

APPENDIX F – DETAILED SERVICES

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PROJECT ADMINISTRATION SERVICES (PA)

PA 1 PROJECT ADMINISTRATION

The following administrative requirements apply to all stages of the project and the Consultant must take them into account in its fee proposal. The associated services are complementary to the required services (RS) and additional services (AS).

The following services are required for the duration of the contract.

PA 1.1 Contract deliverables

Where deliverables and submissions include summaries, reports, drawings, plans, specifications, estimates or schedules, provide six (6) hard copies of each and upload the electronic version to the electronic sharing site (in original software format **and** PDF), unless otherwise specified.

All reports, drawings, models, data, simulation and analysis outputs and other graphical material must be submitted to the departmental representative (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.

Acceptable electronic formats

Electronic version or format means the following (a PDF version must be provided along with the following formats):

Deliverable	Acceptable PWGSC format
Written reports and studies	Microsoft Word
Updates and follow-up of invoices for consultant fees	Microsoft Excel
Spreadsheets and estimates	Microsoft Excel
Presentations	Microsoft PowerPoint
Timelines	Microsoft Project
Drawings	DWG (AutoCAD or Revit)
BIM/MDB models	Refer to the BIM Management Plan (BMP), see Appendix E - Appendix 2
3D electronic format	Refer to the BIM Management Plan (BMP), see Appendix E - Appendix 2
Specifications	Microsoft Word

The CM will be responsible for creating an electronic document sharing site. The Consultant will be responsible for uploading the various deliverables to this site.

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 prepare reports so that the reviewer can easily locate references and respond to related information contained in the report. Reports shall include the following sections:

- a) A cover page indicating the sub-project title, nature of the report, Consultant's contract number and author name, Public Works and Government Services Canada (PWGSC) contract name and reference number, and the date in a non-ambiguous format (e.g. February 6, 2019, or 2019-02-06).
- b) A table of contents.
- c) An executive summary.
- d) An introduction.
- e) A methodology section explaining the methods and tools used, such as weightings, comparative analysis.
- f) A conclusion or synopsis.
- g) Appendices containing supporting material referenced in the report, supplementary and supporting information.

Report content

The Design Team must:

- a) 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.
- b) Use an organizing system, such as MS Word Document Map, for ease of reference and referral.
- c) 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.
- d) Write efficiently with only essential information included in the body of the report and supporting information in an appendix, if required.
- e) Analyze and ensure all relevant correspondence against accepted goals, objectives and the requirements identified in this project statement.

PA 1.2 *Estimate and scheduling services*

1.2.1 *Estimates*

- a. The construction economist must prepare comprehensive cost estimates for all project trades and revise them as the project progresses.
- b. The construction economist must also carry out cost comparisons and cost reports identifying the differences (reports on differences) between successive estimates, the reasons for these gaps, and their effects on project costs. These reports must be prepared at every stage or for every revision of the budget estimate.

- c. The construction economist must provide continuous cost monitoring, timely identification and early warning of all changes that affect or potentially affect the estimated construction costs of the project.
- d. If the estimate falls short of or exceeds the construction cost plan due to such changes, the construction economist must fully advise the DR and submit proposed alternative design solutions to the DR. Thereafter, the most recent estimates must be revised.
- e. A Variance Report will include sufficient description and cost detail to clearly identify, among other information:
 - 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, reason, and total cost impact of all identified and potential cost variations.
 - c. Options enabling a return to the construction cost estimate: Identifying the nature and potential cost effects of all identified options proposed in order to return the project within the construction cost estimate and below the construction cost ceiling.

1.2.2 Schedule

- a. Planning and scheduling are priority activities for all federal government projects. They should facilitate the achievement of project objectives through a continuous, interactive process of planning, intervention, measurement, evaluation and revision.
- b. The Consultant will take the following particularities into account in providing its services:
 - a. The construction project will be carried out according to the construction management mode based on separate construction packages.
 - b. The construction manager (CM) will be responsible for preparing and managing the master project schedule. The Consultant will be required to provide the design schedule at each stage of progress and on a monthly basis, including the data required to supply parts of the master schedule relating to design, reviews and authorization to proceed, and the review of construction work quality.
 - c. The Consultant will harmonize the structure of its schedule with the master schedule prepared by the CM.
- c. The Consultant will work with the CM to develop a project schedule using network analysis techniques such as the critical path methods (CPM) or the program evaluation and review technique (PERT) to plan and establish the project schedule, monitor its progress and report on it. The choice of techniques used to develop the schedule must be justified with the DR. A project control system is also required to validate progress against the baseline schedule. The preferred method is earned value management.
- d. The Consultant must work with the CM to develop a work breakdown structure (WBS). The WBS is the tree structure of the services and other work under the project; it is used to organize, define and present the project graphically. The WBS will cover at least all of the following: project, stage, element, sub-element and work packages. The Consultant must also pay particular attention to the requirement to submit a work breakdown schedule, which should be developed with the CM in order to gain an adequate level of

detail for the sound management of the schedule, time control and projection of cash flows.

- e. The work breakdown structure must include the budgets associated with each work package. This analysis must also be included in the baseline schedule to assess the corresponding cash forecast covering all major activities and all major cost items planned for the project.
- f. The CM, in collaboration with the Consultant, is responsible for establishing the schedule in MS Project format and monitoring it regularly. Schedule planning must be compatible with MS Project 2013. The approved WBS will be used for scheduling configuration. Elements with a direct impact on the schedule and key milestones must be identified, and mitigation measures must be planned and implemented to avoid any delays.
- g. The Consultant will be required to work with the CM to maintain the estimated and actual costs of each activity in the project schedule.
- h. The following is a list of the main planning and sequencing tasks to be completed and coordinated with the CM during the design, plans and specifications, contract award and construction stages:
 - a. Develop a work breakdown structure.
 - b. Assist in developing the project objectives.
 - c. Develop the project master network.
 - d. Develop, monitor, and maintain detail schedules, bar charts, and milestone lists.
 - e. Identify project activities.
 - f. Attend meetings.
 - g. Comment on the main stages and work packages that will be defined by the CM.
 - h. Comment on the construction tendering and sequencing requirements proposed by the CM.
 - i. Identify Design Team coordination requirements.
 - j. Prepare the required progress reports (monthly or as required).
 - k. Prepare the pre-commissioning schedule.
 - l. Analyze and comment on (in writing) the schedules produced by the CM.
- i. Working drawing and specification activities broken down into construction packages, leading through the key milestones must also be shown.
- j. This will be followed by coordination and review activities broken down into construction packages, leading to final tender documents (100%), and then by a description of the tendering process leading to contract award.
- k. As design progresses and the scope of construction work becomes more clearly defined, the Consultant will, with the CM, develop summary activities and cash flows to illustrate the sequencing of work as it relates to activities and/or constraints in other contracts.
- l. When the bid documents have progressed sufficiently (75% complete), the initial construction and commissioning activities included in the main project schedule will be

further broken down to confirm the validity of the approaches adopted for these stages. The descriptions must be detailed enough to show the sequence and interdependence of all contract tasks and to facilitate the coordination and control of all project activities.

- m. The schedule must be detailed enough to be used to ensure proper planning and monitoring of work progress. It is also recommended that activity durations should not exceed five days. The detail activities must relate at all times to the milestones developed and approved in the master project schedule.
- n. To the extent possible, activities with no float (i.e., activities that start and finish on their early calculated dates), which form the “critical path,” must be calculated and clearly indicated on the logical network as being, wherever possible, a continuous sequence of activities from the beginning to the end of the project. No more than 25 percent of the project’s activities will be critical or near-critical. Near-critical activities are those with a float of one to five working days.
- o. Each detailed master schedule issued must include time contingencies for tasks for which unchangeable dates cannot be determined.
- p. The schedules must be submitted to the DR for review and validation, and any subsequent changes required must be submitted to the DR. The Consultant must, at the DR’s request and at no additional cost, provide any additional information that the DR deems necessary to assess the practicality of the proposed schedule. The format of the schedule and the WBS will be subject to the DR’s approval.
- q. The Consultant must comply with the approved detail schedule. The Consultant must also direct its sub-consultants by helping them to plan and coordinate according to this schedule.
- r. The Consultant must produce section 01 32 16.16 *Work Scheduling – Critical Path Method* of the specifications to be included in the contract documents for planning and scheduling the work, submit it for review by the DR and the CM, and discuss with them how it can be broadly aligned with the other relevant contract administration requirements.
- s. During construction, the Consultant must:
 - a. Verify that planning and scheduling are consistent with the specifications.
 - b. Provide the CM with the information to be included in the master project schedule.
 - c. Review the CM’s submissions for completeness, accuracy and treatment.
 - d. Assist in developing the commissioning schedule.
 - e. Provide advice on and prepare gap analysis reports.
- t. Upon receipt of the monthly status report, the partial monthly payment request and the electronic storage medium containing the updated project schedule from the CM, the Consultant must verify its content as follows:
 - a. Assess overall progress to date.
 - b. Compare the current status of the detail schedule and cash flow with the status in earlier documents.
 - c. Prepare a summary report on the findings; this report must be forwarded to the DR.

PA 1.3 *Communication and information security*

The Consultant must develop a communication management plan to be submitted to the DR for approval. Once the plan has been approved, the Consultant and all sub-consultants will follow it. The Consultant must keep the communication management plan up to date and review it as required.

The communication management plan will be developed using the following premises:

- It must include all project stakeholders.
- It must be based on the stakeholder project organization chart to maximize the effectiveness of communications.
- The DR must be the single point of contact with stakeholders on the non-project organization chart (client department, etc.) The Consultant must not contact the stakeholders unless otherwise advised by the DR.

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, including, but not limited to, a 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 with, or disclosed in any manner whatsoever, to any person or entity, other than PWGSC and the National Research Council (NRC) personnel possessing the appropriate security level and authorization, unless expressly authorized by the DR.

PA 1.4 Media

The Consultant must not respond to requests for project-related information or questions from the media. Such inquiries are to be directed to the DR.

PA 1.5 Meetings and workshops

The design and construction teams must meet regularly over the course of the project to ensure that work is proceeding in a diligent and efficient manner. Expect for meetings to be held at either PWGSC's Montréal offices (800 De la Gauchetière Boulevard West, Suite 7300, Montréal), the project site, the Consultant's place of business or virtually. The Consultant is responsible for proposing a location that is appropriate to the type of meeting, and the proposal will need to be authorized by the DR.

The Consultant must schedule and organize the various types of meeting according to their status as an RS or AS. The Consultant must prepare and deliver the agenda, notice to invitees, and minutes. The Consultant must produce the final version of the minutes within one (1) working day of the meeting. The Consultant must create and maintain a current database containing meeting action items and issues. The top five risks from this database must accompany the final minutes of each meeting.

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

The purposes of the meetings include, but are not limited to, the following:

- a) Monitoring overall project progress against project objectives.
- b) Monitoring sub-project progress against the approved scope, construction cost estimate, cash flow and prioritized construction schedule.
- c) Assessing design and construction productivity against agreed-on performance requirements.
- d) Ensuring clear communication among all participants.
- e) Identifying opportunities or issues, assigning responsible individuals and dates for resolution.
- f) Obtaining and clarifying client requirements and proposing solutions.

1.5.1 Design meetings

The Consultant must chair design meetings to review and discuss the Design Team's activities.

Attendance at these meetings will vary in accordance with the stage of design and usually include the Consultant, the DR, the CM, science partners, various 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. In advance of each meeting, the CM will prepare to discuss in an open manner all project-related matters that affect the CM's ability to support the project development or complete the project or ongoing work packages.

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 among all participants.
- c) Ensure effective package prioritization and coordination.
- d) Identify opportunities or problem issues, assigning responsible individuals and dates for resolution.
- e) Ensure effective quality management, including integration of approval body requirements.

1.5.2 Construction and commissioning meetings

The Consultant must chair project construction meetings during the construction and commissioning stages of the project, on the project site (and/or virtually).

For these meetings, the Consultant will prepare and deliver the agenda, notice to invitees and minutes. The Consultant will distribute the final version of the minutes within one (1) working day of the meeting.

The Consultant will create and maintain a database of action items and issues. This database forms part of the Consultant'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 construction and usually include the Consultant, DR, CM, science partners and 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 project scope, construction cost estimate and construction schedule.
- b) Ensure efficient communication among all participants.
- c) Ensure effective construction coordination with site and building operations.
- d) Ensure effective and efficient site coordination of all design trades and sub-contractors and suppliers.
- e) Identify opportunities or problem issues, assign responsible individuals and dates for resolution.
- f) Ensure effective quality management.

1.5.3 Submission meetings

Submissions for work packages will need to be discussed during construction and commissioning meetings. If necessary, the CM may require that a special meeting be held, if required for a particular package.

1.5.4 Workshops

Various workshops will occur throughout the contract, tailored to the stage of project development.

Project control workshops will occur routinely throughout the contract. The Consultant must chair the workshops and be able to openly discuss matters that affect the project. The DR and science partners must be in attendance for each workshop. Workshops include, but are not limited to:

- a) Subject matter workshops: These workshops are for technical design matters and 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 two (2) working days of the workshop, update the database containing action items and issues, and append the top five (5) risks identified at the workshop to the final workshop minutes. Individual subject matter workshops may include:

- i. The inclusions of Good Manufacturing Practices (GMP) Guidelines
- ii. Process equipment
- iii. Mechanical systems
- iv. Electrical systems
- v. Physical security
- vi. IT and multimedia

- vii. Acoustics
 - viii. Lighting
 - ix. Laboratory accommodations and flexibility
 - x. Landscape architecture (if required)
 - xi. Sustainability requirements
 - xii. Model quality and design coordination
- b) Functional program workshops: The purpose of these workshops is 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 two (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 stages of sub-projects. The Consultant must chair these workshops and issue workshop minutes within two (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 multimedia connectivity integration
 - v. Procurement and installation requirements
 - 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 trades 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 must chair and take a leading role in conducting these workshops, which form part of the CM's design management services. The CM will prepare and deliver the agenda, notice to invitees and minutes. The CM will distribute final workshop minutes within two (2) working days of the workshop, update the database containing action items and issues, and append the top five (5) risks identified at the workshop to the final workshop minutes.

- e) Project control workshops: These workshops are to address 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 that 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 and design testing and inspections.
- 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 conducting these workshops, which form part of the CM's cost and time management services. The CM will prepare and deliver the agenda, notice to invitees and minutes. The CM will issue final workshop minutes within two (2) working days of workshop, update the database containing action items and issues, and append the top five (5) 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 in 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.

1.5.5 Frequency of meetings and workshops

Design and construction meetings will be held once a week for the full duration of the project. Allow half a day for each meeting. Workshops will be held according to project requirements.

PA 1.6 Response time

As part of this project, which must follow an accelerated schedule, the service standard for the Consultant's key staff and sub-consultants must be half of one working day in order to attend meetings, to respond to communications sent or to agree on a DR action plan.

This service standard applies, but is not limited to, various communications, requests for information, requests for meetings, and responses to be provided at the construction site. Another time limit may be agreed upon with the DR based on the nature of the communication.

No later than five (5) working days after contract award, the Design Team must mobilize as a team and be available to attend virtual meetings or reply to requests within one half of a working day or within a time limit acceptable to the DR.

PA 1.7 Presentations, reviews and approvals

1.7.1 Work in progress reviews (reviews)

The DR, the PWGSC Professional and Technical Services Team (architecture, design, engineering, environment, etc.) and other quality assurance teams, users, and authorities having jurisdiction will, at every stage of the project, review the Consultant's deliverables and provide comments.

The Consultant will need to allow five (5) working days for the review of the various deliverables. The Consultant must respond formally in writing to all comments and adjust documentation until all issues are resolved to the satisfaction and approval of all authorities. In the case of conflicting comments, the Consultant must identify these to the DR, who will make the final decision.

1.7.2 Presentations

This list is not exhaustive and includes:

To stakeholders on the project organization chart, such as: the PWGSC Professional and Technical Services Team – Project Management, Architecture, Design, Engineering, Environment, Building Management, Users (client department) and the CM

Presentation objectives: Detailed presentations to a **technical** audience to report on key issues, results, issues, options, guidelines and recommendations.

Presentation format: Oral presentations with appropriate media, such as: reports, PowerPoint presentations, drawings, BIM models, specifications, data tables, and graphics.

1.7.3 Reviews and approvals

The Consultant must obtain the DR's written acceptance during each of the project stages before proceeding to the next stage.

PWGSC reserves the right to refuse incomplete or unsatisfactory deliverables. Any such rejected deliverables must be redone and resubmitted for acceptance at the Consultant's sole expense. PWGSC acceptances do not prohibit rejection of deliverables that are determined to be unsatisfactory at later stages of review. If a technical analysis or project design reveals that earlier acceptances should be withdrawn, the Consultant is responsible for redoing the work and resubmitting it for acceptance at the Consultant's sole expense.

PA 1.8 Other authorities having jurisdiction

Although the federal government does not formally recognize the jurisdiction at other levels of government, the federal government may choose to voluntarily comply with the requirements of these other authorities if they are more stringent than federal requirements, unless otherwise specified by the DR. In areas of conflict concerning municipal, provincial and federal requirements, federal authority prevails.

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.

PA 1.9 *Building permits and municipal authorities*

On behalf of PWGSC, the Design Team must prepare and provide the CM with 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 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 work package.

Submissions by the CM will begin with the schematic design when site plan approval is required or with well-advanced initial work packages 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 raised by municipal officers through the CM, including:

- a) The purpose of the review and approval: obtain a site plan and ensure compliance with the building code (permit), requirements for connections to municipal services, etc.
- 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.

PA 2 *Project Team organization and roles*

PA 2.1 *Project Team organization*

This project is to be managed and implemented in a collaborative manner. All members of the Project Team are required to work cooperatively at every stage of the design and construction process in order to ensure a successful and meaningful end result. Under the leadership of the DR, all Project Team members are responsible for establishing and maintaining a professional and cordial relationship. The Project Team will designate the key representatives to coordinate and complete the project and with whom the Design Team may be required to collaborate.

PA 2.2 *Science partners (NRC) and PWGSC*

2.2.1 *NRC senior management*

- Client executive representatives.
- Acts as a client point of contact for PWGSC senior management.
- Oversees project progress and facilitates strategic decision-making.
- Ensures the availability of necessary project resources.

2.2.2 NRC technical reference

- NRC will assign a primary contact person to define and clarify all specific requirements of the science partners, including the ongoing interpretation of operational needs within the context of the government's internal and broader departmental objectives. This means describing all general premises, special-use sites, and other specific requirements, such as the definition of security and IT requirements and GMPs.
- This person will be involved in all stages of the project, including the planning, design, implementation, commissioning, qualification and validation, and project closure stages.
- This person, NRC's technical reference, is the single point of contact responsible for all internal management and communications for the project within the science partner's organization.

2.2.3 Other NRC services

1. Shared Services Canada (SSC)

- Department responsible for ensuring that all information technology (IT) needs are properly identified, communicated to the Project Team, coordinated with the other project requirements, and incorporated into the project, all in a timely manner. The SSC team is made up of IT specialists and external suppliers tasked by SSC.
- They will conduct quality reviews for this project.
- Their standards will be shared with the Consultant to ensure that the design complies with them.
- Refer to section DP5.2 Building Connectivity Components (BCC) of the *Project Brief* for a breakdown of services.

2.2.4 PWGSC senior management

- Provides project supervision and approval.
- Acts as a point of contact for senior management at the client department (NRC).
- Updates the client department's senior management on project progress and facilitates decision-making regarding major project issues.
- Ensures the availability of necessary project resources, by sector.

2.2.5 Senior project manager (PWGSC)

- The senior project manager is responsible for managing the project at a high level.
- Provides general direction for the project.
- Acts as a liaison officer between senior management and the Project Team.
- Manages the project's major issues.

2.2.6 Project manager (PWGSC)

- Serves as the DR for contract purposes for the Consultant, the CM and, in some cases, for other required contracts.
- Acts as the single point of contact during project delivery.
- Manages project delivery stage activities.
- Monitors the project's status.
- Ensures that the Technical Team is established within PWGSC in order to benefit from the expertise and technical advice of Architectural and Engineering Services, Acquisitions, and Environmental Services, and to obtain guidance on architecture, engineering, spatial information, sustainable development, specification for movables and procurement, etc.
- Ensures that the Technical Team is established externally.
- Ensures project coordination with the client department.
- Manages the project for PWGSC and assigns and defines roles and responsibilities identified in pertinent internal and interdepartmental agreements.
- Manages the procurement process, including the development of the terms of reference and evaluation criteria, with assistance from Acquisitions and Architecture and Engineering Services, if needed.

2.2.7 Other PWGSC services

1. Acquisitions

Internal services responsible for ensuring that all procurement activities within PWGSC meet quality standards and adhere to prescribed policy and regulatory practices.

2. Project Management

The PWGSC Project Management Team consists of project managers, project officers, IT specialists, and various project support resources. This team supports the project manager and acts as a single link between the various project stakeholders during all stages of delivery.

3. Architecture and Engineering Services (AES)

Technical team tasked with ensuring that the technical and conceptual design aspects of projects are well defined and correctly expressed and communicated. They protect the best interests of the Crown and ensure that requirements are compliant with client and departmental standards, with technical regulatory requirements, and with codes and standards. They ensure, through quality assurance and quality control processes that service providers and consultants understand and apply these requirements at all stages of the project.

This team provides expert advice on coordination and quality assurance for architectural, engineering and interior design trades, including design reviews, to ensure that technical requirements are suitably defined and incorporated through all stages of the project.

4. Environmental Services (ES)

Technical team tasked with anticipating and preventing the degradation of environmental quality (including air, water, land, natural resources, flora, fauna and humans), and incorporating such factors into the planning and decision-making processes for design, construction and maintenance activities on real property projects in order to promote sustainable development and the health and safety of occupants. This team also oversees

the integration and implementation, throughout the project, of government sustainability commitments and risk prevention associated with materials that are hazardous to occupants, such as asbestos, lead, and mold.

5. Technical and Maintenance Services (TMS)

Technical team responsible for ensuring that aspects related to commissioning, accessibility, vertical transportation, and project operation and maintenance are well defined and communicated. They protect the best interests of the Crown and ensure that requirements are compliant with client and departmental standards, with technical regulatory requirements, and with codes and standards. They ensure, through quality assurance and quality control processes that service providers and consultants understand and apply these requirements at all stages of the project.

6. Real Property Geomatics Services

Technical team responsible for coordinating the management of the project's geographic reference data.

7. Communications

Designated team that handles all official communications related to the project. This team is responsible for communications with the media.

2.2.8 Other external services

1. CM

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 DP content and sequencing. The CM will also:

- a) Provide PWGSC with technical support and services and carry out work for the project in accordance with the terms and conditions of the CM's contract.
- b) Lead the construction team that is composed of its own resources and all sub-contractors 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 of the necessary personnel to deliver the services and carry out the work for sub-projects, either by assignment of CM qualified staff or by engagement of services contracted directly by the CM.
- g) Ensure continuity of key personnel and maintain a dedicated working team for the duration of the sub-projects.
- 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 management services.

- j) Work constructively to ensure a collaborative and cooperative team approach with knowledgeable and timely input and contribution by all Project Team members.
- k) In cooperation with the Consultant, ensure at all times that the design solution and construction comply with the agreed construction cost estimate for the sub-projects.
- l) In cooperation with the Consultant, ensure at all times the design solution and construction can be and is undertaken within the fixed schedule objectives of the sub-projects.
- m) Provide ongoing design management services and, when requested by the DR, design-assist services.
- n) Organize and attend meetings and workshops with Project Team members or, as needed, separate meetings with the DR.

2. Consultant

The Consultant is required to:

- a) Discuss technical issues with the DR and the CM.
- b) Provide PWGSC with technical support and services as prescribed in this project brief and in accordance with the contract.
- c) Obtain, or cause to be obtained, all federal, municipal, and other government regulatory requirements and the regulatory requirements of other authorities and obtain, or cause to be obtained, the approvals necessary for each sub-project.

3. External project management

PWGSC will engage an external project management support services (PMSS) firm to provide project management and administration support. 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.

PWGSC may also engage the services of a cost management firm to provide support. It will report to the DR. The firm's personnel will operate on the project as an extension and part of the responsibilities of PWGSC, which will include conducting an independent assessment of the Consultant and CM's cost and risk management services. This firm will define the format of the information and provide review of cost and time information prepared by the Consultant and the CM.

4. Other delivery-stage external experts

PWGSC and NRC will be able to call upon the services of external experts during the project delivery stage. These experts will be an integral part of the Project Team and will be involved at various levels based on their roles and responsibilities.

5. Other study-stage external experts

PWGSC and NRC have called upon the services of external experts during the project definition stage. These experts participated in the various preparatory studies related to project definition.

PA 2.3 *Coordination and collaboration with stakeholders mandated by the DR*

All coordination and collaboration services are an integral part of RS and AS.

2.3.1 *CM*

The DR will retain the services of a CM.

The Consultant must:

- a. Collaborate with the CM at every design stage (RS1 to RS9 and AS1 to AS2).
- b. Consider the CM's recommendations regarding constructability, cost estimation and planning, sequencing and schedule monitoring.
- c. Work closely with the CM for:
 - Schedule planning, sequencing and monitoring.
 - Preparing and coordinating tender documents in separate construction packages.
 - Calls for tender, bid evaluation and construction contract award by separate construction packages.
 - Construction and contract administration.

PA 3 *BIM Implementation Plan*

PA 3.1 *Overview*

The BIM protocol of the Centre of Expertise – Professional and Technical Services of PWGSC includes two documents: the BIM Management Plan (BMP) and the BIM Implementation Plan (BIP).

3.1.1 *BIM Management Plan (BMP)*

The BMP sets out the objectives to be met and the strategy for implementing and monitoring BIM processes that are deployed throughout the project. It describes the client's intentions regarding the use of the BIM process in the ongoing project.

The BMP serves as a roadmap for all parties involved in the development of BIM models for a project delivered according to the BIM (Building Information Model) process, for the duration of the project.

This BMP is the result of collaboration between all project stakeholders for optimal deployment and successful implementation of the BIM approach in this project. It sets out the objectives to be met and the strategy for implementing and monitoring BIM processes that are deployed throughout the project.

This document is intended to be evolving at the same pace as progress is made in implementing the project and in parallel with the teams working on the project. However, any changes to this document must be made through the senior BIM manager.

The BIM Management Plan (BMP) is available in Appendix E - Appendix 2.

3.1.2 BIM Implementation Plan (BIP)

The purpose of the BIP is to identify the working methods used by each team to successfully carry out modelling and the gathering of data and any other information that is relevant to project delivery.

The BIP defines the uses of the BIM in the context surrounding the project, along with a detailed design of various processes related to BIM principles throughout the life cycle of the project.

Each trade BIM manager is responsible for producing a BIM implementation plan that includes all modelling elements and principles preferred by his or her team for implementing the deployment strategy of the BIM approach defined within this BMP.

This document must follow the common guidelines developed jointly by all stakeholders affected by the BIM approach and be available to everyone to allow other trades to refer to it.

Each party is responsible for preparing, in collaboration with the affected stakeholders, the sections of the BIP that affect it.

Only one BIP for all suppliers during the design and construction stage is required. Collaboration and coordination between the parties of suppliers for the design stage is therefore essential.

Senior BIM design and construction managers are responsible for drafting and updating BIM implementation plans.

The construction BIP must be aligned with the design BIP to maintain consistency between project processes. Thus, all processes presented in the construction BIP that share elements of the processes used in design must refer to the appropriate section of the design BIP.

Contractors required to provide a model to refine the level of detail in professional models (e.g. steel structure, curtain walls, electromechanical systems, wrought metals, etc.) must be identified and contribute to the development of and compliance with the BIP of the general contractor or CM. The common processes (validation, communications, etc.) with the engineers will need to be clearly identified and described.

PA 4 Sustainable development

PA 4.1 Energy performance

The design should aim to achieve and exceed the requirements of the 2017 NEBC and the good practices of the ASHRAE guides for laboratory design. In addition, it should incorporate good practices to eventually become carbon neutral (ready for carbon neutrality). If a design choice is to be made, the parameters to be used are a carbon cost of \$300/tonne over a 40-year timespan.

PA 4.2 Vulnerability and adaptation to climate change

As part of the Greening Government Strategy, the Government of Canada is committed to minimizing disruption and damage to its assets, services and operations related to the impacts of climate change.

Consistent with the Federal Adaptation Policy Framework, departments will:

- Take action to improve understanding of the risks posed by the impacts of climate change to federal assets, services and operations across the country.
- Take action to reduce the risks posed by climate change to assets, services and operations, notably by incorporating and/or strengthening the consideration of climate change in business continuity planning, departmental risk planning or equivalent processes, and program design and delivery.

The incorporation of adaptation to climate change must therefore be taken into account in the design, construction and operation of the new building. Completing the climate change vulnerability and adaptation study will be the responsibility of PWGSC and will help to identify design elements to be considered by the Design Team based on future climate hazards. The conclusions and recommendations of this study will be sent to the Design Team during the mandate.

PA 4.3 Compliance with the Impact Assessment Act

An environmental impact assessment of the project must be used to predict and determine environmental impacts before they occur and to plan mitigation measures that must be integrated into the project. Mitigation measures resulting from this study will be sent to the Design Team during the mandate

PA 4.4 Management of construction, renovation and demolition (CRD) waste

During a construction project, waste is generated. Treasury Board's Greening Government Strategy requires a diversion rate of 90% (mass) of CRD waste from landfill sites.

To meet this diversion objective, the Design Team will need to plan to include specific clauses relating to CRD waste management in the contractor's specifications. PWGSC's requirements for the management of CRD waste will be sent to the successful bidder.

PA 4.5 Favourable development of sound waste management

a. Departmental commitments

With the Greening Government Strategy, the federal government has adopted the directive to redirect at least 75% (by weight) of non-hazardous operational waste from landfills by 2030. In addition, a minimum diversion rate of 75% (by weight) of plastic waste from landfills will be required. The government is also committed to tracking and disclosing its waste diversion by 2022.

To achieve these targets, three-way waste collection must be implemented, which includes organic matter, recyclable materials, and ultimate waste.

b. Client requirement

To plan optimal waste management (WM), the Design Team is responsible for anticipating the client's needs. Based on specific needs, the Design Team must allocate adequate space for the handling and storage of different types of waste.

The following are factors to consider when determining the volume of waste:

- Number of full-time employees (FTEs) in the building.
- Whether or not there is a cafeteria on site or nearby.
- Need to manage confidential paper documentation (include storage space for specialized locked bins).
- Generation of plastic waste from laboratory operations and disposable personal protective equipment, which cannot be found in municipal collection—provide for specialized collection with a recycler.

c. Hazardous and toxic materials

Given the activities of the building occupants, check whether there is any need to include a regulatory space dedicated to the storage of toxic and hazardous materials.

d. Integration with the Royalmount Complex's WM strategy

Look into the operation of waste management at the Royalmount Complex.

- Is there a common agreement for waste collection? Does this agreement meet the project's needs?
- Is there a dedicated space within the complex to deposit waste?
- Will the building be accessible to a collection truck?

e. Waste storage site

Dimensions

Will vary based on client needs and WM volume expected.

Location and accessibility

The accessibility and facilitation of maintenance operations could reduce building management costs.

Ensure that service corridors are manageable for maintenance employees when emptying the building's sorting stations.

Ensure that the waste storage site is accessible for both daily maintenance of sorting stations and for putting storage bins outside for collection. Provide an appropriate-sized outside exit door in or near the storage site.

Facilitate outside access for collection trucks.

Odour control

A ventilated site for storing garbage, recyclable materials, and organic matter is to be provided. Assess the feasibility of indoor air circulation for ventilation and air conditioning of the storage site (e.g., exhaust air from building interior in the waste storage site, where the air can then be directed outside).

The waste storage site must be isolated from the rest of the building by firebreaks with an appropriate fire endurance rating.

f. Sorting stations

In all common areas where food consumption will be permitted, plan for the addition of sorting islands with a minimum of three options (waste, assorted recycling, and composting), whose capacity and appearance meet needs. These sorting stations must

not be incorporated into the furniture so that, if necessary, the capacity of the bins can be increased.

Do not install individual garbage bins (so-called orphans) at workstations. Plan to have two- or three-way sorting stations (depending on whether food is allowed in the area) within a radius of at least 20 metres from each workstation.

PA 4.6 *Lifecycle analysis*

The project to build the new NRC Clinical Trial Equipment Production Infrastructure will require a building life cycle analysis (structural materials) during the RS2 stage to meet greening objectives and reduce GHG emissions as identified in the following government strategies:

- The Treasury Board Secretariat's Greening Government Strategy (2020)
- The Departmental Sustainable Development Strategy (2017–2020)

4.6.1 *Objectives*

The main objective of this life cycle analysis is to determine the amount of embodied carbon in the entire building, i.e., structural materials. The term “embodied carbon” refers to carbon dioxide emitted during the manufacture, transport and construction of building materials together with end-of-life emissions. It also has the secondary aims of:

- Determining the overall embodied carbon for the project's structural materials.
- Determining the amount of embodied carbon broken down by project structural material.
- Preparing a report detailing the results of requested simulations.

4.6.2 *Areas of study*

The “Areas of study” section includes the following:

1. Evaluation methodologies
2. System function
3. The functional unit and system limits

4.6.3 *Evaluation methodologies*

The life cycle analysis (LCA) of the entire building (structure) will need to be carried out using industry-recognized tools (ATHENA Impact Estimator, OneClick or equivalent).

The following standards will need to be used for this study:

- ISO Standard 14040:2006, Environmental Management: Life Cycle Assessment – Principles and Framework
- ISO Standard 14044:2006, Environmental Management: Life Cycle Assessment – Requirements and Guidelines

4.6.4 System function

The system analyzed is the building (structure and envelope). The primary function of the infrastructure is to house the equipment for and production of NRC clinical trial materials.

4.6.5 Functional unit and system limits

The functional unit is: a building for the production of clinical trial materials measuring 2,788 m² for a period of 60 years.

The system limit is a cradle-to-grave study. The building's lifespan is 60 years.

The modelled building will need to be located in Quebec City.

The stages of the building's life cycle will include stages A1, A2, A3, A4, A5, B2, B4, B6, B7, C1, C2, C3 and C4 from the production of materials to the end of life. This is according to Table 1 of Athena's Table IE4B system boundary capacity (Athena Sustainable Material Institute 2020) for both the calculation of overall emissions and the detailed calculation by element (structure).

The following are the details of the stages included in the LCA that must be considered:

- A1: Extraction and production of raw materials
- A2: Transportation of raw materials
- A3: Manufacture of materials
- A4: Transportation of materials to the site
- A5: Construction – Construction/installation process – Energy use by construction equipment and the production, transportation and disposal of waste during construction
- B2: Building maintenance
- B4: Periodic replacement of materials
- B6: Regional variation in building energy consumption – Energy extraction, transportation, distribution and combustion/energy use
- B7: Water use for building operations
- C1: Deconstruction/demolition – Energy used by demolition/deconstruction equipment
- C2: Transportation – Transportation of waste
- C3: Waste processing
- C4: Processing of construction/demolition waste – Energy used for handling and processing until final waste
- C4: Disposal – Effects of landfilling/incineration activities

To assess embodied carbon, a version of the simulations will need to be presented without water (B6) and energy (B7) use for both the overall calculation and the detailed calculation by structural element.

The other version of the simulations will need to include these two criteria for both the overall calculation and the detailed calculation by structural element.

To assess other environmental impacts, also provide results with a simulation version without B6 and B7 for both the overall calculation and the detailed calculation for structural elements and a second version that includes B6 and B7.

The structural elements to be considered include:

Infrastructure

1) Foundations:

- Standard foundation (foundation walls, foundation columns, pile heads, etc.)
- Partitions (structural partitions)
- Special foundation (including, if applicable, concrete piles, piers, and beams, etc.)
- Lower slab (especially, if applicable, slab on ground, pit and base, etc.)
- Other (if applicable)

2) Superstructure

- Floor structures
- Frame and elevation of walls
- Floor on bridging and slab (if required)
- Stair construction
- Roof construction
 - i. Roof structure
 - ii. Awning structure
- Bracing
- Other (if applicable)

The raw area is calculated based on the following principles: all floor space inside the exterior walls is counted, including the interior walls and spaces for equipment. Breakthroughs for circulation and vertical technical voids are not counted on a single floor. The calculation rule will need to be detailed in the appendix to the final report.

4.6.6 Final report

A final report will need to be prepared to describe the results of the LCA.

This report will need to include the following sections:

- 1) Study background
- 2) Study objectives
- 3) Areas of study
 - a. Evaluation methodologies
 - b. System function

- c. The functional unit and system limits
 - d. The detailed calculation of the building's surface area
 - e. The elements included in the study
 - f. The elements excluded from the study
 - g. The geographical border
 - h. Data source
 - i. List of detailed data
 - j. Data quality
 - k. Assumptions and limitations
 - l. Critical review
- 4) Results of inventories and assessments of impacts and damage
 - 5) Interpretation of results
 - 6) Analysis of sensitivity and consistency of results
 - 7) Conclusion and recommendations, including limitations

PA 4.7 *Landscape architecture and sustainable landscaping*

In order to enable the government to achieve its objective of retaining and restoring biodiversity, mitigating and adapting to climate change, the project design should consider the following items:

- a) The ecological development of the site (earthworks, traffic areas, coating materials, furniture, lighting, signs, plants) must be designed and carried out in accordance with the planning of resilient infrastructures and reducing the impact on the environment, for example for parking lots, water retention basins, green roofs, interfaces with the urban or natural environment, etc.;
- b) Landscaping should be designed without using invasive species or requiring pest control products, or excessive demand for water. These spaces must promote the establishment and maintenance of a biodiversity capable of adapting to different seasonal conditions without requiring a sustained maintenance program;
- c) Heat islands reduction measures must be integrated and help reduce the impact on the microclimate for human and wildlife habitats. For example, favor the use of materials with high albedo and provide a canopy that covers 50% of mineralized surfaces based on a 5-year growth;
- d) Where applicable, the design should incorporate stormwater management strategies during heavy rains, such as: temporary water retention devices on the roof, green roofs, landscaped retention basins and favor permeable surface coverings;
- e) The lot must be arranged when the conditions in the basement allow it so that at least 70% of the built environment, excluding the area under the roof, is permeable or designed to capture runoff so that it infiltrates the site. Waterproofing of surfaces should not be more than 50%. The water from roofs must be recovered to facilitate its reuse in order to supply the landscaping.

PA 4.8 Water Management

In order to enable the government to achieve its objective of reducing its water consumption and its load on municipal networks, the project design will have to consider the following items:

- a) Apply best practices for water to reduce water consumption;
- b) Install the necessary equipment for monitoring and disclosing drinking water consumption;
- c) Reduce outside water consumption (irrigation), stormwater runoff as well as the use of toxic products through adequate landscaping;
- d) Plan for infrastructure that fosters ecological management of runoff in exterior traffic areas and parking lots;
- e) Favour the use of low-water landscaping and low-maintenance lawns with drought-resistant species;
- f) Design new infrastructure for efficient management of erosion, stormwater and sediment issues.

REQUIRED SERVICES (RS)

RS A General

The Consultant must take into account Appendix E and the preceding sections of Appendix F in providing the RS as described in the following sections and appendices.

The Consultant, as an expert in matters of design planning and implementation, must:

- a) Provide professional architecture, engineering and specialized services (as per the DPs and PAs), in accordance with the following RS, set out in this section: RS1, RS2, RS3, RS4, RS5, RS6, RS7, RS8, and RS9.
- b) Provide professional services required to obtain, coordinate and integrate the AS required and additional expert and laboratory (disbursement) services. These services include, without being limited to, the following:
 - a. Drafting of mandates required to obtain AS and laboratory services (disbursement) where required.
 - b. Call for tenders, analysis of service offerings and negotiations, if required;
 - c. Coordination and integration of AS and laboratory and expert services (disbursement) with the documents to be delivered in each stage of the project.
- c) 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 must include any warranty-related call-backs and repairs required after the issuance of the certificates of substantial performance.

- d) Submit deliverables to the DR for review and approval at various intervals, as stated within each project brief section.
- e) Actively collaborate with the CM and the DR, prioritizing decision-making for the project.
- f) 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.

The Consultant must ensure that its bid includes the services of all stated sub-consultants required to properly fulfill its mandate.

The team members must be authorized to provide the RS to the full extent prescribed by Quebec law, be a member in good standing of the regulatory body for their profession and respect the security criteria required for this project.

In this Request for Proposals (RFP), unless otherwise indicated, the main Consultant's services also include the services of all its sub-consultants or specialist consultants required to carry out its mandate.

The RS task list is non-exhaustive and in no way limits the professional obligations of the Consultant to perform the required tasks for the purpose of fulfilling the mandate of the project.

These RS include:

- RS 1 Analysis of project requirements
- RS 2 Schematic design (SD)
- RS 3 Design development (DD)
- RS 4 Construction documents
- RS 5 Tender call, bid evaluation & award of construction contracts to sub-contractors (by package)
- RS 6 Construction and contract administration and post-construction warranty review
- RS 7 Risk management
- RS 8 Enhanced commissioning of the facility
- RS 9 Building Information Modelling (BIM)

The following is a non-exhaustive list of services for each trade. Some of the activities listed below may require the participation of several or all professionals. The Consultant will coordinate its various team members (including sub-consultants and specialists) and is responsible for performance of all elements in the mandate. The Consultant is responsible for ensuring that all the documents produced and information supplied are coordinated among all trades.

RS 1 ANALYSIS OF PROJECT REQUIREMENTS

During this stage, the Consultant will:

- a. Conduct a detailed analysis of project requirements as defined in the URB and other supplementary information, including expert opinion on any outstanding process and facility options.
- b. Validate a process basis able to meet identified performance and compliance requirements.
- c. Review the plans, specifications and other available documents of the surrounding buildings and the existing site.
- d. Review the environmental and geotechnical study.
- e. Review the documents described in Appendix E – DP5.
- f. Conduct comprehensive project site surveys.
- g. Take note of the environmental effects assessment (EEA) report and the mitigation measures identified in the assessment report that will need to be included in the plans and specifications, if applicable.
- h. Make recommendations on pre-construction studies, tests and trials.

The Consultant must ensure that formal approval is obtained from the DR at this stage, as the approved deliverables will become the scope of the project work and will be used as reference documents throughout the duration of the project.

On-site surveys are needed to collect the information required to advance the project design. The purpose is to confirm, analyze, test, and determine various conditions, either known or unknown.

To respond to the aggressive schedule, the Consultant must prioritize the analysis of project elements that are on the critical path and advance these elements to the RS2 stage before completion of the RS1 stage.

RS 1.1 Analysis of project requirements

1.1.1 Objective

The purpose of this stage is to ensure that the Consultant reviews and integrates all the project requirements, identifies and evaluates conflicts or problems, provides alternative strategies, presents the project's scope, delivery process, schedule and estimates required to complete a project of consistent quality, and obtains all necessary approvals.

The Consultant must analyze, examine, validate and incorporate the content of all pre-design studies developed by others and ensure that the information presented is complete and coordinated. It must identify any missing information, contradictions or queries resulting from its verification.

In the event that additional or complementary information is required by the Consultant to carry out its mandate, it must notify the DR as soon as possible by providing the required information in writing. Formal approval by the DR will be required before the Consultant can proceed to mandate and obtain AS that may be requested in the form of disbursements (i.e., geotechnical and environmental study, etc.)

The Consultant must identify and assess conflicts and problems. It must list the documents received, check them, validate them and list the missing elements at this stage.

The Consultant must provide the DR with a detailed work plan for the development and production of the documents to be provided at this stage. After approval by the DR, the Consultant may make the necessary changes or produce the missing documents.

1.1.2 Scope of services

- a. Visit the site and neighbouring buildings and check availability and capacity of services needed for the project.
- b. Analyze infrastructure, subsurface and above grade services, including capacities and limitations for storm water drainage, foundation drainage, tunnels, fire protection, power, water, telecommunications, etc.
- c. Attend project start-up meeting.
- d. Analyze and validate project requirements.
- e. Review all available existing material related to the project.
- f. Review and validate the plans, specifications and other documents related to the site and neighbouring buildings.
- g. Review and validate the proposed project schedule to ensure that all milestones are realistic and that all stages can be met.
- h. Prioritize project elements with the CM.
- i. Identify and verify the authorities having jurisdiction over the project.
- j. Identify and validate all applicable codes, regulations and standards.
- k. Conduct comprehensive site surveys.

1.1.3 Deliverables

- a. Submit a document listing the documents received, what has been verified and validated and what is missing. After approval by the DR, make necessary changes or produce the missing documents.
- b. Produce a comprehensive summary of the project brief and program demonstrating understanding of the scope of work, including:
- c. Written identification of the problems, conflicts or other perceived information/clarifying assumptions for the DR's acknowledgement.
- d. Complete and up-to-date plans of the existing site, including existing adjacent constructions.

- e. Description and validation of proposed elements.
- f. Report on all applicable codes, regulations, standards and authorities having jurisdiction.
- g. Code study.
- h. Following the review of the geotechnical study, provide any additional analyses required to complete the data presented, if necessary.

RS 2 SCHEMATIC DESIGN

RS 2.1 Purpose

The Consultant will work with the Project Team, including the DR, CM, and client's technical reference, to finalize any outstanding elements of the production process design, consolidating the preferred options into a final functional design that balances performance, compliance, and project constraints.

The purpose of this stage is to translate the project requirements into space parameters in the most effective way possible, explore design options and analyze them against priorities and program objectives that were previously identified. Out of this process, one option will be recommended to proceed with the design development.

The Consultant will generate a basis of design for the facility that can accommodate the finalized process and other identified user requirements. It is expected that insight gained from previous feasibility and concept design activities will greatly inform the basis of design and expedite the process. Emphasis will be placed on validating the assumptions made in those earlier activities, incorporating changes arising from final revisions to the process design, and addressing gaps or deficiencies still outstanding from the preliminary concepts.

To respond to the aggressive schedule, it is important to prioritize project elements and review those elements already prioritized during the pre-design (PD) stage. It is essential to continue consultation with the science partners, the CM and the DR to prioritize those elements and to update the requirements and develop cost estimates and schedules. 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.

The CM will set the order of priority in which package bid documents are required. The prioritization of the packages will ensure the optimal sequence of construction to achieve the shortest overall construction period and maximum cost control.

RS 2.2 General

2.2.1 Scope of services

- a. Provide the DR with written responses to the review comments issued at the previous stage (RS1) by the DR and the CM.
- b. Prepare and present a minimum of three (3) comprehensive and distinct design options exploring all viable technical strategies that could be implemented. Each option must be illustrated separately (reports, BIM model, drawings, presentation, PowerPoint, etc.) and integrate architectural, structural and mechanical solutions, including the envelope and interior design.
- c. Present the strategy for implementing the GMP Guidelines.
- d. Present for comments the BIM model. Demonstrate how they respectively meet the requirements.

- e. Analyze each solution according to the objectives of the project, including the cost and timing of the project (via a comparative analysis detailing the advantages and disadvantages of each).
- f. Draft a preliminary report on the project's description which describes the different elements and the various alternative options for the systems.
- g. Minimize the use of hazardous/toxic materials/products and products made from endangered or rare species.
- h. Recommend one option for further development with all supporting background and technical justifications.
- i. Verify and ensure compliance with all acts, regulations, codes, standards and municipal regulations applicable to the project design.
- j. Conduct a code study.
- k. Submit a Class "C" cost estimate according to the overall summary format and detailed itemized breakdown of level 3 of the Unifomat II standard and related modelling.
- l. Produce an implementation schedule, including alternative procurement and construction strategies.
- m. Incorporate the base document and programmatic data provided in the project model. The DR will need to approve the integration of baseline data before the Project Team can proceed with the next steps of BIM.
- n. The level of detail in BIM model data must be at level 5 of Unifomat II.

RS 2.3 *Particulars*

The following is a non-exhaustive list of services for each trade. Some of the activities listed below may require the participation of several or all professionals. The Consultant will coordinate its various team members (including sub-consultants and specialist consultants) and is responsible for performance of all elements in the mandate. The Consultant is responsible for ensuring that all the documents produced and information supplied are coordinated among all trades.

2.3.1 *Process engineering and automation*

- a. Validation of process, QA, clean utility and other facility equipment needs.
- b. User requirement specifications (URS) for long lead equipment.
- c. Final block and process flow diagrams.
- d. Process simulation and capacity analysis.
- e. Critical utility assessment and flow.
- f. Support for the development of the facility automation plan and related IT requirements.
- g. User requirement specifications (URS) for remaining clean utilities, any custom design equipment, or other equipment as required.
- h. GMP architectural elements such as a facility program, GMP operational flow plans, and zoning, transition and adjacency layouts.

- i. GMP mechanical and electrical plans, such as area classification, pressurization and HVAC zoning.
- j. Associated schematics and 3D model for the final layout of the facility (inside/outside).
- k. Assessment of the capacity of the existing facility to support the new annex in terms of utilities.
- l. Validation of budget projections.
- m. Basis of design for a facility able to accommodate the validated process design while conforming with the needs and constraints of the project.

2.3.2 Architecture and interior design

- a. Site plan showing the location of the proposed building and existing parking lot to be deconstructed, their orientation and the main access points. The general layout of the site, traffic lanes and parking lots are to be provided for information only.
- b. Schematic plans of the new building, of alternatives showing relative disposition of main accommodation areas, circulation patterns, number of floors, etc.
- c. Sketch elevations and sections indicating the basic design approach and aesthetic philosophy.
- d. Sketch perspectives or massing studies.
- e. Outside gross building areas and summary of main accommodation areas required and proposed.
- f. Horizontal and vertical space relationships.

2.3.3 Landscape architecture

- a. Concept design drawings including the details of relevant and typical sections.
- b. Sketch elevations and sections indicating the basic design approach and aesthetic philosophy.
- c. Sketch perspectives or massing studies.
- d. Comprehensive plan for installing outlying building developments that incorporate the layout of roads and site development (for the project and construction site) coordinated with the civil plans.

2.3.4 Civil

- a. Plans of existing conditions (including contaminated soil locations and levels) and of demolition illustrating the strategies for deconstructing the existing structure and access roads.
- b. Incorporate into the model and provide documentation and specifications for:
 - Excavation methods and supports, including design details such as rock anchor spacing, shotcrete, etc.
 - Existing services/structures that may interfere with proposed works.
 - Mitigation measures required to deal with special issues.

- Excavation support, including proposed alternatives.
 - Subsurface conditions.
 - Underpinning and support including detailed design information.
 - Protection of existing buildings including design details.
 - Dewatering concepts or mitigation.
 - Foundation system concepts and design.
 - Backfill requirements.
 - Waterproofing design.
- c. Vibration management plan, including blast and vibration criteria, monitoring, control, reporting, incident/exceedance management and defining roles and responsibilities.
 - d. Construction monitoring plan that is coordinated with structural monitoring.

2.3.5 Structure

- a. Proposed or alternative structural systems, including foundation methods and explanatory sketches, and a copy of the site report on which the design is based.
- b. Initial seismic analysis.

2.3.6 Mechanical

- a. The concept study submission must include a description of the specific mechanical requirements and the function of each area (or room) in the project. Identify any unique or specialized equipment required by the subject facility. Incorporate in the submission a schedule of requirements listing all rooms and identify the mechanical building services to be provided.
- b. Explain in the concept study submission the manner in which the proposed mechanical systems meet user requirements.
- c. Identify whether full-time operating staff will be needed for operation of any of the mechanical equipment. Differentiate between staff that is needed by code requirements and staff that may be needed because of the nature and size of the facility.
- d. Identify location of entry point into the building of all mechanical services.
- e. Identify in square metres the area to be provided for mechanical rooms and the percentage of the total building area this represents. Identify location of mechanical spaces in each building.
- f. Provide the following details by trade:
 - a. Heating – Ventilation – Air Conditioning:
 - Provide a preliminary estimate of heating, humidification, clean steam, air conditioning and process cooling loads.
 - Confirm the chosen energy source.
 - Identify the building's main mechanical equipment (boilers, coolers, water towers, etc.) and provide economic and technical explanations to support the chosen type.

- Provide a summary list of mechanical systems to be connected to the emergency electrical system and provide a preliminary estimate of the expected loads.
 - Provide technical documentation for the main equipment.
 - Identify the volume of outdoor air to be supplied by the ventilation system.
 - Identify the delivery rate of supply air to occupied spaces.
 - Include directional airflows in spaces.
- b. Plumbing
- Provide an estimate of planned network flows: domestic water, sanitary sewer, storm flow, process water, process drainage, laboratory gas and compressed air. Indicate whether available services can handle this load. If not, develop a new solution.
 - Indicate the pressure and flow rate of available water.
 - Indicate the drainage method intended for roofs and process water.
 - Provide technical documentation for the main equipment.
- c. Fire protection
- Provide a preliminary estimate of the required water flows and pressure required. Indicate the source of supply.
 - Coordinate with the city to conduct a flow test and produce a report that meets NFPA-13 requirements.
 - Indicate the probable classification of risks by type of premises.
 - Indicate if pumping stations will be required.
 - Provide technical documentation for the main equipment.
- g. Provide the following plans with the recommended option for all trades:
- Plans of each service or network.
 - Show the location of mechanical rooms with the main equipment locations.
 - Indicate by means of single line diagrams the operating principles of the main systems proposed.
- h. Provide demolition plans for the existing site.

2.3.7 Electricity

- a. Proposed basic electrical systems of significance to the early design.
- b. Site plan showing location of service entrances.
- c. Distribution diagrams showing single line diagrams to distribution centres and including details of the type of connection proposed by the electricity distributor.
- d. Typical floor plans complete with locations of major electrical equipment and distribution centres.
- e. Location of light fixtures (inside and outside).

- f. Location of electrical outlets.
- g. Ceiling distribution systems for lighting, power and telecommunications.
- h. List of standard PWGSC details to be utilized.
- i. Telephone equipment rooms, conduits and telecommunication cable systems requirements and layout.
- j. Provide an electrical design synopsis describing the electrical work in sufficient detail for assessment by the DR. Include feasibility and economic studies of proposed systems complete with cost figures and disbursements.

2.3.8 Building connectivity components (BCC)

- a. Work with the physical security specialist and SSC to provide them with the infrastructure required to incorporate their services.
- b. Present the provided infrastructure.

2.3.9 Enhanced commissioning (refer to RS8)

- a. Define commissioning requirements.
- b. Identify in square metres the area to be provided to maintenance personnel, including storage and workshops for mechanical, electrical and housekeeping.
- c. Define project verification archives (data storage and retrieval system).

2.3.10 Contaminated soil

- a. In the event that the Consultant finds that the environmental data available for the work are insufficient, additional environmental characterization of the soil may be necessary.

2.3.11 Sustainable development

- a. Create sustainable development strategies that will be incorporated into the project.

2.3.12 Specifications

- a. Preliminary outline specifications following the MasterFormat nomenclature indicating main building components and options for using “green” components and systems.

2.3.13 Cost estimate

- a. Prepare Class “C” cost estimates using the overall summary format and detailed itemized breakdown of the Uniformat II standard for all work (estimates not divided by construction package).
- b. Quantify design, construction and deconstruction costs, contingencies and risks.
- c. Prepare and review alternative costing solutions to be able to determine the most cost-effective design and/or construction strategy.
- d. Provide documentation for all the unit prices, analyses and evaluations.

- e. Work with the CM, who will prepare his/her own cost estimate along with the construction economist, and PWGSC to coordinate the estimates produced and align the amounts of the various estimates before the handover of the deliverable at 99%.

2.3.14 Timeline (Schedule)

- a. Prepare and update the project master schedule (based on established criteria). Refer to PA 1.2.2.
- b. Identify potential scheduling risks.
- c. Advise on alternative procurement and construction strategies to create efficiencies wherever possible.

2.3.15 Good Manufacturing Practices (GMP)

- a. Develop strategy to demonstrate that the GMP Guidelines have been incorporated at every stage of the project.

RS 2.4 Deliverables

Provide the following:

- a. Concept design drawings.
- b. Plan and elevation drawings of the current conditions of work areas.
- c. Preliminary analysis report of current applicable codes, standards, acts and regulations that are in effect.
- d. Description of the options with recommendation of preferred solution.
- e. Project specification amendments.
- f. Commissioning plan.
- g. Report on non-contaminated and contaminated waste management.
- h. Environmental Design Modification Report.
- i. Cost plan, including cost analysis, “what if” scenarios, potential risks, and alternative procurement and construction strategies.
- j. Report on deviations from work schedule and recommended corrective measures or updated timeline.
- k. Total cost analysis studies and reports applied to major electrical and mechanical systems, the structure, as well as to the building envelope.
- l. Analysis report on maintenance costs for the assessed options.
- m. Traffic simulations.
- n. Program of laboratory tests and trials for quality control, geotechnics, etc.
- o. Class “C” cost estimate, including methodology of the estimate, assumptions made, costing alternatives and life cycle costs.

- p. Update of implementation timeline.
- q. Update of the communications management plan and the stakeholder management plan.
- r. Project life cycle analysis for each option.
- s. BIM model.

RS 3 DESIGN DEVELOPMENT (DD)

RS 3.1 Purpose

From the basis of design, the Consultant will engage in detailed design activities necessary to allow a concurrent build-design approach in collaboration with a Construction Manager (CM) contracted separately by the DR. The CM will be continually involved in the design process, providing cost analysis, in conjunction with that provided by the construction economist, and schedule analysis, and support decision-making.

The Consultant will also need to collaborate closely with third-party experts contracted by the RM or the client to oversee sundry aspects of the project, such as additional GMP, automation integration, and qualification and validation consultants.

Ongoing consultation is required with the science partners, the CM and DR to identify, understand and prioritize the Design Team's design activities and clarify scope and timing requirements.

The DD documents consist of drawings and other documents describing the size and character of the entire project as to architectural, interior design, structural, mechanical and electrical, civil and landscape design systems, materials and such other elements as may be appropriate.

It is expected that design development will overlap with some services occurring during SD and PD, as required.

The objective of this stage is to refine and develop the schematic design; conflicts must be addressed and resolved, and complete coordination must be ensured, along with optimization of design iteration and workflow of the Design Team.

The RS3 stage must be a continuous process that will feed the RS4 stage as the project evolves. To respond to the aggressive schedule, it is important to establish project design priorities, review those design activities already prioritized during PD and SD stages, and identify additional or new design priorities.

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

This stage is part of the Integrated Design process (IDP) and BIM process.

All RS are applicable to the entire project.

RS 3.2 General

3.2.1 Scope of work

- a. Provide the DR with written responses to the review comments issued at the previous stage (RS2) by the science partners, the DR and the CM.
- b. Obtain written approval from the DR to proceed to stage RS3.

- c. If any alterations are requested, document all required changes, analyze the impact on all project components and resubmit for approval, if required.
- d. Expand and clarify the concept design intent for each design trade.
- e. Submit for comment the BIM model illustrating the conceptual plans, based on the analysis of all comments received in the previous stage. Demonstrate how it meets the requirements.
- f. Present the design materials to the client, design review or other committees as indicated by the DR.
- g. Ensure design coordination of all trades.
- h. Analyze the constructability of the project and advise on the construction process and duration.
- i. Verify and ensure compliance with all applicable acts and regulations, codes, standards and municipal regulations, and GMP regarding the project design.
- j. Provide a list of all National Master Specification (NMS) sections to be used, complete with a full draft specification, catalogue cuts and sustainable development/green choices.
- k. Update the code study.
- l. Present the studies to the government or local authorities where required.

RS 3.3 *Particulars*

The following is a non-exhaustive list of services for each trade. Some of the activities listed below may require the participation of several or all professionals. The Consultant will coordinate its various team members (including sub-consultants and specialist consultants) and is responsible for performance of all elements in the mandate. The Consultant is responsible for ensuring that all the documents produced and information supplied are coordinated among all trades.

3.3.1 *Ingénierie de procédé et automatisation*

Engineering design package

- a. The final GMP layout of the Facility
- b. Piping & IND design
- c. Utilities drawing
- d. Electrical and mechanical (drawing)
- e. Architecture
- f. DP/Air flow
- g. Drainage
- h. Fire escape and Fire System
- i. HVAC
- j. Lighting
- k. Compressed air system distribution + Gases

- l. Sampling location for EM
- m. Clean room identification and room classification
- n. Personnel and material flows
- o. Material Entry to the building
- p. Water System
- q. Drainage Supply
- r. Electrical Supply
- s. Finished product flow

3.3.2 *Architecture and interior design*

- t. Site plan showing proposed building outlines, orientation, and main accesses. The general layout of the site and lanes are provided for information only.
- u. Cross-sections showing the relationship of the building to proposed plantings, in order to illustrate the three-dimensional aspects of the site.
- v. Floor plans of each floor showing all accommodation required with room names and calculated areas, including all necessary circulation areas, stairs, elevators, etc., and ancillary spaces anticipated for service use. Indicate building grids, modules, etc., and key dimensions.
- w. Furniture and equipment plans.
- x. Elevations of all exterior building façades showing all doors and windows accurately sized and projected from the floor plans and sections. Indicate clear floor and ceiling levels and any concealed roof levels.
- y. Cross-sections through the building(s) to show floor levels, room heights, inner corridor or court elevations, etc.
- z. Detail sections of walls, building envelope design features or other special design features requiring illustration and explanation at this stage, including fireproofing methods.

3.3.3 *Landscape architecture*

- a. Schematic site plan coordinated with civil authorities confirming the location of the proposed building, its orientation, main access points, traffic routes (vehicular, public transit, pedestrian, service and unloading), parking lots and site development (earthworks, existing and proposed elevations), landscaping (plantings, turf).
- b. Cross-sections showing the relationship of the building to proposed plantings, in order to illustrate the three-dimensional aspects of the site.
- c. General plans, overall design, details, elevations and cross-sections to clarify the geometry of the traffic network, drainage and earthworks, service infrastructure, surface coating, street furniture, landscaping and other utility works.
- d. Details, sections or elevation or any other special design features that require illustration or explanation, including, for example, various anchoring methods.

- e. Relevant drawings must be integrated with those of other trades.

3.3.4 Civil

- a. Schematic drawings showing the proposed structural elements, type of foundation, sub-foundation, construction materials, details for retaining walls if relevant and other significant or unusual details proposed.
- b. Drawings showing all the existing elements of the rainwater, sanitary, water and electricity networks and the connection point with the public networks.
- c. Drawings of the locations of new elements of the rainwater, sanitary, water and electrical network, including foundations, embankments, key levels and floors.
- d. Details, utility trench cuts or any other special design features that at this stage require illustration or explanation.

3.3.5 Structure

- a. Drawings indicating the proposed structural elements, construction materials and other significant or unusual details proposed. Include a copy of the site report on which the design is based.
- b. Update seismic report.

3.3.6 Mechanical

- a. Produce the preliminary designs based on the approved concept.
- b. Update the schedule of requirements.
- c. Provide information of all internal and external energy loads in sufficient detail to determine the compatibility of the proposal with available services, approved concept, and energy budget.
- d. Analyze selected equipment and plant with schematics and calculations sufficient to justify the economic benefits of the selected systems.
- e. Describe the mechanical systems (including their preliminary capacities) to be provided and the components of each system.
- f. Describe the proposed operation of the mechanical systems including all the information required to understand the diagrams on the plans.
- g. Explain what operating staff will be needed to operate the building systems and the expected functions of this staff.
- h. Explain the acoustical, vibration and seismic control measures that are to be included in the design.
- i. Describe the selected forms of renewable energy as well as their installation and mode of operation; attach the operating diagrams for heating, air conditioning and ventilation; attach calculations showing the economic benefits of the selected systems.

j. Provide the following details by trade:

a. Heating – Ventilation – Air Conditioning:

Provide in tabular form, for each system, the following preliminary information:

- i. Identification of systems, areas served.
- ii. Area served.
- iii. Heating capacity.
- iv. Cooling capacity.
- v. Average air flow rate per m².
- vi. Total air flow rate, fresh air flow rate, static pressure.
- vii. Pump water flow rate, head pressure.
- viii. Engine horsepower.
- ix. Power connected to the emergency electrical system.
- x. Indicate whether the ventilation system should be shut down in the event of a fire alarm.
- xi. Provide a report on design criteria including operating temperatures and pressures of the various systems.
- xii. Provide engineering controls and facility design requirements to create physical barriers to protect personnel and the environment from contaminants.

b. Plumbing

For each system, provide the following information:

- i. Identification of systems, areas served.
- ii. Capacity, flow, pressure and operating temperatures.
- iii. Indicate the intended energy source for domestic water heating.

c. Fire protection

Provide in tabular form, for each system, the following information:

- i. System identification.
- ii. Area served in m².
- iii. Probable number of sprinkler heads.
- iv. Risk categorization.
- v. Water flows and pressures anticipated.
- vi. Capacity of the pumps, if required.
- vii. Indicate the power of the equipment to be connected to the emergency electrical service, if required.
- viii. Indicate the required connections to the alarm system.

d. Control

- i. Describe the building systems control architecture. Provide preliminary building automation or Energy Management & Control Systems (EMCS) network architecture, mechanical system control schematics and sequence of operation.
- k. Drawings (construction)
 - a. Site plan showing service entrances for water supply, sanitary and storm drains and connections to public utility services, including all key invert elevations. Include plumbing diagrams (domestic water, recirculation circuit, sanitary drainage, rainwater venting and drainage, process water, process drainage, laboratory gas, compressed air) and show service floors at building entrances.
 - b. Drawings showing preliminary sizing of ventilation, cooling and heating systems, showing locations and all major equipment layouts in mechanical rooms. Include operating diagrams of water, air and steam systems to understand how the proposed systems work.
 - c. Drawings of plumbing system, showing routing and sizing of major lines and location of pumping and other equipment where required.
 - d. Drawings of the fire protection systems showing major components. Show in a single line diagram the main fire protection networks.
 - e. Drawings of control diagrams of the main equipment.

3.3.7 Electricity

Provide drawings showing advanced development of the following:

- a. Single line diagram of power circuits with their metering and protection, including:
 - a. Power rating of connected equipment.
 - b. Ratios and connections of CTs and PTs.
 - c. The description of energy smart sub-metering.
 - d. Maximum short circuit levels on which the design is based.
 - e. Identification and capacity of services.
 - f. The connected load and the expected maximum demand of each distribution centre, including the one connected to the generating set.
- b. Electrical plans with:
 - a. Floor elevations and identification of electrical, information technology and telephony rooms.
 - b. A legend of all symbols used.
 - c. Circuit numbers at outlets and control switching identified.
 - d. All conduit and wire sizes, except for minimum sizes, which should be given in the specifications.
 - e. A panel schedule with loadings for each panel.
 - f. Telephone/computing conduits system layout for ceiling/floor distribution.

- g. Riser diagrams for lighting, power, telephone and telecommunication cable systems, fire alarm and other systems.
 - h. Distribution diagrams for quick charging terminals for electric vehicles.
 - i. Elementary control diagrams for each system.
 - j. Schedule for motor and controls.
 - k. Complete lighting layout and fixture schedule clearly indicating methods of circuiting, switching and fixture mounting.
 - l. Electric heating layout and schedule.
- c. Provide the following data:
- a. Total connected load.
 - b. Maximum demand and diversity factors.
 - c. Sizing of standby load.
 - d. Short-circuit requirements and calculations showing the ratings of equipment used.

3.3.8 Building connectivity components (BCC)

- a. Anticipate BCC needs and infrastructure required for the integration of required systems.

3.3.9 Laboratory casework and furniture, fixtures and equipment (FF&E) design

The Consultant must complete the laboratory casework and FF&E construction document 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. References between the plan for all services.
- d. Prepare and submit a final finishes presentation board, which complies with design standards and colour schemes approved at DD, for 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.
- h. Laboratory casework, furniture and equipment drawings based on final layout coordinated with architectural, mechanical and electrical trades.
- i. Mechanical and electrical space and location requirements on the final equipment, laboratory casework and furniture drawings. Ensure that the mechanical and electrical drawings accurately reflect the laboratory casework, furniture and equipment layout including:
 - a. Final lighting layout.
 - b. Final location of light switches and controls.

- c. Final location of HVAC controls.
- d. Final location of IT, multimedia and security systems devices and wiring attachments.
- e. Plumbing location and space requirements.
- f. 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.
- k. Updated BCM listings that are completely integrated into the model.
- l. Updates to the design intent brief.

3.3.10 Enhanced commissioning (refer to RS8)

- a. Define operational requirements.
- b. Define commissioning requirements.
- c. Prepare a commissioning brief describing major commissioning activities for mechanical, electrical and integrated system testing.
- d. Define and establish project specific archives.

3.3.11 Contaminated soil

- a. Develop the environmental strategy based on the results of stage RS2.

3.3.12 Sustainable development

- a. Confirm which sustainable development strategies will be incorporated into the project.

3.3.13 Specifications

- b. Provide a list and draft specification sections of all NMS sections to be used.
- c. Submit outline specifications for all systems and principal components and equipment.
- d. Provide in the outline specifications manufacturers' literature about principal equipment and system components proposed for use in this project.

3.3.14 Cost estimate

- a. Provide a class "B" (substantive) cost estimate.
- b. Prepare the cost estimate according to the overall summary format and detailed itemized breakdown of the Unifomat II standard. Produce a breakdown of the costs where the amounts are clearly differentiated by funding source. The cost estimate must also be broken down by construction package.
- c. Highlight changes to the class "C" (indicative) cost estimate and the proposed solutions to avoid cost increases.

- d. Work with the CM, who will prepare his/her own cost estimate in conjunction with the construction economist, and the DR to coordinate the estimates produced and align the amounts of the various estimates before the handover of the deliverable at 100%.

3.3.15 Timeline (Schedule)

- a. Update the timeline (schedule).
- b. Highlight changes to the timeline and proposed solutions to avoid timeline extensions.

3.3.16 Good Manufacturing Practices (GMP)

- a. Update strategy to demonstrate that GMP Guidelines have been incorporated at every stage of the project.

RS 3.4 Deliverables

- a. Floor plans, including all trades showing all floor elements and services in detail, which are necessary to make all design decisions and to substantially estimate the cost of the project.
- b. Two (2) or three (3) building sections.
- c. Architectural, structural, engineering, millwork and finishing details to determine the choice of materials and finishes.
- d. Reflected ceiling plans.
- e. Elevations.
- f. Interior and/or exterior perspectives.
- g. Analysis report of applicable codes, standards, acts and regulations in effect.
- h. 3D models of the site and the building.
 - i. Using the 3D model, prepare a virtual visit (walkthrough) of the exterior and main interior spaces of the building (including entrance halls, typical offices and laboratories, etc.).
- i. Schedules of finishes and colour schemes and samples.
- j. Preliminary outline specifications for all systems and principal components or equipment.
- k. Class "B" cost estimate.
- l. Fire Protection Engineers Report, including requirements, strategies or interventions for protection of the building and its occupants.
- m. Project dossier detailing the basic assumptions of the project and the justifications for all major decisions.
- n. Blocking report and plan with scenarios that describe IT needs per sector, station, meeting room, etc.
- o. Commissioning plan.
- p. Description of building components with data on design structured as an EPD.

- q. Final total cost analysis studies and reports applied to major electrical and mechanical (HVAC) systems as well as to the building envelope.
- r. Analysis report on maintenance costs for the assessed options.
- s. Code study update.
- t. Operating diagrams for heating, air conditioning and ventilation systems, including the selected renewable energy sources.
- u. Traffic simulations.
- v. Life cycle analysis.

RS 4 CONSTRUCTION DOCUMENTS

RS 4.1 *General and coordination*

Since the project will be carried out in construction management mode by a CM hired by the DR under a separate contract, the Consultant must adapt the method of preparing the tender documents (plans and specifications) based on several separate construction packages.

The construction documents are to include comprehensive, coherent, and fully coordinated sets of drawings and specifications (tender documents) compliant with project requirements in sufficient detail to allow competitive tendering by the CM and guide and direct the sub-contractors to successfully implement each stage and sub-stage of the project. The construction documents as modified following tenders will be issued as construction documents.

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

As work progresses on construction drawings, submit drawings, schedules, details, pertinent design data and updated cost plan as required. Coordinate the project schedule with the CM.

All deliverables will be reviewed and approved by the DR at 66% and 99% unless otherwise indicated.

The Consultant must revise and optimize the individual workflow 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.

The translation of construction documents depends on the language of sub-contractors prequalified by the CM, if applicable. If required, translation services will be treated as a disbursement to the Consultant's contract.

The tender documents to be produced by the Consultant at stage RS4 must represent a coherent, complete and coordinated set of drawings and technical specifications (specifications) that meet the project requirements and allow the CM to proceed with the bidding process.

The services to be provided by the Consultant in this section apply to all solicitation documents that will be processed in the RS under RS5.

The CM and Consultant must work together to:

- a. Split tender documents into packages, according to different trades, to select sub-contractors who will carry out each stage and sub-stage of the project.
- b. The CM will be responsible for defining packages and the Consultant will be able to comment on this to establish the scope and extent of the documents to be prepared for each construction package that will be the subject of separate tender packages.
- c. Agree on changes to be made to the tender documents and the sequence of work to optimize the timing of the work.

- d. Coordinate the changes to be made to the tender documents.
- e. Ensure that the tender documents are complete by incorporating comments and suggestions for revisions before the publication of the calls for tender.
- f. Produce a BIM model in which the relationships between the various elements constituting the building and its location, the names or identifiers, dimensions and shapes as well as any other information necessary to carry out the work and obtain the desired results will be illustrated in detail. Ensure that conflicts are identified and corrected weekly in the model. Revise and optimize the individual workflow of each Consultant Team member to meet schedule requirements and minimize durations.

Tender documents (plans and specifications) must be prepared in accordance with the publication "Doing Business with PWGSC – Documentation and Deliverables Manual," "Doing Business with PWGSC – Addendum – Quebec Region," the BIM Management Plan and other contractual requirements. The tender documents must describe:

- a. The products, materials, standards, equipment, services, construction systems, methods and processes and level of workmanship required.
- b. The existing physical and environmental conditions to be created and maintained in work areas, on-site, in adjacent work areas or off-site.
- c. Procedures for contract administration.
- d. Performance verification and progress reporting requirements.

For design services, the Consultant must ensure congruency between all construction tender packages and:

- a. Confirm the content and timing of each construction tender package with the Project Team.
- b. Coordinate the scope and content of each file with the CM.
- c. Coordinate with the DR and the CM to prepare and finalize performance specifications per trade.
- d. Coordinate and integrate all the submissions from the Consultant Team.
- e. Define commissioning procedures, construction monitoring requirements, performance expectations, Consultant-led and CM-led training sessions, requirements for operating and technical maintenance manuals, post-construction monitoring, and record drawings/model.
- f. Submit construction tender packages, conduct design charrettes and respond to construction tender package comments.
- g. Coordinate and integrate all construction tender package submission review comments.
- h. Confirm the format of the model, drawings and specifications and comply with the stipulated requirements for the project.
- i. Confirm drawings and specifications format requirements with PWGSC and the CM.
- j. Update the design schedule and ensure it is coordinated with the CM's construction schedule and revise the project schedule.

- k. Provide continual input for the construction tender packages and overall construction estimate by the CM in a written report.
- l. Work with the CM when splitting the construction tender packages into the trade-specific tender packages, such as content, cost estimates and unit prices.

RS 4.2 Purpose

The purpose of this stage is to prepare drawings and specifications for each distinct construction package, describing in detail the requirements for carrying out the work and establishing the final project cost estimate.

This stage is part of the BIM program.

- a. Documents must be submitted for verification at the following levels of progress:
 - i. 66% indicates 66% completeness of technical development of all working documents (2/3 finished).
 - ii. 99% is the submission of complete construction documents (finished) ready for the tender call and submission to local authorities for pre-permit purposes.
 - iii. Final submission (100%) incorporates all revisions required in the 99% version and is intended to provide the DR with complete construction documents for the tender call.
- b. Develop a project-specific systems operations manual (SOM).
- c. At every stage and sub-stage, the Consultant is responsible for ensuring that all documents produced are properly and completely coordinated among all the trades and specialties involved in the project.
- d. Prepare plans and specifications in both official languages, as per AS1 terms and conditions. The construction drawings must be coordinated among all trades involved, the technical specifications and the descriptive specification at 99% progress.
- e. Prepare a Class “A” pre-tender estimate that establishes the project’s total cost. Prepare using the overall summary format and detailed itemized breakdown of the Uniformat II standard, as well as the distribution of costs according to the model provided.
- f. Update the project execution timeline (schedule).
- g. Provide the construction documents that make up the complete record, allowing the CM to obtain bids (by package) and build the structure.

RS 4.3 General

Activities are similar at all deliverable stages; completeness of the project development should reflect the stage of a submission. The Consultant is responsible for ensuring the seamless coordination of documents between the different trades. This preparation must be done for each separate construction package.

Scope of work for each construction package:

- a. Provide the DR with written responses to the review comments issued at the previous stage (RS3) and at the 66% and 99% stages by the DR, AES, TMS, and the CM.
- b. Obtain DR approval for DD submissions (RS3, 66% and 99%).

- c. Confirm format of drawings and specifications with the DR.
- d. Specify specific methods (i.e., staggered execution of the work in stages and according to several distinct construction packages).
- e. Submit for comment a BIM model illustrating the plans at the RS3, 66%, 99% and final stages based on the analysis of all comments received in the previous stage. Demonstrate how it meets the requirements and performance requirements of the FTP.
- f. Submit complete and coordinated drawings and specifications, by construction package at the required stages (66%, 99% and final), according to the directory structure provided by the DR.
- g. Ensure compliance with codes, standards, legislation and regulations that are in effect and apply to the project.
- h. Provide written responses to all review comments and incorporate them into the construction documents where required.
- i. Advise as to the progress of cost estimates and submit updated cost estimates as the project progresses.
- j. For each construction package, prepare a Class “B” estimate according to the overall summary format and detailed itemized breakdown of the Unifomat II standard.
- k. Produce a breakdown of the costs where the amounts are clearly differentiated by funding source (breakdown for base building and each client department) at the 33% progress mark.
- l. Prepare a final Class “A” (substantive) estimate, according to the overall summary format and detailed itemized breakdown of the Unifomat II standard at 99% progress and at final submission.
- m. At each level of progression (66%, 99% and final submission), prepare an overall cost estimate for the work (including for all work and packages), identify gaps, and propose solutions to ensure compliance with the overall construction budget.
- n. Prepare a Class “A” overall estimate for all project packages and/or components so that PWGSC can submit the project (total cost) for approval.
- o. Update the project timeline (schedule), including the package schedules and overall schedule.
- p. Prepare summaries of trades that follow the Normative Directory model.
- q. Review specifications for construction materials and processes and confirm that they meet sustainable development objectives.
- r. Prepare and submit a final analysis report on applicable laws, regulations, codes and standards that are in effect.
- s. Prepare and submit final total cost analysis studies and reports applied to major electrical and mechanical systems as well as to the building envelope.
- t. Prepare and submit the construction waste management plan.

RS 4.4 *Particulars*

The following is a non-exhaustive list of services for each trade. Some of the activities listed below may require the participation of several or all professionals. The Consultant will coordinate its various team members (including sub-consultants and specialist consultants) and is responsible for performance of all elements in the mandate. The Consultant is responsible for ensuring that all the documents produced and information supplied are coordinated among all trades. This preparation must be done for each separate construction package.

4.4.1 Progress review

- a. As work progresses on construction drawings, submit drawings, schedules, details, pertinent design data and updated cost plan as required. Coordinate the project schedule with the CM.

4.4.2 Process engineering and automation

- a. Complete and coordinated drawings (plans, cross-sections, elevations, details, etc.) showing the scope of the work and work location at the site.
- b. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.3 Architecture and interior design

- c. Complete and coordinated drawings (plans, cross-sections, elevations, details, etc.) showing the scope of the work and its location at the site.
- d. Furniture and equipment plans.
- e. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.4 Landscape architecture

- a. Complete and coordinated drawings (plans, cross-sections, elevations, details, etc.) showing the scope of the work and work location at the site.
- b. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.5 Civil

- a. Complete and coordinated drawings showing the scope of the work and work location at the site.
- b. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.6 Structure

- a. Complete and coordinated drawings showing the scope of the work and work location at the site.
- b. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.7 Mechanical

- a. Flow diagrams, system layouts, equipment selections and sizes, floor plan layouts showing major equipment.
- b. All major ductwork sized and shown on drawings including layout of all major mechanical and transformer rooms.
- c. Energy management control system (EMCS) or building automation network architecture, mechanical control schematics, sequence of operation for each mechanical system, electrical control schematics, direct digital command (DDC) input/output point schedules.
- d. Submit at the stipulated progress submission all calculations for mechanical design and equipment selection. These calculations will be bound (3-ring binder) and indexed.
- e. Calculations submitted will not necessarily be reviewed. They are required for record purposes and in certain instances to assist in the understanding and interpretation of designs. Calculations will be submitted in a format that is legible, neat and easily understandable.
- f. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.8 Electricity

Submit the complete electrical drawings and specifications, as well as the schedules, details, and relevant calculation data on the following aspects:

- a. Single line diagram of power circuits with their metering and protection, including:
 - i. Power sources (normal, emergency, uninterrupted).
 - ii. Emergency power requirements (fire pump, personal safety, other loads).
 - iii. Power rating of connected equipment.
 - iv. Ratios and connections of CTs and PTs.
 - v. The description of energy smart sub-metering.
 - vi. Maximum short circuit levels on which the design is based.
 - vii. Identification and capacity of services (power sources).
 - viii. The connected load and the expected maximum demand of each distribution centre, including the one connected to the generating set.
 - ix. Selection and settings of protective devices.
 - x. Correction of the power factor, if required, to maintain a lagging power factor of 0.9.
 - xi. The grounding and bonding network.
 - xii. Surge protection.
- b. Electrical plans with:
 - i. The general site conditions for the installation of electrical equipment and the type of equipment, its configuration, clearance and exits.

- ii. Floor elevations and identification of electrical, information technology and telephony rooms.
 - iii. A legend of all symbols used.
 - iv. Circuit numbers at outlets and control switching identified.
 - v. All conduit and wire sizes, except for minimum sizes, which should be given in the specifications.
 - vi. The type of wiring (aerial, underground, busway, cabletroughs, fire resistance, flame resistance).
 - vii. Systems to maintain the integrity of walls and fire partitions.
 - viii. A panel schedule with loadings for each panel, the circuit inventory and their loads, at each panel.
 - ix. The physical infrastructure, position and size of each telecommunications room and the layout of telecommunication lines (telephone/computer) installed in the floors/ceilings.
- c. The architecture, technology and components of the fire detection and alarm network: the single wire diagram of the duct and conductor networks (risers), zoning (walls and fire separations), the characteristics of the wiring network and its classification (fire resistance, class), the sound pressure level of the signals, the intelligibility level of acoustic signalling, auxiliary functions, the characteristics and locations of devices, annunciator panels and fire alarm stations.
 - d. Basic schematics of control systems (lighting, engines, auxiliary systems).
 - e. Schedule and characteristics for motors and controls.
 - f. Complete exterior lighting layout, location of interior lighting devices, and fixture schedule clearly indicating methods of circuiting, switching and fixture mounting. The required lighting levels have been determined with photometric calculations, according to applicable standards and requirements.
 - g. The location and operation of the emergency lighting system and exit signs.
 - h. Lighting strike risk assessment. If required, the type, number and location of the components of the lightning protection system, the category of protection, the grounding of devices and the routing of the conductors.
 - i. The schematic architecture of electronic security systems, the integration of telecommunication systems, power supply and wiring of systems, appropriate mechanical protection against vandalism and bonding.
 - j. Location plan for electrical heaters and related schedule, the type of electrical heater per room (based on environmental and architectural conditions), the type of heating cables according to the application (snowmelt, drain, pipe, garage door threshold, sprinklers) and electric heating controls.
 - k. The location of hazardous sites and their classification, coordinated with other stakeholders.
 - l. Provide the following data:
 - i. Total connected load.
 - ii. Maximum demand and diversity factors.

- iii. Sizing of standby load.
 - iv. Short-circuit requirements and calculations showing the ratings of equipment used.
 - v. Voltage drop.
- m. Calculations submitted will not necessarily be reviewed. They are required for record purposes and in certain instances to assist in the understanding and interpretation of designs. Calculations will be submitted in a format that is legible, neat and easily understandable.
- n. Prescriptive specifications (supply and installation) and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.

4.4.9 Building connectivity components (BCC)

- a. Complete and coordinated drawings.

4.4.10 Laboratory casework and furniture, fixtures and equipment (FF&E) design

- a. Complete and coordinated drawings (plans, cross-sections, elevations, details, etc.) showing the scope of the work and work location at the site.
- b. Specifications and an index of specifications. Use the most recent version of the NMS. Use the sections specific to PWGSC, where applicable.
- c. Minimize the number of packages and supply groups.
- d. Ensure that the preparation of construction documents issued for bids meets the DR's requirements.
- e. List sample components and equivalent mandatory technical criteria.
- f. Produce laboratory casework, furniture and equipment lists, and provide the CM with and advise him/her on installation requirements detailed in the technical specifications.
- g. Include package-specific installation drawings showing delivery site, path of travel and final installation locations.
- h. Review and obtain DR or CM approval for delivery and installation drawings. The CM will coordinate delivery, access and installation of laboratory casework, furniture and equipment.
- i. Review the procurement schedule with the CM and DR. Adjust as required to meet construction operations' requirements.

4.4.11 Enhanced commissioning (refer to RS8)

- a. Commissioning plan, including the required sections of Division 1 of the NMS.

4.4.12 Contaminated soil

- a. Incorporate the requirements set out in RS3 into the plans and specifications, where applicable.

4.4.13 Sustainable development

- a. Integrate the mitigation measures identified in the environmental effects assessment (EEA) report into plans and specifications, where applicable.

4.4.14 Good Manufacturing Practices (GMP)

- a. Update strategy to demonstrate that the GMP Guidelines have been incorporated at every stage of the project.

RS 4.5 Deliverables

4.5.1 General

- a. Ensure review by the DR and coordination with the CM at 66%, 99% and 100% progress.
- b. Provide all construction documents as described above.
- c. Provide Class “A” (substantive) estimates for each package and the full project.
- d. Coordinate all Design Team services and ensure coordination with the CM.
- e. Completeness of the project development should reflect the stage of a submission. If the progress of documents is less than what is required and/or if the documents are not coordinated among all trades, the Consultant will resubmit its work, while observing the project’s key milestones.
- f. If needed, conduct subject-matter workshops to discuss and obtain approval of package scope with the DR, CM and science partners.
- g. 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.
- h. Include recommendations and comments when producing construction documents for each package.

4.5.2 Deliverables completed at 66%

The Consultant must provide the following elements:

- a. An updated and coordinated design 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 subsection 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 requirements of Division 1 of the specifications.
- g. Preliminary summary of applicable codes, 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.
- i. Updated critical path and milestone schedules for design activities. Refer to PA1.2.2.

4.5.3 Deliverables completed at 99%

The Consultant must prepare each document at 99% completion that will be fully coordinated and integrated and include specifications. This includes:

- a. An updated and coordinated design 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 subsection with, as applicable, independent testing and verification requirements.
- d. Extensively detailed schedules material requirements.
- e. Extensively detailed unit rate tables for materials.
- f. Extensively completed Division 1 specifications.
- g. Detailed summary of applicable codes, 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 and 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. Refer to PA1.2.2.

4.5.4 Deliverables completed at 100%

The Consultant must prepare each document at 100% completion that will be fully coordinated and integrated and include:

- a. An updated and coordinated design 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 subsection 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 trades.
- i. Updated critical path and milestone schedules for design activities. Refer to PA1.2.2.

RS 5 TENDER CALL, BID EVALUATION & AWARD OF CONSTRUCTION CONTRACTS TO SUB-CONTRACTORS (BY PACKAGE)

RS 5.1 Purpose

The construction project will be carried out in construction management mode based on separate construction packages.

The purpose of this step is to obtain, through the CM hired by the DR, bids from qualified contractors to carry out the project in accordance with the bid documents, which the CM will assess before awarding the construction contracts.

Where appropriate, the CM, with the DR's approval, will inform the Consultant of the need to specify and update the records and modify sequencing to optimize the schedule.

The Consultant must:

- a. Confirm with the CM and DR the intent and scope of each tender package.
- b. Provide the services described in this section for all tender packages.
- c. Clearly indicate in the documents which components are non-contractual, if necessary.
- d. Obtain written authorization from the DR before issuing each construction tender package.

RS 5.2 General

The Consultant must:

- a. Prepare pre-qualification requirements in collaboration with the DR and CM.
- b. Provide the CM with all documents required to conduct the tender call for sub-contractors. This requires that all documents be complete and be coordinated among all trades.
- c. Attend bidders' briefing meetings for pre-qualification, as required by the CM.
- d. Analyze and respond to questions during the pre-qualification of suppliers and during bid tendering. Provide the DR and CM with responses within half of a working day following the question, or as agreed on with the DR.
- e. Update the model and specifications based on bidders' questions. Provide the DR and CM with addenda that include all information required by bidders to fully interpret the tender documents. The CM will send all addenda to bidders.
- f. Maintain a record of all inquiries directed to the DR and CM during the bidding period and submit the record to the DR and CM at the close of bidding for future audit.
- g. Assist in the evaluation of tenders by providing advice on the following:
 - The completeness of the tender response in all respects.
 - The technical/design aspects of the tenders.

- 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.
 - The bidder's ability to undertake the scope of work.
 - The availability of adequate qualified labour, equipment and materials to do the work.
 - Participate in the bid variation analysis between bids and the latest Class "A" estimate.
- h. Actively follow up with municipal officials, through the CM, until permits are obtained, as required. Provide a summary of follow-up meetings with municipal officials regarding the status of building permit applications.

5.2.1 Retender as required

If the CM decides to launch a new bid solicitation, provide the CM with advice and assistance through the DR.

- a. Determine and report to the CM and the DR any effect the addenda to the tender call or to the contract have on the project cost or project schedule.
- b. As required and approved by the DR, redesign and reissue the bid document and update the model and specifications as necessary to bring the cost within the stipulated limits.
- c. Determine and report, if necessary, to the CM and DR any impact that a new call for tenders could have on the cost and project schedule.

RS 5.3 Deliverables

The Consultant must, in collaboration with relevant trades, the CM and the DR:

- a. Prepare and update construction documents issued for bids 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.
- c. Sign and seal all "Issued-for-Construction" documents (drawings and specifications) within five (5) working days of the issuance of the last addendum. Provide one reproducible copy of the tender documents.
- d. Update the schedule and cost estimates, if necessary.
- e. Update the BCM and the model with the final make, model and description of all awarded laboratory casework and FF&E components within ten (10) working days of contract award.

RS 6 CONSTRUCTION AND CONTRACT ADMINISTRATION AND POST-CONSTRUCTION WARRANTY REVIEW

The list below is not exhaustive and in no way limits the professional obligations of the Consultant, its sub-consultants or specialist consultants.

RS 6.1 Purpose

The construction project will be carried out in construction management mode based on separate construction packages.

The purpose of this stage is to implement the project in compliance with the contract documents and to direct and monitor all necessary or requested changes to the scope of work during construction.

On-site services are an important aspect of the Consultant's mandate and must comply with GMP requirements. A GMP site design support will be required throughout project delivery.

These services are the primary focal point for the Consultant's production input to and in support of construction operations. The ongoing 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 who are well orchestrated and coordinated to respond in real time. Led by a highly experienced and licensed architect or engineer, the Consultant's site services team must adapt its composition as the overall project advances and include administration support.

RS 6.2 General

Scope of work

- a. GMP site design support includes, but is not limited to:
 - I. If there is any change in the design throughout project implementation, the Consultant will need to demonstrate that changes comply with GMP requirements.
 - II. During delivery the Consultants will need to demonstrate that the facility complies to GMP requirements, through the supply of documents to DR, third party and by reviewing commissioning activities on main building items, such as, but not limited

to, room temperature, humidity, compress air, steam, analytical equipment, IT systems, WFI, etc.

- III. Site design activities in support of construction and compliance activities.
 - IV. Qualification and validation of facility, equipment and systems not conducted by third-party contractors.
 - V. Sundry activities related to demonstrating and documenting compliance.
- b. During the implementation of the project, act on behalf of the DR to the extent stipulated in this document.
 - c. Incorporate the addenda to the drawings and specifications issued for bids and submit the “for-construction” drawings and specifications, according to the directory structure provided by the DR.
 - d. Carry out the review of the work at intervals appropriate to determine if the work is in conformity with the contract documents.
 - e. Keep the DR informed of the progress and quality of the work and report any defects or deficiencies in the work observed during the course of the site review.
 - f. Ensure compliance with the commissioning plan and update the plan as needed.
 - g. Determine the amounts owing to the CM based on the progress of the work and certify such payments to the DR.
 - h. Interpret the requirements of the contract documents.
 - i. Provide cost advice during construction.
 - j. Advise the DR of all potential changes to scope for the duration of project implementation.
 - k. Review the CM’s submittals.
 - l. Draft contemplated change notices (CCNs) to be distributed to the CM by the DR and include rationales for them based on the instructions. The CCNs will need to be prepared separately for each trade and package involved.
 - m. Provide the DR with a cost and time estimate for each CCN.
 - n. Analyze CM submissions (costs and timelines) and negotiate with the CM, where required, within one half of a working day of receipt of the submission.
 - o. Provide the DR with a recommendation for issue of change order (CO).
 - p. Keep and share with the DR a record of CCNs detailing the history of each CCN until the date at which a CO is issued.
 - q. Keep and share with the DR a shop drawing log and data sheets that must be submitted by the CM, detailing the history of their revisions.
 - r. Indicate any changes or material/equipment substitutions on documents kept in the project records.
 - s. Prepare and post systems operating instructions.
 - t. Follow up on the construction waste management plan and start adding up weighings (provided by the CM) for the final report demonstrating a 90% diversion rate of construction

waste and the tonnage/m² generated. The final report will need to be sent to the DR with all evidence of related weighings by the completion of work.

- u. Verify commissioning during the construction period for all trades.
- v. Ensure that all end-of-project documents and manuals are complete and in compliance with contractual requirements before submitting them to the DR.
- w. Finalize the systems operations manual.
- x. Conduct a final warranty review.
- y. During the 12-month warranty period, investigate all defects and alleged defects and issue instructions to the CM.
- z. Ensure final update of the code study.
- aa. Coordinate and monitor the delivery and installation of equipment and furniture in consultation with all suppliers and the CM.

RS 6.3 *Particulars*

6.3.1 *General services*

The Consultant must, in full coordination with all relevant members of the Design Team, CM and DR:

- a. Coordinate and manage all of the Consultant's services, activities and communications at the site.
- b. Lead the design and instruct the CM in all investigation activities by planning, coordinating and scoping inspections, trials, surveys, examinations or tests to be done at the site, reflecting the prioritized information requirements of the Design Team and the CM in order to meet schedule milestones. Services include:
 - i. Coordinating all Design Team information and efforts.
 - ii. Preparing documents issued for submissions for inspections or trials and their issuance to the CM.
 - iii. Managing, administering and accurately compiling data for each service to be rendered.
 - iv. Coordinating and validating all site survey and examination findings to ensure accuracy and completeness of information, relaying the findings to the Design Team, the CM and the DR within one (1) working day following each inspection or trial.
 - v. Survey as-found conditions for each building assembly and site element affected by surveys, 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 limitations.

- ii. Assessing, discussing and reporting of construction sequencing options, risk assessments, material substitutions, and life cycle considerations for materials, components and systems.
 - iii. Providing a formal written response to the CM and the DR for all constructability comments.
- d. Participate in formal design and construction meetings and technical 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 submissions and Requests for Information (RFIs) from the CM, suppliers and sub-contractors, or the DR, by providing accurate, coordinated and comprehensive information. 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.
 5. Responding to all other RFIs or submittals generally within two (2) working days, but never longer than five (5) working days.
 6. Respond to all RFIs within two (2) working days. If the Consultant needs more than two (2) working days, it must inform the DR in writing within one half of a working day of receipt of the RFI and provide a response time 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 the construction documents or approved performance requirements, and notifying the DR immediately.
- f. Provide field clarifications within one half of a working day of issue identification or when required by the CM.

- g. Prepare and issue in a timely manner to the DR and/or CM accurate and coordinated construction documents, supplementary instructions, notices, contemplated change notices and change orders. The Consultant must ensure the following:
 - i. Detailed quotes with price support that reflect all aspects of the proposed work and, if not, return the quote to the CM, indicating which elements of the quote are problematic.
 - ii. Alternative solutions proposed are thoroughly assessed for compatibility and viability.
 - iii. Quotes, alternative design solutions, contemplated change notices, and change orders are reviewed by all relevant Design Team trades within two (2) working days or less, or with the approval of the DR within an agreed timeframe.
 - iv. Quotes include only rates for personnel and percentage mark-ups provided for in the CM's contract.
 - v. After comprehensive review and verification, recommend to the DR if the quote is complete, fair and reasonable.
- h. Update the model and reissue the Issued-for-Construction documents as determined in the BIM Management Plan 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 construction activities and the 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 five (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 in each sub-contractor tender before tender. Advise the CM and DR of each sub-contractor 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, timeline, cost, and risk related to the site instructions, contemplated change notice and change order.
- n. Validate, from the Design Team's perspective, potential CM or sub-contractor 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 one (1) working day of receipt. Establish an acceptable process with the CM and to the satisfaction of the DR for the measurement and validation of 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.

- r. Provide input to the CM's lessons learned related to the construction.

6.3.2 Services linked to Good Manufacturing Practices (GMP)

- a. Update strategy to demonstrate that the GMP Guidelines have been incorporated at every stage of the project.

6.3.3 Laboratory casework and furniture, fixtures and equipment (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 the site, be present to complete an initial inspection of deliveries against the packing slip. Either accept or reject deliveries to the 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 the 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.
- d. Coordinate rectification of delivery and installation deficiencies to the satisfaction of the DR.

6.3.4 Project schedule

- a. Once construction contracts are awarded, obtain from the CM the project schedule with detailed commissioning requirements shown separately and ensure proper distribution.
- b. Verify that construction is proceeding according to the approved schedule, take the necessary steps with the CM to ensure that the schedule is met and submit a detailed report to the DR on delays once a month.
- c. Keep accurate records of causes that lead to delays and associated costs.
- d. Make every effort to assist the CM to avoid delays with respect to the project schedule, in particular by acting proactively and by providing clear, accurate answers that are consistent with requirements.
- e. Only the DR may approve a request to extend a deadline.

6.3.5 Sub-contractor changes

- a. The CM is required to use the sub-contractors listed on the tender form unless the DR authorizes a change. Changes are only considered when they involve no increase in cost. Review all requests for changes of sub-contractors, and submit recommendations to the DR.

- b. When sub-contractors have not been listed on the tender form, obtain the list from the CM not later than 10 working days after the date of award.

6.3.6 Labour requirements

- a. The CM is bound by the contract to employ qualified, experienced workers throughout the project and to comply with laws, regulations and obligations on labour conditions. The Consultant will inform the DR of any labour situations or working conditions that appear to require corrective action by the CM.
- b. The Consultant must ensure that a copy of the labour conditions for the contract is posted in a conspicuous place on site.

6.3.7 Regulatory compliance

- a. Ensure that construction complies with applicable statutes and regulations.

6.3.8 Construction safety

- a. The CM must comply with provincial occupational health and safety acts and regulations, as well as with all directives pertaining to occupational health and safety on worksites issued by the competent provincial authority.
- b. Fire safety provisions during construction must comply with the version of the National Fire Code (NFC) in effect at the federal level, and the instructions of the City of Montréal's Sécurité Incendie.
- c. If necessary, ensure that the CM is mandated to coordinate, isolate, protect and recommission the fire protection and suppression systems during construction. Notify the Property Manager each time the fire protection and suppression systems are bypassed and provide information on the estimated reinstatement time. Verify that the CM is complying with the NFC.

6.3.9 Site visits

- a. Provide work inspection services at a minimum frequency of two (2) visits per week. Ensure compliance with contract documents.
- b. Ensure that qualified persons providing services are fully aware of the technical and administrative requirements of the project and have taken the *General Occupational Health and Safety Course for Construction Sites* and any other training required under regulations or set out in the specifications. Ensure that the individuals comply with the *Occupational Health and Safety Regulations*.
- c. Establish a written understanding with the CM as to what stages or aspect of the work are to be inspected prior to being covered up.

- d. Ensure that the work is performed in accordance with the plans and specifications. Assess quality of work and notify the CM and the DR in writing of any defects and deficiencies observed at the time of such inspections.
- e. Prepare a site visit note for every visit.
- f. Inspect materials and prefabricated assemblies and components at their source or assembly/fabrication plant, as necessary for project progress and work compliance.
- g. Submit any deficiency list, directive or clarification to the DR in writing.

6.3.10 Environmental monitoring

If required, environmental monitoring of excavation of contaminated soil will need to be done by the Consultant or its sub-contractors. Environmental monitoring will include, but is not limited to:

- a. Reviewing the Contractor's waste management plan.
- b. Ensuring that the PWGSC-mandated Contractor has all the information required to dispose of the excavated soil directly and without delay, namely regarding the chemical analyses required by disposal sites authorized by the MELCC.
- c. Reviewing and accepting the Contractor's waste management plan (i.e., verifying that the disposal sites selected by the Contractor comply with specification requirements and the excavation of contaminated soil management chart in MELCC Policy's Guide d'intervention.
- d. Reviewing and accepting siting drawings for temporary storage areas, if required.
- e. Monitoring the Contractor for the duration of excavation and waste management work and notifying PWGSC if the Contractor's methods do not comply with the specifications or the overall waste management plan.
- f. Supervising soil excavation work based on contamination levels.
- g. Ensuring adequate separation of waste (asphalt, concrete, etc.) and soil based on established contamination levels and field observations.
- h. In cases where the soil quality is unknown or suspect and cannot be immediately loaded for disposal, said soil will need to be stored temporarily by the Contractor on a polyethylene membrane or a cement concrete or bituminous concrete surface. This soil will need to be sampled by the Consultant before being disposed of in accordance with the regulations in force by the Contractor. The Consultant must collect and send the samples to an MELCC-accredited laboratory in accordance with the required conservation procedures. In addition, the Consultant must obtain and interpret the results of the analyses.
- i. Monitoring the movements and volumes of soil and other materials moved on the site.
- j. Monitoring trucking (using transportation manifests and a GPS system) and the off-site elimination of soil and other materials and ensuring that all shipments have the required transportation and disposal permits.
- k. Analyzing soil or other materials that make up the walls and bottoms of excavations.
- l. Analyzing soil or other materials that have been temporarily piled and stored water that is likely to be contaminated and providing the analysis results within 48 hours (unless otherwise advised by the DR) for management under current regulations, as required.

- m. Measuring the temporarily stored piles for quantity control purposes, if needed.
- n. Analyzing water from excavations, prior to its discharge into a sewer, ditch (or other discharge point) or its elimination off-site, as required.
- o. Ensuring that this water is managed by the Contractor in accordance with the specifications and with the standards in force.
- p. Monitoring of environmental quality of materials imported to the site. Backfill soil must be “clean” – that is, free of contamination. Obtain analytical certificates attesting that this soil is compliant.
- q. Identifying soil disposal or treatment sites submitted by the CM.
- r. Weekly monitoring of the CM’s reports and results of chemical analyses of samples taken from the walls and bottoms of excavations (table of results and figures).
- s. Confirming the quantities of contaminated soil disposed of by the Contractor.
- t. Supervising during the dismantling of groundwater monitoring wells in the work right-of-way.
- u. A preliminary and final environmental monitoring report (with input from the DR) that will include all quantities compiled and analytical results (including the walls and bottoms), analytical certificates, etc., while in compliance with applicable standards, policies, and regulations.

Show that the objective of diverting construction waste has been achieved by providing a diagnosis of the construction waste that allows for the visualization of 90% diversion of construction waste.

6.3.11 Training

- a. Provide the DR with the recommended list of training to be taken.
- b. Ensure that all training is detailed in the commissioning plan (RS8).

6.3.12 Materials on site

- a. The CM may claim for payment of material that is on site but not incorporated into the work.
- b. Material must be stored in a secure place designated by the DR.
- c. A detailed list of the materials with the supplier invoices showing the price of each item must be provided to support the request for progress payment, in the detailed cost section, of the designated form. The Consultant is required to check this list.
- d. As material is incorporated into the work, the cost of such material must be removed from the material list. The Consultant is required to monitor and check the list.

6.3.13 Acceptance Board

The Consultant will inform the DR when satisfied that the project (by sector) is substantially completed. The Consultant must ensure that its representative, sub-consultant representative, resident on-site reviewer, the CM and major sub-contractor representatives shall form part of the Project Acceptance Board and attend all meetings as organized by the DR.

6.3.14 Interim inspection

The Consultant must inspect the work and list all unacceptable and incomplete work (deficiencies) and assess their value on a designated form. The Consultant must accept the project as carried out by the CM subject to elimination of the deficiencies and completion of the uncompleted work listed and priced.

6.3.15 Interim certificates

- a. Payment requires completion and signing, by the parties concerned, of the following documents:
 - Substantial completion certificates (by package).
 - Cost Breakdown for Fixed Price Contract.
 - Cost Breakdown for Unit and/or Combined Price Contract.
 - Inspection and Acceptance.
 - Statutory declaration – substantial completion certificates (by package).
 - Certificate from the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST).
- b. The documents to be provided will be issued several times in accordance with the package-based construction delivery mode.
- c. Verify that all items are correctly stated and ensure that completed documents and any supporting documents are submitted to the DR for processing.

6.3.16 Building occupation

- a. The DR or client department may occupy the building after the date of interim acceptance of the building by the Acceptance Board. The acceptance date is normally that of the interim certificate of completion issued by the Consultant. At the acceptance date, the DR or client department (as the case may be) assumes responsibility for the following factors, where applicable:
 - The safety of the work(s) (without releasing the CM of its health and safety obligations at the site).
 - Fuel and utility charges.
 - Proper operation and use of equipment installed in the project.
 - General maintenance and cleaning of the works.
 - Maintenance of the site (except any landscaping maintenance covered by the contract).

6.3.17 Operation and maintenance data manual

- a. Operation and maintenance data manual: four hard copies and one electronic (PDF) copy of each volume established by the CM in accordance with the project specifications sections and verified for completeness, relevance and presentation format by the architectural, mechanical, electrical and other applicable consultants.
- b. The documents must be submitted to the DR prior to interim acceptance or actual start of the work and the instruction period, whichever occurs first. The CM will retain one copy of each volume for its record and use during the instruction period.

6.3.18 Instruction of operating personnel

- a. Make arrangements and ensure that the DR's operating personnel is properly instructed on the operation of all services and systems using the final manuals as reference.
- b. The Consultant must provide training sessions, as required, on design intent and systems operations. Use the systems operations manual for training sessions.

6.3.19 Keys

- a. Ensure that all keys and safe combinations are delivered to the DR and/or the client department as applicable.

6.3.20 Final inspection

- a. The Consultant must inform the DR when satisfied that all work under the contract has been completed, including correction of the deficiency items listed on the Inspection and Acceptance form as a result of the interim inspection. The DR reconvenes the Acceptance Board, which makes a final inspection of the project. If everything is satisfactory, the Board makes final acceptance of the project from the CM.

6.3.21 Final certificate of completion

The final payment requires completion and signing, by the parties concerned, of the following documents:

- Final Certificate of Completion
- Cost Breakdown for Fixed Price Contract
- Inspection and Acceptance
- Statutory Declaration – Final Certificate of Completion
- Cost Breakdown for Unit and/or Combined Price Contract
- Workmen's Compensation Clearance Certificate
- Hydro Certificate

Verify that all items are correctly stated and ensure that completed documents and any supporting documents are submitted to the DR for processing.

6.3.22 Management

- a. The official take-over of the project or parts of the project from the CM is established by the DR's Project Team, which includes the Consultant and the client department. The date of the Interim Certificates of Completion and of the Final Certificates of Completion for the work (for the work completed after the Interim Certificates of Completion are issued), consistent with the beginning of the warranty periods (12-month base warranty and extended warranties). The warranty periods will be staggered based on each construction package and will begin at the dates indicated on the various certificates, in accordance with the contract's general conditions (GC).
- b. Provide DR with original copies of the CM's warranties for all materials and work covered by an extended warranty or guarantee, according to the conditions of the specifications. Verify their completeness and extent of coverage.
- c. Investigate the execution deficiencies found by the DR during the twelve (12) month warranty period and convey the appropriate instructions to the CM and the DR. Take part in six (6) official visits of the building accompanied by the CM and the DR. The parties must agree on the visit dates based on the packages deemed critical. Provide a visit report at the completion of each inspection.

6.3.23 As-built and record drawings and specifications

- a. As the project will have multiple construction tender packages under the construction management model, for each construction tender package, the Consultant must:
- b. Following the take-over, obtain marked-up hard-copy as-built drawings from the CM, for each construction package, showing:
- c. Significant deviations in construction from the original contract drawings, including changes shown on post-contract drawings, changes resulting from change orders or from on-site instructions.
- d. Verify all as-built records for completeness and accuracy and submit them to the DR.
- e. Produce record drawings by incorporating information on the finished work into project drawings.
- f. Hard copies of plans and specifications. Electronic copies of drawings and specifications, in DWG and PDF formats, according to the directory structure provided by the DR.
- g. Submit two hard copies and two electronic copies, with drawings in compliance with the CADD standard and the BIM Management Plan within eight weeks following the final acceptance of the work.
- h. Provide a complete set of final shop drawings.

RS 6.4 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.
 - 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. Documents issued for tenders (by package).
 - ii. Issued-for-Construction documents.
 - iii. Approved submittals.
 - iv. Supplementary and site instructions.
 - v. Field clarifications.
 - vi. Contemplated change orders.
 - vii. Change orders.
 - viii. Certifications of progress payment applications.
 - ix. Memoranda.
 - x. Inspection, testing and deficiency reports.
 - xi. Correspondence and minutes of meetings.
 - xii. Names, addresses, telephone numbers of the DR, sub-consultants, CM key personnel and key sub-contractor 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.
 - 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.
- h. Submit the final strategy that demonstrates that the GMP Guidelines were incorporated adequately at every stage of the project.

RS 7 RISK MANAGEMENT

RS 7.1 Purpose

The Consultant is to provide support to the DR in identifying risks throughout the project life cycle. See documents “Doing Business with PWGSC – Documentation and Deliverables Manual v. 1.0 (January 12, 2018)” and “Doing Business with PWGSC – ADDENDA-Quebec Region v. 1.0 (June 1, 2018)” for the risk management “Definitions” and “Checklist.”

RS 7.2 General

Scope of Work

Risk Management Process:

- a. Identify risk events based on past experience of the consulting team and using proposed checklist or other available lists.
- b. Qualify/quantify probability of risk events (low, moderate, high) and their impact (low, moderate, high), as well as potential costs and/or delays.
- c. Prioritize risk events (i.e., concentrate efforts on risk events with high probability and medium to high impact).
- d. Develop risk response (i.e., evaluate risk mitigation alternatives, which is the real added value of risk management).
- e. Implement risk mitigation.

RS 7.3 Deliverables

- a. The Consultant must complete and maintain a project risk log (for all trades and specialties). This log should identify the following for each potential risk: a description of the risk, potential consequences, the initial risk profile (probability and impact), a risk response plan and/or mitigation measures, the final risk profile (probability and impact) and a monitoring method.
- b. The risk log shall be updated monthly for the entire duration of the project.

RS 8 COMMISSIONING THE FACILITY

The construction project will be carried out using the construction management method based on a series of separate construction packages. Commissioning must factor in this particularity.

The Consultant shall retain the services of a Commissioning Manager from a firm other than that of the Consultant and his or her engineering Sub-Consultants. This resource must not have been involved in the design of the project.

The Commissioning Manager represents the interests of the DR and the Client Department. He or she is responsible for all commissioning activities during the project's development, execution and post-construction periods.

During this step, in order to successfully complete the commissioning activities, the Commissioning Manager, the PWGSC Commissioning Coordinator and the CM's Commissioning Agent must collaborate closely with the Consultant's Design Professionals in order to produce coordinated drawings, reports and manuals in accordance with contract documents.

RS 8.1 General Requirements

8.1.1 Composition, Roles and Responsibilities of the Commissioning Team

The project's Commissioning Team consists of the following collaborators:

- **PWGSC Commissioning Coordinator (Quality Assurance):**

The Coordinator supervises the execution of all commissioning-related activities so as to deliver a fully operational project. He or she is assisted by the PWGSC Design Quality Review Team, which will periodically review the site to observe work progress. His or her responsibilities include, but are not limited to:

- a. Review of the commissioning documentation from an operational perspective
- b. Approval of the following: performance, reliability, durability of operation, accessibility, maintainability, and operational efficiency under all conditions of operation
- c. Quality monitoring for commissioning activities, training supervision, approval of commissioning documents

- **Consultant's Commissioning Manager (CxM)**

The Manager's responsibilities include, but are not limited to:

- a. Organization of commissioning and meetings
- b. Development of commissioning documentation
- c. Drafting of minutes of meetings and the commissioning report
- d. Monitoring of commissioning activities
- e. Review of the following: performance, reliability, durability of operation, accessibility, maintainability, and operational efficiency under all conditions of operation
- f. Witnessing and certifying the accuracy of select reported results
- g. Witnessing testing, adjusting and balancing operations and related testing, and select certification
- h. Approval of the Building Management Manual
- i. Development and implementation of the final commissioning plan

- j. Verifying performance of installed systems and equipment
- k. Approval of training plan

- **Consultant's Design Professionals:**

The Design Professionals' responsibilities include, but are not limited to:

- a. Participation in commissioning activities and meetings
- b. Participation in development of commissioning documentation
- c. Review of the following: performance, reliability, durability of operation, accessibility, maintainability, and operational efficiency under all conditions of operation
- d. Certification and approval of selected reported results
- e. Certification of testing, adjusting and balancing operations and related testing
- f. Preparation of the Building Management Manual, in accordance with the instructions of the Commissioning Manager
- g. Participation in the development and implementation of the final Commissioning Plan
- h. Participation in verification of performance of installed systems and equipment
- i. Development of training plan

- **CM:**

The CM's team includes its subcontractors and suppliers. This team must carry out construction/installation in accordance with the requirements in the contract documents. Its responsibilities include, but are not limited to:

- a. Full collaboration and participation in commissioning activities
- b. Testing
- c. Performance of testing, adjusting and balancing operations
- d. Performance of commissioning activities
- e. Delivery of commissioning training and provision of commissioning documentation
- f. Development of the Building Management Manual
- g. Designation of the CM's Commissioning Agent who will collaborate with the Consultant's Commissioning Manager, the Consultant's Design Professionals and the PWGSC Commissioning Coordinator for administration and coordination matters

- **CM's Commissioning Agent:**

Also known as the Mechanical and Electrical Building Systems Agent, he or she performs the commissioning activities indicated in the specifications. His or her responsibilities include, but are not limited to:

- a. Organization of commissioning and internal meetings
- b. Implementation of final commissioning plan
- c. Demonstration of operation of equipment and systems
- d. Implementation of training plan
- e. Witnessing and certifying accuracy of reported results
- f. Testing
- g. Witnessing testing, adjusting and balancing operations and related testing, and certification
- h. Preparation and submission of test reports
- i. Follow-up of static verification and performance control records with subcontractors
- j. Development of the Building Management Manual

8.1.2 General Instructions

- The Consultant's Commissioning Manager shall:
 - a. Provide commissioning services for the project to ensure that the planning, design, installation, testing, optimization, and operating and maintenance conditions of the finished work, systems and equipment are in accordance with project requirements, the Basis of Design and any other requirement set out in the contract documents for construction.
 - b. Bear general responsibility for commissioning, production of reports and commissioning documentation.
 - c. Compile the commissioning data and prepare a report for the PWGSC Commissioning Coordinator.
 - d. Regularly transmit an update of the log of commissioning issues to the PWGSC Commissioning Coordinator.
 - e. Assemble the final commissioning documentation, transmit the final Commissioning Plan and manual to the PWGSC Commissioning Coordinator and the CM's Commissioning Agent for review and acceptance, and recommend acceptance or rejection of the project's finished work, systems, equipment and assemblies.

- The designation of a PWGSC Commissioning Coordinator and a Commissioning Manager does not permit the Consultant's Design Professionals to waive their professional responsibilities as outlined in the contract, including on-site supervision and reviews to ensure that the finished work conforms to the requirements, to the project's design intent and contract documents, and to the applicable regulations, codes and standards.

8.1.3 Services Required During the Planning Phase (if applicable)

- The Commissioning Manager shall:
 - a. Examine the documentation on the project requirements, including the commissioning requirements and Statement of Work document prepared for it and for the CM's Commissioning Agent by the Consultant's Design Professionals, as well as the Commissioning Plan and the commissioning specifications for the model/pre-design phase.
 - b. Propose recommendations for improving functionality, efficiency, operability, maintenance capacity and savings.
 - c. Notify the DR of all necessary special tests to be added to the project.
 - d. Examine the scope of commissioning with the PWGSC Commissioning Coordinator and the CM's Commissioning Agent.
 - e. Examine the project's operations and maintenance requirements and needs.
 - f. Support the project team and the Commissioning Team during surveys and when preparing the design and recommendation options.

8.1.4 Services Required During Design Phase

The Commissioning Manager shall:

- a. Integrate the requirements and activities of the commissioning process, the Commissioning Plan and the commissioning specifications, and commissioning forms.
- b. Examine operation and maintenance issues to be factored in at the design phase.
- c. Prepare and review the project contract documents to coordinate the required interfaces among systems, equipment and assemblies.
- d. Review or draft the commissioning specifications.
- e. The commissioning specifications must include detailed descriptions of the responsibilities of all the parties, including the CM, subcontractors, manufacturers and testing contractors, for each of the commissioning activities; details on the commissioning process; and reporting and documentation requirements, including formats requested:
 - a. *alerts relating to coordination problems*
 - b. *the commissioning issues log and a description of how shortcomings were resolved*
 - c. *pre-functional checklists and start-up requirements*
 - d. *the performance testing process*
 - e. *the specific requirements and procedures of the performance tests*
 - f. *requirements relating to test equipment and instrumentation*
 - g. *the acceptance criteria for each applicable system, piece of equipment and assembly*
- f. Respond promptly to comments made by the Commissioning Team upon examination of the design (review of drawings and specifications) or when there are other issues.
- g. Develop or update the design phase commissioning plan. Submit it for review by the PWGSC Commissioning Coordinator and by the CM's Commissioning Agent. Include the commissioning plan in section 01 91 13.13 of the specifications.
- h. Prepare the commissioning sections (017800, 017900, 017900.13, 019113, 019113.13, 019113.16, 019200) for all commissioned equipment.
- i. Ensure that the operation and maintenance of systems and equipment are described in detail in the project's contract documents to ensure that the commissioning is properly applied and executed.
- j. Ensure that the project's design and contract documents include all devices, elements and instruments required for the execution of commissioning and for satisfactory documentation on the operation of each applicable piece of equipment, system and assembly.
- k. Examine, and where necessary incorporate, the comments of the PWGSC Commissioning Coordinator and the CM's Commissioning Agent made in reviews of the preliminary drawings and specifications.
- l. Submit all plans to scale.
- m. Provide drawings in A2 format to the PWGSC Commissioning Coordinator and the CM's Commissioning Agent for the RS4 99% issuance and for construction.

- n. Submit the drawings and specifications to the PWGSC Commissioning Coordinator and the CM's Commissioning Agent for comment at each issuance. A minimum of 10 working days must be allowed for review.
- o. Inform the PWGSC Commissioning Coordinator and the CM's Commissioning Agent of any change during the design/construction process (including Change Orders).
- p. The PIPVF (Product Information and Performance Verification Form) test forms and installation checklists (ICL) must be prepared by the professional responsible for design, inserted in the specifications and adapted to the project. Coordinate with the PWGSC Commissioning Coordinator and the CM's Commissioning Agent for review and include all comments in the documents.
- q. Design commissioning forms specific to the project, systems, equipment and assemblies, including (as necessary):
 - a. *pre-functional checklists*
 - b. *start-up checklists*
 - c. *procedures and report templates for functional performance testing*
 - d. *procedures and report templates for integrated systems testing*
- r. These requirements apply to all project systems and equipment that are new or that have been modified, or that have been connected to new or modified systems. Attach forms to the submissions under the specifications section (01 91 13.16) of the commissioning forms.
- s. Verify and confirm the accuracy and completeness of testing, adjusting and balancing (TAB) specifications and of specifications for field performance and quality control of other systems and equipment.
- t. Ensure that the maintenance space requirements have been observed:
 - a. *Leave enough space to access equipment for maintenance.*
 - b. *Safe access to equipment.*
- u. Computerized Maintenance Management System (CMMS) requirements:
 - a. *The Commissioning Manager must identify the CMMS numbers on equipment affected by the project and show them in the drawings.*
 - b. *Equipment labelling is to be done by the CM in accordance with PWGSC nameplate standards and requirements. CMMS standards, requirements and forms are to be incorporated in the specifications by the Commissioning Manager.*
 - c. *Specify that produced labels must follow nameplate standards. Include a copy of the standards in the specifications.*
- v. Procedures for updating single-line electrical drawings (if applicable):
 - a. *The Commissioning Manager is responsible for ensuring that changes to single-line diagrams are made by the Design Professionals.*
 - b. *The Commissioning Manager must recommend approval of the corrected final drawings to the DR.*
 - c. *The Commissioning Manager must ensure that the Design Professionals have incorporated the changes to the single-line diagrams in the CAD version.*

- w. Training: The Commissioning Manager must ensure that the CM is responsible for providing training on the new facilities to operational personnel. Indicate all training sessions and content of required training in the specifications. State in the specifications that the CM shall submit a training plan for prior approval. The Commissioning Manager must ensure that the Design Professionals have detailed the content of the training plan in their specifications.

8.1.5 Services Required in the Tender, Construction, Acceptance and Closure Phase

The Commissioning Manager shall:

- a. Attend the work assessment visit / the pre-bidding meeting. Present the project's commissioning process and requirements to the construction team. Answer questions about commissioning from the PWGSC Commissioning Coordinator and the CM's Commissioning Agent.
- b. Coordinate and direct commissioning activities in a logical, sequential and effective manner using uniform protocols and forms, centralized documentation, clear and regular communications, and consultations with all necessary parties. Update time frames, schedules and technical expertise.
- c. Coordinate commissioning with the CM and the CM's Commissioning Agent to ensure that commissioning activities are included in the CM's main schedule.
- d. Where applicable, review the commissioning plan for the construction phase that was developed during design, including the scope of work and schedule.
- e. Examine the submissions and applicable shop drawings of the CM from the perspectives of commissioning, integration, performance, operation and maintenance. Review Installation, Operation and Maintenance manuals (IOMs), start-up instructions and checklists, and any other relevant equipment manufacturer documentation. Identify issues/problems. Submit forms and comments from the shop drawings review to the PWGSC Commissioning Coordinator and the CM's Commissioning Agent.
- f. Revise, adapt and update the test procedures in the Commissioning Plan and the commissioning forms (pre-functional, start-up, functional performance tests and integrated systems tests) based on modifications made to the system and equipment during the construction and acceptance phase, particularly those prescribed by inquiries, job site directives and change notices from the Design Professionals.
- g. Coordinate the integration of commissioning activities into the project construction schedule with the CM.
- h. Organize a commissioning coordination meeting with the CM's Commissioning Agent, the CM, its Subcontractors and others involved in the commissioning (contractor in charge of call-ups, testing, adjusting and balancing contractors, manufacturer's representatives, specialized testing contractor, and others as necessary) and the PWGSC Commissioning Coordinator.
- i. Lead meetings and prepare and distribute minutes.
- j. Perform site visits and inspection to review component, equipment and system installations in preparation for the completion of the Pre-Functional and Installation Verifications and Checklists.

- k. Monitor and evaluate the execution of inspections and pre-functional and installation tests by the CM. Ensure that pre-functional and installation test reports are accurate and exhaustive.
- l. Identify deficiencies, issues and required corrective actions. Prepare checklists and final reports using approved forms, and confirm that equipment and systems are ready for start-up. Submit reports to the PWGSC Commissioning Coordinator for review and approval.
- m. Perform the following pre-functional tasks:
 - a. Witness sufficient pressure tests on piping and flushing to confirm that appropriate procedures have been followed, including testing documentation in the commissioning documentation package.
 - b. Ensure that installation checklists have been duly executed by examining their completion on periodic site visits.
 - c. Ensure that registration forms for pre-functional systems tests have been duly completed by examining their completion on periodic site visits.
 - d. Verify and comment on water balancing reports through selective job site inspections and by consulting final reports. Approval and final acceptance of these reports are the responsibility of the Design Professional.
- n. Monitor and witness start-up verifications of systems selected for commissioning by the CM, the manufacturer's representative or the specialized testing contractor, as the case may be. Review start-up reports for accuracy and completeness. Identify deficiencies, issues and required corrective actions. Prepare final start-up reports with the start-up reports, data, results, adjustment and setting provided by the CM, and confirm the adequacy of equipment or system operation and the readiness of equipment and systems for functional performance testing (FPT).
- o. Monitor and witness FPT and integrated systems testing (IST) of systems and assemblies carried out by the CM. Supervise and coordinate the Commissioning Team members and participants in completion of the testing. Gather and verify all test results, data and other relevant information. Prepare Commissioning FPT and IST reports using approved forms. Document deficiencies and action items stemming from the FPT and IST. Recommend acceptance or rejection of the commissioning of each system or equipment component. Submit the duly completed FPT and IST reports to the Commissioning Monitoring Coordinator for review and approval.
- p. Regularly examine the CM's drawings (annotated "as built") to verify their accuracy relative to the facilities. Report any discrepancy or problem to the PWGSC Commissioning Coordinator.
- q. Review and comment on progress reports and the Commissioning Issues Log.
- r. Review and comment on commissioning test results, data and reports. Confirm that tests and their results are in conformity with project requirements, the Basis of Design and contract documents.
- s. Participate in the training of operations and maintenance personnel and/or users by presenting the project's conceptual design, core design, and operations and maintenance instructions.
- t. Review, comment on and accept the CM's documentation (which may include as-built drawings, diagrams and schedules).

- u. Review and comment on the CM's data and its operation and maintenance manual. Check for completeness, accuracy and updating, including changes made during the project.
- v. Review equipment warranties to ensure that the responsibilities of operational personnel are clearly defined.
- w. Review and comment on the commissioning plan and the final commissioning manual.
- x. Validate the project's as-built drawings. Submit these to the PWGSC Commissioning Coordinator and the CM's Commissioning Agent for review and comment. The as-built drawings are to be approved by the Design Professionals.
- y. Make a recommendation to the DR for acceptance or non-acceptance of the finished work.
- z. Prepare the final commissioning report. The report must be organized as follows and include:
 - a. A summary report containing a list of Commissioning Team members and participants, roles and responsibilities, a brief description of the building and project, a summary of the basis of design and project requirements, and an overview of the commissioning and testing methods and scope. For each system and piece of equipment commissioned, the report must include an assessment by the Commissioning Manager concerning the adequacy of systems and equipment in conforming to the project requirements, the Basis of Design and the contract documents in the following fields:
 - i. Specifications of installed equipment
 - ii. Installation of equipment and systems
 - iii. System and equipment operation, functional performance, efficiency, optimization
 - iv. Adequacy of operation and maintenance, working order
 - v. Documentation requested in the specifications relating to operation, maintenance, information and performance records, etc.
 - vi. Operators' training documents and comments on their quality
 - aa. Commissioning Issues Log status and final update. All shortcomings, problems and non-conformities must be specifically classified. Each item must correspond to the specific testing, inspection or trend log report for which it has been identified and documented. Include recommendations for corrective action, improvements, optimization, system and equipment operating parameters, performance and efficiency, future action, changes to the commissioning process, recommissioning, etc.
 - bb. Gather all final commissioning documents and prepare the final commissioning manual. Submit the manual to the PWGSC Commissioning Coordinator for review and approval. Documents for the final commissioning manual must be gathered in searchable electronic format (pdf) and must include:
 - i. Final Commissioning Process Report
 - ii. Project Requirements document
 - iii. Basis of Design
 - iv. Schematic Design documents
 - v. Construction drawings

- vi. As-built or file drawings
 - vii. As-built single-line diagrams
 - viii. As-built product and equipment schedules
 - ix. Commissioning specifications
 - x. Commissioning reports (PF, S-U, TAB, FPT, IST, controls, DDC trend log reports, data logger reports, others as applicable)
 - xi. Operator Training Records
 - xii. Computerized Maintenance Management System (CMMS) equipment forms
 - xiii. Any other relevant project reports and correspondence
 - xiv. Systems and equipment manuals:
 - 1. A set of applicable shop drawings (including consignments and forms and approvals examined)
 - 2. Installation, Operation and Maintenance manuals
 - 3. Performance Data Sheets (updated to “as commissioned” operating condition if applicable)
 - 4. Other relevant manufacturer’s literature, brochures, product bulletins, technical information
 - 5. Equipment warranties
 - 6. System Operation Manuals / Standard Operating Procedures (SOP)
- cc. Notes on Requirements for the Development and Use of Commissioning Forms (PF, SU, FPT, IST)
- a. Pre-functional (PF) inspections/verifications and start-up (SU) checklists
- dd. When available from the equipment manufacturers, the Installation, Operation and Maintenance (IOM) instructions, and the manufacturer’s installation and start-up checklists are acceptable and should be used. As deemed necessary by the Commissioning Manager, supplemental verifications and additional data could be required for specific project conditions, and such verifications and data must be documented on same or separate forms. Functional performance testing (FPT) and integrated system testing (IST). FPT shall include and cover operating the system and components through each of the written sequences of operation, and other modes and sequences, including start-up, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. The sensors and levelers must be calibrated during pre-functional verification by the construction contractors doing the installation, and spot-checked by the Commissioning Agent during the functional test.
- ee. Tests on respective HVAC equipment and systems shall be executed, if possible, during both the heating and cooling seasons. However, some overwriting of control values to simulate conditions shall be allowed. FPT shall be done using conventional manual methods, control system trend logs, and, where appropriate or required, with data loggers.

FPT must be conducted in order to provide a high level of confidence in the system's operation, as deemed appropriate by the Commissioning Manager.

- ff. The FPT procedures and reports must allow for full examination and analysis of performance, operational parameters and the systems and equipment sequence.

RS 8.2 *Regulatory Requirements*

8.2.1 *Requirements Pertaining to Codes, Standards, Policies, Guidelines, Design and Construction Documents*

The Commissioning Manager is required to perform the work in accordance with all applicable codes, statutes and regulations in effect at the time of project implementation. The Commissioning Manager is responsible for formally notifying the PWGSC Commissioning Coordinator if he or she receives any directive that contravenes a code, law, regulation, statute or any other mandatory or legal requirement in effect.

8.2.2 *PWGSC Departmental Policy (DP) 039 – Policy on the Use of the National Master Specification (NMS)*

- a. The last update of the NMS must serve as the source document for drafting sections of the specifications dealing with commissioning in project manuals covering all future construction and renovation work performed by or for PWGSC.
- b. When preparing specifications sections concerned with commissioning, the Commissioning Manager must use the latest and most current release of the National Master Specification (NMS) to the maximum extent to which that version is applicable, in accordance with the departmental policy and subject to the Commissioning Manager's overriding responsibility for the content of the construction project specifications. The NMS must be properly amended or supplemented to generate a project manual that is adapted to the specific circumstances of the project and free of any discrepancies or ambiguities.
- c. The Commissioning Manager is responsible for obtaining the NMS User's Guide from an authorized supplier and an up-to-date version of the NMS specification sections to prepare the project specifications. The NMS User's Guide is also available through the office of the NMS Secretariat.

8.2.3 *Computerized Maintenance Management System (CMMS)*

All work performed under the construction contract must meet the requirements set out in PWGSC's CMMS.

- a. CMMS inventory records must be provided for all major elements and systems.
- b. Before removing or replacing elements or systems as part of the project, note and submit their respective CMMS sequence numbers to the PWGSC Commissioning Coordinator.
- c. Collect and record all CMMS data for all new or moved equipment that is installed, replaced, removed or deactivated from an existing equipment inventory.
- d. Inventory records must include all data on the product, including its serial and model number, the description of the equipment and its location.

- e. Provide the PWGSC Commissioning Coordinator with fully completed inventory data records for all new equipment two (2) weeks before requesting approval, so as to identify the proposed elements.
- f. All CMMS inventory records must be added to the operation and maintenance manual provided by the CM and its Subcontractors.
- g. The CMMS is applicable to all major elements or systems. Minor elements such as switches, thermostats, etc. need not be inventoried in CMMS. The PWGSC Commissioning Coordinator must respond to any requests for clarification from construction contractors.
- h. The specifications must hold the CM responsible for providing the PWGSC Commissioning Coordinator with all necessary CMMS data and inventory records.

RS 8.3 *Requirements for Commissioning*

8.3.1 *Mechanical, Electrical, Architectural, Physical Security and Accessibility Systems*

The commissioning program, services and documentation shall adhere to the following standards, policies and guidelines as appropriate for the scope of work.

- CSA Z320-11 – Building Commissioning Standard and Check Sheets
- ASHRAE Guideline 0 – The Commissioning Process
- ASHRAE Guideline 1 – The HVAC Commissioning Process
- ASHRAE Guideline 4 – Preparation of Operating and Maintenance Documentation for Building Systems
- ASHRAE 202 – Commissioning Process for Buildings and Systems
- PWGSC Commissioning Manual (CP.1) – 4th edition – November 2006
- PWGSC Commissioning Guidelines, CP.3 to CP.13
- BCxA – Handbook, Samples and Templates
- PECE – Cx plan and Cx specifications template
- PECE – Templates and Sample Documents
- PECE – Sample Functional Tests and Checklists
- Accessible Design for the Built Environment – CSA B651HB-18

8.3.2 *Fire Safety and Protection*

The commissioning program, services and documentation for systems fire safety and protection must also adhere to the standard:

- CAN/ULC S1001-11 Integrated Systems Testing of Fire Protection and Life Safety Systems and Fire Protection Commissioning

RS 8.4 *Variances*

8.4.1 Table 1: CSA Z320-11 Variances

The scope of the Commissioning Manager's services must comply with CSA Z320-11, Building Commissioning, ASHRAE Standard 202-2013, Commissioning Process for Buildings and Systems, including the variances as listed in Table 1 below, and the reference guide LEED BD+C version V4, ongoing commissioning credit EA (obtaining of option 1: enhanced systems commissioning). Note that the section and subsection numbers indicated in Table 1 refer to sections and subsections in CSA Z320-11.

CSA Z320-11 Section	CSA Z320-11 Subsection	Variances
1.2 Specific systems	1.2.1 General	In addition to the requirements listed in this section, commissioning must apply to all built works, including bridges, dams and engineering assets. It must not be limited to the building enclosure.
Section 3 Definitions	Systems Operation Manual	An additional clarification should be added to the definition of Systems Operation Manual: The term "Systems operation manual" is equivalent to the PWGSC term "Standard Operating Procedure."
Section 3 Definitions	Owner	An additional clarification should be added to the definition of Owner: The Crown, or an entity representing the Crown, is considered to be the Owner.
4.2 Pre-design phase		In addition to the requirements listed in section 4.2, the Owner's Project Requirements shall meet all the requirements of Section 6.2.3 of ASHRAE Standard 202-2013 <i>Commissioning Process for Buildings and Systems</i> , henceforth referred to as ASHRAE Standard 202.
4.2 Pre-design phase	4.2.1 (b) Establishment of Basis of Design	In addition to the requirements of subsection 4.2.1(b), the Basis of Design shall meet all the requirements of Section 8: Basis of Design, ASHRAE Standard 202.

CSA Z320-11 Section	CSA Z320-11 Subsection	Variations
4.2 Pre-design phase	4.2.3 Commissioning plan	<p>In addition to the requirements listed in section 4.2.3, include the following items in the Commissioning Plan:</p> <p>Identification of all systems and sub-systems to be commissioned</p> <p>Identification of all deliverables</p> <p>The requirements of Section 7: Commissioning Plan ASHRAE Standard 202</p>
4.3 Design phase	4.3.1 General	<p>Prepare commissioning specifications.</p> <p>Prepare a training plan.</p> <p>Prepare preliminary commissioning manual.</p> <p>Perform Design Review, meeting the requirements of Section 10, ASHRAE Standard 202.</p>
4.4 Construction Phase	4.4.1 General	<p>In addition to the requirements listed in section 4.4.1, include the following item:</p> <p>Perform Commissioning Submittal Review, meeting the requirements of Section 11, ASHRAE Standard 202.</p>
4.4 Construction Phase	4.4.2 Pre-construction	<p>In addition to the requirements listed in section 4.4.2, include the following items:</p> <p>Prepare commissioning schedule.¹</p> <p>Prepare installation/start-up checklists.</p>
4.4 Construction Phase	4.4.4 Static verification	<p>In addition to the requirements listed in section 4.4.4, include the following item:</p> <p>Obtain certificates of authenticity for equipment.</p>

CSA Z320-11 Section	CSA Z320-11 Subsection	Variations
4.5 Functional performance testing	4.5.3 Implementation	In addition to the requirements listed in section 4.5.3, include the following item: Functional performance tests shall be documented according to Section 13: Issues and Resolution Documentation ASHRAE Standard 202.
4.7 Facility turnover activities	N/A	In addition to the requirements listed in section 4.7, include the following item: Facility turnover activities shall also be required where a project rather than an entire facility is being turned over.
4.9 Final documentation	4.9.1 General	In addition to the requirements listed in section 4.9.1, include the following item: The final documentation shall be retained in a document archive.
4.9 Final documentation	4.9.3 Additional commissioning documentation	In addition to the requirements listed in section 4.9.3, include the following items: Certificate of Interim Acceptance Final Certificate of Completion Deferred commissioning test reports System and environmental checks report Final Commissioning Report
4.11 Training and education	4.11.1	In addition to the requirements listed in section 4.11.1, include the following item: Meet the requirements of Section 15.2 Training Requirements, ASHRAE Standard 202.
4.13 Record drawings	N/A	In addition to the requirements listed in section 4.13, include the following item: Record drawings are required whenever the built work being commissioned is connected to or impacts the operation of the base building systems.

CSA Z320-11 Section	CSA Z320-11 Subsection	Variances
4.14 Manuals	4.14.2 Systems operation manual	<p>In addition to the requirements listed in section 4.14.2, include the following items:</p> <p>The systems operation manual shall indicate both normal and emergency modes of operation.</p> <p>The systems operation manual shall include Life Safety Compliance Report.</p>
5.1 Architectural systems	5.1.3.4 Functional performance testing (interior spaces)	<p>In addition to the requirements listed in sub-section 5.1.3.4, include the following item:</p> <p>The following additional system shall be part of the commissioning process:</p> <ul style="list-style-type: none"> • Sound masking, as per design documents
5.4 Mechanical systems	5.4.3.4 Functional performance testing	<p>In addition to the requirements listed in sub-section 5.4.3.4, include the following items:</p> <p>The following additional tests are to be performed, as per design documents:</p> <ul style="list-style-type: none"> • Duct pressure test • Duct leakage test • Indoor air quality test
Schedule A (informative) – General guidelines	N/A	This schedule is adopted as a mandatory requirement.
Schedule B (informative) – Architectural systems guidelines (informative)	N/A	The architectural testing protocols listed in Table B.1 are the minimum mandatory testing requirements.

RS 8.5

Table of Commissioning Duties and Responsibilities

E : Execute
 A : Assist/Participate
 C : Check

Lead	Departmental Representative	Design Quality Review Team	Commissioning coordinator - Quality assurance	Design Professionals	Commissioning Manager	Commissioning Officer	Construction Team	Property Manager
Organization	PWGSC	PWGSC - AES	PWGSC - TMS	Consultant	Consultant	Construction Manager	Construction Manager	PWGSC
Update of:								
Design Quality Review Team	E		C					
Commissioning Coordinator - Quality Assurance	E							
General Work Progress:								
Action		E						
Design:								
Commissioning Meetings	A		A	A	E	A	A	
Commissioning Risks	E		A					
Specifications - Commissioning Section			C	A	E			
Commissioning Planning								
Commissioning Organization			C		E	A	A	
Commissioning Plan			C		E	A		
Commissioning Schedule			C		C	E		
Commissioning:								
Commissioning Activities	A		A		C	A	E	A
Performance and Operation			A	C	C	E		
Testing			A	C	A	A	E	
Test Reports			C	C	C	E	A	
TAB Operations			C	C	A	A	E	
Building Management:								
Building Management Manual			C	C	C	A	E	
Training:								
Training Plan	A		C		E		A	
Training			A		C	A	E	A
Documentation:								
Commissioning Documentation			C	C	A	A	E	
PI and PV Forms/Records			C		C	E	A	
Operations:								
Acceptance								E
Operation and Maintenance								E

RS 9 Building Information Modeling (BIM)

For this project, Building Information Modelling (BIM) is one of the building design visualization tools used in the Integrated Design Process (IDP) by focusing the work of all stakeholders on the designs and options presented and the analysis of all project data. The data thus centralized within the digital models are used to document design decisions, as well as to visualize the future building in 3D. BIM brings together all the project players throughout the design process, the tender process (for all packages) and construction, all in collaboration with the CM.

The Consultant is responsible for overseeing the entire BIM effort.

The application of BIM to the project must address, but is not limited to, the following aspects:

- Serve as a design support and concept validation tool for monitoring client functional requirements by synchronizing data between modelling and the functional and technical requirements deliverable (FTP).
- Serve as a communication and visualization tool during the integrated design workshops and design review workshops to stimulate exchanges and optimize decision making.
- Serve as an interdisciplinary coordination tool throughout the design process until the construction tenders and during the construction period to identify potential conflicts between components specified by different design trades and their contract documents.
- Produce the required plan specifications for each package at the various stages of the project.
- Meet other objectives in the *BIM Management Plan* (BMP) – see Appendix E – Schedule 2.

The working methods of the various stakeholders, including the Consultant and his or her sub-consultants, are documented in the *BIM Management Plan* (BMP). The Senior Building Information Modelling Manager must submit it to the Consultant, who must then read, understand and improve it at the project's BIM management meetings. These methods must be adjusted to the needs of the project so that the BIM provides real added value to the work of the Consultant and CM. The BMP will outline the collaborative methods, the level of modelling detail (minimum LOD 300) and the objectives to be achieved for the success of the project.

The Consultant must assist the Senior BIM Manager and participate actively and in close collaboration with all stakeholders involved as well as the CM in the meetings described in this document, in order to meet the conceptual needs arising from the established objectives.

He or she must also:

- For each of the trades, designate a BIM Manager who will be the Senior BIM Manager's main contact for planning and deploying the BIM approach.
- Deploy and ensure compliance with the BIM approach on his or her team, in accordance with the BMP. Refer to the preliminary BIM Management Plan outlined in this section.
- Provide the CM and his or her subcontractors with design models to optimize the constructability analysis, which includes systems coordination, as well as work planning and monitoring.
- Plan 2D (AutoCAD) and 3D (Revit) renderings at all stages of RS2, RS3 and RS4 deliverables and plans and specifications for submission. Between each rendering, the DR will provide feedback that must be incorporated into the models produced.

- All plans and specifications issued must be submitted in 2D format (AutoCAD). These plans and specifications must comply with CADD standards.
- The professionals will be required to produce signed and sealed plans for submission and construction (2D). The 2D documents must be extracted directly from the BIM models and transmitted in both paper and PDF formats. These documents will be the contract documents. The 3D models will be used for design only. Specialized contractors will be able to refer to them for a better understanding when submitting their bid. If there are conflicting elements, the 2D documents take precedence over the models.
- Participate in meetings to draft the BMP in accordance with Section B.13.
- Participate in coordination and BIM meetings in accordance with the requirements of Section B.13.

9.1 SENIOR BUILDING INFORMATION MODELLING (BIM) MANAGER

9.1.1 General

The Consultant may use an external firm or in-house resource for the Senior BIM Manager. However, this resource must be a different person than the Consultant's or the sub-consultants' BIM manager. The Senior BIM Manager must, as part of the project, set up a reference framework in accordance with the BIM objectives established in the preliminary BIM Management Plan (BMP), ensure its application and perform quality control throughout the project development process, in collaboration with the DR.

He or she must also produce a general schedule of activities and deployment steps within 20 working days of the contract being awarded.

In addition, during this mandate, the Senior BIM Manager will collaborate with and support the DR, providing advice on PWGSC's internal BIM approach as well as on the management tools for the implementation of the BIM approach at PWGSC. To this end, plan for three (3) specific three-hour meetings.

The prime consultant must provide the necessary staff to carry out this mandate. At a minimum, he or she must designate a Senior BIM Manager who will assume the following responsibilities and tasks.

9.1.2 Senior Building Information Modeling (BIM) Manager Roles

The Senior BIM Manager is responsible for developing the BIM Management Plan (BMP) for the project, coordinating the deployment of the BIM approach and supporting the project teams in its implementation.

The Consultant's Senior BIM Manager must have at least 10 years of consulting experience in the construction industry, including experience over the past five (5) years as Senior BIM Manager in projects involving the construction of public, semipublic or institutional buildings.

Objectives:

- a. Ensure optimum deployment of the BIM approach.
- b. Ensure that the BIM approach adds value to the various implementation activities and supports the Integrated Design Process (IDP), and that its implementation enables the achievement of the project objectives.
- c. Provide quality control to ensure that the work and deliverables of the project teams comply with the BMP.

Roles and Responsibilities:

- a. Develop (produce and draft) a BMP, in accordance with the BIM objectives and the project objectives, and supervise its overall implementation and updating.
- b. Produce a work plan (a BIM implementation plan [BIP]) that determines how the objectives of the BMP will be achieved.
- c. Review the BIM of the various stakeholders.
- d. Develop and define the various modeling strategies with the BIM managers from each trade.
- e. Coordinate the BIM component of coordination meetings (in accordance with the requirements of Section B.1 Coordination Meetings under Required Services [RS]).
- f. Coordinate meetings to draft the BMP (including the start-up meeting) in accordance with the requirements of Section B.13.
- g. Schedule coordination and BIM meetings in accordance with the requirements of Section B.13.
- h. Coordinate the work of all the BIM managers of each trade.
- i. Supervise and validate the conformity of the models with the BMP.
- j. Supervise the choice of BIM tools and ensure the interoperability of all data created and software used by the Design Professionals.
- k. Monitor the availability and capacity of BIM resources required to achieve the project objectives.
- l. Upload every week the most recent version of the virtual model on the hosting site provided by the CM.
- m. Coordinate and monitor the achievement of objectives.
- n. Act as a main point of contact for BIM-related issues.

9.1.3 BIM Management Plan (BMP) – see Appendix E – Schedule 2

- a. The purpose of these provisions is to establish rules and terms and conditions for the development, use, transmission and exchange of digital data for the project, including for the creation and management of digital data, the production of digital models, and coordination throughout the BIM process.
- b. The parties agree to integrate these rules and terms into their relationships with other stakeholders involved in the project’s BIM approach who may make use of this digital data. Before transmitting or allowing access to digital data, a party to the BIM Agreement may require another party involved in the BIM approach to provide reasonable and tangible

evidence that it has incorporated these rules and terms into any contractual agreement with a subcontractor or third party involved in the project.

- c. The Consultant is required to deliver a model with a level of development that will be defined in the information exchange matrix and an appropriate level of information with the objective of reducing change requests during the delivery phase. The working methods of the various stakeholders are documented in the BMP. The Consultant must then read it, understand it and improve it at the project's BIM management workshops (refer to Section B.14 under Required Services [RS]). These methods must be adjusted to the needs of the project so that the BIM provides real added value to the work of the Consultants and the CM as well as to the project deliverables (including those in this contract).
- d. During the period prior to the BIM agreement:
If a party to the BIM agreement receives a digital model or model before the BIM agreement is signed, that party must use, transmit or rely on such digital data with caution. In this context, any use or transmission, in particular of such model or model, is carried out without liability to the communicating party, nor to its Consultants, subcontractors, agents and employees. Upon signing the BIM agreement, each of the signatories must take the appropriate steps to adjust the digital data created and processed in advance in accordance with the rules and procedures set out in the BIM agreement.
- e. During the period after the BIM agreement:
After the BIM agreement has been signed, if a party to the BIM agreement uses or relies on a digital model or model for any purpose other than the authorized uses identified in the BIM agreement, such use is at the risk of the receiving party. A party to the BIM agreement may rely on a model or model only in accordance with the level of development (LOD) identified in the BIM agreement depending on the progress of the project, even if the content of a model or model element includes data that exceeds that LOD.

ADDITIONAL SERVICES (AS)

The Additional Services task list is non-exhaustive and in no way limits the professional obligations of the Consultant, its sub-consultants and its specialist consultants to perform the required tasks for the purpose of fulfilling the mandate of the project.

These additional services include:

- AS 1 Bilingual Construction Documents
- AS 2 Enhanced Site Supervision Services

AS 1 BILINGUAL DOCUMENTS

- 1.1 The Consultant may be required to provide certain tender documents in both official languages. This requirement would apply to, but not be limited to, drawings, specifications, questions, answers, addendums and any other documents required and produced by the Consultant for some of the tenders for this project.
- 1.2 Official languages requirements:
 - a. Both official languages are considered equal in status; neither is considered to be a translation of the other.
 - b. The Consultant shall be responsible for the accuracy and completeness of the texts, as well as the consistency within documents. Both versions of the plans and specifications (English and French) must be sealed and signed by the Consultants.
 - c. The current practice is to produce a single set of drawings with notes written in French and English, and separate documents in each language for the specifications, the addenda and all other documents needed for tendering reasons such as archive drawings and documents dealing with operations, maintenance and the like.

AS 2 ENHANCED SITE SUPERVISION SERVICES

2.1 *Description of Services*

The purpose of enhanced supervision services is to:

- a. Ensure increased or full-time presence of the Consultant's Resident Site Representative to coordinate inspection and testing with other Consultants as well as to inspect and monitor all aspects of the work during construction. This supervision complements and completes the site visits planned for the required services (RS6).
- b. Liaise with the CM, DR and other organizations. More than one person may be required to cover the hours of construction.
- c. The Consultant's Resident Site Representative shall:
 - a. Provide resident inspection services on a full-time basis or as agreed upon with the DR (including overtime) for all aspects of the project and maintain daily logs of all construction work in progress.
 - b. Ensure communication between the DR, the design sub-consultants, the

CM and any other appropriate stakeholders.

- d. The Resident Site Representative shall report directly to the consultant. He or she is required to become familiar with and master:
 - a. All contractual documents
 - b. The National Building Code of Canada (NBC) (latest edition)
 - c. All provincial and municipal standards related to the health and safety on construction sites
 - d. The requirements of the Consultant Project Brief and project responsibilities of other stakeholders, which relate to these services

NOTE: The Consultant shall plan for optimal use of these hours, based on site requirements. The DR may terminate these continuous site inspection services at any time.

2.2 Specific Duties and Responsibilities

- a. The Resident Site Representative shall provide full-time resident inspection, coordination and monitoring during the construction work and be responsible to the Consultant. In addition, the DR may delegate additional responsibilities subject to the Consultant's agreement.
- b. The Resident Site Representative is required to update his or her construction files on a daily basis and ensure communication with the Consultant and its sub-consultants, specialized consultants, the CM and the DR.
- c. The Resident Site Representative shall coordinate the activities of and provide any necessary instructions to an assistant (where necessary) approved by the DR.
- d. In case of emergencies, the Resident Site Representative is empowered to stop the work, or give orders to ensure the safety of the workers and to protect Crown property.

2.3 Inspection and Reporting

It is the responsibility of the Resident Site Representative to inspect all work in progress and identify any discrepancies between site conditions, contract documents and accepted construction procedures. Following validation with the Consultant and the DR, he or she must notify the CM of the discrepancies observed and the corrective measures to be taken. He or she must keep a daily log of his or her inspections and is to issue a weekly written report to the Consultant, for distribution, in the form directed. The Resident Site Representative is to prepare any reports or surveys as may be requested by the DR through the Consultant.

2.4 Interpretation of the Contract Documents

Interpretation of the contract documents shall be the responsibility of the Consultant. The Consultant may, however, have the Resident Site Representative provide him or her with pertinent information regarding implementation conditions and may require him or her to relay day-to-day instructions to the CM.

The Resident Site Representative shall assist the Consultant and further notify him or her in writing of any anticipated problems that may delay the progress of the work.

2.5 Changes to Work

The Resident Site Representative shall not authorize or order any change in the work that will constitute a change in construction design or in the value of the contract except as delegated by the DR.

The Resident Site Representative shall assist the Consultant, upon request, in assessing the modifications to be made to the work, as he or she is the only person qualified to describe the implementation conditions at the site.

2.6 Communication and Liaison

The Resident Site Representative shall:

- a. Convey the instructions regarding the required standards of workmanship to the CM.
- b. Identify defects or work that does not conform to drawings and specifications and notify the Consultant. Obtain instructions from the latter regarding the corrective measures to be taken and forward them to the CM. The Resident Site Representative must not deal directly with foremen or tradespeople or influence the progress of the work in any way.
- c. Communicate formally with the CM in memorandum form only. When such a document is issued, the Resident Site Representative must immediately forward copies to the DR and the Consultant.
- d. Contact the Consultant when information or action is required of him or her, e.g., general instructions, clarifications, sample of shop drawing approvals, requisitions, contemplated change orders, site instructions, details, and drawings.
- e. Accompany the DR on inspections and report requirements, comments or instructions from the DR to the Consultant. Note that the Resident Site Representative should encourage the provision of such requirements, comments or instructions in writing.
- f. Consider and evaluate any suggestions or modifications to the documents advanced by the CM and immediately report these to the Consultant with comments.

- g. Ensure that the DR and the Consultant are notified promptly when key pieces and/or components of materials and equipment are delivered, so that these two parties can arrange for inspection by the appropriate personnel prior to installation.
- h. The Resident Site Representative shall investigate, schedule and approve in writing all temporary or permanent connections to any of the buildings' systems prior to the work being done.
- i. The Resident Site Representative shall provide advanced forecasts and advise the DR of any interruption of normal building services with a minimum of twenty-four (24) hours' notice prior to the work being undertaken, where this work cannot be done during silent hours.

2.7 Daily Log

The Resident Site Representative must keep a daily log recording, in particular:

- a. Number of workers on the job site, their duties or trades, and their hours at the job site if they are not there for the entire workday
- b. Weather conditions, particularly unusual weather relative to construction activities in progress
- c. Major material and equipment deliveries
- d. Daily activities and major work done
- e. Start, stop or completion of activities
- f. Presence of inspection and testing firm employees, tests taken, results, etc.
- g. Unusual site conditions experienced
- h. Significant developments, remarks, etc.
- i. Special visitors on site
- j. Authorities given to the contractor to undertake certain work or hazardous work
- k. Environmental incidents
- l. Reports and instructions from appropriate authorities regarding emergency response actions

Note: The log is the personal property of the Resident Site Representative. Copies of the logbook are to be provided to the DR and the Consultant at the end of the project.

2.8 Weekly Records

The Resident Site Representative is to prepare weekly reports for the Consultant in the form directed, including:

- a. Progress of work relative to schedule

- b. Major activities commencing or completed during the week; main activities in progress
- c. Major deliveries of materials and/or equipment
- d. Difficulties which may cause delays in completion
- e. Materials and labour required immediately
- f. Cost estimates for work completed and materials delivered (cost plus contracts)
- g. Outstanding information or action required by the Consultant or the DR
- h. Work force
- i. Weather
- j. Remarks
- k. Accidents on site
- l. Life safety or building hazards caused by the work, the CM or its agents

2.9 Site Records

The Resident Site Representative is to maintain orderly and updated files at the site for the use of the DR and the Consultant and for own use as follows:

- a. Contract documents and tender documents
- b. Approved shop drawings
- c. Approved samples
- d. Samples
- e. Site instructions
- f. Contemplated Change Notices (CCN)
- g. Change Orders (COs)
- h. Memoranda
- i. Test and Deficiency Reports
- j. Correspondence and minutes of meetings
- k. Names, addresses and telephone numbers of the representatives of the Client, the Consultant, the CM, all contractors and key personnel associated with the contract, including home telephone numbers in case of emergency

In addition, the Resident Site Representative shall maintain an updated progress schedule. A reproduction of the original contract drawings shall be carefully preserved and shall be kept up to date with all memoranda, change orders, site instructions, details, as-built conditions, etc., issued after the award of the contract.

2.10 Inspection of the Work

The Resident Site Representative shall make on-site inspections and spot checks of the work to determine whether the work, material and equipment conform to the contract documents and supplementary conditions. The Resident Site Representative shall advise the CM of any deficiencies or unapproved deviations via memorandum and report immediately to the Consultant and DR any issues that the CM is slow to or refuses to correct.

The Resident Site Representative shall arrange for the Consultant's architectural, structural, mechanical engineering, electrical engineering and other sub-consultants to make the periodic inspections required by the contract entered into with the Consultant, and for these inspections to be made in a timely manner with respect to the progress of the work.

The Resident Site Representative shall also report if material and equipment are being incorporated into the project prior to approval of related shop drawings or samples.

The Resident Site Representative shall assist in the preparation of all deficiency reports, interim, preliminary and final, in collaboration with the DM and the Consultant.

The Resident Site Representative shall be responsible for the measurement of all work to be done on a unit cost basis.

2.11 Site Meetings

The Resident Site Representative shall attend all job-site meetings.

2.12 Inspection and Testing

The Resident Site Representative shall ensure that the tests and inspections required by the contract documents are conducted, and should observe these tests and report the results in the daily log.

The Consultant must be notified if the test results do not meet the specified requirements, or if the CM does not have tests undertaken as required.

2.13 Emergencies

In the case of an emergency where safety of persons or property is concerned, or work is endangered by the actions of the CM, to safeguard the interests of PWGSC, the Resident Site Representative shall give immediate written notice to the CM of the potential hazard. The Resident Site Representative has the authority to stop the work or order corrective measures. He or she must immediately contact the Consultant for instructions.

2.14 Restrictions

The Resident Site Representative shall not, in particular:

- a. Authorize deviations from the contract documents
- b. Conduct tests
- c. Approve shop drawings or samples
- d. Advise the Client in any matter without first obtaining guidance from the Consultant and the DR
- e. Accept any work or portions of the building
- f. Enter into the area of responsibility of the CM
- g. Stop the work unless convinced that an emergency exists, as noted above

2.15 Hazardous Construction Operations

It is the duty of the Resident Site Representative to examine all site conditions and methods to be used by the CM undertaking hazardous operations. The CM shall provide work plans, inspection reports and any other documents required by the specifications to ensure adequate preparation for hazardous construction work. The Resident Site Representative shall give written authority to the CM to undertake hazardous operations when fully satisfied that all necessary precautions and actions have been taken to safeguard the life safety of the workers and building occupants and Crown property. This written authority shall be countersigned by the CM to acknowledge that the latter is aware of the Resident Site Representative's instructions and requirements. Both parties will retain copies of the authority document jointly signed by them.

The Resident Site Representative will inspect the areas where hazardous work is underway to ensure that the CM is maintaining the agreed safety standards. Any infractions may result in the Resident Site Representative stopping the work. All infractions or work stoppages must be reported in writing and verbally to the Consultant and the DR.

2.16 Building Security

Special precautions must be taken at all times to prevent unauthorized entry into the building.

The Resident Site Representative shall ensure that all CM-made openings and means of access are firmly secured when the Contractor leaves the site.

The Resident Site Representative shall liaise closely with the CM and the DR on all security and/or safety problems that may arise due to the CM's operations.