1 Building Program

The Consultant must advance and submit in the DD report the building program in coordination with the Project Team. The Consultant must:

- a) Identify proposed changes to the approved functional program:
 - i. Advise the DR and CM of all proposed changes;
 - ii. Inform the DR of potential opportunities or risk related to the proposed change;
 - iii. Review potential Cost impacts with the CM and the DR;
 - iv. Obtain the approval of the DR before incorporating any proposed change;
 - v. Incorporate updated standardized laboratory design guidelines, requirements, and topologies from PWGSC's advocate team; and
 - vi. Update and track functional program changes within individual room data sheets, with a summary of changes;
- b) Refine in detail and incorporate into the Model programmatic layouts, including;
 - i. Detailed listing and numbering strategy for all rooms;
 - ii. Update spatial relationship diagrams;
 - iii. Update area calculations and analysis to quantify operational equipment requirements;
 - iv. Updated storage analysis; and
 - v. Update functional program room data sheets as required, including interoperability requirements for the as-built Model.

13.2.5.2 Laboratory Casework and FF&E

The Consultant must, with input from the Project Team, advance the design and Model requirements for laboratory casework and FF&E components and submit in the DD report, including:

- a) A final laboratory casework and FF&E components report (minimum of two iterations) to include but not be limited to:
 - i. Refinement of the laboratory casework and FF&E types to accommodate a flexible and adaptable fit (reconfiguration) within the overall design and functional program;

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- ii. In-depth laboratory casework and FF&E requirements analysis against the functional program;
 - iii. Updated standardized laboratory design guidelines, requirements, and topologies from PWGSC's advocate team;
 - iv. A narrative of the integration of the laboratory casework and FF&E component strategy and how it will complement sub-Project Science Facility principles and objectives;
 - v. A narrative and graphic representation of all laboratory casework and furniture finishes, including samples and specifications for all casework, furniture, fittings, window coverings and accessories requirements;
- b) Laboratory casework, furniture, and equipment plans using dynamic CAD blocks to locate and identify casework, furniture, and equipment;
- c) Window treatment design and detailing;
- d) Final laboratory casework, furniture, and equipment plan coordination with the architectural, structural, mechanical, electrical disciplines, including IT, multi-media and security system requirements;
- e) The confirmation of mechanical and electrical spaces and location requirements on the laboratory casework, furniture, and equipment plans. Ensure the mechanical and electrical Drawings accurately reflect the laboratory casework, furniture and equipment plans including:
 - i. Final lighting plans;
 - ii. Final location of light switches and controls;
 - iii. Final location of HVAC controls;
 - iv. Final location of IT, multi-media, and security system devices;
 - v. Plumbing components and rise locations and space requirements; and
 - vi. Supplemental or laboratory-specific cooling and exhaust location and space requirements;
- f) Elevations of all special purpose areas to reflect locations of electrical end devices including plugs, controls, switches based on final laboratory casework, furniture and equipment plans;
- g) The location and number of outlets for phones, data and video conferencing;
- h) The design of all custom laboratory casework and furniture;
- i) Commercially available laboratory casework and furniture. Indicate finishes and provide presentation board(s) and catalogue cut sheets for all;
- j) Mock-up and material testing requirements for commercially available and custom laboratory casework and furniture;
- k) Validation of the BCM matrix against the design; and
- l) Review and confirm all laboratory casework, furniture and equipment counts, related fittings, and all accessories.

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13.2.5.3 Sustainable Design

The Consultant must, in collaboration with the Design Team, refine, Model, and submit in the DD report sustainable design solutions which include update to:

- a) Sustainable design requirements, strategies and budgets;
- b) Analysis and compilation of energy consumption reflective of advanced designs, per discipline; and
- c) Update the sustainability score card.

13.2.5.4 Acoustic Design

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special Drawings and Specifications, and submit in the DD report acoustic design solutions which:

- a) Reflect investigations to finalize the design approach;
- b) Incorporate lessons learned from acoustic Models and, if applicable mock-ups, into the acoustic design;
- c) Ensure acoustic design requirements reflect the approved functional program;
- d) Finalize acoustic testing and inspection requirements for all disciplines;
- e) Validate all disciplines understand the acoustic requirements as they apply to them; and
- f) Validate that the design of all disciplines has incorporated the acoustic requirements into their designs and into the Model before the 100% DD submission.

13.2.6 Building Envelope

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report building envelope design solutions which include:

- a) Detailed building envelope design with elevations, sections and details of all building envelope components, including walls, roofing, windows, doors, stonework, damp proofing, waterproofing, flashing, building insulation, caulking and sealants, finishes, and structural members;
- b) Substructure Drawings, including foundations and basement, below grade work;
- c) Detailed structural stabilization requirements, if applicable;
- d) New and repair material selection and description of methodology for all envelope treatments;
- e) Special construction, dismantling and demolition requirements;
- f) Indicate the limits of and requirements for temporary support, scaffolding, and permanent reattachments;
- g) Indicate envelope and material stabilization, cleaning and water management requirements; and

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- h) Final terms of reference for envelope quality control testing.

13.2.7 Structural

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report structural design solutions which include for the approved structural, and if applicable seismic upgrade, option:

- a) Identify structural deficiencies and issues that will be addressed before and during construction;
- b) Provide detailed Drawings, sections, elevations, and connection or other details for modifications to existing and new systems and materials, components, cladding and load-bearing details, wind loading requirements, fireproofing methods and any significant or unusual details or components and operational functional components;
- c) Design structural system to support all new mechanical, electrical and IT loads. Identify required supports and hangers per systems;
- d) Coordinate the design for all architectural and engineering components and systems below grade, in floors, walls and ceilings and their relationships with the building structure. Identify and resolve all clashes and interferences in the Model;
- e) Confirm target reliability level for seismic compliance to NBCC 2015;
- f) Identify any Model Elements that may be vulnerable to vibrations, including temporary stabilization strengthening or dismantling before construction. Include loading, bracing, and support requirements for scaffolding as it relates to the structure and building envelope;
- g) Develop construction phasing and details necessary for the implementation of the structural work, including the sequencing of temporary bracing, shoring or stabilization;
- h) Develop structural system and component monitoring requirements during construction;
- i) Include inter-relationships between the structural systems, building envelope, and architectural finishes;
- j) Identify proposed changes or modifications to the Model and analysis, including identifying the reason for the changes and impact;
- k) If required, develop approaches for the use of mock-ups, testing and investigations to validate the feasibility, constructability and effectiveness of the proposed work. Review with the CM and DR and obtain approval from the DR; and
- l) Include all dead and live loads, seismic loads, wind loads and any atypical loads and all detailed calculations.

13.2.8 Mechanical

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report mechanical design solutions which include:

- a) Service entrances for domestic water, sanitary and storm drainage, and connections to utility services including all invert elevations, coordinated with building program and landscape plans;

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- b) Sizing and materials of ventilation, cooling and heating systems with locations and layouts of all major equipment and showing security protection of fresh air intakes, exhaust systems and stacks, coordinated with building program and landscape plans;
- c) Primary and secondary and sub-metering requirements and locations, coordinated with laboratory casework and FF&E plans and interoperability requirements for the as-built Model;
- d) Plumbing and piping systems showing routing and sizing of lines and location of pumps and other equipment, coordinated with building program, laboratory casework and FF&E plans and interoperability requirements for the as-built Model;
- e) Fire suppression systems indicating major components and piping layout, coordinated with building program, laboratory casework and FF&E plans and interoperability requirements for the as-built Model;
- f) Acoustic control measures for the mechanical design;
- g) In consultation with the CM, update energy consumption per system and the overall consumption and estimated annual Cost by utility;
- h) Include equipment list of all equipment with equipment number and location, coordinated with laboratory casework and FF&E plans;
- i) Include mechanical ancillary devices needed to support emergency power systems, coordinated with building program plans and interoperability requirements for the as-built Model;
- j) Include control architecture including the proposed EMCS network architecture, mechanical control schematics, zone and air flow control, the sequence of operation for each building system, and interoperability requirements for the as-built Model; and
- k) Include mechanical control interconnection with other building systems and interoperability requirements for the as-built Model.

13.2.9 Electrical

The Consultant must, in collaboration with the Design Team, refine, Model, develop Model-based special sketches, Drawings, and Specifications, and submit in the DD report electrical design solutions which include:

- a) Normal, Emergency and UPS Electrical Distribution:
 - i. The chosen electrical option;
 - ii. Theoretical load calculations for normal, emergency and UPS power requirements. Refine load tables for every piece of equipment and divide in their particular load management priority;
 - iii. Electrical equipment sizing;
 - iv. Distribution Single Line Diagram with nomenclature, capacities;
 - v. Distribution Drawings with identified equipment location, coordinated with building program, laboratory casework and FF&E plans;
 - vi. Emergency power load management system sequence of operation;

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- vii. Floor Drawings of every floor with tables associated to each room indicating every type of power, coordinated with building program, laboratory casework and FF&E plans;
 - viii. Decommissioning floor Drawings to include location of major equipment for demolition and/or maintenance with associated demolition phase;
 - ix. Primary metering and sub-metering include metering equipment space requirements and locations, coordinated with laboratory casework and FF&E plans;
 - x. Safety label information, in accordance with CSA Z462, for all panel boards, motor control centres, switchgear, and major electrical equipment;
 - xi. Indicate the short circuit information at point of entry; and
 - xii. Interoperability requirements for the as-built Model;
- b) Lighting and Lighting Controls:
- i. Floor Drawings with layout, coordinated with laboratory casework and FF&E plans;
 - ii. Lighting fixture schedule;
 - iii. Lighting control layout and control logic, associated light fixture zones, switch (control) location, coordinated with laboratory casework and FF&E plans;
 - iv. Specific rooms which contain specific lighting control systems, including architectural lighting systems, coordinated with laboratory casework and FF&E plans;
 - v. Decommissioning floor Drawings with lighting for removal and re-installment; and
 - vi. Provide Drawings and details for Site, building and security lighting, including proposed typical fixtures, coordinated with building program and landscape plans;
 - vii. Interoperability requirements for the as-built Model;
- c) Fire Alarm System:
- i. Floor Drawings for new fire alarm system to show end of line device location, coordinated with laboratory casework and FF&E plans;
 - ii. Table identifying every piece of fire alarm equipment, coordinated with building program, laboratory casework and FF&E plans;
 - iii. Single line diagrams with main equipment and approximate amount of end of line devices;
 - iv. Decommissioning floor Drawing with existing fire alarm system devices to be removed;
 - v. Temporary construction fire alarm system; and
 - vi. Interoperability requirements for the as-built Model;
- d) Public Address System:
- i. Floor Drawing to indicate locations of main equipment and end of line devices, coordinated with building program, laboratory casework and FF&E plans;
 - ii. Single line diagram with main equipment, risers and raceways;
 - iii. Decommissioning implementation strategy;
 - iv. Floor Drawings with equipment to be removed, if applicable; and

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- v. Interoperability requirements for the as-built Model;
- e) Lightning Protection System:
 - i. Roof Drawing with device location, coordinated with building program and landscape plans;
 - ii. Single Line Diagram of system with main equipment and components;
 - iii. Decommissioning implementation strategy, if applicable; and
 - iv. Interoperability requirements for the as-built Model;
- f) IT, Multi-Media, and Security:
 - i. Distribution Drawings with telecom closet, IT riser and raceway locations, equipment requirements (e.g. equipment racks, special isolation transformers, etc.), coordinated with building program, laboratory casework and FF&E, mechanical plans;
 - ii. Carrier entrance room, and carrier network pathway and requirements on the Site, coordinated with building program, landscape, and mechanical plans;
 - iii. Floor Drawing of every floor with tables associated to each room indicating every type and location end of line devices, coordinated with building program, laboratory casework and FF&E plans;
 - iv. Single line diagram per systems with main equipment, risers and raceways;
 - v. EMF shielding materials, requirements and locations, coordinated with building program, laboratory casework and FF&E plans;
 - vi. Decommissioning floor Drawings to include location of major equipment for demolition and/or maintenance with associated demolition phase; and
 - vii. Interoperability requirements for the as-built Model.

13.2.10 Commissioning and Property Management

The Consultant must, in collaboration with the Design Team, refine, compile and submit in the DD report commissioning, property management and operating requirements, and reconfirm life-cycle Costs for the developed option, as per Project Brief section 4.6 – Operating Requirements, for the sub-Project, which include:

- a) Detailed commissioning and training plans in consultation with the CM, DR and Science Partners for all components, systems and integrated systems with full load dynamic testing of building systems. Include in the training plan:
 - i. User/operator skills training requirements and prerequisites;
 - ii. Schedule for all training to be provided by the Consultant concerning systems design intent;
 - iii. Schedule of all training to be provided by contractors, suppliers and manufacturers. Includes at least two separate follow-up training sessions per training session; and
 - iv. Schedules will limit training sessions to a maximum of 3 hours per day. Stagger training so personnel can attend without major disruption to ongoing operations;

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- b) Construction monitoring plan and requirements (e.g. geotechnical, envelope, structure, temperature, humidity, air quality, etc.);
- c) Refine and update of the design intent brief for all building systems (architecture, accessibility, sustainability, acoustics, geotechnical, environmental, landscape, civil/municipal, building envelope, structural, mechanical, electrical);
- d) Update and compile elements of the property management BMP and life-cycle Cost outlined in Project Brief section 12.2.10 – Commissioning and Property Management (i.e. energy consumption and Cost, labour and maintenance contract types and Cost, property tax estimates, etc.).

13.3 Approvals

The Consultant must:

- a) Prepare and deliver 50% and 100% DD presentations to the LC Office, Science Partners, and Authorities having jurisdiction to obtain DD stage approval;
- b) In the National Capital Region and with DR support, if required, update NCC FLUDA documentation and obtain NCC FLUDA approval; and
- c) Integrate recommendations and feedback from submissions and presentations into subsequent design submissions.

13.4 Design Development Deliverables

At a minimum, the Consultant must:

- a) Coordinate all Services of the Design Team and with the CM;
- b) As described in Project Brief sections 13.1 - Intent and 13.2 – Design Services, advance approved SD options, provide analysis and recommendations;
- c) Integrate ongoing PD investigation information submitted before the completion of each DD sub-phase;
- d) Prepare and submit presentation materials associated with approval processes;
- e) Maintain full production during the submission review processes;
- f) Ensure draft and final reports contain integrated and coordinated designs that:
 - i. Comply with the requirements of the functional program and all applicable plans, policies, practices, standards and guidelines;
 - ii. Include Modelling and Drawings extracted from the Model that illustrate the functional and schematic relationships of the sub-Project and its scale and character and include scope narratives, with consideration of impacts to construction planning and scheduling, construction Cost, and construction risk;
 - iii. Present Model-based fly-by renderings, presentations, graphics, and narrative design solutions free of conflicts, anomalies and other issues; and
 - iv. Consolidate the DD design solutions, findings, analysis and recommendations;

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- g) Revise the final draft in response to the compiled review comments and submit a final submission to the DR for acceptance;
- h) Based on the prioritized construction planning and scheduling by the CM, proceed with DP stage activities and the preparation of identified DPs before acceptance of the 100% DD submission, as approved by the DR;
- i) Prepare and submit concise reports for each discipline consolidating information gathered to illustrate an integrated analysis of the Design Team's design. Include commissioning and property management information. Place supporting information and reports (e.g. investigations, etc.) as appendices. Include as a minimum:
 - i. Executive summary;
 - ii. Glossary of terms;
 - iii. Summary of information gathered and documentation reviewed, with an annotated bibliography;
 - iv. Summary of investigations;
 - v. Regulatory requirements;
 - vi. Geotechnical requirements;
 - vii. Environmental requirements;
 - viii. Site requirements;
 - 1. Landscape architecture requirements;
 - 2. Civil/municipal requirements;
 - 3. Legal and topographic survey information;
 - ix. Architectural requirements and options;
 - 1. Building program requirements;
 - 2. Functional program requirements;
 - 3. Sustainable design requirements;
 - x. Acoustic design requirements;
 - xi. Building envelope requirements;
 - xii. Structural requirements;
 - xiii. Mechanical requirements;
 - xiv. Electrical requirements; and
 - xv. Commissioning, property management requirements, and life-cycle Costing;
 - xvi. Time, Cost and risk analysis and compilation of information provided by the CM.

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13.5 Response to Design Development Report

The Consultant must:

- a) Review and analyse all the comments provided by the Project Team;
- b) Prepare and submit a written response to the DR within 20 working days to all the submission comments; and
- c) Integrate comments into the subsequent submissions as directed by the DR.

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14 DESIGN PACKAGE SERVICES

14.1 Intent

The Services required of the Consultant in this section apply to each DP. All deliverables are to be reviewed and approved by the DR at a minimum of 50%, 90% and 100% unless otherwise indicated.

The CM will take the lead role to define the scope and sequencing of each DP to optimize the schedule, in consultation with the Consultant and DR.

The DPs are to include comprehensive, coherent, and fully coordinated sets of Drawings and Specifications (tender documents) compliant with sub-Project requirements in sufficient detail to allow competitive tendering by the CM and guide and direct the sub-contractors to successfully implement each phase and sub-phase of the Project. The DPs as modified following tenders will be issued as Construction Documents.

The CM may take the DPs and split them into tender packages to secure the sub-contractors necessary to undertake each phase and sub-phase of the sub-Project. The CM will review the tender packages submitted by the Design Team to ensure completeness and provide comments and suggestions for revisions.

The Consultant must revise and optimize the individual work flow of each Design Team member to meet schedule requirements and shorten durations. The Design Team must produce Drawings generated from the Model with coordinated and interference free relationships between elements and the location of the elements, the name or identity of the elements, the dimensions of the elements, the shape and form of the elements and the details required to execute and achieve the intended results.

DPs must be prepared in accordance with Project Brief Appendix A – Guide to Preparation of Construction Documents. DPs must describe the products, materials, standards, equipment, construction systems, methods and processes and level of workmanship required. Specifications must describe the physical and environmental conditions to be created and maintained in work areas, on-site, in adjacent work areas or off-site. Specifications must indicate the procedures for contract administration to control and Monitor the quality of the work, performance verification requirements, and the reporting of work progress.

Translation of Design Packages is dependent on the language of the CM's prequalified subcontractors. If required, translation Services will be treated as a disbursement to the Consultant's Contract.

14.2 Design Services

The Consultant must ensure congruency and coordination between all DPs and:

- a) Confirm the content and timing of each DP with the Project Team;
- b) Coordinate with the CM on the scope and content of each DP submission;
- c) Coordinate and integrate all the submissions of the Design Team;

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- d) Define commissioning procedures, construction monitoring requirements, performance expectations, consultant led and contractor led training sessions, requirements for operating and technical maintenance manuals, post-construction monitoring, and record Drawings/Model;
- e) Submit DPs, conduct design charrettes (constructability workshops) and respond to DP comments in accordance Project Brief Appendix D – PROCESS MAPS;
- f) Coordinate and integrate all DP submission review comments;
- g) Confirm the format of the Model, Drawings and Specifications and comply with the stipulated requirements for the sub-Project;
- h) Confirm the format of the Drawings and Specifications and comply with the stipulated requirements for the Project;
- i) Confirm Drawing and specification format requirements with CM for paperless site-wide distribution and use by sub-trades and the Project Team;
- j) Update the Design Team's design production schedule and ensure coordination with the CM's construction schedule; and
- k) Provide all technical support required for the CM when the CM splits the DPs into the tender packages such as content, Cost estimates, unit prices, etc.

14.3 Design Package Content

The Consultant must, for each DP, use graphical information to generate from the Model discipline-specific Drawings complete with elevations, sections, details and schedules. The Consultant must create Project-specific Specifications for each DP.

14.3.1 Investigations

The Consultant must prepare complete DP Drawings and Specifications for:

- a) All investigations; and
- b) All temporary work, temporary protection, and temporary systems, including alterations and maintenance requirements, as applicable.

14.3.2 Regulatory

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Final code data summary for NBC, OBC, CSA, environmental and other applicable codes, standards and regulations;
- b) A table of equivalent codes when conflicting requirements exist;
- c) Authorities having jurisdiction review reports, recommendations and approvals; and
- d) Updates to the design intent brief.

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14.3.3 Geotechnical Design

The Consultant must complete the DP Drawings and Specifications to include:

- a) Excavation method and support;
- b) Underpinning and support including detailed design;
- c) Protection of existing structures;
- d) Dewatering requirements;
- e) Foundation system requirements;
- f) Existing infrastructure that may interfere with proposed works;
- g) Mitigation measures required to deal with all technical issues;
- h) Subsurface conditions; and
- i) Updates to the design intent brief.

14.3.4 Environmental Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Hazardous soils and non-hazardous materials, management and/or removal Specifications that reflect the legislative requirements and sustainable development objectives;
- b) Environmental protection Specifications to ensure, among other items, that nesting birds, tress remain protected at all times;
- c) Define sub-Project-specific environmental protection, testing and/or Monitoring requirements, Site water treatment, and follow-up on/obtain environmental permits;
- d) Provide ongoing auditing and reporting of designated and non-designated substances; and
- e) Updates to the design intent brief.

14.3.5 Site Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Site Drawings including property line with dimensions, benchmarks, existing structures, new structures, site improvements, fencing, roads, streets, drainage, rights of way;
- b) Municipal infrastructure, subsurface and above grade components or systems. Describe capacities and limitations. Include flow-through systems;
- c) Underground utilities relocation;
- d) Environmental features including sustainable design strategies;
- e) Existing conditions site Drawings;
- f) Removals Drawings;

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- g) Landscaping Drawings;
- h) Layout Drawings;
- i) Grading and drainage Drawings;
- j) Signage Drawings, include those required for temporary works;
- k) Planting Drawings;
- l) Cross sections, elevations, sections, schedules, details of critical areas for all of the above Drawings, fully dimensioned;
- m) Details to show type of material, size, layout pattern (if applicable), railings, tactile markers for accessibility, and other related elements on the site;
- n) Updates to the design intent brief.

14.3.6 Architectural Design

14.3.6.1 Building Program

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Programmatic accommodation, including horizontal and vertical zoning diagrams;
- b) Spatial relationship diagrams;
- c) Final storage analysis;
- d) Area calculations and analysis; and
- e) Update the design intent brief.

14.3.6.2 Building Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Floor Drawings including walls, floor elevations and grade elevations at building line, construction to remain, references to other details and elevations, room names (subject to security requirements), room numbers, door swings and numbers, window numbers, floor materials, plumbing fixtures, built-in fixtures, stairs, special equipment, vertical transportation, legend as required, dimensions;
- b) Roof Drawings including roof outline, overall dimensions, setbacks, slopes, drainage, reference to other Drawings and details, roof materials, penetrations and roof mounted equipment;
- c) Reflected ceiling Drawings including partitions extending to and through the ceiling, ceiling material and grid lines, ceiling heights, location of all lights including exit lights, diffusers, access panels, speakers, sprinklers, all other equipment and ceiling penetrations, expansion joints;
- d) Exterior elevations including structural grid centre lines, vertical dimensions, floor-to-floor heights, opening heights, references to other Drawings and details, floor lines, elevations of

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major elements, grade lines, foundation lines, materials, windows, doors and all other openings, symbols for window/door schedule, gutters, signs;

- e) Building sections including dimensions to grid centre lines, face of wall dimensions to other components, vertical dimensions from foundations to parapet relating all elements to top of structural members, materials, all connection methods, mechanical and electrical elements shown schematically, roof construction, floor construction, foundation construction;
- f) Interior elevations including vertical dimensions to critical elements, reference to other Drawings and details, openings in walls, wall finishes, built-in fixtures, location of switches, and all wall mounted equipment;
- g) Schedules including room schedule, door schedule, window schedule, hardware schedule and schedules for all architectural work, louvers and equipment;
- h) Detailed drawings of all signage, including proposed messaging, palette, materials, mounting and locations for all interior and exterior signage;
- i) Temporary structures, partitions, physical, dust and water protection, mechanical and electrical systems, construction constraints and sequencing;
- j) DP documents for mock-ups;
- k) Temporary maintenance requirements for building components and systems during construction and for 12 months after achieving of Substantial Performance for the sub-Project.
- l) Requirement for service call-back with stipulated response times;
- m) Construction and post construction building component and system monitoring systems including all details and specifications; and
- n) Updates to the design intent brief.

14.3.6.3 Laboratory Casework and FF&E Design

The Consultant must complete the laboratory casework and FF&E DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Final layout of all laboratory casework, furniture, case goods, workstations, support and special purpose spaces;
- b) Final location and identification of all equipment;
- c) Final window treatments cross-references as required to electrical Drawing, if electrical fed;
- d) For colour schemes approved at DD, prepare and submit a final finishes presentation board(s) for all laboratory casework and furniture;
- e) Confirmation of all component counts, fittings and all accessories;
- f) Confirmation, location and number of all electrical, telephone, data and video layouts;
- g) A report with narrative and graphic representation of all laboratory casework and furniture finishes, including samples and Specifications for all laboratory casework furniture, fittings, window coverings and accessories requirements;

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- h) Laboratory casework, furniture and equipment Drawings based on final layout coordinated with architectural, mechanical and electrical disciplines;
- i) Mechanical and electrical space and location requirements on the final equipment, laboratory casework and furniture Drawings. Ensure the mechanical and electrical Drawings accurately reflect the laboratory casework, furniture and equipment layout including:
 - i. Final lighting layout;
 - ii. Final location of light switches and controls;
 - iii. Final location of HVAC controls;
 - iv. IT, multi-media and security systems devices and wiring attachments;
 - v. Plumbing location and space requirements; and
 - vi. Additional cooling and exhaust location requirements;
- j) Elevations of all special purposed areas to reflect locations of electrical end devices including plugs, controls, switches based on final equipment, casework, and furniture layout Drawings; and
- k) Updated BCM listings that are completely integrated into the Model; and
- l) Updates to the design intent brief.

14.3.6.3.1 Laboratory Casework and FF&E Procurement

The Consultant must:

- a) Minimize the number of DPs and procurement groups;
- b) Ensure DPs are prepared as agreed by the DR;
- c) List sample components and equivalent mandatory technical criteria for evaluation;
- d) Produce laboratory casework, furniture and equipment lists, provide to and advise the CM of installation requirements detailed in Specifications;
- e) Include DP-specific installation Drawings showing delivery Site, path of travel, and final installation locations;
- f) Review and obtain approval by the DR of CM for delivery and installation Drawing. The CM will coordinate delivery, access and installation of laboratory casework, furniture and equipment; and
- g) Review the procurement schedule with the CM and DR. Adjust as required to meet construction operations' requirements.

14.3.6.4 Sustainable Design

The Consultant must complete the sustainable design requirements and ensure sustainable requirements are coordinated and detailed in individual design discipline Drawings and Specifications, based on updated information in the Model, and:

- a) Update and report upon sustainable design strategies and budgets;

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- b) Reconfirm that materials and equipment selected, reflect the analysis and energy consumption profiles established at DD;
- c) Maintain an ongoing and updated database of equipment to enable Modeling at end of construction and end of warranty period for validation of achieving the sustainable objectives; and
- d) Update the design intent brief.

14.3.6.5 Acoustic Design

The Consultant must ensure acoustic requirements are coordinated and detailed in individual design discipline Drawings and Specifications, based on updated information in the Model, and include:

- a) All calculations for acoustical and equipment selection with the 100% submission. Index and provide calculations in a format suitable to the DR;
- b) Acoustic construction requirements for all applicable disciplines (Drawings, sections, details, Specifications) and performance verification requirements; and
- c) Updates to the design intent brief.

14.3.7 Building Envelope Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Substructure Drawings, including foundations and below grade work;
- b) Interiors, including interior construction, protection;
- c) Services, including, fire protection, electrical and mechanical, building automation, hygrothermal or other envelope monitoring during construction and post-construction (coordinate with structural and other disciplines);
- d) Building envelope Drawings and sections including walls, roofing, windows, doors, stonework, damp proofing, waterproofing, flashing, building insulation, caulking and sealants, finishes, etc., and showing structural members;
- e) Performance Specification for scaffolding and enclosure system, and temporary support requirements;
- f) Detail directions for envelop cleaning: including the cleaning process and methodology;
- g) Exterior lighting Drawings with components, connection details, envelope penetration details and Specifications cross-references as required to electrical Drawings;
- h) Detailed Drawings and directions on mock-ups, if any;
- i) Detailed Drawings and directions for the repair or replace of windows;
- j) Thermographic scan of the entire envelope in winter conditions at least 6 months after reaching Substantial Performance of the sub-Project;
- k) Detail directions on unit price, fixed price, work and measurements for payment;

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- l) Support data, studies, calculations;
- m) Special construction and dismantling requirements;
- n) All calculations for building science design and equipment selection with the 100% submission. Index and provide calculations in a format suitable to the DR; and
- o) Updates to the design intent brief.

14.3.8 Structural Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Substructure and superstructure Drawings, rebar layout, framing Drawings, structural sections, details, seismic reinforcing schedules and connection details, all temporary structural bracing/shoring requirements complete with timing and sequencing of bracing/shoring and all loads;
- b) Component/assembly repair or replacement Drawings, schedules and connection details, all temporary structural bracing/shoring requirements complete with timing and sequencing of bracing/shoring associated;
- c) Special construction and demolition details including structures, hazardous materials abatement;
- d) Updated load calculations and include all calculations for structural with the 90% submission. Index and provide calculations in a format suitable to the DR;
- e) The Monitoring plan DP to clearly define the scope of work, details, and information to complete the installation, operation and maintenance of Monitoring systems; and
- f) Updates to the design intent brief.

14.3.9 Mechanical Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Plumbing, HVAC, and fire protection Drawings including location of equipment, layout of ductwork, pipes fixtures and all other components, plumbing isometrics, fire protection components, layout and details for all mechanical rooms, details all connections and support, equipment schedules;
- b) DP documents for mock ups, if any;
- c) Updated building load calculations, energy consumption per system and totalized for each utility for 50% and 90% submissions ensuring the analysis is reflective of the mechanical sequences of operation per system;
- d) All calculations for mechanical, and equipment selection with the 100% submission. The calculations will be indexed and provided in a .pdf format suitable to the DR; and,

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- e) EMCS network architecture, control schematics per system and zone, sequence of operation per system and zone, alarm thresholds, DDC input and output point schedules for each mechanical system; and
- f) Updates to the design intent brief.

14.3.10 Electrical Design

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Electrical Drawings including: power Drawings; lighting Drawings; IT, multi-media, and security system Drawings; one-line diagrams per system; transformer, equipment and fixture schedules; building automation Drawings per system and zone; pathways and service infrastructure Drawings; electrical and telecommunications room Drawings with equipment layout, elevations, and details;
- b) Safety label information, in accordance with CSA Z462, for all panel boards, motor control centres, switchgear, and major electrical equipment;
- c) DP documents for all mock ups;
- d) Updated building load calculations, energy consumption per system and totalized for each utility for 50% and 90% submissions ensuring the analysis is reflective of the electrical sequences of operation per system;
- e) All calculations for electrical and equipment selection with the 100% submission. The calculations will be indexed and provided in a format suitable to the DR, provide in pdf format;
- f) EMCS network architecture, control schematics per system and zone, sequence of operation per system and zone, alarm thresholds, input and output control point schedules for each electrical system; and
- g) Updates to the design intent brief.

14.3.11 Commissioning and Property Management

The Consultant must complete the DP Drawings and Specifications, based on updated information in the Model, to include:

- a) Final commissioning plan, performance verification procedures for components, systems and integrated systems within each specification subsection. Include expected testing results and maintenance management information for each piece of base building equipment and each system, and for integrated systems. Include seasonal commissioning testing, adjusting and reporting requirements;
- b) Timing and requirements for integrated systems (life safety compliance) tests before Substantial Performance of the sub-Project;
- c) Tests to be conducted at manufacturer's plants, on-Site during construction, installation, commissioning on-Site and during the operation phase;

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- d) Infra-red scans of the entire electrical system under full load (occupied) conditions 10 months into warranty period;
- e) Training requirements for operations and maintenance personnel;
- f) Materials and construction processes specifications to meet sustainable development objectives and commissioning requirements;
- g) Final Building Management Plan and operating requirement annual Costs, labour requirements for operation, maintenance contract type and requirements; utility and property tax Costs; and
- h) Updates to the design intent brief;

14.4 Design Package Submission Requirements

14.4.1 50% Complete Design Package Documentation

The Consultant must provide the following for each DP:

- a) An updated design coordinated and BIM clash detection identified and resolved;
- b) Drawings: view plans, elevation plans, perspectives, cross-sections with coordinated details, device identification and information, etc. and Specifications;
- c) Preliminary performance requirements per Specification sub-section with, as applicable, independent testing and verification requirements;
- d) Preliminary listing of goods and materiel requirements;
- e) Preliminary unit rate tables for goods and materiel;
- f) Draft Division 01 Specifications;
- g) Preliminary code summary including an equivalent matrix for each applicable code. Where codes differ, include a comparison table to highlight the differences/equivalencies;
- h) Preliminary Drawings and Specifications for all demolition, temporary protection, bracing, supports, etc., including installation sequencing; and
- i) Updated Critical Path and milestone schedules for design activities.

14.4.2 90% Complete Design Package Documentation

The Consultant must prepare each 90% complete DP that will be fully coordinated and integrated and include specifications. This includes:

- a) An updated design coordinated and BIM clash detection identified and resolved;
- b) Extensively detailed Drawings (view plans, elevation plans, perspectives, detailed cross-sections, device identification and information, etc.) and Specifications with the majority of dimensioning incorporated;
- c) Detailed performance requirements per Specification sub-section with, as applicable, independent testing and verification requirements;
- d) Extensively detailed schedules material requirements;

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- e) Extensively detailed unit rate tables for materials;
- f) Extensively completed Division 01 Specifications;
- g) Detailed code summary including an equivalent matrix for each applicable code. Where codes differ, include a comparison table to highlight the differences/equivalencies;
- h) Finalize all code exemptions, including rationale, approval body, approved decisions;
- i) Extensively detailed Drawings for all demolition, temporary protection, bracing, supports, etc., Monitoring, including installation sequencing;
- j) Updated Critical Path and milestone schedules for design activities;

14.4.3 100% Complete Design Package Documentation

The Consultant must prepare each 100% DP that is fully coordinated and integrated and includes:

- a) An updated design coordinated and BIM clash detection identified and resolved;
- b) Final signed and sealed original Drawings (view plans, elevation plans, perspectives, detailed cross-sections, device identification and information, etc.) and Specifications that are fully dimensioned;
- c) Final performance requirements per Specification sub-section with, as applicable, independent testing and verification requirements;
- d) Final schedules and material requirements;
- e) Final unit rate tables for materials;
- f) Final Division 01 Specifications;
- g) Final Drawings and Specifications for all demolition, temporary protection, bracing, supports, etc., Monitoring, including installation sequencing and performance requirements;
- h) Data, studies, detailed calculations, etc. that are fully indexed for final review and records for all disciplines; and
- i) Updated Critical Path and milestone schedules for design activities

14.5 Approvals

The Consultant must:

- a) Conduct subject matter and DP workshops to discuss and obtain approval of DP scope with the DR, CM and Science Partners;
- b) Through the CM, provide clarification to and, if required deliver presentations to, municipal officials and other Authorities having jurisdiction to obtain required approvals and permits; and
- c) Integrate recommendations and feedback in DP production.

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15 TENDERING SERVICES

15.1 General

The Consultant's must:

- a) Prepare pre-qualification requirements in collaboration with the DR and CM;
- b) Attend bidders' briefing meetings for pre-qualification, as required by CM;
- c) Analyze and respond to questions during the pre-qualification of suppliers and during DP tendering. Provide the DR and CM with responses within two days of question, or as agreed by the DR;
- d) Update the Model and Specifications based on bidders' questions. Provide the DR and CM with addenda inclusive of all information required by bidders to fully interpret the tender documents. CM will issue all addenda to bidders;
- e) Maintain a record of all inquiries directed to DR and CM during the bidding period and submit the record to the DR and CM at the close of bidding for future audit;
- f) Assist in the evaluation of tenders by providing advice on the following:
 - i. The completeness of the tender response in all respects;
 - ii. The technical/design aspects of the tenders;
 - iii. The effect and suitability of alternatives and qualifications that may have been included in the tender. Revise the Model as required to reflect any impact of accepted alternates or qualifications;
 - iv. The tenderer's ability to undertake the scope of work;
 - v. The availability of adequate qualified labour, equipment and materials to do the work; and
 - vi. Participate in the bid variation analysis between bids and the latest Class 'A' estimate; and
- g) Through the CM, follow up with municipal officials until permits are obtained. Provide a summary of follow-up meetings with municipal officials regarding the status of building permit applications.

15.2 Retender as required

The Consultant must:

- a) As required and approved by the DR, redesign and reissue DP, updating the Model and Specifications as necessary to bring the Cost within the stipulated limits; and
- b) If required, in coordination with the CM, prepare and submit a detailed narrative of the implications for retendering, including Cost impacts and the risk implications and proposed mitigations.

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15.3 100% Construction Documents Issued-for-Construction

The Consultant must, in collaboration with relevant disciplines, the CM and the DR:

- a) Prepare and update DPs to include all revisions resulting from the addenda issued during the tender period;
- b) Confirm in writing to the CM and DR that all addenda have been integrated into the tender documents to be issued for construction, that the Model is fully updated and coordinated with all component and system clashes resolved, and updated Specifications reflect all addenda; and
- c) Sign and seal all “Issued-for-Construction” documents (Drawings and Specifications) within five working days of the issuance of the last addendum. Provide one reproducible copy of the complete DP (or tender documents as applicable).

15.4 Laboratory Casework and FF&E

The Consultant must update the BCM and the Model with the final make, model, and description of all awarded laboratory casework and FF&E components within 10 working days of contract award.

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16 SITE SERVICES

16.1 Intent

Site Services are an essential aspect of the Consultant's mandate. These Services are the primary focal point for the Consultant's production input to and in support of construction operations. The congoing flow of accurate and coordinated information to and from the construction site will ensure a very high level of design and construction sequencing and productivity.

The Consultant's Site Services team must have the authority, ability and capacity to immediately respond to evolving situations on all parts of the Site, coordinating Site information with ongoing design production, and providing immediate access to design direction to the CM for all Site matters of construction and temporary protection, work sequencing, shoring, etc.

The Consultant must provide highly experienced, multi-disciplinary team of licensed and non-licensed professionals well-orchestrated and coordinated to respond in real time. Lead by a highly experienced and licensed Architect or Engineer, the Consultant's Site Services team must adapt in composition as the overall Project advances and include administration support. The Consultant's human resources plan (section 10.2.1, paragraph f) must reflect the Site Services required by discipline, by sub-Project stage.

16.2 General Services

The Consultant must, in full coordination with all relevant members of the Design Team, CM and DR:

- a) Coordinate and manage all Consultant's Services, activities and communication at the Site;
- b) Lead the design and instruct the CM in all investigation activities by planning, coordinating and scoping investigation DPs, reflecting the prioritized information requirements of the Design Team and CM in order to meet schedule milestones. Services include:
 - i. Coordinating all Design Team information and efforts;
 - ii. Preparing and issuing CM DPs;
 - iii. Managing, administering, accurately compiling data, for each investigation element;
 - iv. Coordinating and validating all Site investigation findings to ensure accuracy and completeness of information, relaying the findings to the Design Team, the CM, and the DR within 36 hours of each investigation; and
 - v. Survey as-found conditions for each building assembly and Site element affected by investigations, demolition, reconstruction, temporary roads and paths, and other construction activities, linking the as-found conditions to the existing survey network to create a comprehensive and coordinated Model;
- c) Address the DR's technical and the CM's constructability review comments for suitability to ensure appropriate design production integration. Services include:
 - i. Understanding the design intent, design direction, scope mandate, design assumptions, and design limitations;

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- ii. Assessing, discussing and reporting of construction sequencing options, risk assessments, material substitutions, and life-cycle considerations for materials, components and systems; and
 - iii. Providing formal written response to the CM and the DR for all constructability comments;
- d) Participate in formal design and construction meetings and technical meeting and workshops as per Project Brief section 10.1.1 – Meetings and Workshops;
- e) Provide ongoing Services, with monthly summaries, to include:
 - i. Managing, coordinating and controlling all design production documentation to and from the site for accuracy and completeness on an ongoing basis;
 - ii. Coordinating with the CM and Design Team, providing supplemental information required by the municipality or other Authorities having jurisdiction to resolve design issues related to any permit;
 - iii. Responding to submittals and Requests for Information (RFI) from the CM, suppliers and subcontractors, or the DR with accurate, coordinated and complete information as per Project Brief Appendix D – PROCESS MAPS. Submittals include shop Drawings, samples, mock-ups, test reports, and demonstrations for all submittals requiring the Consultant's review and approval. Manage requests by:
 - 1. Establishing a submittal and RFI review, approval and response framework based on submittal or RFI importance, with the input and the acceptance of the CM and DR. Include a mechanism to reclassify importance when required;
 - 2. Confirming the degree of importance of each RFI or submittal on receipt from the CM;
 - 3. Prioritizing responses so that schedule critical responses by the Design Team are provided by the critical date established by the CM;
 - 4. Validating that the Model Element data file provided matches the submittal being reviewed and approved and retain the Model Element data file. Upon approval of the submittal, immediately update the Model with the approved Model Element data file; and
 - 5. All RFIs must be responded to within 5 working days. If the consultant requires more than 5 working days, they are to notify the DR in writing within 2 days of receiving the RFI and provide a timeline for response for review and approval by the DR.
 - iv. Reviewing the construction routinely, daily if and when required, interpreting design information and ensuring construction as per the design intent.
 - v. Providing the CM with direction and rejecting work that does not conform to DP or approved performance requirements, notify the DR immediately;
- f) Provide field clarifications within 2 working days of issue identification, or when required by the CM as per Project Brief Appendix D – PROCESS MAPS;

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- g) Prepare and issue in a timely manner to the CM accurate and coordinated DPs, supplementary instructions, notices, contemplated change notices, Change Orders. The Consultant must ensure that:
 - i. Detailed quotations with price support that reflect all aspects of the proposed work and, if not, return the quotation to the CM, indicating which elements of the quotation are problematic;
 - ii. Alternative solutions proposed are thoroughly assessed for compatibility and viability;
 - iii. Quotations, alternative design solutions, contemplated change notices, and change orders are reviewed by all relevant Design Team disciplines within 5 working days or less, or with the approval of the DR within an agreed timeframe;
 - iv. Quotations only include rates for personnel and percentage mark-ups provided for in the CM's contract; and
 - v. After comprehensive review and verification, recommend to the DR if the quotation is complete, fair, and reasonable;
- h) Update the Model and reissue the Issued-for-Construction DPs every 3 months or more frequently if requested by the DR to incorporate all supplementary and site instructions and change orders;
- i) Analyze and report monthly on all activities of the construction and construction schedule for viability, including the status of all design activities relative to the construction schedule. Ensure ongoing design production is fully coordinated with tendering schedules. Report potential design production gaps and mitigation measures to the CM and the DR within 5 working days of the end of each month;
- j) Analyze and report on the CM's proposed sub-contractor productivity measurement methodology before tender. Make suggestions to the CM and DR for productivity measurement improvements. Confirm productivity measurement methodology is included within each sub-contractor tender before tender. Advise the CM and DR of each sub-trade productivity measurement methodology;
- k) Report monthly or more frequently if warranted on any proposed blasting procedures, if any. Inform the CM and the DR in writing immediately of any conditions that require immediate remedial measures;
- l) Review and confirm the completeness of the CM's estimate for each site instruction that attracts Cost, contemplated change notice, and change order;
- m) Validate, from the Design Team's perspective, potential impact to the sub-Project scope, time, Cost, and risk related to the site instruction, contemplated change notice, and change order;
- n) Validate, from the Design Team's perspective, potential CM or subcontractor claims;
- o) Validate material types and quantities related to unit price work;
- p) Validate the CM's work and services completed monthly;
- q) Review and recommend to the DR for payment the CM's progress payment applications for accuracy and completeness. Advise within 2 working days of receipt. Establish an acceptable process with the CM and to the satisfaction of the DR for the measurement and validation of

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materials, equipment and labour in advance of each progress payment application. Assess equipment and material types and quantities against approval submittals. Certify the degree of completion of all aspects of the construction. Confirm to the DR that applications for progress payment are complete and only reflect the work that has progressed to the date of the invoice; and

- r) Provide input to the CM's lessons learned related to the construction.

16.3 Model-Related Services

The Consultant must provide sub-Project specific Model operators at the Site capable of laser scanning, compiling point-cloud data, 24 mega-pixel high-resolution photogrammetry (referred herein as photogrammetry), and integration of point-cloud data and photogrammetry into the Model, printing and plotting capability are mandatory to support the daily design coordination, construction and administration effort.

Laser scanning and photogrammetry equipment, calibration and maintenance are a disbursement to the Contract. Obtain the approval of the DR prior to acquiring the equipment. Equipment must be secured and protected at all times. A protocol for equipment access and storage must be developed and maintained. Revise as required to the approval of the DR.

The Consultant must ensure Model updates and interdisciplinary coordination, are performed weekly or more often depending on the criticality of the information. Provide the CM and DR all related information. Identify, prioritize and resolve the building component and systems interferences.

The Consultant must:

- a) Manage and perform detailed construction laser scanning, photogrammetry, and compile and incorporate point-cloud data and photogrammetry into the Model for each building assembly and Site element affected by investigations, temporary protection, blasting, shoring, construction Monitoring systems, and other construction activities. The Consultant must include:
 - i. Information describing the physical configuration, ongoing modification, and condition of the building assemblies or Site elements;
 - ii. Verifications and updates to existing Model information, include building elements, components, sensors, etc. and their actual interoperability in the as-built Model;
 - iii. Temporary protection, shoring, and other design direction;
 - iv. Data collected as per the vibration, structural, and other component/systems Monitoring as appropriate;
 - v. All interventions, including but not limited to:
 - 1. Typical and unique assembly (walls, floors, doors, windows, etc.) and sub-grade compositions;
 - 2. Typical and unique assembly connections, including composition;
 - 3. Typical and unique window jamb, head and sill connection with its adjacent wall;

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4. Typical and unique door jamb, head and sill connection with its adjacent wall;
5. Various materials of the wall, floor, window, and door composition;
6. Quantities of the various elements by measuring their thicknesses. In cases where the thickness may vary, a maximum and minimum dimension must be measured and recorded in the Model;
7. Laser scan, photograph, compile point-cloud data, and incorporate all data into the Model of each as-constructed sub-Project element before concealment and in its final state. Ensure the as-built Model reflects the actual orientation, anchoring, interconnection, and attachment of each building component and system.

16.4 Laboratory Casework and FF&E Services

The Consultant must:

- a) Coordinate with the CM and the DR the laboratory casework and FF&E delivery and installation schedule, including integration into and coordination with the overall construction schedule;
- b) Initial Inspection: For all deliveries to Site, be present to complete an initial inspection of deliveries against the packing slip. Either accept or reject deliveries to Site. Track all deficiencies with a written and visual description in an inspection report. Update the inspection report daily throughout the delivery period;
- c) Final Inspection: Coordinate with the CM on where to relocate items accepted on Site to the final location. Complete a final inspection and issue the Inspection Report. Develop and use a standard inspection report template accepted by the DR; and
- d) Coordinate rectification of delivery and installation deficiencies to the satisfaction of the DR.

16.5 Environmental Monitoring Services

Environmental Monitoring Services are an integral aspect of the Consultant's Site Services and, as such, must be fully coordinated and integrated with the Services outlined in Project Brief sections 16.1 - Intent and 16.2 – General Services.

The Consultant must:

- a) Visit the site to confirm with the DR and CM details of:
 - i. Construction Site size and layout;
 - ii. All environmental protection measures include specific tree or nesting bird protective measures or construction start-stop periods;
 - iii. All hazardous materials and, if applicable, water related work;
- b) Participate in environmental protection kick-off meetings with the CM to communicate intent and scope of environmental protection, contaminated material removal and/or handling requirements, as well as requirements for non-hazardous materials;

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- c) Define and update as required Design Team and the CM's construction worker protection requirements, protocols and procedures for investigations, geotechnical and hazardous materials and water handling, treatment, and removal work;
- d) Provide, as appropriate, real-time Monitoring and assessment Services during the investigations and the handling and removal of contaminated materials, ensuring compliance defined protocols and processes and with environmental protection and permitting requirements;
- e) Report Monitoring results within 24-hours of sample collection, with results posted on site in accordance with prescribed regulations. Advise the DR and CM in writing immediately of any conditions where the Monitoring indicates a health risk to the public or construction personnel;
- f) Provide daily Site visit reports for all Site visits. Reports must include detailed sub-Project information, work-Site observations, assessment of compliance with regulations and recommended procedures for working in hazardous substances work areas, and all contract information necessary for document tracking;
- g) Inform the CM and the DR in writing immediately of any conditions that require immediate remedial measures;
- h) Provide hazardous material bulk sampling and analyses for materials discovered during the implementation of hazardous materials work; and
- i) Attend design and construction meetings, as per Project Brief section 10.1.1 – Meetings and Workshops, to discuss sampling or Monitoring issues as required until all hazardous materials are removed.

16.5.1 Testing and Sampling

The Consultant must:

- a) Consult with the DR and CM to determine a protocol for sampling and testing;
- b) Prepare and implement a work plan for testing methodology and frequency to the approval of the DR; and
- c) Revise and resubmit to the DR and CM when required.

16.5.2 Transmission Electron Microscopy

The Consultant must:

- a) Perform Transmission Electron Microscopy (TEM) verification analysis of any Phase Contrast Microscopy (PCM) air sample taken during the implementation of the work as may be appropriate considering the Site activities; and
- b) Perform TEM verification analysis due to occupant-worker concern or due to elevated airborne fiber concentrations noted during PCM sampling.

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16.5.3 Polarized Light Microscopy

The Consultant must:

- a) Perform Polarized Light Microscopy (PLM) to determine if building materials contain asbestos;
- b) Interpret results to determine appropriate abatement methodologies; and
- c) Perform PLM analysis if previously non-sampled materials are revealed during demolition and abatement activities.

16.5.4 Air and Material Sampling

The Consultant must:

- a) Provide at least two blank field cassettes for laboratory analysis or ten percent (10%) of the total samples taken, whichever is greater for all PCM, TEM or PLM air sampling;
- b) Prepare a written report that includes all findings for each day following a Site visit or the collection of air samples,
- c) Ensure that an accredited operator analyzes all collected air and material samples. Use calibrated air sampling equipment only;
- d) Provide records of regular equipment calibration and proper equipment maintenance. Testing equipment must remain at the Site; and
- e) Provide logbooks for calibrations and calibration of testing equipment.

16.6 Commissioning Services

The Consultant must ensure compliance with and implementation of the commissioning plan and training program by:

- a) Assembling, reviewing and approving all commissioning documentation including installation check lists, performance verification report forms, performance verification procedures, instruments to be used and instrument calibration and incorporate relevant data from reviewed and accepted shop Drawings and installed component data;
- b) Witnessing and certifying tests conducted before concealment and start-up;
- c) Verifying each system is completed, safe to operate and ready to start-up;
- d) Ensuring that all deficiencies are rectified and notify the CM that the installed components and systems are ready for commissioning;
- e) Witnessing and certifying all testing, including testing off-hours or off-Site;
- f) Measuring and recording energy consumption per building system and by utility. Confirm sustainability targets for energy consumption are being met. Adjust systems or sequence of operations as required to meet approved sustainability objectives, while maintaining approved operational intent;

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- g) Planning and implementing a full-load system testing for each building system as a prerequisite to integrated systems testing. Identify and resolve deficiencies. Retest as required;
- h) Planning and implementing integrated systems (life safety compliance) testing as a condition precedent for Substantial Performance of the sub-Project. Ensure deficiencies to or from emergency power in a fire (water flow) condition. Resolve deficiencies and retest if necessary; and
- i) Updating the design intent brief to reflect each as-commissioned building systems.

16.7 Deliverables

The Consultant must:

- a) Provide monthly reporting of all Consultant activities, as separate sections, noting:
 - i. Progress and productivity of the design production and the construction;
 - ii. Quality of the construction work;
 - iii. Monitoring, inspection, commissioning, and if required blasting, procedures and reports;
 - iv. Information gaps, including when these must be resolved and who is to take the required action/decision; and
 - v. Potential opportunities and risks, including criticality and timing for resolution;
- b) Issue and maintain orderly and updated files at the Site for the use of the DR, including:
 - i. DPs;
 - ii. Issued-for-Construction documents;
 - iii. Approved submittals;
 - iv. Supplementary and site instructions;
 - v. Field clarifications;
 - vi. Contemplated change notices;
 - vii. Change orders;
 - viii. Certification of progress payment applications;
 - ix. Memoranda;
 - x. Inspection, testing and deficiency reports;
 - xi. Correspondence and minutes of meetings; and
 - xii. Names, addresses, telephone numbers of the DR, sub-consultants, CM key personnel and key sub-trade personnel, including home telephone numbers in case of emergencies;
- c) Provide environmental Monitoring work plans for testing methodology, including:
 - i. Emergency response protocol for sub-Project stakeholders;
 - ii. Equipment calibration and maintenance reports;
 - iii. Daily Site visit reports; and

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- iv. Sampling, testing, and Monitoring results report;
- d) Provide written comments for all CM constructability feedback;
- e) Finalize the Consultant's design intent brief before Substantial Performance of the sub-Project to reflect each as-commissioned building system;
- f) Provide signed documentation for Substantial Performance and Completion;
- g) Provide an as-built Drawing and as-built Specifications of the built work prior to Science Partner occupancy.

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17 POST-CONSTRUCTION SERVICES

17.1 Seasonal Commissioning

The Consultant must:

- a) Revise the commissioning plan as required to meet seasonal commissioning requirements. Conduct all seasonal commissioning activities, testing, adjusting, repairing, revalidating and reporting on each seasonal commissioning activity;
- b) Witness all testing, including tests during evenings and weekends. Submit reports to the CM and DR and within five days of each activity.
- c) Instruct CM to correct any deficiency, agreeing on appropriate schedule for correction with the CM and DR. Inspect, laser scan, photograph and report on all deficiency repairs prior to concealment or within five days of repair completion if concealment is not a requirement. Compile point-cloud and photogrammetry data and update the Model within two weeks;
- d) Confirm building and life safety system checks that must be carried out by the CM or Science Partner operations staff prior to the expiration of warranties;
- e) Measure and record energy consumption per building system and by utility. Confirm sustainability targets for energy consumption are being met. Adjust systems or sequence of operations as required to meet approved sustainability objectives, while maintaining approved operational intent;
- f) Validate procedure for electrical system infra-red scanning with CM prior to scan. Review results and provide CM with corrective instructions, if required. Confirm corrective measures are completed;
- g) Validate procedure for building envelope thermographic scanning with CM prior to scan. Review results and provide CM with corrective instructions, if required. Confirm corrective measures are completed;
- h) Ensure any modification to building components or systems are updated in the Model;
- i) Submit and obtain LEED/Green Globes certification; and
- j) Participate in a lessons-learned workshop with the CM, DR and Science Partners at a time approved by the DR.

17.2 Training

The Consultant must conduct Consultant-led training that provides an understanding of:

- a) The design and operational intent of systems;
- b) The limitations of systems; and
- c) Work not completed as part of the sub-Project, if any.

The Consultant must coordinate the dates of the training session(s) with the DR to organize the location and provide the lists of participants. Prepare a summary of each training session, indicate the session

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dates, subject matter and participants in attendance. Once training is completed, submit the training summary to the DR.

17.3 Manuals

The Consultant must:

- a) Review and validate the CM's sub-contractor 100% operations and maintenance manuals to ensure completeness and submit comments to the Commissioning Manager. Manuals must be in accordance with all modifications undertaken during the sub-Project. O & M manuals must include:
 - i. Workplace Hazardous Materials Information System (WHMIS) information, as a separate volume, containing all information relating to products used in building operations and maintenance. This manual is to be subdivided by supplier then by product, with detailed index;
 - ii. Inventory of spare parts, special tools, maintenance materials with instructions for use; and
 - iii. Warranty information by supplier;
- b) Review and validate the content of the CM's commissioning manual to ensure all commissioning activities (training, testing, etc.) are included and that as-commissioned results, necessary revisions, are detailed;
- c) Prepare Standard Operating Procedures (SOPs) per building system in accordance with relevant codes, standards and PWGSC's commissioning policy. Validate content with the CM and DR. Refined SOPs during the seasonal commissioning period to reflect as-commissioned components and systems;
- d) Prepare all information required for equipment labelling protocols;
- e) Make the revisions to commissioning documentation to reflect all changes, modifications, revisions and adjustments as finally determined upon the completion of the commissioning process; and
- f) Update the design intent brief to reflect seasonal commissioning adjustments.

17.4 Deliverables

The Consultant must provide and submit to the DR:

- a) Performance verification reports and compile Model updates for all seasonal commissioning activities to create a final as-built Model of the built work;
- b) Training reports for all training sessions;
- c) Verification that the CM O&M manuals are complete and accepted before the start of CM-led training;
- d) Standard Operating Procedures for each building system;
- e) LEED/Green Globes (sustainability) certificates;

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- f) Final design intent brief; and
- g) Post-construction evaluation and lessons learned reports.

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PROJECT BRIEF APPENDICES

APPENDIX A – GUIDE TO PREPARATION OF CONSTRUCTION DOCUMENTS

1. Purpose

This document provides direction for the Design Team in the preparation of DPs (i.e. Specifications, Drawings, and addenda) for PWGSC projects. The Design Team must incorporate Project Brief Appendix A information in this in preparing DPs.

Drawings, Specifications, and addenda are to be complete and clear, so that a Contractor can prepare a bid without guesswork. Standard practice for the preparation of DPs includes:

- a) Drawings, which are the graphic means of showing work to be done, as they depict shape, dimension, location, quantity of materials and relationship between building components; and
- b) Specifications, which are written descriptions of materials and construction processes in relation to quality, colour, pattern, performance and characteristics of materials, installation and quality of work requirements.

2. Principles of DPs for the Contract

Base DPs on common public procurement principles: open, fair and transparent solicitations.

3. Quality Assurance

The Design Team must undertake their own quality control process and will review, correct and coordinate (between disciplines) their documents before sending them to the CM.

4. Specifications

4.1 National Master Specification

The NMS is a bilingual system of master construction Specification sections, which is divided into 48 Divisions and used for a wide range of construction and/or renovation projects. In preparing Project Specifications, the Design Team must use the current edition of the NMS in accordance with the NMS “User’s Guide” and format requirements stipulated.

The Design Team retains overriding responsibility for content and must edit, amend and supplement the NMS as deemed necessary to produce an appropriate Project Specification free from conflict and ambiguity.

4.2 Specification Organization

Narrow scope sections describing single units of work are preferred for more complex Work; however, broad scope sections may be more suitable for less complex work. Either the NMS 1/3 - 2/3-page format or the Construction Specifications Canada full-page format can be utilized.

Start each section on a new page and show Project number, section title, six-digit section number and page number on each page. Specification date and Design Team discipline’s name are not to be

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indicated.

4.3 Terminology

Use the term CM instead of Engineer, PWGSC, Owner, Consultant or Architect. CM means the entity designated in the Project construction contract, and/or subcontract, or by written notice to the Contractor and/or subcontractor, to act as the representative for the purposes of the Project construction contract, and includes a person, designated and authorized in writing by the representative to the Contractor.

Notations such as; "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by the CM", must not be indicated in the Specifications as this promotes inaccurate and inflated bids. Specifications must permit bidders to calculate all quantities and bid accurately. If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices). Ensure that the terminology used throughout the Specifications is consistent and does not contradict the applicable standard DPs.

4.4 Dimensions

Dimensions must be in metric only. Dual dimensioning is forbidden.

4.5 Standards

As references in the NMS may not be the most current, it is the responsibility of the Design Team to ensure that Project Specification use the latest applicable edition. The following is a list of Internet websites, which provides the most current publications of standards for reference in the construction Specification document.

- a) CSA standards: <http://www.csa.ca>;
- b) CGSB standards: <http://www.pwgsc.gc.ca/cgsb>;
- c) ANSI standards: <http://www.ansi.org>;
- d) ASTM standards: <http://www.astm.org>;
- e) ULC standards: <http://www.ulc.ca>; and
- f) General reference of standards: <http://www.techstreet.com> ;

For the website addresses of other standards organizations and manufacturers associations, refer to the [Canadian National Master Construction Specification \(NMS\)](http://www.nrc-cnrc.gc.ca/eng/solutions/advisory/nms_index.html) (http://www.nrc-cnrc.gc.ca/eng/solutions/advisory/nms_index.html).

4.6 Specifying Materials

The practice of specifying actual brand names, model numbers, etc., is against PWGSC policy except for special circumstances. The method of specifying materials must be by using recognized standards such as those produced by Canadian Gas Association (CGA), Canadian General Standards Board (CGSB), CSA, and Underwriters' Laboratories of Canada (ULC), or by trade associations such as Canadian Roofing Contractors' Association (CRCA) and Terrazzo, Tile, Marble Association of Canada (TTMAC). Canadian standards must be used wherever possible.

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If the above method cannot be used and where no standards exist, specify by a non-restrictive, non-trade name prescription or performance-type Specifications.

If no standards exist and when a suitable non-restrictive, non-trade name prescription or performance-type Specification cannot be developed, specify by trade name. Include all known materials acceptable for the purpose intended, and in the case of equipment, identify by type and model number.

Acceptable Materials: set up the paragraph format as follows:

Acceptable Materials:

1. ABC Co. Model [_____].
2. DEF Co. Model [_____].
3. GHI Co. Model [_____].

The Design Team is responsible to review and evaluate all requests for approval of alternative materials.

The term “Acceptable Manufacturers” must not be used, as this restricts competition and does not ensure the actual material or product will be acceptable. A list of words and phrases that should be avoided is included in the NMS “User's Guide”.

Sole Sourcing: Sole sourcing for materials and work can be used for proprietary systems (i.e. fire alarm systems, EMCS systems).

Wording for the sole source of work must be in Part 1 as:

“Designated Contractor

- .1 Hire the services of [_____] to do the work of this section.”;

Wording for the sole source of EMCS systems must be in Part 1 as

“Designated Contractor

- .1 Hire the services of [_____] or its authorized representative to complete the work of all EMCS sections.”;

And in Part 2 as “Materials

- .1 There is an existing [_____] system presently installed in the building. All materials will be selected to ensure compatibility with the existing [_____] system.

Wording for the sole source of materials (i.e. fire alarm systems) should be in Part 2 as:

“Acceptable materials

- .1 The only acceptable materials are [_____].”

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Prior to including sole source materials and/or work, the Design Team must contact the DR to obtain the approval in writing for the sole sourcing.

4.7 Unit Prices

Unit prices are used only for unknown work (i.e. rock removal) and the approval of the DR and the CM will be sought in advance of their use.

Use the following wording:

[The work for this section] or [defines the specific work if required, e.g. rock excavation] will be paid based on the actual quantities measured on-Site and the unit prices stated in the CM's "Bid and Acceptance Form", or equivalent document.

Replace paragraph title "Measurement for Payment" with "Unit Prices".

Sample of Unit Price Table:

The unit price table designates the work to which a unit price arrangement applies.

- a) The "Price per Unit" and the "Estimated Total Price" must be entered for each item listed; and
- b) Work included in each item is as described in the referenced Specification section.

Item	Specification Reference	Class of Labour, Plant, or Material	Unit of Measurement	Estimated Quantity	Price per Unit HST extra	Estimated Total Price HST extra
TOTAL ESTIMATED AMOUNT <i>(Transfer amount to CM's bid and accept form)</i>						

4.8 Cash Allowances

DPs must be complete and contain all the requirements for the contractual Work. Cash allowances are to be used only under exceptional circumstances (i.e. utility companies; municipalities), where no other method of specifying is appropriate. The DR's approval must be obtained in advance to incorporate cash allowances and the section of the NMS will be used to specify the criteria.

4.9 Warranties

This Project will require a minimum 12-month warranty period. When necessary to extend beyond the 12-month warranty period provided for in the General Conditions of the Contract, use the following

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wording in Part 1 of the applicable technical sections, under the heading "Extended Warranty":

- a) "For the work of this Section [____], the 12-month warranty period is extended to xx months"; or
- b) Where the extended warranty is intended to apply to a particular part of a Specification section modify the above as follows: "For [____] the 12-month ... [____] months."

Delete all references to manufacturer's guarantees.

4.10 Scope of Work

Paragraphs must not include statements such as "Scope of Work".

4.11 Summary and Section Includes in Part - 1 of Section

Delete paragraphs identified as "Summary" and/or "Section Includes".

4.12 Related Sections

In every section of the Specification at 1.1 "Related Sections", coordinate the list of related Specification sub-sections and appendices. Ensure coordination among the Specification sub-sections and ensure not to reference any section or appendices that do not exist.

4.13 Index

List all the Drawings and Specification sections with correct number of pages and correct Drawing titles and section names. The format must be that presented in Project Brief Appendix A, Attachment B - Sample Index for Drawings and Specifications.

4.14 Division 1 Specifications

The scope and content of the Division 1 Specifications must be assessed by and agreed to between the Design Team and the CM, to the approval of the DR. Common sections that apply to the entire Specification will be prepared by the Design Team, such as environmental, sustainability, and commissioning Specifications. Other sections such as health and safety, work restrictions, etc. will be prepared by the CM.

The CM will combine the Design Team's and CM's Specifications to create a common 'front-end' document for the CM's tendering of the work.

4.15 Health and Safety

For all Project Specifications include NMS "Section 01 35 29.06 - Health and Safety Requirements." Confirm with the CM to determine if there are any instructions to meet specific Project requirements.

4.16 Designated Substances Report

Include Section 01 14 25 - Designated Substances Report

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4.17 Subsurface Investigation Reports

If required, subsurface investigation report(s) shall be included after Section 31, and the following paragraph added to Section 31:

Subsurface Investigation Report(s)

- .1 Subsurface investigation report(s) are included in the specification following this section.

If the Departmental Representative determines that it is not practical to include the subsurface investigation report(s), alternate instructions will be provided. Where tender documents are to be issued in both official languages, the subsurface investigation report(s) must be issued in both languages. In addition to providing the subsurface investigation report(s), the foundation information required by the current *National Building Code of Canada* (Division C, Part 2, 2.2.4.6) must be included on foundation drawings.

4.18 Experience and Qualifications

Remove experience and qualification requirements from Specification sections.

4.19 Prequalification

Do not include in the Specification any mandatory supplier and/or subcontractor prequalification requirements that could become a subcontract award condition. A prequalification process is required prior to tender of all specialty and major tenders.

There must be no references to certificates, transcripts or license numbers of a trade or subcontractor being included with the bid information.

4.20 Contracting Issues

Specifications describe the workmanship and quality of the work. Contracting issues must not appear in the Specifications. Division 00 of the NMS is not used for PWGSC projects.

Remove all references to the following:

- a) General instructions to bidders;
- b) General conditions;
- c) CCDC documents;
- d) Priority of documents;
- e) Security clauses;
- f) Terms of payment or holdback;
- g) Tendering process;
- h) Bonding requirements;
- i) Insurance requirements;

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- j) Alternative and separate pricing;
- k) Site visit (Mandatory or Optional); and
- l) Release of Lien and deficiency holdbacks.

4.21 Quality Issues

Ensure that there are no Specification clauses with square brackets “[]” or lines “_____” indicating that the spec is incomplete or missing information.

5. Drawings

5.1 Title Blocks

Use PWGSC title block for Drawings and sketches (including addenda).

5.2 Dimensions

Dimensions are to be in metric only (no dual dimensioning).

5.3 Trade Names

Trade names on Drawings are not acceptable.

5.4 Specification Notes

No Specification-type notes are to appear on any Drawing.

5.5 Terminology

Use the term CM instead of Engineer, PWGSC, Owner, Consultant, or Architect. CM means the entity designated in the Project construction contract, and/or subcontract, or by written notice to the Contractor and/or subcontractor, to act as the representative for the purposes of the Project construction contract, and includes a person, designated, and authorized in writing by the representative to the Contractor.

Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by the CM", must not be indicated on the Drawings as this promotes inaccurate and inflated bids. Drawings must permit bidders to calculate all quantities and bid accurately.

5.6 North Arrow

Include a north arrow on all plans. Orient all plans in the same direction for easy cross-referencing. Wherever possible, lay out plans so that the north point is at the top of the sheet.

5.7 Information to be included

Drawings must show the quantity and configuration of the Project work, the dimensions and details of

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how it is constructed. There must be no references to future work nor information that will be changed by a future addendum. The scope of work must be clearly detailed and elements not in the scope of the DP should be eliminated or kept to an absolute minimum.

6. Addenda

6.1 Format

Refer to Project Brief Appendix A, Attachment C - Sample Addendum Format. No signature-type information is to appear.

Every page of the addendum (including attachments) must be numbered consecutively. All pages must have the Project number and the appropriate addendum number. Sketches are to appear in the PWGSC format, stamped and signed.

No Design Team design discipline information (name, address, phone number, consultant project number, etc.) must appear in the addendum or its attachments (except on sketches).

6.2 Content

Each item must refer to an existing paragraph of the Specification or note/detail on the Drawings. The clarification-style of note is not acceptable.

7. Documentation

7.1 Translation

When required, all documentation included in the DP must be in both official languages. Obtain clarification of translation requirements from the Departmental Representative at the beginning of DP production. If required, ensure that English and French documents are equal in all respects. There can be no statement that one version takes precedence over the other.

The Design Team must provide:

- a) Per DP submission, a completed and signed Project Brief Appendix A, Attachment A - Checklist for the submission of Construction Documents;
- b) Specification: provide originals printed one side on 216 mm x 280 mm white bond paper, or in an acceptable format for mass printing;
- c) Index: as per Project Brief Appendix A, Attachment B - Sample Index for Drawings and Specifications;
- d) Addenda (if required): as per Project Brief Appendix A, Attachment C - Sample Addendum Format, for issue by the CM;
- e) Drawings: reproducible originals, sealed and signed by the Design Team's design authority; and
- f) Tender information:
- g) Provide a description of all units and estimated quantities to be included in unit price table(s); and
- i. Design Team must provide an electronic true copy of the final documents (Specifications and

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Drawings) on one or multiple CD-ROM in PDF without password protection and printing restrictions, or as agreed by the CM and DR. The electronic copy of Drawings and Specifications is for bidding purposes only and do not require to be signed and sealed.

The CM will provide:

- a) General and special instructions to bidders;
- b) Bid and acceptance form, or equivalent; and
- c) Construction documents.

8. Project Brief (PB) Appendix A - Attachments

PB Appendix A, Attachment A - Checklist for the submission of Construction Documents;

PB Appendix A, Attachment B - Sample Index for Drawings and Specifications; and

PB Appendix A, Attachment C - Sample Addendum Format.

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PB Appendix A: Attachment A:

Checklist for the Submission of Construction Documents

Date:		
Project Title:	Project Location:	
Project Number:	Departmental Representative:	
Design Team consultant's Name:	CM Representative:	
Design Package Review Stage: <div style="text-align: center; margin-top: 5px;"> 50% 90% 100% </div>		

Item	Verified by:	Comments
Specifications:		
1 Current edition of the NMS has been used.		
2a Either the NMS 1/3 - 2/3-page format or the Construction Specifications Canada full-page format is used.		
2b Each section starts on a new page and the project number, section title, section number and page number show on each page.		
2c Specification date and consultant's name are not indicated.		
3a Term CM is used instead of Engineer, PWGSC, Owner, Consultant or Architect.		
3b Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to", "equivalent to" and "to be determined on site by" are not used.		
4 Dimensions are provided in metric only.		
5 The latest edition of all references quoted is used.		
6a Method of specifying materials uses recognized standards. Actual brand names and model numbers are not specified.		
6b Identify if non-restrictive, non-trade name "prescription" or "performance" Specifications are used.		
6c Indicate if a list of acceptable materials has been used.		

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6d Term “Acceptable Manufacturers” is not used.		
6e Indicate if sole sourcing has been used.		
7 Unit prices are used only for unknown Work.		
8 Indicate if cash allowances have been used.		
9a Indicate if warranties extend more than 24 months. If so, indicate the extended duration.		
9b Manufacturers guarantees are not indicated.		
10 No paragraphs noted as “Scope of Work” are included.		
11 In part 1 of section, paragraphs “Summary” and “Section Includes” are not used.		
12 List of related sections and appendices are coordinated.		
13 The index shows a complete list of Drawings and Specification sections with the correct number of pages and correct Drawing titles and section names.		
14 Section 01 00 10 - General Instructions is included, if agreed by the CM.		
15 Section 01 35 29.06 - Health and Safety Requirements is included.		
16 Section 01 14 25 - Designated Substances Report is included, if agreed by the CM.		
17 Subsurface reports are included in Division 31.		
18 Experience and qualification requirements do not appear in the Specification sections		
19 There are no mandatory Contractor and/or subcontractor pre-qualification requirements or references to certificates, transcripts or license numbers of a trade or subcontractor being included in the bid.		
20a Contracting issues do not appear in the Specifications.		
20b Division 00 of the NMS is not used.		
21 There are no Specification clauses with square brackets “[]” or lines “___” indicating that the document is incomplete or missing information.		
Specification Quality Management Verification All previous submission review comments approved/provided by the DR are appropriately incorporated in the Specifications and responses to all comments send to the DR.		

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Item	Verified by:	Comments
Drawings:		
1 PWGSC title block is used.		
2 Dimensions are provided in metric only.		
3 Trade names are not used.		
4 There is no Specification-type notes.		
5 Term CM is used instead of Engineer, PWGSC, Owner, Consultant or Architect.		
6 Notations such as; “verify on site”, “as instructed”, “to match existing”, “example”, “equal to”, “equivalent to” and “to be determined on site by” are not used.		
7 Project quantity and configuration, dimensions and construction details are included.		
8 References to future work and elements not in contract do not appear or are kept to an absolute minimum and clearly marked.		
Drawings Quality Management Verification All previous submission review comments approved/provided by the DR are appropriately incorporated in the Specifications and responses to all comments send to the DR.		

I confirm that the Drawings and Specifications have been thoroughly reviewed and that the items listed above have been addressed or incorporated. I acknowledge and accept that by signing, I am certifying that all items noted above have been addressed.

Consultant’s Representative:

Firm name:

Signature:

Date:

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PB Appendix A: Attachment B:

Sample Index for Drawings and Specifications

Project No: _____

Index

Page 1 of ____

DRAWINGS AND SPECIFICATIONS

DRAWINGS:

SPEC NOTE: List all Drawings by number and title.

C-1	Civil
L-1	Landscaping
A-1	Architectural
S-1	Structural
M-1	Mechanical
E-1	Electrical

SPECIFICATIONS:

SPEC NOTE: List all divisions, sections (by number and title) and number of pages.

<u>DIVISION</u>	<u>SECTION</u>	NO. OF PAGES
DIVISION 01	01 00 10 - General Requirements.....XX
	01 14 25 - Designated Substances Report.....XX
	01 35 30 - Health and Safety.....XX
DIVISION 23	23 xx xx	
DIVISION 26	26 xx xx	

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PB Appendix A: Attachment C:

Sample Addendum Format

ADDENDUM No. _____

Project Number: _____

The following changes in the bid documents are effective immediately. This addendum will form part of the DPs

DRAWINGS

SPEC NOTE: indicate Drawing number and title, then list changes or indicate revision number and date, and re-issue Drawing with addendum.

- 1 A1 Architectural

SPECIFICATIONS

SPEC NOTE: indicate section number and title.

- 1 Section 01 00 10 - General Requirements

SPEC NOTE: list all changes (i.e. delete, add or change) by article or paragraph

- .1 Delete article (xx) entirely.
- .2 Refer to paragraph (xx.x) and change ...

- 2 Section 23 05 00 - Common Work Results - Mechanical

- .1 Add new article (x) as follows:

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APPENDIX B - TERMS

The following terms and abbreviations are used in this document:

Baseline	The original plan and/or schedule approved by the DR (for Project, DP, or activity), plus or minus approved scope changes.
Building Information Modelling (or Modeling)	The process and technology used to create Models.
Building Information Modelling (or Modeling) Execution Plan (BXP)	A document developed collaboratively by the Project Team to establish standardized procedures, conventions and guidelines with agreed targets for responsibility, timely delivery, exchange, and reuse of the Model.
Construction Documents	Includes Project specific specifications and Drawings and includes Models or Model Elements.
Construction Manager, or Contractor	Means the person(s) or entity(ies) identified and authorized by the PWGSC to perform the construction management services and Construction Services for work under this Contract.
Contracting Authority	Means the individual delegated by the Minister of PWGSC to enter into contracts, amend the contracts and is responsible for all matters concerning and interpretation of the terms and conditions of the Contract. The delegated individual is responsible for the management of the Contract. Any changes to the Contract terms and conditions must be authorized in writing by the Contracting Authority.
Cost, or Contract Cost Principles	The principles used to determine reasonable direct and indirect costs related to the Contract, as defined at the following website: https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/3/1031-2/6
Cost Consultant	The entity in contract with PWGSC engaged to provide independent Cost planning, estimating, control and quality assurance services directly to PWGSC.
Critical Activity	Any task/activity on a Critical Path.
Critical Path	A series of tasks/activities that determines the longest duration of the Project.
Critical Path Method	A network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of Float).
Design Package	The part of the overall work for the Project that is specific to a limited number of trades or even one trade and is prepared by the Consultant to acquire or construct one or more building element and/or to acquire and construct install one or more laboratory casework or FF&E element.
Design Team	The combined forces of the Consultant, Sub-Consultant(s), and Specialist Consultant(s).
Drawings	The 2D Drawings generated from the Model and traditional 2D Drawings not generated from the Model.

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Float	The amount of time that an activity may be delayed from its early start without delaying the Project finish date. Float is a mathematical calculation and can change as the Project progresses.
Model	A digital representation of the physical and functional configuration, characteristics or attributes of the Project or a portion of the Project.
Model Element	Means a part of the Model representing a portion of the Project or a system or assembly within the Project or the Project site as well as data sets.
Monitoring	The capture, analysis, and reporting of Project performance, usually as compared to plan.
National Master Specification	The standard framework used for writing construction project specifications for this Contract.
Network (Logic) Diagram	A schematic display of logical relationships of Project activities and is always drawn from left to right to reflect Project chronology.
Project	All Services and work required to fulfill the Services described in the Contract, including additional or incremental sub-Projects.
Project Management Support Services consultant	The entity contracted by PWGSC for project management support services for this Project directly to PWGSC.
Project Team	The combined private sector and government sector teams responsible for delivering the Project including the Design Team, the Project Management Support Services consultant, the Cost Consultant, the Construction Manager, the Departmental Representative, and the Clients'/Users' representatives.
Science Cluster	A group of science programs within a LC Science Facility, designed and built to meet the specific needs of the Science Partners for that facility.
Science Facility	Real property and infrastructure in its entirety, inclusive of base building, fit-up and surrounding property.
Science Partners	As applicable to each Science Cluster, the Place of the Work, a combination of federal science-based department(s) and agency(ies), including but not limited to: Natural Resources Canada; National Research Council; Canadian Conservation Institute; Parks Canada Agency; Canadian Food Inspection Agency; Health Canada; and the Royal Canadian Mounted Police.
Site, or Place of the Work	Means the designated site or location of the work identified in the Contract documents or by the Departmental Representative.
Specifications	Are that portion of the Construction Documents consisting the written technical requirements and standards for the Work of the Contract as prepared by the Consultant or Construction Manager, as applicable.
Working Day	Means a day other than a Saturday, Sunday, or a statutory holiday that is observed by the construction industry in the area of the Place of the Work.

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APPENDIX C - ACRONYMS

ACPDR	Advisory Committee on Planning, Design and Realty
ASHRAE	American Society of Heating, Refrigeration and Air-conditioning Engineers
BAS	Building Automation System
BXP	BIM Execution Plan
CADD	Computer-aided Design and Drafting
CATV	Cable Television
CBRN	Chemical, Biological, Radiation and Nuclear
CC	Cost Consultant
CCI	Canadian Conservation Institute
CCTV	Closed-circuit Television
CEAA	<i>Canadian Environmental Assessment Act 2012</i>
CFIA	Canadian Food Inspection Agency
CGA	Canadian Gas Association
CGSB	Canadian General Standards Board
CIQS	Canadian Institute of Quantity Surveyors
CM	Construction Manager
COHS	Canada Occupational Health and Safety Regulations
CPM	Critical Path Method
CRCA	Canadian Roofing Contractors Association
CSA	Canadian Standards Association
CSO	Corporate Security Officer
DD	Design Development
DMP	Design Management Plan
DP	Design Package
DR	Departmental Representative
ECCC	Environment and Climate Change Canada
ECMP	Environnemental Compliance Management Program
EMCS	Electronic Monitoring and Control System
FC	Field Clarification
FCSI	Food Consultants Society International
FHBRO	Federal Heritage Buildings Review Office
FLUDA	Federal Land Use and Design Approval
GDM	Geotechnical Design Memorandum
GDR	Geotechnical Design Report
HC	Health Canada
HVAC	Heating, Ventilation and Air Conditioning system
IFC	Industry Foundation Class
IM / IT	Information Management / Information Technology
KPI	Key Performance Indicators
LC	Laboratories Canada
LCC	Life Cycle Costing
MM	Multimedia

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NBCC	National Building Code of Canada 2015
NCC	National Capital Commission
NCR	National Capital Region
NRC	National Research Council
NRCan	Natural Resources Canada
NMS	National Master Specification
OFC	Operational and Functional Component
OWS	Operator Work Station
PCA	Parks Canada Agency
P&TS	Professional and Technical Services
PCM	Phase Contrast Microscopy
PDF	Portable Document Format
PLM	Polarized Light Microscopy
PMSS	Project Management Support Services consultant
PMT	Project Management Team
PWGSC	Public Works and Government Services Canada
RCMP	Royal Canadian Mounted Police
RFI	Request for Information
RS	Required Services
SD	Schematic Design
SLS	Serviceability Limit State
SOP	Standard Operating Procedures
SPC	Speech Privacy Class
SSC	Shared Services Canada
STC	Speech Transmission Class
TEM	Transmission Electron Microscopy
TMM	Technical Maintenance Manual
ToR	Terms of Reference
TRA	Threat and Risk Assessment
TSSA	Technical Standards and Safety Authority
TTMAC	Terrazzo, Tile, Marble Association of Canada
ULC	Underwriters Laboratories of Canada
ULS	Ultimate Limit State
UPS	Uninterrupted Power Supply
VE	Value Engineering
WHMIS	Workplace Hazardous Materials Information System
ZNE	Zero Net Energy (buildings)

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APPENDIX D – PROCESS MAPS

The following process maps depict the general workflow and Project Team members involved with subject in question. Time periods indicated show activity duration.

Process maps applicable to the Contract include:

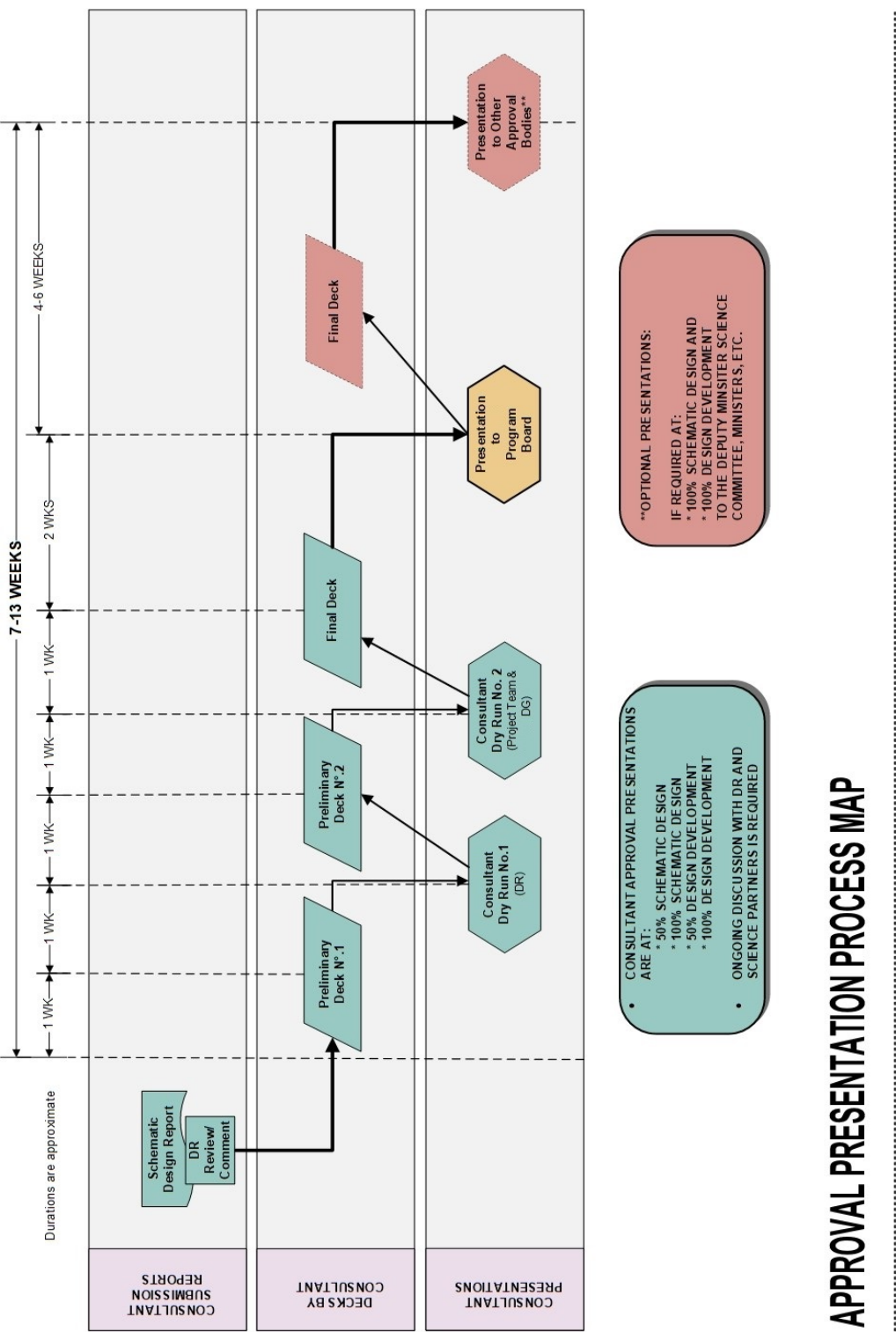
- Approval Presentations;
- SD, DD, DP Submissions;
- Construction Submittals.
- Request for Information (RFI), Field Clarification (FC) and Supplementary Instruction; and
- Expenditure Authority (EA) for CM Subcontract Changes;

Refer to the DR for clarification or refinement of any individual workflow process.

The DR may redefine existing and add new workflow processes.

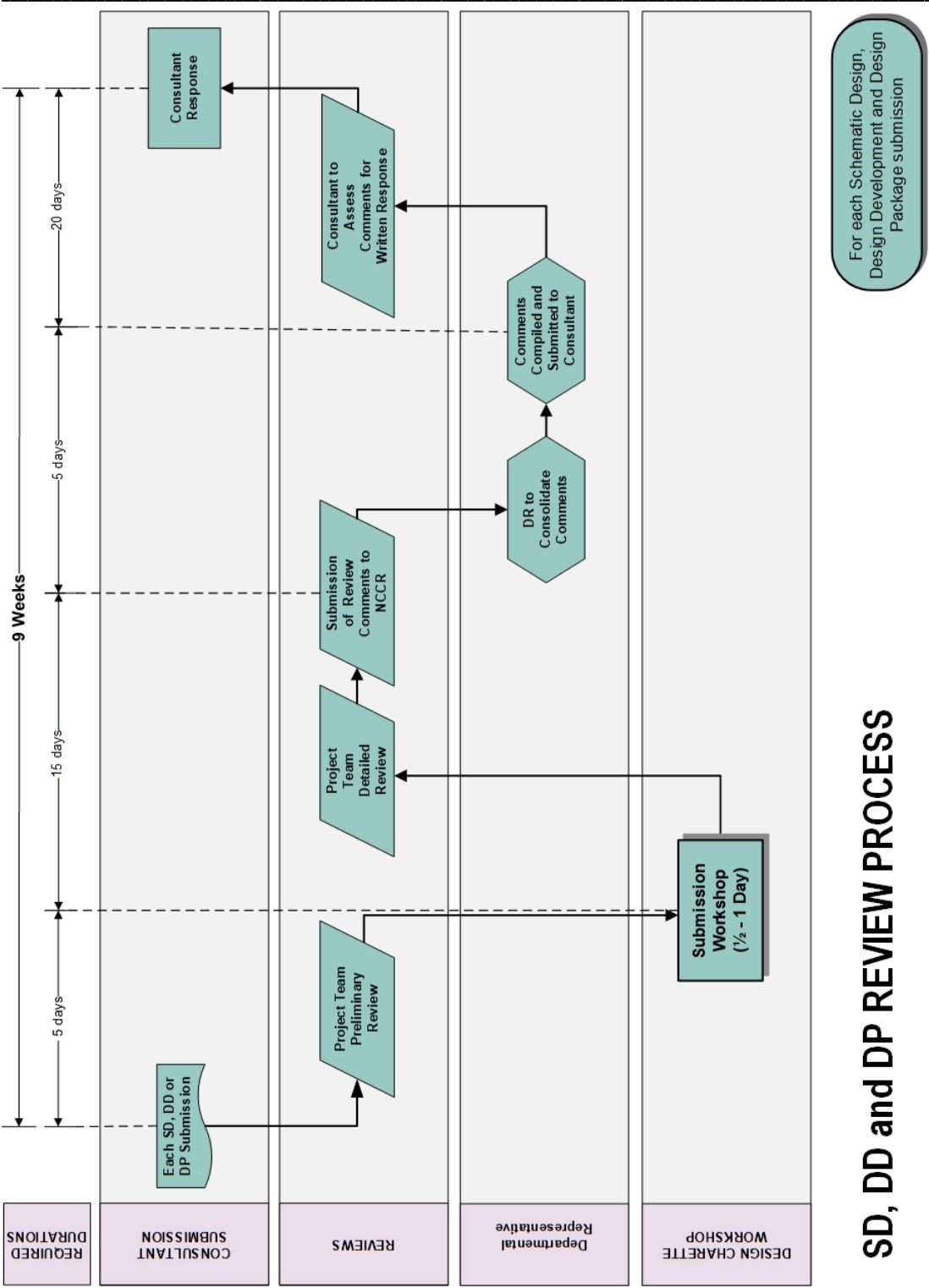
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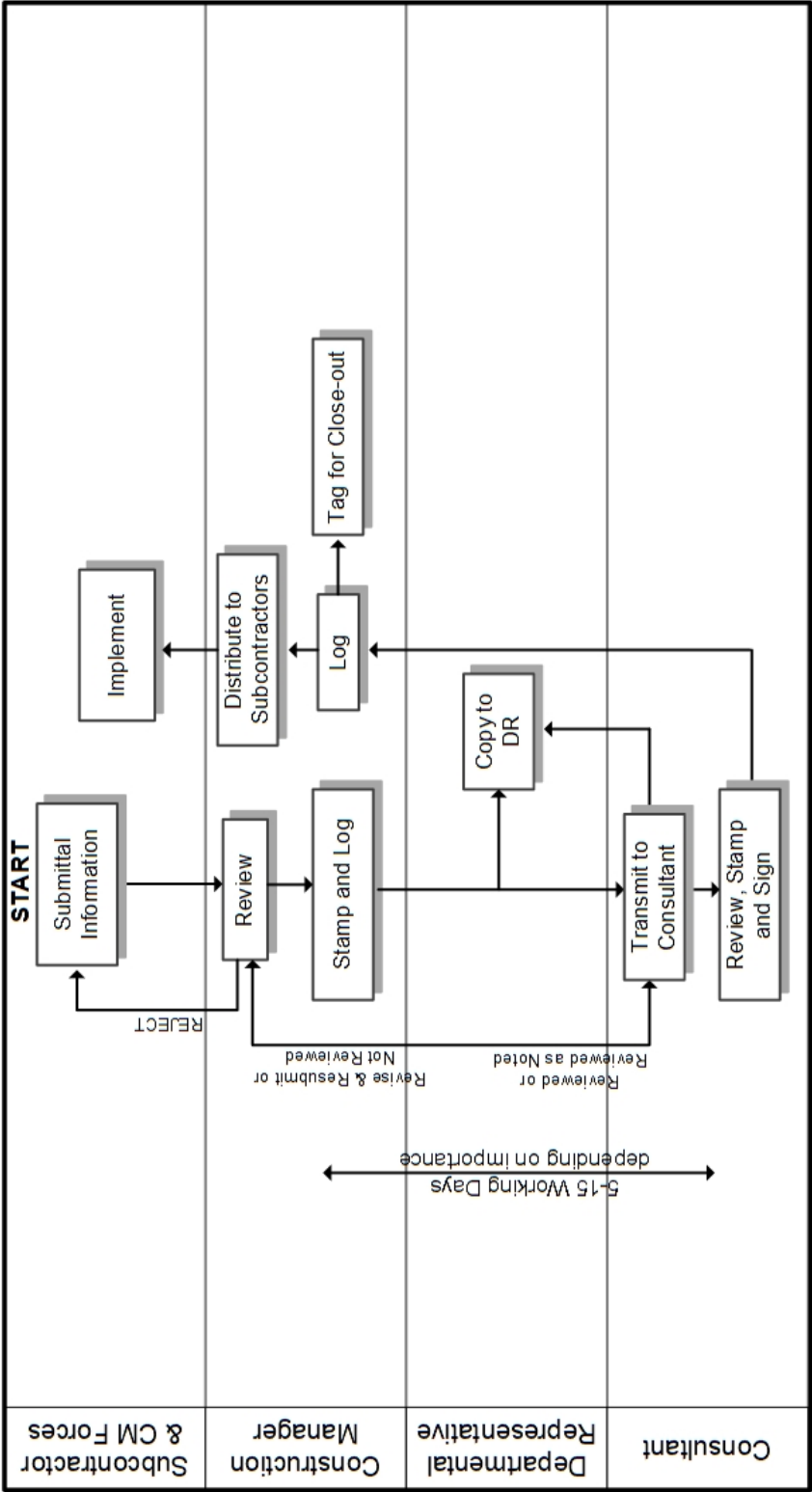
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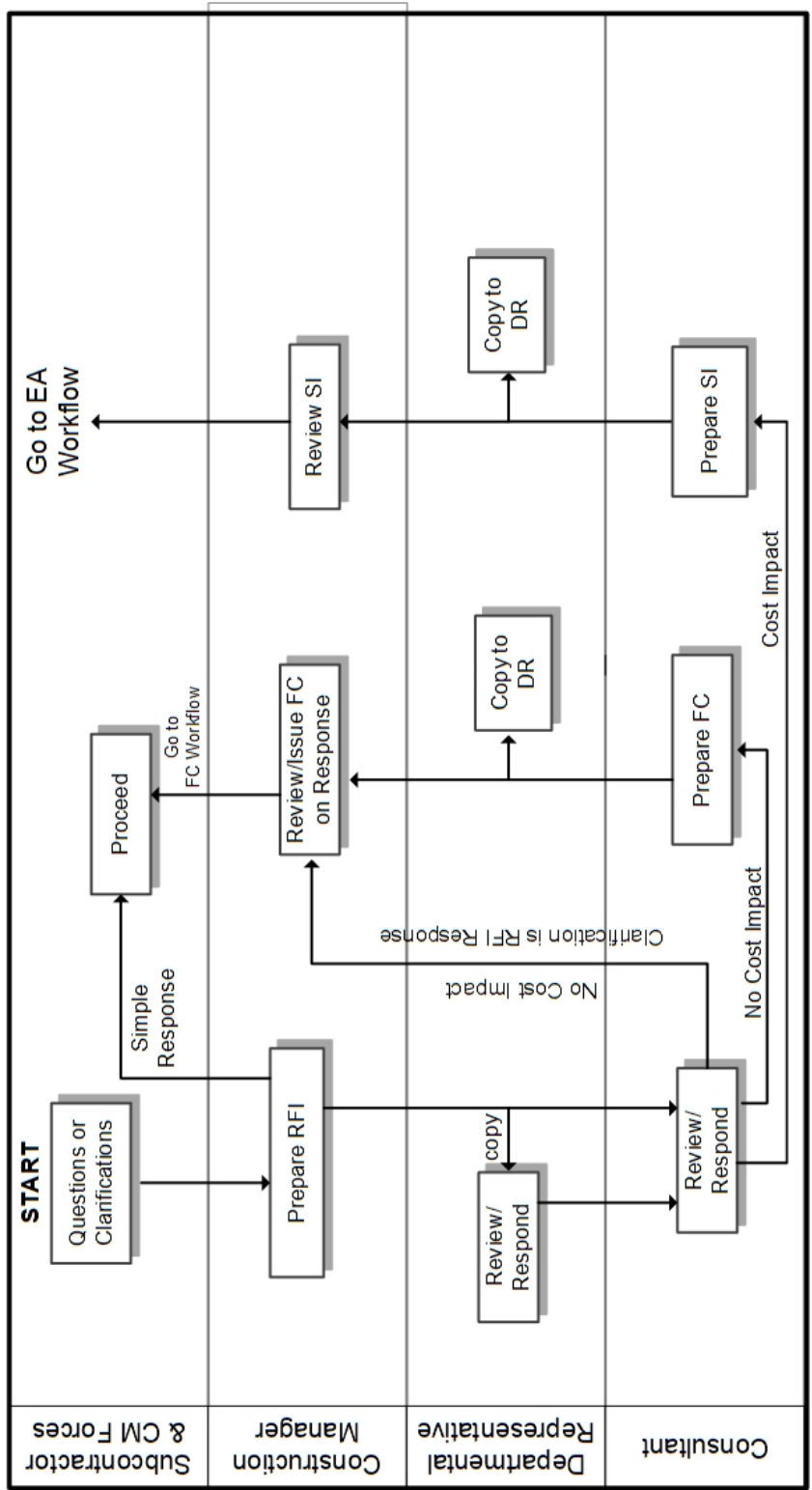
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CONSTRUCTION SUBMITTALS FLOWCHART



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RFI WORKFLOW

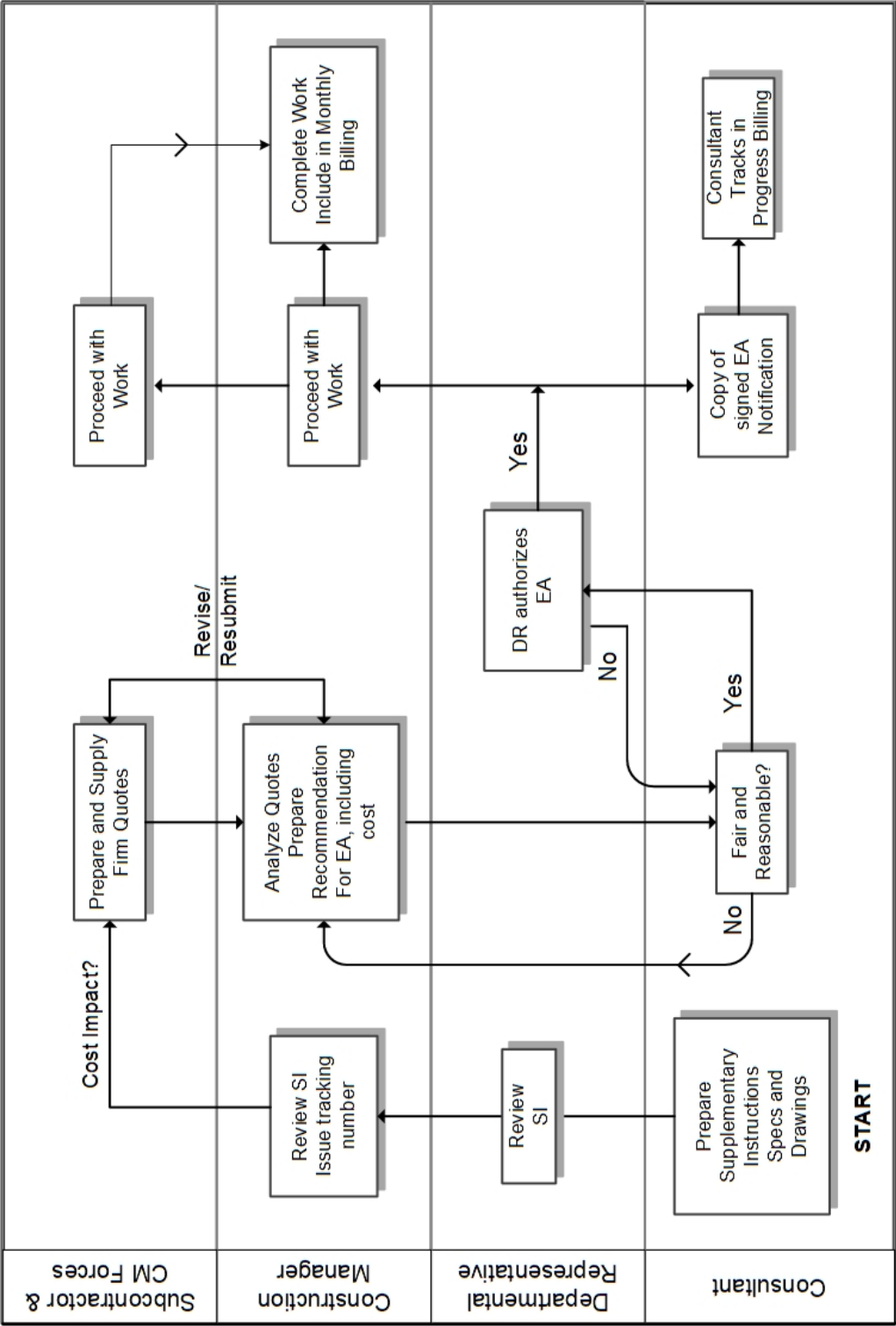


RFI – Request for Information
 FC – Field Clarification
 SI – Supplementary Instruction

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EXPENDITURE AUTHORIZATION (EA) WORKFLOW
FOR SUBCONTRACT CHANGES



SI – Supplementary Instruction

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APPENDIX E – OPTIONAL COST ESTIMATING AND SCHEDULING SERVICES

The Services described in Appendix E will only apply should the DR determine some or all of these optional Services are necessary.

1 Cost Estimating

1.1 Cost Specialist Subconsultant Services

A fully qualified cost estimating, cost planning and cost control team, referred to herein as the Cost Specialist, with a demonstrated record of successful cost management on large construction projects is required. This Cost Specialist must be conversant with all aspects of Construction Cost Estimating during the design stages, including the use of Elemental Cost Analysis, Risk Analysis, Life Cycle Costing and Value Engineering / Management techniques. Cost breakdowns must be required by trades and unit price configurations.

The purpose of Cost planning and Cost control is to assist in the accomplishment of Project Cost objectives. It is a continuous and interactive process involving planning, action, measurement, evaluation and revision.

1.2 Scope

The Cost Specialist must provide an interactive and continuous Cost consulting Service from the commencement of project design through to construction completion, including the preparation of complete estimates for all construction trades, escalation, inflation and contingency Costs.

The Cost Specialist must provide the DR and the Design Team, a Cost advising, and Cost Monitoring, and reporting Services. The Cost Specialist must attend all Project meetings throughout the design phases and be prepared to present and defend the estimates directly to the DR.

1.3 Basic Activities

The Cost Specialist must work with and advise the Design Team and DR of the Costs of individual building components and Costs of various design systems. Estimates must be prepared in detail and summarized using an elemental analysis, in accordance with UniFormat as issued by Construction Specifications Canada and the Construction Specifications Institute. Estimates must be presented differentiating base building, fit-up and client Costs and indicate net and gross cost per meter squared for each type of Cost. The submissions must coincide with all SD, DD and DP submissions. Estimates must include for a separate estimate by trade summary (Divisional breakdown)

1.3.1 Reporting

Milestone reporting at each of the Milestones specified in this document, provide a complete submission including the required Elemental Summaries, supported by all backup work sheets clearly detailing the process used in preparing the estimate. The detailed work sheets will be the prime basis on which estimates will be reviewed by the DR. Cost comparisons and Cost reports identifying and explaining the differences between each succeeding Cost estimate and their Cost effect are also required. In addition, the Cost Specialist must fully coordinate all estimates with schedules.

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A typical milestone report will contain:

- a) Project estimate summary;
- b) Elemental estimate summary;
- c) Estimate back-up detail:
 - i. Basis for escalation, inflation and contingency calculations; and
 - ii. Detailed measurement and pricing;
- d) Narrative:
 - i. Outline description of estimate basis;
 - ii. Description of information obtained and used in the estimate including the date received;
 - iii. Listing of notable inclusions;
 - iv. Listing of notable exclusions; listing of items / issues carrying significant risk; and
 - v. Notes on past and forecast Cost Specialist activity;
- e) Estimate Reconciliation:
 - i. With last submission;
 - ii. With construction Cost plan; and
 - iii. Any other relevant information.

1.3.2 Monthly Report

In addition to the milestone reports, submit a monthly report outlining activities during the previous month, identifying areas of concern and new information received etc., along with forecast and proposed revisions to the current estimate. This report must also contain a full up-to-date Elemental Cost Summary:

- a) Project estimate summary;
- b) Elemental Cost summary;
- c) Narrative:
 - i. Description of the basis for estimate revision;
 - ii. Description of new information used in the estimate including the date received;
 - iii. Listing of notable inclusions;
 - iv. Listing of notable exclusions;
 - v. Listing of items / issues carrying significant risk; and
 - vi. Notes on past and forecast Cost Specialist activity.

1.3.3 Exception Report

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The Cost Specialist must provide continuous Cost monitoring, timely identification and early warning of all changes that influence or potentially influence the estimated Costs of the Project. If the estimate falls short of or exceeds the Cost Plan due to such changes, the Cost Specialist must immediately advise the Consultant and DR. The Cost Specialist must submit to the DR proposed alternative design solutions and revise the most recent monthly estimate. An exception report will include sufficient description and Cost detail to clearly identify:

- a) Scope Change: Identifying the nature, reason and total Cost impact of all identified and potential Project scope changes affecting Construction Cost Estimate;
- b) Cost Overruns and Underruns: Identifying the nature, the reason and the total Cost impact of all identified and potential Cost variations;
- c) Options Enabling a Return to Construction Cost Estimate: Identifying the nature and potential Cost effects of all identified options proposed to return the Project within Construction Cost Estimate.

1.4 Submission Standards

1.4.1 Summary Format

- a) Elemental Analysis: All estimates must be summarized in accordance with UniFormat as issued by Construction Specifications Canada and the Construction Specifications Institute.
- b) Trade Summary: Where a trade summary is required, those following the master format are preferred, except where local practice provides a more suitable alternative.
- c) Project Cost Subdivision: The estimate must isolate the Costs of each phase of construction. All estimates within these phases must further isolate and show separately the Cost of individual building blocks and / or the accommodation sections listed here:
 - i. New Construction;
 - ii. Renovation; and
 - iii. Site work.

1.4.2 Time Lag

Recognizing that estimates must follow the design decisions they represent, such estimates may lag. The Cost portion of the milestone reports may follow, but by no more than two (2) weeks unless otherwise determined by the DR.

1.4.3 Use of all available information

The Cost Specialist is responsible for providing a complete Cost estimate even though the information provided during the concept, design development and early working drawing stages is incomplete. Where requirements are not firmly defined, the Cost Specialist must make assumptions, confirm them with the Consultant and either list them as assumptions, or have them incorporated in an outline specification modified by the Consultant.

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1.5 Techniques

The Cost Specialist must be familiar with and make use of a broad range of techniques, especially the following.

- a) Risk Analysis: All construction estimates (except the final pre-tender estimate) must include and identify design, estimating, inflation escalation and currency exchange allowances as are deemed necessary in light of the current information available. The Cost Specialist must provide a satisfactory explanation of the level and / or amount of all such sums included within any estimate.
- b) Scheduling: The Cost Specialist must assist the DR's time management resource by providing building quantities, building systems information, and other quantifiable parameters deemed appropriate to the calculation of a reasoned Project schedule. The DR's resource will assist the Cost Specialist by maintaining an up-to-date schedule of all design activities along with an agreed bidding and Construction Schedule that will be incorporated by the Cost Specialist within the estimates on a timely basis.
- c) Life Cycle Costing: In advising the Consultant of the Cost information for alternative materials, methods and systems, it is necessary that the Cost Specialist uses all available information to ensure that a complete Cost picture is made available, upon which design and construction decisions will be made.
- d) Continuing Estimate Process: A process of continual adjustment of previous estimates may be used in place of total remeasurement at each milestone reporting point. This is acceptable provided that at each monthly reporting point a full and up-to-date elemental Cost summary is provided, and that at each milestone reporting point this elemental Cost summary is supported by complete, detailed, stand alone back-up / support documentation, as previously described.
- e) Project Research: The Cost Specialist must visit the proposed or alternative construction Sites to become familiar with Site conditions, site access, etc., analyse local labour and material supply conditions, local bidding practices and competition to establish pricing levels. A written report detailing this reconnaissance activity is expected.
- f) Value Engineering / Management: The DR will cause a Value Engineering / Management Study to be undertaken for each tender package. The Design Team must answer questions and / or provide information required for the value management study. The Cost Specialist must assist the Value Management Team by providing copies of the latest Construction Cost Estimate and any additional Cost information that may be required.

1.6 Project Stage – Specific Activities

1.6.1 Analysis of Project Requirements

Review, report on, and propose revisions to the existing Class 'D' estimate (+/- 20%). Do not proceed until the Cost Specialist, the Consultant and the DR have accepted the revised Class 'D' estimate. The revised Class "D" estimate must become the Construction Cost Plan.

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1.6.2 Concept Design

A Class 'C' estimate (+/- 15%) will be prepared at the highest level of detail commensurate with the available information using elemental and additional detailed Costs.

1.6.3 Design Development

Upon completion of design development prepare a Class 'B' estimate (+/- 10%) representing the increased level of design detail available. The report must be prepared using detailed (elemental) Costs i.e. measured quantities with minimal allowances or lump sums. The Class 'B' estimate must be broken down in conformity with the tender packages. Upon final acceptance, the Class 'B' estimate must become the Construction Cost Plan.

1.6.4 Contract Documents

During the production of the contract documents, a process of continuing cost control progressively more detailed is required. At each review of contract documents, an up-to-date estimate must demonstrate compliance with the Construction Cost Plan. Non-compliance with the Construction Cost Plan will require revisions to the contract documents.

1.6.5 Pre-Tender

Upon completion of the contract documents a pre-tender Class 'A' Cost estimate (+/- 5%) will be prepared using 100% measured quantities. A Class 'A' estimate is to be prepared for each tender package. Provide a trade breakdown of the pre-tender estimate for use in reviewing the submitted bids and the successful Contractor's or the General Contractor(s) estimate breakdown.

Estimates must be presented differentiating base building, fit-up and client Costs and indicate net and gross Cost per meter squared for each type of Cost. The 90% and 100% estimates must include for a separate estimate by trade summary (Divisional breakdown).

1.6.6 Tender Stage

- a) **Tender Award:** During the tender period, examine and report on any Cost impact created by the issue of tender / contract addenda. Incorporate the results of such addenda review into the final pre-tender estimate (both elemental and trade versions) prior to receipt of bids.
- b) **Bid Review and Analysis:** Assist the DR, as required, by analysing and reconciling any differences between the pre-tender estimate and the submitted bids.
- c) **Negotiation:** Should it be necessary to negotiate with any bidder prior to awarding the construction contract, the Cost Specialist must provide Cost information as needed and participate in the negotiations if requested by the DR
- d) **Reconciliation:** Upon the signing of a contract with the successful Contractor(s), the Cost Specialist if necessary, will reconcile both the elemental and trade estimates, in detail, with the agreed contract sum. These reconciled estimates will be used by the Contractor during the construction phase of the Project.

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1.6.7 Cost Specialist Services through Construction

During construction, the Cost Specialist must assist the Contractor with Cost advice if requested. If required, payment will be made on an agreed, negotiated basis. Such activity may well encompass the following activities:

- a) Evaluation of change orders;
- b) Evaluation of claims;
- c) Evaluation of work completed; and
- d) Evaluation of cash flow.

1.6.8 Post Contract

The Cost Specialist may be required to assist with the provision of details needed for an evaluation of the Project regarding the Project's Cost performance. If required, this work will be paid for on an agreed, negotiated basis.

1.7 Responsibilities to PWGSC

The DR will review all aspects of the Cost Specialist's work on a continuing basis to determine the validity and completeness of the information provided. In the event the DR may identify areas of concern including errors and omissions as well as areas of inadequate detail or areas that require further explanation, the Cost Specialist must re-examine the estimates provided and make such revisions as are subsequently agreed to be necessary and / or provide ample acceptable evidence that such corrections or amendments are unnecessary.

1.7.1 No Action Abrogates Consultant's Responsibilities

No acceptance or approval by PWGSC, whether expressed or implied will be deemed to relieve the Cost Specialist or the Consultant of professional or technical responsibility for the estimates and Cost reports.

Neither does acceptance of an estimate by the DR in any way abrogate the Consultant's responsibility to maintain the agreed Construction Cost Plan throughout the life of the Project, or the requirement to redesign should the lowest acceptable bid differ significantly from the agreed Construction Cost Plan, unless and until the DR indicates otherwise in writing.

1.8 Deliverables

The Consultant must provide the DR:

- a) Cost comparisons and Cost reports, monthly reports, exception reports;
- b) Class D, C, B and A estimates as required by Project stage, including reconciled estimates; and
- c) Ongoing evaluation reports during construction.

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2 Scheduling

2.1 Scheduling Specialist Subconsultant Services

A fully qualified planning and scheduling specialist, referred to herein as the Time Specialist, with a demonstrated record of successful time planning, scheduling, Monitoring Services on large construction projects is required.

2.2 Detailed Schedules

The Time Specialist must prepare and maintain a detailed schedule for the entire Project. The schedule must be prepared and maintained, monthly, in consultation with all members of the Design Team, DR and the Science Partners. Activities and interdependencies must also be detailed and shown for all stages of the Project and inclusive of all submissions, reviews and approvals.

The Time Specialist must:

- a) Analyze in detail the initial Project and program of work schedule prepared by the DR and confirm in writing to the DR the Time Specialist's understanding of specific activity relationships, durations, interdependencies, and sequencing for:
 - i. Investigation work, if any;
 - ii. Design and construction documents submission and review processes for each design submission;
 - iii. Dependencies on investigation work or other linkages with the start of construction; and
 - iv. Construction that maintains existing operations or public use;
- b) Prepare a comprehensive Baseline network logic diagram of the work of each Project, including its relationship and dependencies with the design, schematically displaying the detailed and logical relationships of all activities that must be accomplished to satisfy the objectives of each Project;
- c) Include reasonable time contingencies that reflect the degree of work complexity and historical weather-related work-stoppages;
- d) Ensure critical activities are no greater than 10 working days in duration. A critical activity is one that has less than 5 working days of Float. Clearly identify all predecessor, successor, and dependent activities. Indicate Float per activity. Do not use relationship lags, but instead, use activities to mark the delay between the completion of one activity and its successor (e.g. indicate curing of concrete as an activity and not as a lag to another activity);
- e) Prepare detailed, summary and master schedules (network logic diagrams and bar charts) for all work and its design elements for the overall program. Indicate the Critical Path for the Project work and overall program of work. Advise the DR of work (activity) dependencies or constraints and suggest methods to optimize the delivery of the Work each year and over multiple years, as appropriate;

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2.3 Compliance with the Detailed Schedule

The Design Team must comply with the approved detail schedule, planning, coordinating and implementing their Services with respect to the schedule.

The Time Specialist must actively Monitor the Contractor's performance, documenting all activities on Site throughout the construction periods. The Design Team must promptly address slippage in any work element of the construction schedule by providing immediate direction to the Contractor to mitigate and reverse delay impacts.

2.3.1 Progress Monitoring and Reporting

On a monthly basis the Time Specialist working with the Project Team must update the detailed schedule and submit as part of the monthly progress report. The detailed schedule must reflect:

- a) Progress of each activity to the date of the report,
- b) Any logic changes, both historic and planned,
- c) Projections of progress and completion,
- d) The actual start and finish dates of all activities being monitored,
- e) A logic diagram and bar chart listing of all Project activities including milestones in all networks and sub-networks from Project start to Project end. Group activities by similar work packages and sort by early start dates. List early and late start and finish dates together with durations, codes and Float and include:
 - i. A criticality report listing all activities and milestones with negative, zero and up to five (5) days total float used as a first sort for ready identification of the critical, or near critical paths through the entire project. List early and late start and finish dates, together with durations, codes and float for the critical activities printed,
 - ii. A written monthly narrative progress summary based on the detailed schedule, detailing the work performed to date, comparing work progress to planned, and presenting current forecasts. The report must summarize the progress to date, explaining current and possible deviations and delays with respect to the detailed schedule and Critical Path. The report must include assessment of progress against Project objectives and contract documents.

2.4 Tender Documents

Included within the 50%, 90% and 100% construction documents submissions, Time Specialist must progressively develop and present the NMS Specification dealing with construction planning and scheduling, for review and approval by the DR.

2.5 Construction and Implementation

During construction and commissioning the Time Specialist must participate in the following scheduling and planning activities:

- a) Participate in planning sessions with the DR and the contractor(s),

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- b) Assist the Contractor as needed to develop their construction schedule,
- c) Identify, in detail, Science Partner moves,
- d) Assist in the development of the Contractors' commissioning schedule,
- e) Advise and prepare variance analysis reports monthly, and
- f) Upon receipt of the Contractor(s) current monthly status report, progress claim and Project schedule, Time Specialist must review the information by:
 - i. Evaluating, on a general basis, actual progress achieved to date, and
 - ii. Comparing current status of detailed schedule and cash flow status with previously submitted detailed schedules and cash flows.

2.6 Reporting

- a) Monthly (Technical Focus)

The Consultant, in consultation with the Cost and Time Specialists, must prepare and submit to the DR a monthly technical progress reports throughout the Project, in a format agreed by the DR. The report must focus on the progress of the Design team's Services and work by the Contractor(s). The report must identify the progress of all deliverables, identify all instances where the schedule or Cost plan are not being met, outline remedial measures being taken and identify any anticipated or potential problems to be addressed; and

- b) Quarterly (Management Focus)

Quarterly, the Consultant, in consultation with the Cost and Time Specialists, must prepare and submit to the DR a high-level management report summarizing the Project status including progress and issues internal to the Design Team. During construction reports must include review of the contractor(s) performance and fit-up implementation relative to Cost, cash flow, planned activities. Non-conformance issues (pre and post construction) are to be highlighted.

2.7 Deliverables

The Consultant must provide the DR:

- a) Monthly and quarterly progress reports;
- b) Summary and detailed bar charts;
- c) Network logic diagrams;
- d) Draft and final NMS Specification for construction planning and scheduling

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APPENDIX F – DELIVERABLES SUMMARY

The following table summarizes the Design Team’s deliverables. In case of conflict or future amendment of this Contract, the requirements of each Project Brief section and sub-section will prevail over the following summary.

	Deliverables	Timeline	Project Brief Reference
ADMINISTRATION AND DESIGN SERVICES	Project Meetings; agenda, notice to invitees, minutes, database	Monthly	Section 10.1.1.1
	Design Meetings; agenda, notice to invitees, minutes, database	Weekly	Section 10.1.1.2
	Submission Presentations	Required at 50% and 100% SD, DD, as required during sub-Project implementation	Section 10.1.1.4
	Subject Matter Workshops	required at 50% SD, 90% SD, 50% DD, 90% DD, and at other stages of sub-Projects, as required	Section 10.1.1.5
	Subject Matter Workshops final workshop minutes	Within 2 working days of workshop	Section 10.1.1.5
	Functional Program Workshops	During Pre-Design, SD and DD	Section 10.1.1.5
	Functional Program Workshops final workshop minutes	Within 2 working days of workshop	Section 10.1.1.5
	Laboratory Casework and FF&E Workshops	During the SD, DD, and DP phases of sub-Projects	Section 10.1.1.5
	Laboratory Casework and FF&E Workshops final workshop minutes	Within 2 working days of workshop	Section 10.1.1.5
	Draft Design Management Plan	Within 30 working days of the Contract award	Section 10.2.1.1
	Final Design Management Plan (DMP)	Within 15 working days of reviewing the DR’s review and acceptance	Section 10.2.1.1
	DMP human resource subsection	Update, resubmit to DR every three months, or more often if requested.	Section 10.2.1.1
	DMP delegated design Specification and design responsibility matrix subsection	Timing as agreed with DR and CM, updates as DR requests	Section 10.2.1.1
	Formal Presentations	As described in Project Brief Appendix D – PROCESS MAPS	Section 10.2.2.5

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	Deliverables	Timeline	Project Brief Reference
	Establish a BIM management team	Within 20 working days of Contract award	Section 10.2.3.1
	Draft BIM Execution Plan (BXP)	Within 40 working days of the Contract award	Section 10.2.3.3
PRE-DESIGN SERVICES	Summarize the documentation reviewed and provide an initial gap analysis per discipline	Within 10 weeks of Contract award	Section 11.2.1
	Sub-Project-specific investigation program	Within 20 working days of Contract award, as per Section 11.15	Section 11.3.1
	Investigation inspection reports	Within two weeks of each investigation	Section 11.3.1
	Incorporate investigation results into the Model	Within two weeks of each investigation	Section 11.3.1
	Investigation Plan	Within 20 working days of Contract award	Section 11.15
	Pre-design report	Timing as agreed with DR	Section 11.15
	Response to Pre-Design Report	Within 20 working days to all the submission comments	Section 11.16
SCHEMATIC DESIGN SERVICES	Schematic Design report	50% and 100% unless otherwise indicated	Section 12.4
	Response to Schematic Design Report	Within 20 working days to all the submission comments	Section 12.5
DESIGN DEVELOPMENT SERVICES	Design Development report	50% and 100% unless otherwise indicated	Section 13.4
	Response to Design Development Report	Within 20 working days to all the submission comments	Section 13.5

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	Deliverables	Timeline	Project Brief Reference
DESIGN PACKAGE SERVICES	Design Package submissions	50%, 90% and 100% per DP as agreed with DR and CM, unless otherwise indicated	Section 14.4
TENDERING SERVICES	Input to/prepare pre-qualification criteria	Extent and timing as agreed with DR and CM	Section 15.3
	Respond to bidder questions, record of inquiries	Within two days of question, or as agreed by the DR	Section 15.3
	Evaluation of tenders	Extent and timing as agreed with DR and CM	Section 15.3
	Issued-for-Construction Drawings and Specifications, per DP	Within five working days of the issuance of the last addendum	Section 15.3
SITE SERVICES	Responding to all RFIs or submittals	Within 5 working days, but never longer than 15 working days	Section 16.2
	Update the Model and reissue the Issued-for-Construction DPs	Every 3 months or more frequently if requested by the DR	Section 16.2
	Consultant Activities Report	Monthly, within 5 working days of the end of each month;	Section 16.2
	Review and recommend to the DR for payment the CM's progress payment	Within 2 working days of receipt	Section 16.2
	Testing methodology work plan	Revise, resubmit as required and agreed by DR and CM	Section 16.5.1
	Environmental Monitoring work plans	Extent and timing as agreed with DR and CM	Section 16.7
POST CONST	Revised Commissioning Plan	Revise, resubmit as required and agreed by DR and CM	Section 17.1

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	Deliverables	Timeline	Project Brief Reference
	Testing reports	Within five days of each activity	Section 17.1
	Deficiency inspection, Model update	Inspection prior to concealment or within five days of repair completion, Model update within 2 weeks	Section 17.1
	Performance verification reports, infrared and building envelope thermographic scanning	Timing as agreed with DR and CM	Section 17.4
	Training reports for all training sessions	As per sections 11.4, 12.2.10, 13.2.10, and 14.3.11 Commissioning Plan, timing as agreed with DR and CM	Section 17.4
	Standard Operating Procedures for each building system	As per sections 11.4, 12.2.10, 13.2.10, and 14.3.11 Commissioning Plan, timing as agreed with DR and CM	Section 17.4
	LEED/Green Globes (sustainability) certificates	Timing as agreed with DR and CM	Section 17.4
	Final design intent brief	Timing as agreed with DR and CM	Section 17.4
	Post-construction evaluation and lessons learned reports.	Timing as agreed with DR and CM	Section 17.4

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APPENDIX G – PWGSC STANDARDS

The following documents will be provided to the Consultant by DR after Contract award or during bidding by the Contracting Authority:

1. Government of Canada Workplace Fit-up Standards;
2. Seismic Standard;
3. GCWORKPLACE Design Guide;
4. GCWORKPLACE Best Practice Checklist; and
5. GCWORKPLACE Data Sheets for Typical Workstations.

END OF PROJECT BRIEF