

**RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:**
Réception des soumissions - TPSGC / Bid
Receiving - PWGSC
1550, Avenue d'Estimauville
1550, D'Estimauville Avenue
Québec
Québec
G1J 0C7

**REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION**

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

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

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

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

Comments - Commentaires

Title - Sujet Renovations at 715 PEEL	
Solicitation No. - N° de l'invitation EF950-160393/A	Date 2015-07-07
Client Reference No. - N° de référence du client EF950-160393	
GETS Reference No. - N° de référence de SEAG PW-\$QCL-026-16484	
File No. - N° de dossier QCL-5-38079 (026)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2015-08-20	Time Zone Fuseau horaire Heure Avancée de l'Est HAE
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Gallant, Julie	Buyer Id - Id de l'acheteur qcl026
Telephone No. - N° de téléphone (418) 649-2931 ()	FAX No. - N° de FAX (418) 648-2209
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: TPSGC/PWGSC PL.BONAVENTURE,PORTAIL S-E,BUR.7300 800, RUE DE LA GAUCHETIERE O.7300 MONTREAL Québec H5A1L6 Canada	

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address

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

Issuing Office - Bureau de distribution

TPSGC/PWGSC
601-1550, Avenue d'Estimauville
Québec
Québec
G1J 0C7

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

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF950-160393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qc1026

CCC No./N° CCC - FMS No/ N° VME

REQUEST FOR PROPOSAL (RFP)

IMPORTANT NOTICE TO BIDDERS

NEW PWGSC IMPLEMENTATION OF GOVERNMENT-WIDE INTEGRITY REGIME ANNOUNCED ON JULY 3, 2015

To find the new integrity provisions, please refer to:

- R1410T (2015-07-03), General Instructions (GI) – Architectural and/or Engineering Services – Request for Proposal, GI1 - integrity Provisions – Proposal; and
- R1210D (2015-07-03), General Condition (GC) 1 - General Provisions – Architectural and/or Engineering Services, GC1.13 - integrity Provisions – Contract

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

THIS PROCUREMENT CONTAINS A SECURITY REQUIREMENT

For further instructions please consult "Supplementary Instructions" SI9, "Security related requirements" and "Supplementary Conditions" SC01 "Security related requirements".

SUBMISSION OF BIDS

Bids must be submitted only to the address below by the date, time and place indicated on page 1 of the bid solicitation:

Bid Receiving Unit

Public Works and Government Services Canada
1550, D'Estimauville Avenue
Québec (Québec)
G1J 0C7

Due to the nature of the bid solicitation, bids transmitted by facsimile and/or by e-mail to PWGSC will not be accepted.

TABLE OF CONTENTS

The following is intended to clarify the general structure of the whole document.

Front Page

Supplementary Instructions to proponents (SI)

- SI1 Introduction
- SI2 Proposal Documents
- SI3 Bid Solicitations Distributions
- SI4 Questions or request for clarifications
- SI5 Bidder's conference and visits
- SI6 Confidential Information for Bidding
- SI7 Canada's Trade Agreements
- SI8 Certifications
- SI9 Security Requirement
- SI10 Construction Cost Limit
- SI11 Web Sites

Attachment 1 - Confidentiality agreement

Submission Requirements and Evaluation (SRE)

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

Terms, Conditions and Clauses

Agreement

Supplementary Conditions (SC)

- SC1 Security Requirement
- SC2 Language Requirements
- SC3 Construction Cost Limit
- SC4 Non-Disclosure Agreement
- SC5 Federal Contractors Program for Employment Equity - Default by the Consultant

Agreement Particulars

Appendix A Project Brief / Terms of Reference

- Project Description (PD)
- Project Administration (PA)
- Description of Services - Required Services (RS)
- Description of Services - Additional Services (SA)

Appendix B Price Proposal Form

Appendix C Team Identification Format

Appendix D Declaration/Certifications Form

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

-
- Appendix E Non-Disclosure Agreement
- Appendix F Security Requirements Check List
- Appendix G Doing Business, Quebec Region, Architectural and Engineering Services (AES),
May 1, 2013
- Appendix H CADD Supplement – Quebec Region, January 2013
- Appendix I PWGSC Commissioning Manual

SUPPLEMENTARY INSTRUCTIONS TO PROPONENTS (SI)

SI1 INTRODUCTION

1. Public Works and Government Services Canada (PWGSC) intends to retain an individual consulting firm or joint venture to provide the professional services for the project as set out in this Request for Proposal (RFP).
2. This is a single phase selection process. The strict time frames to implement this project do not allow sufficient time to conduct the usual two phase's selection process.
3. Proponents responding to this RFP are requested to submit a full and complete proposal. The proposal will cover not only the qualifications, experience and organization of the proposed Consultant Team, but also the detailed approach to the work, and the pricing and terms offered. A combination of the technical and price of services submissions will constitute the proposal.

SI2 PROPOSAL DOCUMENTS

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

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

2. The following are the proposal documents:
 - (a) Supplementary Instructions to Proponents (SI); R1410T (2015-07-03), General Instructions (GI) – Architectural and/or Engineering Services – Request for Proposal; Submission Requirements and Evaluation (SRE);
 - (b) the general terms, conditions and clauses, as amended, identified in the Agreement clause;
 - (c) Project Brief / Terms of Reference;
 - (d) the document entitled " Doing Business, Quebec Region, Architectural and Engineering Services (AES), May 1, 2013";
 - (d) the document entitled " CADD Supplement – Quebec Region, January 2013";
 - (e) the Security Requirements Check List (SRCL);
 - (f) any amendment to the solicitation document issued prior to the date set for receipt of proposals; and
 - (g) the proposal, Declaration/Certifications Form and Price Proposal Form.

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

SI3 BID SOLICITATIONS DISTRIBUTIONS

Canada will make available Notices of Proposed Procurement (NPP), bid solicitations and related documents for download through the Government Electronic Tendering Service (GETS). Canada is not responsible and will not assume any liabilities whatsoever for the information found on websites of third parties. **In the event an NPP, bid solicitation or related documentation would be amended, Canada will not be sending notifications.** Canada will post all amendments using GETS. It is the sole responsibility of the Bidder to regularly consult GETS for the most up-to-date information. Canada will not be liable for any oversight on the Bidder's part nor for notification services offered by a third party.

SI4 QUESTIONS OR REQUEST FOR CLARIFICATION

Questions or requests for clarification during the solicitation period must be submitted in writing to the Contracting Authority named on the RFP - Page 1, at julie.gallant@tpsgc-pwgsc.gc.ca, as early as possible. Enquiries should be received no later than seven [7] working days prior to the closing date identified on the front page of the Request for Proposal. Enquiries received after that date may not be answered prior to the closing date of the solicitation.

SI5 BIDDER'S MANDATORY CONFERENCE AND VISITS

It is MANDATORY that the Bidder or a representative of the Bidder attends at least one of the two Bidder's conferences and visits of the work site. Arrangements have been made for the conferences and site visits to be held at 1020 Rue Saint Antoine Ouest, Montreal, QC H3C 1B2 on the following dates and time:

Conference and visit, session 1 – 16 July 2015, at 13:30 EDT;

Conference and visit, session 2 – 6 August 2015, at 13:30 EDT;

Bidders should communicate with the Contracting Authority no later than 48 hours before the session to confirm attendance, provide the name(s) of the person(s) who will attend and specify their preferred language of interaction (English or French). PWGSC reserves the right to limit the number of participants to two (2) persons per bidder.

Bidders will be required to sign an attendance sheet and a Confidentiality Agreement if this is not already done (see SI6 here under). Bidders should confirm in their bid that they have attended one of the MANDATORY conferences and site visits. Bidders who do not attend one of the MANDATORY conferences and site visits or do not send a representative will not be given an alternative appointment and **THEIR BID WILL BE DECLARED NON-RESPONSIVE**. Any clarifications or changes to the bid solicitation resulting from the site visit will be included as an amendment to the bid solicitation.

SI6 CONFIDENTIAL INFORMATION FOR BIDDING

In order to prepare a bid in response to the bid solicitation, suppliers must have access to information that is confidential or proprietary to Canada or a third party. It is a condition of the bid solicitation that bidders sign a Confidentiality Agreement in the form set out in **Attachment 1 here under** before it is provided to them as part of the bid solicitation.

In order to receive said documents, the bidder must make a written request to the contracting authority at julie.gallant@tpsgc-pwgsc.gc.ca. The request must include the Confidentiality Agreement duly signed. PWGSC will then upload the documents on the Proponent's FTP site. The site's address as well as a username/password must be provided.

Bidders who do not obtain these documents during the period of RFP will see their **BID DECLARED NON RESPONSIVE.**

SI7 CANADA'S TRADE AGREEMENTS

This procurement is subject to the provisions of the North American Free Trade Agreement (NAFTA), the World Trade Organization - Agreement on Government Procurement (WTO-AGP). The Agreement on Internal Trade (AIT) does not apply because some professional services are specifically excluded.

SI8 CERTIFICATIONS

1. Integrity Provisions - Associated Information

By submitting a proposal, the Proponent certifies that the Proponent and its Affiliates are in compliance with the provisions as stated in Section GI1 Integrity Provisions - Proposal of R1410T (2015-07-03) General Instructions (GI) – Architectural and/or Engineering Services – Request for Proposal. The associated information required within the Integrity Provisions will assist Canada in confirming that the certifications are true.

2. Federal Contractors Program for Employment Equity - Proposal Certification

By submitting a proposal, the Proponent certifies that the Proponent, and any of the Proponent's members if the Proponent is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list (http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml) available from [Employment and Social Development Canada \(ESDC\) - Labour's website](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml).

Canada will have the right to declare a proposal non-responsive if the Proponent, or any member of the Proponent if the Proponent is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list at the time of contract award.

Canada will also have the right to terminate the Agreement for default if a Consultant, or any member of the Consultant if the Consultant is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list during the period of the Agreement.

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

SI9 SECURITY REQUIREMENT

1. **AT THE DATE OF BID CLOSING**, the following conditions must be met:

-
- (a) the Proponent must hold a valid organization security clearance as indicated in Supplementary Conditions SC1;
 - (b) the Proponent's proposed individuals requiring access to classified or protected information, assets or sensitive work site(s) must meet the security requirement as indicated in Supplementary Conditions SC1;
 - (c) the Proponent's proposed location of service performance or document safeguarding must meet the security requirement as indicated in Supplementary Conditions SC1.
 - (d) the Proponent must provide the address(es) of proposed location(s) of service performance or document safeguarding as indicated in the Declaration/Certifications Form.
2. When a Proponent is a consortium, the security requirements apply to EACH member of the consortium. A member of the consortium cannot represent or endorse the other members of the consortium. However, if the joint venture is a corporation, general partnership or limited partnership, the security requirements apply only to the entity thus formed (and not, for clarity, its shareholders, general or limited partners).
 3. For additional information on security requirements, proponents should refer to the Canadian Industrial Security Directorate (CISD), Industrial Security Program of Public Works and Government Services Canada (<http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html>) website.

SI10 - CONSTRUCTION COST LIMIT

Construction Cost Estimates prepared by the Consultant shall not exceed the Construction Cost Limit as specified in the Supplementary Conditions.

SI11 - WEBSITES

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

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

Federal Contractors Program (FCP)
http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/index.shtml

Certificate of Commitment to Implement Employment Equity form LAB 1168
<http://www.servicecanada.gc.ca/cgi-bin/search/eforms/index.cgi?app=profile&form=lab1168&dept=sc&lang=e>

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

Consent to a Criminal Record Verification (PWGSC-TPSGC 229 form)
<http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/formulaires-forms-eng.html>

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qc1026

CCC No./N° CCC - FMS No./N° VME

Lobbying Act

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

Contracts Canada

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

Supplier Registration Information

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

Consultant Performance Evaluation Report Form

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

Canadian economic sanctions

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

National Joint Council (NJC) Travel Directive

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

Organization Security Screening

<http://iss-ssi.pwgsc-tpsgc.gc.ca/ssi-iss-services/eso-oss-eng.html>

ATTACHMENT 1 – CONFIDENTIALITY AGREEMENT

TO: HER MAJESTY THE QUEEN IN RIGHT OF CANADA ("CANADA"), AS REPRESENTED BY THE MINISTER OF PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

The description of the requirement of the bid solicitation No. **EF950-160393** contains information that is confidential or proprietary to Canada or to a third party (the Confidential Information) that is not to be disclosed or used in any way other than as set out below.

1. The Supplier agrees that:
 - a. it must not, without first obtaining the written permission of the Contracting Authority, disclose to anyone, other than an employee or a proposed subcontractor with a need to know, the Confidential Information;
 - b. it must not make copies of the Confidential Information or use it for any purpose other than for the preparation of a bid in response to the bid solicitation identified above;
 - c. at close or early termination of the bid period, it must immediately deliver the Confidential Information to the Contracting Authority as well as every draft, working paper and note that contains any information related to the Confidential Information.

2. The Supplier must require any proposed subcontractor referred to in (a) above to execute a Confidentiality Agreement on the same conditions as those contained in this agreement.

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

4. Nothing in this Confidentiality Agreement should be construed as limiting the Supplier's right to disclose any information to the extent that such information:
 - a. is or becomes in the public domain through no fault of the Supplier or any proposed subcontractor;
 - b. is or becomes known to the Supplier from a source other than Canada, except any source that is known to the Supplier to be under an obligation to Canada not to disclose the information;
 - c. is independently developed by the Supplier; or
 - d. is disclosed under compulsion of a legislative requirement or any order of a court or other tribunal having jurisdiction.

Name of Supplier

Signed by its authorized representative

Date

SUBMISSION REQUIREMENTS AND EVALUATION (SRE)

SRE 1 GENERAL INFORMATION

1.1 Reference to the selection procedure

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

1.2 Calculation of total score

For these projects the Total Score will be established as follows:

Technical Rating x 90% = Technical Score (Points)
Price Rating x 10% = Price Score (Points)
Total Score = Maximum 100 Points

SRE 2 PROPOSAL REQUIREMENTS

2.1 Requirement for Proposal Format

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

- Submit one (1) bound original plus five (5) bound copies of the proposal, for a total of six (6)
- Paper size should be 8.5" x 11" (216mm x 279mm)
- Minimum font size - 10 points Arial, 11 point Times New Roman, or equivalent
- Minimum margins - 20 mm
- Double-sided submissions are required:
 - One (1) "page" means one side of a 8.5" x 11" (216mm x 279mm) sheet of paper
- 11" x 17" (279mm x 432 mm) fold-out sheets for spreadsheets, schedules, organization charts etc. will be counted as two pages per side
- The order of the proposals must follow the order established in the current Request for Proposal, SRE section.

2.2 Specific Requirements for Proposal Format

The maximum number of pages, including text and tables for quotation requirements under SRE 3.2 is thirty (30) pages.

The following is not included in the maximum number mentioned above:

- Front page of the RFP
- Front page of revision(s) to the RFP
- Cover letter
- Price Proposal Form (Appendix B)
- Consultant Team Identification Form (Appendix C)
- Declaration/Certifications Form (Appendix D)

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

SRE 3 SUBMISSION REQUIREMENTS AND EVALUATION

3.1 Mandatory Requirements

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

3.1.2 Licensing, Certification or Authorization

The Proponent must be an architectural firm, licensed to provide the necessary professional services to the full extent that may be required by provincial or territorial law in the province of Quebec.

Its sub-consultants and specialists must be licensed to provide the required professional services, to the full extent that may be required by provincial or territorial law in the province of Quebec.

3.1.3 Consultant Team Identification

The team members of the consultant to identify are:

Proponent (Prime Consultant)

1. Architecture
 - Project Manager
 - Designer

Main Sub-consultants/Specialists

1. Engineering – Electrical
 - Project Manager
 - Must be a mechanical or electrical engineer.
2. Engineering – Electrical
 - Designer
3. Engineering – Mechanical
 - Designer
4. Engineering – Structural
 - Designer
5. Cost Estimate and Planning
 - Specialist
 - Must be a Certified Construction Estimator (CCE) or a Professional Quantity Surveyor (PQS) member of the CIQS.
 - Must have a minimum of ten (10) years of relevant experience.
6. LEED
 - Specialist
 - Must be LEED accredited.
 - Must have completed a minimum of two (2) LEED certification process.
7. Commissioning
 - Specialist
 - Must be independent of firms represented on the design and construction team.
 - Must be LEED accredited.
 - Must have completed a minimum of one Enhanced Commissioning process as part of LEED certification processes.
8. Security Hardware
 - Specialist
9. Vertical Transportation
 - Specialist

If the Proponent proposes to provide multidisciplinary services that might otherwise be provided by a sub-consultant, it must be clearly indicated in the bid proposal. The Cost Planning and Estimate, LEED, and Vertical Transportation specialists are required to be independent from the Proponent. The Commissioning Specialist must be independent from the Proponent and its engineering sub-consultants.

Information required:

- Company Name
- Names of key personnel assigned to the project.

For the Prime Consultant, indicate current license and/or how he/she intends to meet the provincial or territorial licensing requirements. In the case of a joint venture identify the existing or proposed legal form of the joint venture (refer to R1410T General Instructions to Proponents, GI9 Limitation of Submissions).

An example of an acceptable form for submission of the team identification information is provided in Appendix C.

3.1.4 Declaration/Certifications Form

Proponents must complete, sign and submit the Appendix D, Declaration/Certifications Form.

3.1.5 Integrity Provisions – Associated Information

Proponents, who are incorporated, including those bidding as a joint venture, must provide a complete list of names of all individuals who are currently directors of the Proponent. Proponents bidding as sole proprietorship, as well as those bidding as a joint venture, must provide the name of the owner(s). Proponents bidding as societies, firms, or partnerships do not need to provide lists of names. If the required list of names has not been received by the time the evaluation of bids is completed, Canada will inform the Proponent of a time frame within which to provide the information. Failure to provide the names within the time frame specified will render the bid non-responsive. Providing the required names is a mandatory requirement for contract award.

3.2 Rated Requirements

3.2.1 Achievements of Proponent on Projects

Describe the Proponent's accomplishments, achievements and experience as Prime Consultant on projects.

Select a maximum of two (2) projects undertaken within the last ten (10) years. Joint venture submissions are not to exceed the maximum number of projects. Only the first two (2) projects, in the order listed, will receive consideration and any others will be disregarded.

Information that should be provided:

- Brief project description and intent. Narrative should include a discussion of the approach to meet the intent, design challenges and resolutions.
- Clearly explain how the project is similar/relevant to the projects of this Request for Proposal.
- Budget Control and Management: provide the Class A estimate of the total cost, the contract cost and the final cost of construction, and explain the differences
- Project Schedule Control and Management: provide the planned schedule and the revised schedule at project completion, and explain the differences
- Client References: provide the name, address, email address and telephone number of clients with knowledge of the construction work (references can be checked)
- Names of key personnel responsible for project delivery;

The Proponent (as defined in R1410T General Instructions to Proponents, GI2 Definitions) must possess the knowledge on the above projects. Past project experience from entities other than the Proponent will not be considered in the evaluation unless these entities were part of the Proponent's joint venture.

Please indicate the projects that were carried out in joint venture and the responsibilities of each of the involved entities in each project. The rating awarded for each project will take into account the responsibilities of the Proponent in the joint venture and the relevance of said responsibilities when compared to the services requested in this RFP.

3.2.2 Achievements of Key Sub-consultants and Specialists on Projects

Describe the accomplishments, achievements and experience either as Prime Consultant or in a sub-consultant capacity on projects. If the Proponent proposes to provide multidisciplinary services that might otherwise be provided by a sub-consultant, it must be clearly indicated in the bid proposal. The Cost Planning and Estimate, LEED, Vertical Transportation and Commissioning specialists are required to be independent from the Proponent.

Select a maximum of two (2) projects undertaken within the last ten (10) years. Joint venture submissions are not to exceed the maximum number of projects. Only the first two (2) projects, in the order listed, will receive consideration and any others will be disregarded.

Information that should be provided:

- Brief project description and intent. Narrative should include a discussion of the approach to meet the intent, design challenges and resolutions.
- Clearly explain how the project is similar/relevant to the projects of this Request for Proposal.
- Budget Control and Management: provide the Class A estimate of the total cost, the contract cost and the final cost of construction, and explain the differences
- Project Schedule Control and Management: provide the planned schedule and the revised schedule at project completion, and explain the differences
- Client References: provide the name, address, email address and telephone number of clients with knowledge of the construction work (references can be checked)
- Names of key personnel responsible for project delivery;

The sub-consultants and the specialists must possess the knowledge on the above projects. Past project experience from entities other than the sub-consultants and/or the specialists will not be considered in the evaluation unless these entities were part of the sub-consultants and/or the specialists' joint venture.

Please indicate those projects which were carried out in joint venture and the responsibilities of each involved entities in each project. The rating awarded for each project will take into account the responsibilities of the sub-consultants and/or the specialists in the joint venture and the relevance of said responsibilities when compared to the services requested in this RFP.

3.2.3 Achievements of Key Personnel on Projects

Describe the experience and expertise of key personnel to be assigned to the realization of this project, regardless of their prior association with the company's current offering. This is an opportunity to showcase the strengths of team members and emphasize their responsibilities, commitments and previous achievements.

Information that should be supplied for each key personnel:

- Professional accreditation
- Classification and years of experience
- Role, responsibilities and level of involvement in previous projects

- accomplishments, achievements and awards
- competencies and relevant experience in relation to the projects subject to this RFP, and explanation of the potential contributions to said projects

Exception:

- The Vertical Transportation Specialist and the Security Hardware Specialist should only be identified. Not rating will be attributed. It is the Proponent's responsibility to ensure that its specialists have the required competencies and experience.

Should the following key personnel have a LEED professional credential, two (2) additional points will be added to each person's rating (within the maximum rating of ten (10) points):

- Designer, Architecture
- Designer, Electrical Engineering
- Designer, Mechanical Engineering

3.2.4 Understanding of the Project

The Proponent should demonstrate an understanding of the project goals, the functional and technical requirements, the constraints and all aspects that will influence the final product.

Information that should be provided:

- The functional and technical requirements
- Broader goals (sustainable development, special features, etc.)
- Significant issues, challenges and constraints
- Project schedule and cost. Review schedule and cost information and assess risk management elements that may affect the project
- Philosophies and values of the government departments
- Relationship between the current mandate and other previous projects completed by PWGSC

3.2.5 Scope of Services

The Proponent should demonstrate its ability to deliver services to meet the challenges of the projects and provide an action plan.

Information that should be provided:

- Scope of Services - detailed list of services
- Work Plan - detailed breakdown of work tasks and deliverables
- Project schedule - proposed major milestone schedule
- Risk management strategy

3.2.6 Management of Services

The Proponent should describe how:

- he /she proposes to perform the services and meet the constraints;
- the services will be managed to ensure continuing and consistent control as well as production and communication efficiency;
- the team will be organized and how it will fit in the existing structure of the firms;
- how the team will be managed.

The proponent is also to identify sub-consultant disciplines and specialists required to complete the consultant team. If the Proponent proposes to provide multidisciplinary services that might otherwise be provided by a sub-consultant, it must be clearly indicated in the bid proposal. The Cost Planning and

Estimate, LEED, Vertical Transportation and Commissioning specialists are required to be independent from the Proponent.

Information that should be provided:

- Confirm the makeup of the full project team, including the names of the consultant's sub-consultants and specialists' employees and their duties and responsibilities in the project;
- Organization chart with position titles and names (Consultant's team); joint venture business plan, team structure and responsibilities, if applicable;
- What back-up will be committed;
- Profiles of the key positions (specific duties and responsibilities);
- Outline of an action plan of the services with implementation strategies and sequence of main activities;
- Reporting relationships;
- Communication strategies;
- Response time: demonstrate how the response time requirements will be met.

3.3 Evaluation and Rating

The Proponent must coordinate its sub-consultants and specialists, as to be expected during the course of the projects. The Proponent is responsible for submitting a complete bid package with all the required information.

In the first instance, price envelopes will remain sealed and only the technical components of the proposals which are responsive will be reviewed, evaluated and rated by a PWGSC Evaluation Board in accordance with the following to establish Technical Ratings.

Criterion	Rating	Weight Factor	Weighted Rating
Achievements of Proponent (3.2.1)	0 - 10	2.00	20.0
Achievements of Key Sub-consultants / Specialists (3.2.2):		(1.75)	(17.5)
• Electrical engineering	0 - 10	0.25	2.5
• Mechanical Engineering	0 - 10	0.50	5.0
• Structural Engineering	0 - 10	0.25	2.5
• Cost Planning and Estimate Specialist	0 - 10	0.25	2.5
• LEED Specialist	0 - 10	0.25	2.5
• Commissioning Specialist	0 - 10	0.25	2.5
Achievements of Key Personnel on Projects (3.2.3):		(1.75)	(17.5)
• Project Manager, Architecture	0 - 10	0.40	4.0
• Project Manager, Engineering	0 - 10	0.25	2.5
• Designer, Architectural	0 - 10	0.25	2.0
• Designer, Electrical Engineering	0 - 10	0.15	1.5
• Designer, Mechanical Engineering	0 - 10	0.20	1.5
• Designer, Structural Engineering	0 - 10	0.10	1.0
• Cost Planning and Estimate Specialist	0 - 10	0.15	1.5
• LEED Specialist	0 - 10	0.15	1.5

• Commissioning Specialist	0 - 10	0.10	1.0
Key Personnel to be identified (3.2.3):			
• Security Hardware Specialist	-	-	-
• Vertical Transportation Specialist	-	-	-
Understanding of the Project (3.2.4)	0 - 10	1.75	17.5
Scope of Services (3.2.5)	0 - 10	1.50	15.0
Management of Services (3.2.6)	0 - 10	1.25	12.5
Technical Rating			0.0 - 100.0

No further consideration will be given to Proponents who do not attain a minimum technical rating of sixty (60) points.

Generic Evaluation Table

PWGSC Evaluation Board members will evaluate the strengths and weaknesses of the Proponent's response to the evaluation criteria and will rate each criterion with even numbers (0, 2, 4, 6, 8 or 10) using the generic evaluation table below:

	INADEQUATE	WEAK	ADEQUATE	FULLY SATISFACTORY	STRONG
0 point	2 points	4 points	6 points	8 points	10 points
Did not submit information which could be evaluated	Lacks complete or almost complete understanding of the requirements.	Has some understanding of the requirements but lacks adequate understanding in some areas of the requirements.	Demonstrates a good understanding of the requirements.	Demonstrates a very good understanding of the requirements.	Demonstrates an excellent understanding of the requirements.
	Weaknesses cannot be corrected	Generally doubtful that weaknesses can be corrected	Weaknesses can be corrected	No significant weaknesses	No apparent weaknesses
	Proponent do not possess qualifications and experience	Proponent lacks qualifications and experience	Proponent has an acceptable level of qualifications and experience	Proponent is qualified and experienced	Proponent is highly qualified and experienced
	Team proposed is not likely able to meet requirements	Team does not cover all components or overall experience is weak	Team covers most components and will likely meet requirements	Team covers all components - some members have worked successfully together	Strong team - has worked successfully together on comparable projects
	Sample projects not related to this requirement	Sample projects generally not related to this requirement	Sample projects generally related to this requirement	Sample projects directly related to this requirement	Leads in sample projects directly related to this requirement
	Extremely poor, insufficient to meet performance requirements	Little capability to meet performance requirements	Acceptable capability, should ensure adequate results	Satisfactory capability, should ensure effective results	Superior capability, should ensure very effective results

SRE 4 PRICE OF SERVICES

All price proposal envelopes corresponding to responsive proposals that have achieved the pass mark of sixty (60) points will be opened upon completion of the technical evaluation. An average price is determined by adding all the price proposals together and dividing the total by the number of price proposals being opened.

All price proposals that are greater than twenty-five percent (25%) above the average price will be set aside and receive no further consideration. This is only applicable when there are more than three (3) bidders.

The remaining price proposals are rated as follows:

1. The lowest price proposal receives a Price Rating of one hundred (100).
2. The second, third, fourth and fifth lowest prices receive Price Ratings of eighty (80), sixty (60), forty (40), and twenty (20) respectively.
3. All other price proposals receive a Price Rating of 0.
4. In the rare event where two (or more) price proposals are identical, the matching price proposals receive the same rating and the corresponding number of following ratings is skipped.

The Price Rating is multiplied by the applicable percentage to establish the Price Score.

SRE 5 TOTAL SCORE

Total scores will be calculated as follows:

Rating	Possible Range	% of Total Score	Score (points)
Technical Rating	0 - 100	90	0-90
Price Rating	0 - 100	10	0 - 10
Total score		100	0 - 100

The Proponent receiving the highest Total Score is the first entity that the Evaluation Board will recommend for the provision of the required services. In the case of a tie, the proponent submitting the lower price for the services will be selected.

SRE 6 SUBMISSION REQUIREMENTS (checklist)

The following list of documents and forms is provided with the intention of assisting the Proponent in ensuring a complete submission. The Proponent is responsible for meeting all submission requirements.

Please follow detailed instructions in R1410T General Instructions to Proponents, G116 Submission of Proposal. Proponents may choose to introduce their submissions with a cover letter.

- Front page of RFP
- Front page(s) of any solicitation amendment
- Team Identification - see typical form in Appendix C
- Declaration/Certifications Form - form provided in Appendix D, to be filled and signed
- Proposal - submit one (1) original proposal of five (5) copies
- Use the evaluation and rating table (SRE 3.3) as a checklist and provide all requested information for each assessed item

In a separate sealed envelope:

- Price Proposal Form complete and submit one (1) copy, see Appendix B

TERMS, CONDITIONS AND CLAUSES

AGREEMENT

1. The Consultant understands and agrees that upon acceptance of the offer by Canada, a binding Agreement shall be formed between Canada and the Consultant and the documents forming the Agreement shall be the following:

- (a) the Front Page and this Agreement clause;
- (b) the General Terms, Conditions and Clauses, as amended, identified as:
 - R1210D (2015-07-03), General Condition (GC) 1 - General Provisions – Architectural and/or Engineering Services
 - R1215D (2014-06-26), General Condition (GC) 2 - Administration of the Contract
 - R1220D (2015-02-25), General Condition (GC) 3 - Consultant Services
 - R1225D (2015-04-01), General Condition (GC) 4 - Intellectual Property
 - R1230D (2015-02-25), General Condition (GC) 5 - Terms of Payment
 - R1235D (2011-05-16), General Condition (GC) 6 - Changes
 - R1240D (2011-05-16), General Condition (GC) 7 - Taking the Services Out of the Consultant's Hands, Suspension or Termination
 - R1245D (2012-07-16), General Condition (GC) 8 - Dispute Resolution
 - R1250D (2015-07-03), General Condition (GC) 9 - Indemnification and Insurance
- Supplementary Conditions
- Agreement Particulars
- (c) Project Brief / Terms of Reference;
- (d) the document entitled "Doing Business, Quebec Region, Architectural and Engineering Services (AES), May 1, 2013";
- (e) the document entitled "CADD Supplement – Quebec Region, January 2013";
- (f) the Security Requirements Check List (SRCL);
- (g) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
- (h) the proposal, the Declaration/Certifications Form and the Price Proposal Form.

2. The documents identified above by title, number and date are hereby incorporated by reference into and form part of this Agreement, as though expressly set out herein, subject to any other express terms and conditions herein contained.

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

<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>

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

- (a) any amendment or variation in the Agreement that is made in accordance with the terms and conditions of the Agreement;
- (b) any amendment to the solicitation document incorporated in the Agreement before the date of the Agreement;
- (c) this Agreement clause;
- (d) Supplementary Conditions;
- (e) General Terms, Conditions and Clauses;

-
- (f) Agreement Particulars;
 - (g) Project Brief / Terms of Reference;
 - (h) the document entitled "Doing Business, Quebec Region, Architectural and Engineering Services (AES), May 1, 2013";
 - (i) the document entitled "CADD Supplement – Quebec Region, January 2013";
 - (j) the document entitled "Security Requirement Check List";
 - (k) the proposal.

SUPPLEMENTARY CONDITIONS (SC)

SC1 SECURITY REQUIREMENT

1. The following security requirement (SRCL and related clauses) applies and form part of the Agreement.

SECURITY REQUIREMENT FOR CANADIAN SUPPLIER:

PWGSC FILE # EF950-16-0393

- a. The Contractor/Offeror must, at all times during the performance of the Contract/Standing Offer, hold a valid Designated Organization Screening (DOS) with approved Document Safeguarding at the level of **PROTECTED B**, issued by the Canadian Industrial Security Directorate, Public Works and Government Services Canada.
 - b. The Contractor/Offeror personnel requiring access to PROTECTED information, assets or work site(s) must EACH hold a valid **RELIABILITY STATUS**, granted or approved by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC).
 - c. The Contractor MUST NOT utilize its Information Technology systems to electronically process, produce or store PROTECTED information until the CISD/PWGSC has issued written approval. After approval has been granted or approved, these tasks may be performed at the level of **PROTECTED B**.
 - d. Subcontracts which contain security requirements are NOT to be awarded without the prior written permission of CISD/PWGSC.
 - e. The Contractor/Offeror must comply with the provisions of the:
 - (a) Security Requirements Check List and security guide (if applicable), attached at Annex F;
 - (b) Industrial Security Manual (Latest Edition)
2. Consultant's Site or Premises Requiring Safeguard Measures
(will be completed at contract award)

The Consultant must diligently maintain up-to-date, the information related to the Consultant's site or premises, where safeguard measures are required in the performance of the Services, for the following addresses:

Address:

Street Number / Street Name, Unit / Suite / Apartment Number

City, Province, Territory

Postal Code

SC2 LANGUAGE REQUIREMENTS

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

SC3 CONSTRUCTION COST LIMIT

1. The Construction Cost Limit is:
9.0M\$ for the CIC project (Applicable Taxes extra);
9.8M\$ for the CBSA project (Applicable Taxes extra).
2. In accordance with R1220D (2015-02-25) GC 3.11 Cost Control, throughout Project Development, the Construction Cost Estimate prepared by the Consultant shall not exceed the Construction Cost Limit as specified above. This disclosure of available funds does not commit Canada to pay Consultant fees based on such an amount.

SC4 FEDERAL CONTRACTORS PROGRAM FOR EMPLOYMENT EQUITY - DEFAULT BY THE CONSULTANT

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

AGREEMENT PARTICULARS

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

APPENDIX A - PROJECT BRIEF / TERMS OF REFERENCE

The Project Brief is divided into two sections:

- Project Description (PD)
- Description of Services
 - Project Administration (PA)
 - Services Required (RS)
 - Additional Services (AS)

For standards relating to the service provisions herein please refer to the document at Appendix G, "Doing Business, Quebec Region, Architectural and Engineering Services (AES), May 1st 2013". The standards must be adhered to in conjunction with this scope of services.

PROJECT DESCRIPTION

PD 1 PROJECT INFORMATION	27
1.1 Government departments	27
1.2 PWGSC Project Titles.....	27
1.3 Location of the Project	27
1.4 PWGSC Project Number	27
1.5 PWGSC Project Manager	27
PD 2 PROJECT IDENTIFICATION.....	27
2.1 Description	27
2.2 Project Features.....	27
2.2.1 Status of design documents.....	27
2.2.2 Execution of the works	28
2.3 Costs	28
2.4 Schedule	29
PD 3 BUILDING SUMMARY	29
PD 4 EXISTING DOCUMENTATION.....	29
4.1 Documentation - available on written request from the Contracting Authority	29
4.2 Documentation - available to the selected consultant	30
PD 5 PROGRAM.....	30
PD 6 PROJECT OBJECTIVES	30
6.1 Quality	30
6.1.1 Design Principles - General	30
6.1.2 Design Principles - Specific	31
6.2 Sustainable development.....	31
6.3 Waste management.....	31
6.4 Code Compliance	31
6.5 Risk Management	32
6.6 Health and safety	32
PD 7 ISSUES	32
7.1 Major Cost and Time Issues	32
7.1.1 Existing, Temporary and New Security Systems.....	32
7.1.2 Existing Services.....	32
7.1.3 Security Door Hardware.....	32
7.1.4 LEED Certification.....	33
7.1.5 Enhanced Commissioning	33
7.1.6 Vertical Transportation	33
7.1.7 Reviews.....	33

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

7.2 Facility Security	33
7.3 Existing building	33

PD 1 PROJECT INFORMATION

Public Works and Government Services Canada (PWGSC) intends to retain hire an architectural firm and its team of sub-consultants and specialists for the provision of the services required for two (2) projects. Construction work will be performed one project after another.

1.1 Government departments

Citizenship and Immigration Canada (CIC)
Canada Border Services Agency (CBSA)

1.2 PWGSC Project Titles

Major Renovations of CIC
Major Renovations CBSA

1.3 Location of the Project

Federal Building
715 Peel
Montreal (Québec) H3C 4L7

1.4 PWGSC Project Number

R.044489 (CIC)
R.002280 (CBSA)

1.5 Departmental Representatives

Serge Demers, Architect, Senior Project Manager
Nicholas Chan, Architect LEED AP, Project Manager
Linda Rheault, Architect, Project Manager

PD 2 PROJECT IDENTIFICATION

2.1 Description

Several government departments are housed in the federal building at 715 Peel, including Citizenship and Immigration Canada (CIC) and the Canada Border Services Agency (CBSA). Existing spaces have been deemed inadequate and present a significant risk to the safety of CIC employees, due to weapon-carrying CBSA agents. Space fit-up to one or both clients would eliminate this risk.

In addition, the existing premises no longer meet the operational needs of each client. Major Renovation projects will therefore also provide spaces that meet the updated requirements of each client, in accordance to PWGSC's Workplace 2.0 Fit-up Standards.

2.2 Project Features

2.2.1 Status of design documents

A previous architectural firm and its sub-consultants completed both RS2 (Concept) and RS3 (Design Development) deliverables. PWGSC has since further developed the latter to an advanced stage.

2.2.2 Execution of the works

A construction manager appointed by PWGSC will act as advisor and general contractor for the construction works to be carried out. He will be responsible for tendering out the multiple bid packages.

The implementation of these projects requires planning over several phases. Different branches within the same government department, representing considerable square footage, must be physically linked throughout the projects. Consequently, the majority of employees must remain in the building during the construction works. PWGSC is responsible for the base building component, and as such wishes to optimize the distribution of its occupied spaces. Because of insufficient swing spaces, both construction projects cannot be concurrent.

Current planning is for the CIC construction project to start first, followed by CBSA. The multiple construction phases must be analyzed and defined by the consultant, all the while coordinating with the construction manager. Temporary spaces while have to comply with all safety requirements and client and building operations must not be interrupted.

Construction must be planned in a manner to make clear to potential sub trades of the complexity of the projects, of the building safety requirements and of the constraints due to the building remaining in operation during construction.

The two projects include, but are not limited to, the following activities:

- Review the advanced Design Development drawings and the documents pertaining to the existing building
- Conduct the necessary surveys following the review of the provided documents
- Produce the construction documents and to provide the services required in this document
- Locate the necessary services in the building and identify the connection points
- Plan all required temporary spaces
- Plan new spaces over several levels, in compliance with the Workplace 2.0 Fit-up Standards
- Connect all furniture and equipment
- Coordinate with Shared Services Canada for all IT work
- Coordinate with the construction manager to plan all phases of required work
- Assess and analyze the existing security systems, and the connection of the new systems to the existing ones. All requirements for compatibility between existing and new systems will be fully implemented;
- Follow the heritage requirements of the projects
- Obtain a LEED-CI (Commercial Interiors) Silver certification

2.3 Costs

The construction cost for the fit-up projects (including temporary works) are:

- \$ 9.0M for CIC
- \$ 9.8M for CBSA

These estimates include the following elements:

- Design contingencies
- Overhead, administrative costs and profit
- Project constraints

The consultant must review the aforementioned budgets and incorporate all of the considerations for various specialties required. The estimates will be reviewed at each stage of advancement according to the requirements of each service required. The percentage allocated for the contingency fund must comply with the "Doing Business" document in Appendix G.

2.4 Schedule

It is anticipated that the contract award be expedited following the closing of the RFP. Work should begin shortly thereafter.

Schedules for both projects will have to be defined by the consultant in coordination with the construction manager. The schedule will identify all construction phases, including temporary work. The two renovations projects will have to be completed within a tight schedule. Compliance with the delivery dates of these renovations projects is essential.

The CIC renovation project must start first; the CBSA project will follow. Overlapping of both construction projects should be considered in order to meet the schedule.

Substantial completion of the CBSA Major Renovations project must be achieved by October 27th 2017. Employee move-in must be completed by November 5th 2017.

It is strongly recommended to complete the CIC Major Renovations project as soon as possible, to allow CBSA to meet its substantial completion target date.

PD 3 BUILDING SUMMARY

The federal building at 715 Peel was built 1935/1937 to serve as the General Post Office, a mail sorting center. The building was expanded in 1949/1953. It has seven (7) floors, of which two (2) are partially used as parking garages, and two basement levels. The total gross area of the building is approximately 59,000 m², over an 8,340 m² building footprint.

From 1983 to 1988, the industrial spaces were converted into high security offices spaces. The current tenants are:

- Citizenship and Immigration Canada (CIC);
- Agency Canada Border Services Agency (CBSA);
- Employment and Social Development Canada (ESDC);
- Public Safety Canada (PSC);
- Shared Services Canada (SSC).

The building is equipped with specialized security systems to meet the specific operational requirements of its occupants.

The activities of the occupants of 715 Peel are essential to the delivery program of the Government of Canada in Quebec. Its operations round the clock, 365 days a year, effectively meet operational requirements of the tenants. Many of the 1,500 employees of the building work according to shifts.

PD 4 EXISTING DOCUMENTATION

4.1 Documentation - available on written request to the Contracting Authority

- Building Master Plans

- Advanced Design Development drawings, PWGSC
- Electromechanical Technical Supplement, PWGSC
- Design Development Documents (RS3 100%)
 - Phases of work
 - CIC Movable partition Study
- Review Reports, PWGSC
- Workplace 2.0 Fit-up Standards
- Heritage Report, PWGSC

To be eligible to bid, the Proponent must have made a request to the contracting authority and obtained all the documentation available during the tender period.

4.2 Documentation - available to the selected consultant

- Design Development Documents (RS3 100%)
 - LEED Analysis
- LEED Report (Energy Efficiency, Prerequisite 2), PWGSC
- CBSA Construction Standards
- CIC Planning Guide
- IT Functional and Technical Program, Shared Services Canada

PD 5 PROGRAM

The program was finalized with each client. The needs are reflected in the advanced Design Development drawings.

PD 6 PROJECT OBJECTIVES

In every phase of the project, the following must be taken into consideration by the Prime Consultant and his/her sub-consultants and specialists:

- Quality
- Sustainable Development
- Code Compliance
- Risk Management
- Health and Safety
- Schedule Control
- Cost Control
- Scope Control

6.1 Quality

6.1.1 Design Principles - General

PWGSC expects the Consultant to maintain a high standard of architectural design, based upon recognized contemporary design principles. Design elements including but not limited to planning, architectural, engineering and landscaping, must be fully coordinated, and consistent in adherence to good design principles. The proponent is responsible to ensure such coordination throughout the project. The level of quality is to be consistent with other buildings of the Government of Canada.

The project is to be implemented in an environmentally responsible manner.

Quality of materials and construction methods shall be commensurate with the type of building and the budget. Avoid experimental materials. The total life-cycling of the building must be taken in to account.

Operating costs must be kept to a minimum and reflect the projected operating costs in the cost plan. This is to be achieved by compliance with the Energy Budget, selection of equipment, requiring the minimum of operating personnel, and building finishes for easy maintenance, etc.

The character, massing, scale, materials of this project will be compatible with its surrounding context.

Design for maximum flexibility in immediate and future use of space. Where possible, devise a building grid with column spacing, fenestration and service runs suited to flexible interior space arrangements.

6.1.2 Design Principles - Specific

The building at 715 Peel has a "secure" status, to meet the high security standards of its occupants, including CIC and CBSA. Each project has security requirements applicable to employees of the consultant, its sub-consultants and specialists, and to those of the contractor.

The building at 715 Peel was "Recognized" by the Federal Heritage Buildings Review Office (FHBRO) in 1984. Such a designation represents the intermediate level on a scale of three (3). This designation means that the FHBRO must be consulted prior to changes to exterior architectural elements that could affect the image or the character of this heritage building. Some interior architectural elements are to be kept and/or reclaimed.

6.2 Sustainable development

The Canadian Federal Government has begun a series of initiatives to ensure that sustainable development principles are built into the policy of all federal organizations. PWGSC, like all federal departments, is required to develop a Sustainable Development Strategy (SDS). The Real Property Branch (RPB) of PWGSC has developed a strategic plan that sets out the principles, goals and methods of integration of sustainable development principles into its policies and activities. Consequently, both projects must obtain a LEED-CI (Commercial Interiors) silver level certification.

6.3 Waste management

The Construction, Renovation, and Demolition (CRD) Non-hazardous Solid Waste Management Protocol to which PWGSC RPB is bound, provides directions on the undertaking of non-hazardous solid waste management actions for CRD projects. The protocol is designed to meet the requirements of federal and provincial policies and the objectives of the RPS Sustainable Development Strategy (SDS) as these relate to non-hazardous solid waste generated in CRD projects.

The implementation of a waste management program is mandatory. The Consultant must pay special attention to the management of materials resulting from site work, and make provision for the reuse of these materials.

6.4 Code Compliance

Codes, regulations, by laws and decisions of "authorities having jurisdiction" will be observed. In cases of overlap, the most stringent will apply. The Consultant shall identify other jurisdictions appropriate to the project.

6.5 Risk Management

A risk management strategy is crucial for PWGSC Project Management and integrates project planning into procurement planning. All the stakeholders of a project will be an integral part of the risk management strategy, culminating in an integrated product team. Specific services required for project delivery are outlined in Required Services.

6.6 Health and safety

PWGSC recognizes its responsibility to ensure the health and safety of all persons on Crown construction projects and the entitlement of both federal employees and private sector workers to the full protection afforded them by occupational health and safety regulations.

In keeping with its responsibility and in order to enhance health and safety protection for all individuals on federal construction sites, PWGSC will voluntarily comply with the applicable provincial/territorial construction health and safety acts and regulations, in addition to the related Canada Occupational Safety and Health Regulations.

At the very start of the process, the PWGSC will the consultant with Section 01 35 30 – Occupational Health and Safety, PWGSC, Quebec Region, and a general list of specific clauses. The list shall be adapted by the project team, and the relevant specific clauses shall be incorporated into the project specifications.

PD 7 ISSUES

7.1 Major Cost and Time Issues

Effective cost estimating and cost control is of prime importance and shall be provided by professional quantity surveyors. Estimates must be submitted in UNIFORMAT II format.

Draw up the schedule using the critical path method and the MS Project 2007 software program. Develop the Work Breakdown Structure (WBS) through at least five levels: project, stage, element, sub-element and work package. Components that have a direct impact on the schedule must be identified and mitigation measures must be planned and implemented.

7.1.1 Existing, Temporary and New Security Systems

Identify the building's existing security systems to which it will be necessary necessary to establish connections or that will have to be modified in line with the current projects. Determine whether the existing equipments have the capacity to handle the new requirements in addition to any temporary requirements. Recommend to the Departmental Representative that a contract for modifications to some security systems be awarded directly.

7.1.2 Existing Services

Compile a list of available existing utilities up to their respective sources. Coordinate with PWGSC and confirm the capacity of the existing services to meet the needs of each project, for the interim and final spaces.

7.1.3 Security Door Hardware

Become familiar with CIC's, CBSA's and the building's standards. Compile a list of equipment currently used in the building. Hire a security hardware specialist at no additional cost to PWGSC.

7.1.4 LEED Certification

Obtain a LEED-CI Silver level certification for each project.

7.1.5 Enhanced Commissioning

Perform the work required as per PWGSC's Commissioning Manual and as per the LEED-CI Rating System (EA Prerequisite 1 and Credit 2).

7.1.6 Vertical Transportation

Add and modify passenger elevators and freight elevators, while meeting the Building Management's requirements.

7.1.7 Reviews

Draw up a predetermined schedule for submitting progress documents in order to allow PWGSC and its clients to mobilize their employees for the reviews. Submit documents representative of the percentage of progress required. Clearly identify items that require additional information and/or are on the critical path. Plan for reasonable timeframes for the reviews.

Following receipt of the comments from PWGSC and its clients, reply in writing in regards to each item.

7.2 Facility Security

Anyone wishing to access the building at 715 Peel must first obtain authorization from the building's management. The following information must be provided with each visit request:

- Visitor name(s)
- Company name(s)
- Time of arrival
- Visit duration
- Spaces to be visited

Visitors will be accompanied at all times by a security guard of the Canadian Corps of Commissionaires.

Single visits to Public Safety Canada's garage on the ground floor will require a temporary security clearance. For repeat visits, a Level II security clearance is required. Security forms and an interview will be required; a 6 month wait period is to be expected. The information to be provided for each visit is as previously outlined.

The consultant must plan for the time and costs involved in the security screening process for its personnel and/or the company, as well as the time lost due to the building's security measures.

7.3 Existing building

The consultant is bidding on projects within an existing building, with constraints as mentioned in this RFP. It is up to the Proponent to assess the complexity of the projects, with full knowledge that they are not new constructions.

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

PROJECT ADMINISTRATION

PA 1 PROJECT ADMINISTRATION.....	35
1.1 PWGSC Project Management	35
1.2 General Project Deliverables	35
1.3 Communication Channels	35
1.4 Media	35
1.5 Meetings.....	35
1.6 Project Response Time.....	36
1.7 Submissions, Reviews and Approvals	36
1.8 Official Languages	36

PA 1 PROJECT ADMINISTRATION

The following administrative requirements apply during all phases of project delivery.

The use of the term "consultant" in this document refers to the consultant, sub-consultants and specialists.

The use of the word "day" should be construed as a "business day", unless otherwise stated.

1.1 PWGSC Project Management

The Project Manager assigned to the project is the Departmental Representative. He is directly concerned with the project and responsible for its progress. The Project Manager is the liaison between the consultant, PWGSC and its clients, the Government Departments.

PWGSC administers the project and exercises continuing control over the consultant's work during all phases of development. Unless directed otherwise by the Project Manager, the Consultant obtains all Federal requirements and approvals necessary for the work.

1.2 General Project Deliverables

Where deliverables and submissions include summaries, reports, drawings, plans or schedules, ten (10) hard copies and one (1) digital copy of each shall be provided unless otherwise specified.

At the request of the Departmental Representative and in compliance with the security requirements, documents must be made available on an FTP site provided and organized by the Consultant. PWGSC must have read and write rights for file sharing.

1.3 Lines of Communication

Unless otherwise arranged with project manager, the consultant shall communicate with the project manager only. There shall be no direct official contact between client departments and the consultant.

During construction tender call, PWGSC conducts all correspondence with bidders and makes the contract award. There shall be no direct communication between the consultant and the bidders.

1.4 Media

The consultant shall not respond to requests for project related information or questions from the media. Such inquires are to be directed to the project manager.

1.5 Meetings

Following the awarding of the contract, the Proponent must organize and convene a kick-off meeting. Separately, a meeting should be scheduled with PWGSC's Architectural and Engineering Services (AES) to review the advanced Design Development documents, and all other available documents.

Subsequently, the consultant must hold weekly meetings during the familiarisation period. During Construction Drawings, the consultant must plan for biweekly meetings to validate its progress with AES. On alternate weeks, AES will be available for a conference call. Close collaboration between the

consultant and PWGSC's professionals will be essential to work as fast as possible and to ensure that the plans and specifications comply with the requirements of government departments.

The consultant shall attend the meetings, record the issues and decisions and prepare and distribute minutes within two (2) business days of the meeting. The meetings will take place 715 Peel or at Place Bonaventure, in Montreal.

1.6 Project Response Time

It is a requirement that the key personnel of the consultant to be personally available to attend meeting or respond to inquiries within two (2) business days.

1.7 Submissions, Reviews and Approvals

Work in progress is to be reviewed by the Project Manager as well as the following:

- PWGSC in-house services
 - Submission Format: drawings and specifications (hard copy, pdf, dwg/doc/xls/mpp/etc.)
 - Submission Schedule: Submissions are reviewed at every milestone as identified in the Required Services
 - Expected turnaround time: 10 business days
- Design review committee – client (CIC, CBSA)
 - Submission Format: drawings and specifications (hard copy, pdf, dwg/doc/xls/mpp/etc.)
 - Submission Schedule: Submissions are reviewed at every milestone as identified in the Required Services
 - Expected turnaround time: 10 business days

The content of files in dwg format that are submitted at each design phase will be checked against the PWGSC, Quebec Region standard for the preparation of CAD drawings. Updated versions of the files will be sent to the Consultant. Meeting this requirement is a prerequisite for payment of the consultant's fees.

The consultant should respond in writing to each item within five (5) working days.

1.8 Official Languages

These projects require services in both official languages.

REQUIRED SERVICES

RS 4 CONSTRUCTION DOCUMENTS	39
4.1 Intent	39
4.2 General	39
4.3 Details	39
4.3.1 Technical and Production Meetings	40
4.3.2 Progress Review	40
4.4 Deliverables	42
4.4.1 50% Submission	42
4.4.2 99% Submission	43
4.4.3 Final Submission (100%)	43
RS 5 TENDER CALL, BID EVALUATION & CONSTRUCTION CONTRACT AWARD	44
5.1 Intent	44
5.2 General	44
5.3 Deliverables	45
RS 6 CONSTRUCTION AND CONTRACT ADMINISTRATION	45
6.1 Intent	45
6.2 General	45
6.3 Details	46
6.3.1 Construction Meetings	46
6.3.2 Project Schedule	47
6.3.3 Time Extensions	47
6.3.4 Cost Breakdown	47
6.3.5 Sub-contractor Changes	47
6.3.6 Labour Requirements	47
6.3.7 Bylaw Compliance	47
6.3.8 Construction Safety	47
6.3.9 Site Visits	48
6.3.10 Clarifications	48
6.3.11 Progress Reports	48
6.3.12 Work Measurement	48
6.3.13 Detail Drawings	48
6.3.14 Shop Drawings	48
6.3.15 Inspection and testing	48
6.3.16 Training	49
6.3.17 Construction Changes	49
6.3.18 Contractor's Progress Claims	49

6.3.19 Materials on Site	49
6.3.20 Acceptance Board.....	50
6.3.21 Interim Inspection.....	50
6.3.22 Interim Certificates, for each phase of work	50
6.3.23 Take-over	50
6.3.24 Building Occupation	50
6.3.25 Operation and Maintenance Data Manual	50
6.3.26 Instruction of Operating Personnel	51
6.3.27 Keys	51
6.3.28 Final Inspection	51
6.3.29 As-Built and Record Drawings and Specifications.....	51
6.3.30 Final Certificate	51
6.4 Deliverables	52
RS 7 FACILITY COMMISSIONING	52
7.1 Intent	52
7.2 General	53
7.3 Details	54
7.3.1 Analysis of Project Brief and Preliminary Design.....	54
7.3.2 Construction documents & Tender calls	54
7.3.3 Construction / Installation.....	55
7.3.4 Commissioning phase.....	56
7.3.5 Post-construction (operation).....	56
7.4 Standards.....	56
RS 8 RISK MANAGEMENT	57
RS 9 ENVIRONMENT.....	57
9.1 Intent	57
9.2 Details	57
9.2.1 Sustainable Development	58
9.2.3 Construction	58
9.2.4 Demolition	58
9.2.5 Hazardous Materials	58
9.2.6 Halocarbons	58
9.3 References.....	58

PWGSC produced advanced Design Development documents approved by its government department clients. An electromechanical technical supplement, prepared by PWGSC, identifies the majority of the scope of work to be done. The consultant must review the available information and produce complete drawings and specifications. Any and all information missing from the available documents must be completed by the consultant. A familiarisation period has been planned for in the Additional Services.

RS 4 CONSTRUCTION DOCUMENTS

4.1 Intent

To prepare drawings and specifications setting forth in detail the requirements for the construction and final cost estimate of the project.

- 50% indicates substantial technical development of the project - well advanced architectural and engineering plans, details, schedules and specifications
- 99% is the submission of complete Construction Documents ready for tender call and submission to local authorities for pre-permit purposes
- Develop project specific Systems Operations Manual (SOM)
- Final Submission at 100% incorporates all revisions required in the 99% version and is intended to provide PWGSC with complete construction documents for tender call in both official languages.

4.2 General

The activities are similar for each step; the progress of project development should correspond to the stage of the intended presentation.

Scope of Work:

- Obtain Project Manager's approval for Construction Drawings submissions (50%, 99% and final)
- Confirm format of drawings and specifications
- Clarify special procedures (i.e. phased construction, tender of trade contracts)
- Submit drawings and specifications at the required stages. (50%, 99% and final)
- Provide written response to all review comments and incorporate them into the next submission where required.
- Advise as to the progress of cost estimates and submit updated cost estimates as the project develops
- Update the project schedule
- Prepare a Class 'A' estimate using Unifomat II
- Review and approve materials and construction processes and ensure that they will support a LEED-CI Silver certification.
- Prepare the administrative and technical files (simulations, data sheets, interpretation requests, reports, etc.) required for each project's LEED-CI certification.
- Final Code Compliance Report

Surveys are not included in either RS4 or AS2 of this RFP. Please see allowance in Appendix B.

4.3 Details

The following non-exhaustive list identifies services expected from each discipline. Some activities may require input from other consultants on the team. The architect must coordinate his/her sub-consultants and specialists, and is responsible for ensuring that all the works in the consultant mandate is carried out. This includes, but is not limited to the following:

- Supervise the team and determine the project objectives, budgets, schedules and design criteria to be met;
- Oversee work progress of own sub-consultants and experts and ensure that all parties concerned have made progress to the appropriate level;
- Summarize and incorporate services provided by various specialists;
- Act as the main contact person for the Departmental Representative throughout the project;
- Distribute information received from the Departmental Representative to the sub-consultants and experts, and vice versa;
- Check and validate to ensure that various disciplines have coordinated their designs among one another;
- Eliminate incompatibilities between various design components and fully coordinate the construction to eliminate worksite disputes;
- When shortcomings are identified, follow-up until they are corrected;
- Produce a consolidated document to be submitted to the Departmental Representative as part of the required submitted documents;
- Coordinate work progress with the construction manager and participate in work sessions, along with all key personnel, when required by the departmental representative;
- Coordinate the activities of testing laboratories.

4.3.1 Technical and Production Meetings

During the development of Construction Drawings, Architectural and Engineering Services (AES) will be available to monitor the progress of the consultant.

- Production of construction documents will be reviewed during the meetings arranged by Project Manager and Consultant.
- Consultant shall ensure that his staff and the sub-consultant representatives attend the technical and production meetings as required.
- Consultant shall arrange for all necessary data, progress prints, etc.
- Consultant shall prepare minutes of the meetings and distribute copies to all participants.

4.3.2 Progress Review

- As work progresses on construction drawings, submit drawings, schedules, details, pertinent design data and updated Cost Plan and Project Schedule as required. Among other things:
 - Drawings for each phase, including temporary work
 - Floor Plans of each floor showing all accommodation required, including all necessary circulation areas, stairs, elevators, etc. Identify ancillary spaces provided for maintenance or refuge areas.
 - Cross Sections through the building(s) to show floor levels, room heights, inner corridor, junction with the existing building, etc;
 - Blow-ups, sections and details
 - Identify the building's structural grid, modules, etc. Indicate the dimensions and annotations of the main elements.
 - Identifying work to be performed on a unit cost basis.
 - Identify not in contract work, if any.
 - Identify the required quality control tests and determine the necessary budget allowance.
- Architecture
 - Site Plan showing the building and existing or proposed environmental items including the following:
 - Traffic routes:
 - Pedestrians (employees, public);
 - Vehicles (employees, government departments);

- Public transport;
 - Service access;
 - etc.
 - Construction site:
 - Deliveries;
 - Authorized parking;
 - Mobilization zone.
 - Furniture and equipment layout.
 - Detailed views of wall sections or any other special design features which at this stage requires an illustration or an explanation, including fire protection methods.
 - Colour and finish schedules
 - Door, Frames and Hardware schedules. Identify the required approvals, the fire resistance rating to achieve and confirm that the products' level of security meets the requirements of each government department.
 - Calculate usable and rentable areas for each client, as per PWGSC's standards.
- Mechanical
 - Meet the requirements of PWGSC'S Electromechanical Technical Supplement.
 - Flow diagrams, system layouts, equipment selections and sizes, floor plan layouts showing major equipment.
 - All major ductwork sized and shown on drawings including layout of all major mechanical and transformer rooms.
 - EMCS network architecture, mechanical control schematics, sequence of operation for each mechanical system, electrical control schematics, DDC input/output point schedules.
 - Commissioning Plan in accordance with CP (Commissioning Policy)
 - Update the building load calculation, energy analysis and energy budget.
 - Submit at the stipulated progress submission all calculations for mechanical design and equipment selection. These calculations shall be bound (3-ring binder) and indexed.
 - Calculations submitted shall not necessarily be reviewed. They are required for record purposes and in certain instances to assist in the understanding and interpretation of designs. Calculations shall be submitted in a format that is legible, neat and easily understandable.
- Electricity
 - Meet the requirements of PWGSC'S Electromechanical Technical Supplement.
 - Single line diagram of the power circuits with their metering and protection, including:
 - Complete rating of equipment.
 - Ratios and connections of current transformers (CT) and potential transformers (PT).
 - Description of relays when used.
 - Maximum short circuit levels on which design is based.
 - Identification and size of services.
 - Connected load and estimated maximum demand on each load centre.
 - Electrical plans with:
 - Floor elevations and room identification.
 - Legend of all symbols used.
 - Circuit numbers at outlets and control switching identified.
 - All conduit and wire sizes except for minimum sizes which should be given in the specification.
 - A panel schedule with loadings for each panel.
 - Telephone conduits system layout for ceiling/floor distribution.
 - Riser diagrams for lighting, power, telephone and telecommunication cable systems, fire alarm and other systems.

- Control diagrams for each system.
- Schedule for motor and controls.
- Complete lighting layout and fixture schedule clearly indicating methods of circuiting, switching and fixture mounting.
- Electric heating layout and schedule.
- Provide the following data:
 - Total connected load.
 - Maximum demand and diversity factors.
 - Sizing of standby load.
 - Short-circuit requirements and calculations showing the ratings of equipment used.
- Structure
 - Drawings showing the proposed structural framing system, type of foundation, structural materials, cladding details and other significant or unusual details proposed. Include a copy of the site survey and investigation report on which the design is based;
- Vertical transportation
 - The new elevators and any changes to existing vertical transportation equipments must comply with the safety Standard for the design and construction of equipment to be used in conformity with the rules of the applicable elevator and electrical codes, or ASME A17.1 / CSA B44 (use current version).
 - Observe all regulations, codes, standards and laws. The design for the new elevators must also be based on the CAN / CSA-B651-12 Accessible design for the built environment, and on the CAN / CSA-C22.10 Quebec Electrical Code.
 - Propose different vertical transport systems and coordinate with Building Management to identify the one best suited to Operations and Maintenance.
 - Plan to connect to the building's emergency electrical generator, to each government department's access control system, and to the building's control center.
 - Specify generic parts and software, and ensure that the vendor or its approved distributors do not have exclusive ownership of, and rights to use, the intellectual property for the goods and/or services in question.
 - Lay out the commissioning requirements and plan for the necessary maintenance work during the warranty period.
- Specifications and an index of specifications.
 - The specifications shall consist of typed and edited PWGSC amended NMS sections, PWGSC in-house Master Specifications sections and NMS sections, latest edition.

4.4 Deliverables

Deliverables are similar at all stages; completeness of the project development should reflect the stage of a submission. If the level of progress is less than what is required, the consultant will have to resubmit his work.

4.4.1 50% Submission

- Plans must comply with the PWGSC, Quebec Region standard for the drafting of CAD drawings;
- Specifications must be in the most recent National Master Specification (NMS) format.
- Drawings and Specifications must reflect the expected progress of the submission.
- Specific clauses in PWGSC health and safety must be integrated.
- Class 'A' Construction Cost Estimate, using the Uniformat II standard, including a summary table clearly identifying separate costs for each of the following items:
 - Base building
 - Lessee improvements, PWGSC

- Lessee improvements, government departments
- Exclusive costs, government departments
- Temporary works related to interim phases
- Updated Project Schedule, following the Critical Path Method (MS Project)
- Scheduling of the various phases of construction work
- Code compliance report
- Commissioning Plan.
- LEED-CI implementation report and project checklist.
- Provide written response to all review comments

4.4.2 99% Submission

- Complete construction drawings and specifications.
- Class 'A' Construction Cost Estimate, using the Uniformat II standard, including a summary table clearly identifying separate costs for each of the following items:
 - Base building
 - Lessee improvements, PWGSC
 - Lessee improvements, government departments
 - Exclusive costs, government departments
 - Temporary works related to interim phases
- Updated Project Schedule, following the Critical Path Method (MS Project)
- Scheduling of the various phases of construction work
- Code compliance report
- Commissioning Plan and Systems Operations manual.
- Complete colour schedules, including textures, sheens, super-graphics, colour chips and material samples.
- LEED-CI implementation report and project checklist.
- Provide written response to all review comments

4.4.3 Final Submission (100%)

This submission incorporates all revisions required by the review of the 99% submission. PWGSC will perform a final review before the tender documents are sent to the press to ensure that all comments have been taken into consideration and integrated.

- Checklist and strategy implementation report LEED-CI.
- List of tests that should be performed, including tests to be performed at the site and in the factory.
- List of training that should be followed.

Provide the following, among others:

- Complete set of originals of the working drawings;
- Complete sets of original specifications;
- Completed checklist as found in the Doing Business document
- Class 'A' Construction Cost Estimate, using the Uniformat II standard, including a summary table clearly identifying separate costs for each of the following items:
 - Base building
 - Lessee improvements, PWGSC
 - Lessee improvements, government departments
 - Exclusive costs, government departments
 - Temporary works related to interim phases
- Updated Project Schedule, following the Critical Path Method (MS Project)

- Scheduling of the various phases of construction work
- Provide written response to all review comments;
- Complete Commissioning Plan;
- Complete Systems Operations manual;
- Complete colour schedule;
- As a safeguard against loss or damage to the originals, retain a complete set of drawings in duplicable form and one copy of the specifications;
- Submit, present and obtain approval on plans and specifications required by Inspection Authorities before tender call;
- LEED-CI final checklist.
- List of tests that should be carried out, including tests to be carried out on the worksite and in the plant;
- List of trainings that should be offered.

For the bid solicitation, provide the plans and specifications in PDF format in accordance with the file presentation standards for PWGSC bid solicitations. Check that the documents print correctly and that it contains all the information found on the CAD drawings.

RS 5 TENDER CALL, BID EVALUATION & CONSTRUCTION CONTRACT AWARD

5.1 Intent

Obtain and evaluate bids from qualified contractors to construct the project as per the Tender Documents. Award the construction contract according to government regulations. Projects will follow the Construction Management Delivery Method. Plan to award multiple trade packages.

5.2 General

Scope and activities, for each bid package:

- Prepare the Bid Form with the cost planning and estimate specialist, in preparation for the tender analysis;
- Identify work to be performed on a unit cost basis and determine quantities;
- Attend bidders' briefing meeting(s) and site visit(s) along with sub-consultants and specialists;
- Prepare a presentation for bidders, identifying critical items for each project;
- Help the Departmental Representative answer bidders' questions and all evaluation of equivalent products;
- Prepare addenda based on questions arising in such meetings, to be issued by the Project Manager;
- Provide the Project Manager with all information required by bidders to fully interpret the Construction Documents. The Project Manager, through the Contract Agent, will issue the addenda to all participants;
- Keep full notes of all inquiries during the bidding period and submit same to Project Manager at the end, for PWGSC records;
- Assist in tender evaluation by providing advice on the following:
 - The completeness of tender documents in all respects;
 - The technical aspects of the tenders;
 - The effect of alternatives and qualifications which may have been included in the tender;
 - The tenderers capability to undertake the full scope of work;
 - The availability of adequate equipment to carry out the work;
- If PWGSC decides to re-tender the project, provide advice and assistance to the Project Manager;

- Revise and amend, at the expense of the consultant, the construction documents to bring the cost of the work within the limits stipulated;
- Examine and report any cost and schedule impact created by the issue of tender / contract addenda; draft addenda distributed by the Departmental Representative;
- Following the bid package contract award, issue the construction documents.

5.3 Deliverables

- Originals and electronic copies of drawings and specifications for each bid package, For Tender;
- Addenda where needed;
- Changes to the documents, if re-tendering is necessary;
- Updated cost estimate or schedule;
- Original construction drawings and Specifications documents;
- Electronic copies of construction drawings and Specifications.

RS 6 CONSTRUCTION AND CONTRACT ADMINISTRATION

6.1 Intent

Implement the project in compliance with the Contract Documents and direct and monitor all necessary or requested changes to the scope of work during construction.

6.2 General

Scope of Work:

- During the implementation of the project, act on PWGSC's behalf to the extent stipulated in this document;
- Review the work at appropriate intervals to determine whether or not the work complies with the Contract Documents;
- Keep PWGSC 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;
- Ensure compliance with Commissioning Plan, update plan as necessary;
- Determine the amounts owing to the Contractor based on the progress of the work and certify payments to the contractor;
- Act as interpreter of the requirements of the Contract Documents;
- Provide cost advice during construction;
- Advise the Project Manager of all potential changes to scope for the duration of the implementation;
- Review the Contractor's submittals;
- Draft Contemplated Change Notices (CCN) to be distributed by the Departmental Representative and include rationales for them based on the instructions of the consultant(s) concerned;
- Submit a cost estimate for each CCN to the Departmental Representative;
- Analyse the Contractor's quote and negotiate with the Contractor, when required, within two (2) working days following receipt of the quote;
- Provide the PWGSC Representative with a recommendation for the purposes of issuing a Change Order (CO);
- Keep a record of CCNs, including detailed background information for each CCN, until issuance of the CO;
- Indicate any changes or material/equipment substitutions in record documents;

- Submit to the Departmental Representative a table of all warranties, along with the commencement and expiry dates and references to the Section applicable to each item in the Specifications;
- During the twelve (12) month warranty period, investigate all defects and alleged defects and issue instructions to the Contractor;
- Prepare and post Systems Operating Instructions;
- Ensure that all end-of-project documents and manuals are complete and in compliance with contractual requirements before submitting them to the Departmental Representative;
- Draft the final version of the Systems Operations Manual;
- Carry out a final warranty review.

6.3 Details

The following list is incomplete and in no way limits the professional obligations of the Consultant and his/her sub-consultants:

- Ensure that the work is carried out in accordance with the Plans and Specifications;
- Provide assistance for and chair site meetings (1 meeting every 2 weeks), write up meeting minutes, and distribute them within two working (2) days following the meetings;
- Provide written clarifications and interpretations of the construction documents with the help of supplementary drawings and in accordance with project requirements;
- Review shop drawings and technical data sheets submitted by the Contractor in order to ensure that they comply with the design, inform the Contractor of their compliance. Repeat this activity until the documents are deemed in compliance;
- Coordinate sub-consultants', specialists' and testing laboratories' activities;
- Recommend that tests on materials and work carried out and analyse the test results;
- Study requests for changes and submit to the Departmental Representative recommendations relative to amounts and appropriateness. The Consultant does not have the authority to approve changes;
- Indicate all changes to or substitutions of materials or equipment on the documents kept in the project records;
- Review Progress Payment Requests and make appropriate recommendations;
- Inspect the work and draw up lists of deficiencies;
- Provide assistance for and recommend temporary acceptance and final acceptance of work carried out;
- Ensure that occupational health and safety measures stipulated in the Contractor's occupational health and safety plan are implemented and complied with;
- Draft as-built drawings in .dwg and .pdf formats (according to PWGSC, Quebec Region standards) and submit them to PWGSC
- The Consultant must include all significant deviations in construction from the Contractor's annotated drawings, as well as all work resulting from change authorizations during the construction work.

6.3.1 Construction Meetings

Immediately after contract award arrange a briefing meeting with the Contractor and the Departmental Representatives.

Call job meetings as frequently as required, commencing with the construction briefing meeting. The meetings should include the job superintendent, Inspector of Construction main sub-subcontractors, affected sub-consultants and Government Services representatives as necessary. Prepare minutes of the meeting and distribute copies to all participants within two (2) business days. The Project Manager may invite client Departments to attend any of these meetings.

6.3.2 Project Schedule

- Obtain Project Schedule with detailed commissioning component shown separately, as soon as possible after contract award and ensure proper distribution.
- Monitor the approved construction schedule, take necessary steps to ensure that the schedule is maintained and submit a detailed report to the Department concerning any delays.
- Keep accurate records of causes of delays.
- Make every effort to assist the Contractor to avoid delays.

6.3.3 Time Extensions

Only the Department may approve any request for Time Extensions. Approval will be issued in writing by the Project Manager.

6.3.4 Cost Breakdown

Obtain from the Contractor detail cost breakdown on standard PWGSC form and submit to the Department with the Progress Claims.

6.3.5 Sub-contractor Changes

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

When sub-contractors have not been listed on the Tender Form, obtain the list from Contractors not later than ten (10) working days after date of award.

6.3.6 Labour Requirements

The Contractor is bound by the Contract to maintain competent and suitable workmen on the project and to comply with the Canada Department of Labour - Labour Conditions. Inform the Department of any labour situations that appear to require corrective action by the Department. The Consultant shall ensure that a copy of the Labour Conditions for the Contract is posted in a conspicuous place on site.

6.3.7 Bylaw Compliance

- Ensure that construction complies with applicable bylaws and regulations.
- Matters pertaining to the Department of Labour shall be referred to the Ministry.

6.3.8 Construction Safety

- All construction projects that are occupied by federal employees during construction are subject to the Canada Labour Code Part II, as administered by Labour Canada.
- Fire safety provisions during construction must comply with the National Fire Code of Canada, Section 5.6
- In addition to the above, the Contractor must comply with the provincial and municipal safety laws and regulations, and with any instructions issued by the officers of these authorities having jurisdiction relating to construction safety.
- Ensure the Contractor is mandated to provide all required coordination, isolation, protection and reinstatement of the fire protection and suppression systems throughout construction. Notify the Institution each time the fire protection and suppression systems are bypassed and advise of estimated reinstatement time.

6.3.9 Site Visits

- Provide non-resident construction inspection services. Ensure compliance with contract documents.
- Provide services of qualified personnel who are fully knowledgeable with technical and administrative requirements of project.
- Establish a written understanding with contractors as to what stages or aspect of the work are to be inspected prior to being covered up.
- Assess quality of work and identify in writing to the Contractor and to the Department all defects and deficiencies observed at time of such inspections.
- Inspect materials and prefabricated assemblies and components at their source or assembly plant, as necessary for the progress of the project.
- Submit a Field Review Report after each site visit.
- Any directions, clarifications or deficiency list shall be issued in writing to PWGSC.

6.3.10 Clarifications

Provide clarifications on Plans and Specifications or site conditions, as required in order that project not be delayed.

6.3.11 Progress Reports

Submit work progress reports to the Department on a regular basis. Submit weekly reports that summarize planned activities, list activities that were or were not carried out, and assess the Contractor's employees working on the worksite.

6.3.12 Work Measurement

If work is based on unit prices, measure and record the quantities for verification of monthly progress claims and the Final Certificate of Measurement.

When Contemplated Change Notice is to be issued based on Unit Prices, keep accurate account of the work. Record dimensions and quantities.

6.3.13 Detail Drawings

Provide for the Department's information any additional detail drawings as and when required to properly clarify or interpret the contract documents.

6.3.14 Shop Drawings

- Verify the number of copies of shop drawings required. Consider additional copies for Client's departmental review.
- Shop drawings shall be stamped: "Checked and Certified Correct for Construction" by the Contractor and stamped: "reviewed" by the Consultant before return to the Contractor.
- Expedite the processing of Shop Drawings.
- On completion of project forward three copies of reviewed shop drawings to the Department. Ensure that shop drawings include the project number and are recorded in sequence.

6.3.15 Inspection and testing

-
- Prior to tender, provide Department with recommended list of tests to be undertaken, including on site and factory testing
 - Ensure all testing is detailed within commissioning plan
 - When contract is awarded, assist Departmental Representative in briefing testing firm on required services, distribution of reports, communication lines, etc.
 - Review all test reports and take necessary action with Contractor when work fails to comply with contract.
 - Immediately notify Project Manager when tests fail to meet project requirements and when corrective work will affect schedule.
 - Assist Departmental Representative in evaluating testing firm's invoices for services performed.

6.3.16 Training

- Prior to tender, provide Department with recommended list of training to be undertaken
- Ensure all training is detailed within the commissioning plan

6.3.17 Construction Changes

- The Consultant does not have authority to change the work or the price of the Contract;
- Changes which affect cost or design concept must be approved by the Departmental Representative;
- Upon Departmental approval, obtain detailed quotes from the Contractor. Review prices and promptly submit recommendations to the Departmental Representative;
- The Departmental Representative will issue Consultant-prepared Change Orders to the Contractor, with copy to Consultant;
- All changes, including those not affecting the cost of the project, will be covered by Change Orders;
- The practice of "trade offs" is not allowed.

6.3.18 Contractor's Progress Claims

- Each month the Contractor submits a progress claim for work and materials as required in the Construction Contract.
- The claims are made by completing the following forms where applicable:
 - Request for Construction Payment
 - Cost Breakdown for Unit and/or combined Price Contract
 - Cost Breakdown for Fixed Price Contract
 - Statutory Declaration Progress Claim
- Review and sign designated forms within five (5) business days and promptly forward claims to the Department for processing. Co-ordinate the sub-consultants' participation and consolidate information forwarded to the Departmental Representative.
- Submit with each progress claim:
 - Updated schedule of the progress of the work.
 - List of project risks.
 - Photographs of the progress of the work.

6.3.19 Materials on Site

- The Contractor may claim for payment of material on site but not incorporated in work.
- Material must be stored in a secure place designated by the Department.
- Detailed list of materials with supplier's invoice showing price of each item must accompany claim; Consultant shall check and verify the list.
- Items shall be listed separately on the Detail Sheet after the break-down list and total.

- As material is incorporated in the work the cost must be added to the appropriate Detail item and removed from the material list.

6.3.20 Acceptance Board

Inform the Department when satisfied that the project is substantially completed. The Consultant shall ensure that his representative, his sub-consultant representative, Resident On-Site Reviewer, Contractor and major sub-trades representatives shall form part of the Project Acceptance Board and attend all meetings as organized by the Department.

6.3.21 Interim Inspection

The Acceptance Board shall inspect the work and list all unacceptable and incomplete work on a designated form. The Board shall accept the project from the Contractor subject to the deficiencies and uncompleted work listed and priced.

6.3.22 Interim Certificates, for each phase of work

Payment requires completion and signing, by the parties concerned, of the following documents:

- Interim Certificate of Completion
- Cost Breakdown for Fixed Price Contract
- Cost Breakdown for Unit or Combined Price Contract
- Inspection and Acceptance
- Statutory Declaration Interim Certificate of Completion
- Workmen's Compensation Board Certificate.

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

6.3.23 Take-over

The official take-over of the project, or parts of the project, from the Contractor is established by the PWGSC Project Team which includes the Consultant and the Client Department. The date of Interim Certificate of Completion and the Final Certificate of Completion signifies commencement of the twelve (12) month warranty period for work completed on the date of each certificate in accordance with the General Conditions of the Contract.

- Provide Department with original copy of Contractor'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.

6.3.24 Building Occupation

The Department or Client Department may occupy the building after the date of acceptance of the building by the Acceptance Board. The acceptance date is normally that of the Interim Certificate issued to the Contractor. As of the acceptance date, the Contractor may cancel the Contract Insurance, and the Department or Client Department (as the case may be) assumes responsibility for:

- Security of the work(s).
- Fuel and utility charges.
- Proper operation and use of equipment installed in the project.
- General maintenance and cleaning of the work(s).
- Maintenance of the site. (Except any landscaping maintenance covered by the contract.)

6.3.25 Operation and Maintenance Data Manual

Operation and Maintenance Data Manual: four (4) sets of each volume and one (1) electronic copy (pdf) produced by Contractor in accordance with Section 01 91 13 and 01 91 51 of project specification and verified for completeness, relevance and format by the Architectural, Mechanical and Electrical Consultants and submitted to PWGSC Project Manager prior to interim acceptance or actual start of operation and instruction period, whichever occurs sooner. The Contractor shall retain one copy of each volume for his record and use during the instruction period.

6.3.26 Instruction of Operating Personnel

- Make arrangements and ensure that Department's operating personnel is properly instructed on the operation of all services and systems using the final manuals as reference.
- Consultant to provide training sessions, as required, on the subject of design intent and systems operations. Utilize Systems operations manual for training sessions.

6.3.27 Keys

Ensure that all keys and safe combinations are delivered to the Department and/or the Client Department as applicable.

6.3.28 Final Inspection

Inform the Department when satisfied that all work under the contract has been completed, including the deficiency items identified on the inspection and acceptance forms from the Interim Inspection. The Department 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 Contractor.

6.3.29 As-Built and Record Drawings and Specifications

- Following the take-over, obtain as-built marked-up hard copy from the Contractor:
 - Show significant deviations in construction from the original Contract drawings, including changes shown on Post-Contract Drawings.
 - Show changes resulting from Change Orders or from On Site Instructions.

This activity must be performed in a timely manner. When work is completed for a particular trade, the consultant must then obtain the as-built drawings. For example, Record Drawings can be completed well before the project take-over. Similarly, as-built drawings and any other end of project documents must be completed at the take-over of each construction phase.
- Check and verify all as-built records for completeness and accuracy and submit to PWGSC.
- Produce Record Drawings by incorporating As-Built information into project drawings.
- Submit Record Drawings and Specifications in number and format required by the Consultant Agreement within four (4) weeks of final acceptance.
- Provide a complete set of final shop drawings.

6.3.30 Final Certificate

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 furnished to the Department for processing.

6.4 Deliverables

- Written reports from site visits including persons involved
- Written reports on the progress of the work and the cost of the project at the end of each month
- Additional detail drawings when required to clarify, interpret or supplement the Construction Documents
- Post contract drawings
- Interim or Final certificates
- Debrief of Commissioning Activities
- As built records
- Warranty deficiency list
- Report on Final Warranty Review

RS 7 FACILITY COMMISSIONING

Commissioning as described in this section shall be provided by the same commissioning specialist in charge of enhanced commissioning. The requirements of the LEED-CI rating system must be met.

As a member of the PWGSC team, the Commissioning Manager represents the Owner's and User's interests, and is responsible for overseeing all commissioning activities during the development, implementation and post construction stages of the project.

Throughout this stage, the Consultant and Consultant's representatives on site will work closely with the Commissioning manager, PWGSC and the Contractor to implement commissioning activities and create useful, well integrated drawings, reports and manuals, in compliance with Contract Documents.

The responsibilities of each stakeholder are listed in the PWGSC Commissioning Manual at Appendix I.

7.1 Intent

- Draw up a Commissioning Plan;
- Define Owner and user operational and performance requirements;
- Ensure that responsibility for meeting these requirements and demonstrating compliance is defined in the design and contract documents;
- Ensure that appropriate start-up procedures and procedures for the monitoring of components and sub-systems are implemented and, in particular, ensure the drafting of useful documents, such as quality control reports and descriptions of quality control methods that are part of regular or improved basic services and descriptions of certification procedures and contract procedures;
- Help conduct tests to ensure that components, sub-systems and systems are tested in accordance with the provisions of the contract documents;
- Review and approve commissioning documentation as well as operating and maintenance manuals provided by the Contractor;
- Provide complete documents describing operations, maintenance and management requirements and assign completed installations to competent building operators;
- Keep operating and maintenance costs to a minimum during the life cycle;
- Check that the functional requirements of the Department and the government department are correctly interpreted throughout the design phase and that the building systems operate

continuously at optimum performance during normal load conditions and without exceeding the specified energy budget;

- Ensure that appropriate start-up procedures and procedures for the monitoring of components and sub-systems are implemented and, in particular, ensure the drafting of useful documents, such as quality control reports and descriptions of quality control methods that are part of regular or improved basic services and descriptions of certification procedures and contract procedures;
- Draft manuals containing operating procedures for facilities and documentation on the preventive maintenance support system;
- Identify the responsibilities of the Contractor and subcontractors with respect to commissioning, performance inspections and tests;
- Plan performance inspection activities, draw up installation control lists and draft performance inspection report forms, and draw up a detailed schedule of inspections to be carried out by the Contractor. Keep detailed reports during the development period;
- Carry out various tests and inspections to determine whether or not the new facilities operate in compliance with the stated requirements in the contract documents;
- Co-ordinate a training plan for operations and maintenance (O&E) employees that covers operation of the new facilities;
- Provide technical data sheets for proposed materials, equipment, components and other specific items;
- Provide a complete operations and facilities manual;
- Update manuals as progress is made in the project.
- In the O&E Manual, provide the following:
 - All design objectives, all sequences of operations, etc, to be included in the user manual;
 - Procedures for start-up, operation and emergency shut-down;
 - Unilingual diagrams of all systems;
 - Inventory of equipment for the client's preventive maintenance system;
 - List of shop drawings.
- Provide commissioning manuals that include the following:
 - Equipment performance inspection;
 - Test reports; and
 - Warranty expiry dates.

7.2 General

Scope and activities:

- Provide complete documentation on the operations and maintenance requirements
- Prepare Systems Operations Manual (SOM) Manuals and Preventative Maintenance Support System (PMSS)/MMS documentation.
- Contents of O & M Manual shall be in accordance with CP.4 operating and maintenance (O & M) Manuals.
- Carry out various checks and tests to determine if the new facilities function in accordance with the contract documents
- Identify contractor and subcontractor commissioning, PV and testing responsibilities.
- Plan the performance verification (PV) activities, develop the installation checklists and PV report forms, and prepare a detailed verification schedule. PV tests will be performed by the contractor. Maintain detailed development reports and review with the contractor for special systems such as EMCS.
- PV inspection forms will be completed for all components, sub-systems and systems, and a final performance verification report will be submitted to the Commissioning Manager.

- Prepare a training plan for the O&M staff to be trained on the operations of the new facilities. The training plan will recognize both short-term and long term requirements and shall employ both hard copy and audio visual techniques.

7.3 Details

Scope and activities:

7.3.1 Analysis of Project Brief and Preliminary Design

O&M (General)

- Submit an O&M report showing how the design will meet O&M requirements including the following subjects:
 - Spatial requirements for O&M staff (office, lockers, kitchen, showers, washrooms, flow of people and supplies, storage for special tools, spare parts, and maintenance materials).
 - Cleaning (janitor closets, receptacle for vacuum, equipment supply and storage).
 - Capacity of the facility to change in response to program changes over its life expectancy.
 - Spare equipment, extra material and redundancies needed to operate and maintain this facility over its life expectancy.
 - System selection based on life cycle cost analysis considering energy, maintenance and operational cost.
 - Occupancy during construction.
 - "Phased" construction program.

O&M Manuals and Systems Operations Manual (SOM)

- Complete design intent prepare SOM.
- Submit at the end of the design development stage.
- Provide review comments and conditions for accepting preliminary O& M Manuals.

Design Submissions

- Ensure all the review comments are addressed to the satisfaction of the Commissioning Manager.

7.3.2 Construction documents & Tender calls

O&M (General)

- In consultation with the Commissioning Manager, continue the assessment which started during the design stage with respect to O&M concerns including staffing, redundancies, spare equipment and extra material, service contracts, preventative maintenance and equipment identification, O&M facilities, the O&M budget.
- Ensure all review comments provided by the Commissioning Manager are addressed.
- Incorporate design and performance intent in the construction documents and identify anticipated performance outputs in PV forms
- Identify contractor and subcontractor commissioning, PV and testing responsibilities.

Systems Operations Manual (SOM)

- Provide all design intent, sequence of operation, etc., for the SOM.
- Provide emergency start -up/operations/shut-down procedures.
- Provide Single Line Diagrams of all systems.
- Provide PMSS/MMS inventory lists and Valve Schedules
- Provide Service Contract lists

- Provide Shop Drawing lists.

Commissioning Specification

- Use PWGSC disciplinary master specification for commissioning as the basis for the project specifications for commissioning. Complete design information required in the performance verification report forms.
- Specify detailed performance verification procedures and output, documents, scheduling and reporting requirements.
- Identify and include in specification all tests to be conducted at manufacturer's plants, on site during construction, installation, commissioning on site and during the operation phase.
- Develop training package for O&M personnel and include in specification as required.

Maintenance Management System (MMS) Specification

- Use the client's standard for the identification of equipment and inventory in conjunction with the MMS. Provide the client's coding and system nomenclature on tender documents.
- Coordinate with existing building equipment inventories.

Submission Requirements

- The commissioning plan is submitted at the end of the design phase and is updated and resubmitted at the end of each stage of the working documents. The Prime Consultant and the commissioning manager work together to update the commissioning plan.
- The commissioning specification are submitted at the end of the 50% working drawings stage and are updated and resubmitted at each subsequent stage of the working documents.
- The SOM is submitted at the end of the 50% working drawings stage, and is updated and resubmitted during subsequent stages of the working documents.
- Respond to all PWGSC comments in writing at each stage.

7.3.3 Construction / Installation

- Three (3) months before substantial completion, assemble, review and approve all commissioning documentation, including check lists, PV report forms, PV procedures, instruments to be used, and instrument calibration, and incorporate relevant data from reviewed shop drawings and installed component data.
- Assemble all certified tests results and incorporate into the O&M manuals.
- Review the selected test instruments which are to be calibrated less than 3 months prior to substantial completion.
- In consultation with the contractor, select the commissioning test instruments.
- The Prime Consultant shall
 - review contractors compliance with the contract documents;
 - witness and certify tests conducted before concealment and start-up;
 - verify that each system is completed, safe to operate and ready for start-up;
 - ensure that all deficiencies are rectified and acknowledge that the installation of components and systems is ready for the commissioning phase.
- Manuals
 - Revise the SOM as construction progresses, ensuring that it reflects the installed systems.
 - Review for acceptance the contractor's O&M Manuals.
 - Submit all manuals to the Commissioning Manager for review and acceptance. The maintenance manual shall be in accordance with CP.4 standard.
- Training
 - Co-operate with the Commissioning Manager in making necessary arrangement for site O&M staff familiarization. Prepare training material in accordance with CP.5 standard.

7.3.4 Commissioning phase

- Submit a list of the technical staff required to conduct all performance and verification tests for approval by the commissioning manager prior to beginning testing and verification
- Manuals
 - Review the "O&M" Manuals to 100% and submit comments to the Commissioning Manager for approval. Manuals to be in accordance with all modifications to the project.
- Spare Parts
 - Finalize the delivery of all the spare parts requirements through the project and assist Commissioning Manager in the definition of additional parts not listed in the construction documents.
- Performance Verification
 - Witness that the components, subsystems and systems are tested in accordance with the provisions of the contract documents and ensure all systems meet design intent.
 - Witness all tests and PV procedures and certify same.
 - Provide solutions during the PV process with respect to the variances from the design parameters.
 - In consultation with the Commissioning Manager, instruct the contractor to correct all the deficiencies identified and recorded during the performance verification and adjust or alter the systems to achieve the design parameters. Retest as required.
 - In consultation with the Commissioning Manager, and Project Manager, recommend takeover of the facility subject to outstanding deficiencies deferred tests during the operational phase.
- Coordinate the training of O&M personnel and conduct training sessions.
- Review all MMS nomenclature, devices and submissions prepared by the contractor. Ensure on site implementation and tagging as per the client's standards.
- Prior to Interim Inspection, debrief the Project Manager and Commissioning Manager on the commissioning process including training; problems; required changes to systems (with costs) which are outside the contractor's responsibility, but which are deemed necessary to meet project requirements; commissioning procedures and other information, experiences and suggestions for future projects. Submit a report to the Commissioning Manager. Repeat this process when 80% occupancy is achieved.

Note: Start-Up and TAB are construction activities and do not form part of the Commissioning Phase.

7.3.5 Post-construction (operation)

- Make recommended revisions to documentation to reflect all changes, modifications, revisions and adjustments as finally set upon completion of commissioning.
- Develop an occupant's comments/complaints audit system.
- Witness completion of Performance Verification and review reports.
- Monitor environmental and life safety system checks which must be carried out by the contractor or O&M staff prior to the expiration of warranties.
- Identify and monitor all deficiencies to be rectified by the contractor prior to the expiration of warranties.

7.4 Standards

- Operating & Maintenance (O&M) Manuals
 - The contents & organization of the manuals shall be in accordance with CP.4: Operating & Maintenance Manuals. The documents are available upon request, from PWGSC.

- Training of O&M Personnel
 - The requirements and the delivery of the training of O&M Personnel shall be in accordance with CP.5: Training of O&M Personnel.
- Performance Verification Procedures
 - The extent of performance verification procedures shall be in accordance with PWGSC generic manuals: CP10 – Performance Verification Report Forms and CP10 – Performance Verification Procedures.

Consultants are to use the client's MMS standard maintenance package and equipment identification nomenclature.

RS 8 RISK MANAGEMENT

The consultant is to provide support to the Project Manager in identifying risks throughout the project life cycle.

See "Doing Business" for Risk Management "Definitions" and "Checklist".

Risk Management Process:

- Identify risk events based on past experience and using proposed checklist or other available lists;
- Qualify/quantify probability of risk event (Low, Medium, High) and their impact (Low, Medium, High);
- Prioritize risk events (i.e. concentrate efforts on risk events with High probability and Medium to High impact);
- Develop risk response (i.e. evaluate alternatives for mitigation. This is the real added-value of risk management); and,
- Implement risk mitigation.

RS 9 ENVIRONMENT

Given that sustainable development is an important concern for the Government of Canada, PWGSC addresses this concern by including best environmental practices in each project phase.

9.1 Intent

- Comply with environmental legislations, including but not limited to:
 - Storage Tank Systems for Petroleum Products and Allied Petroleum Products
<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2008-197/FullText.html>
 - Federal Halocarbon Regulations
<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-289/>
- Comply with the spirit of the Federal Sustainable Development Strategy
<http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=A22718BA-1>
- Comply with the spirit of the Departmental Sustainable Development Strategy
<http://www.tpsgc-pwgsc.gc.ca/rapports-reports/rpp/2015-2016/smdd-dsds-eng.html>
- Attain a LEED-CI Silver level certification.
- Meet the environmental objectives of the "Real Property Sustainability Frameworks".

9.2 Details

Provisions of environmental legislation:

- The Consultant will be given a PWGSC report on provisions of environmental legislation that the Consultant must take into account during the project;
- The Consultant will not be limited to the report and will identify other provisions of environmental legislation to be assessed.

9.2.1 Sustainable Development

In accordance with the Treasury Board Policy on Management of Real Property, real property must be managed in an environmentally friendly manner and in accordance with sustainable development principles. As one of the biggest property owners in the country, and given the major impact buildings have on the environment, the federal government is working to reduce the environmental impact of its operations related to real property.

9.2.3 Construction

The required LEED-CI Silver certification level will guide the choice of materials, equipment and construction methods.

9.2.4 Demolition

A construction, renovation and demolition (CRD) waste management plan must be drawn up in accordance with the requirements set out in Section 01 74 21 of the most recent version of the National Master Specifications (NMS). This plan will include a preliminary inventory of materials to be disposed of as well as available disposal locations based on the 4R principle (Reduce, Reuse, Recycle and Recover). The methods must also be in accordance with the LEED-CI requirements.

9.2.5 Hazardous Materials

PWGSC's Environmental Services has mandated a firm to conduct the survey of asbestos containing materials (ACMs) and the consultant will have to adapt its work and the construction documents based on the results.

9.2.6 Halocarbons

Work on systems containing a halocarbon must be performed in accordance with federal regulations. A summary of all the requirements and forms to be used during construction will be provided to the selected consultant.

9.3 References

- LEED-CI 1.0, or latest version.
- National Master Specification, March 2013 or latest version.

ADDITIONAL SERVICES

AS 1 BILINGUAL DOCUMENTS	60
AS 2 FAMILIARISATION PERIOD.....	60
2.1 Intent	60
2.2 General	60
2.3 Details	61
2.3.1 Architecture Documents.....	61
2.3.2 Structure Documents	61
2.3.3 Mechanical Documents.....	62
2.3.4 Electrical Documents	62
2.3.5 Security documents.....	62
2.3.6 Commissioning.....	62
2.3.7 Sustainable Development	62
2.4 Deliverables	63
AS 3 LEED-CI	63
3.1 Description	63
AS 4 ENHANCED COMMISSIONING	63
4.1 Description	63
AS 5 ESTIMATING AND COST PLANNING	63
5.1 Cost Specialist	63
5.2 Scope of Services	64
5.3 Services – Basic Activities	64
5.3.1 Reporting.....	64
5.3.2 Submission Standards	65
5.3.3 Techniques.....	66
5.4 Services – Specific Activities	67
5.5 PWGSC Responsibilities	68
AS 6 ADDITIONAL ARCHITECTURAL AND ENGINEERING SERVICES	68

AS 1 BILINGUAL DOCUMENTS

Documents must be made available in both official languages.

Bilingual Requirements:

- The Consultant shall prepare all documents in Canada's two official languages.
- The languages are considered equal in status; neither is considered to be a translation of the other.
- During tender, bidders' questions must be translated by the consultant.
- The Consultant shall be responsible for the accuracy and completeness of translations and the consistency of documents.
- It is standard practice to produce a single set of drawings (originals) on which written information is shown in both languages and separate written documents for each language for tendering, records drawings, and operation and maintenance documentation.

AS 2 FAMILIARISATION PERIOD

2.1 Intent

The consultant must familiarize itself with the available documents in order to produce complete construction drawings and specifications, as per RS4. The requirements for each project must be met. The consultant must demonstrate that all conflict and problems have been identified and adequately assessed. The proposed method of execution, the schedules and the cost estimates should reflect a proper understanding of the scope of work to implement.

2.2 General

Scope and activities:

- Complete the design for following items, among others:
 - Ceilings
 - Redevelop the existing coffered ceiling for CIC's space on the ground floor
 - Built-in furniture
 - Citizenship Room, including the operable wall
 - Coordinate with Shared Services Canada
 - etc.

The consultant must determine, based on documents provided in the RFP, the elements to complete. A list of these elements must be compiled, to allow for progress monitoring. This list is a working document and does not remove the consultant's obligation to complete the design of all the elements needed to produce complete construction drawings and specifications.

- Attend the project kickoff meeting.
- Attend all coordination meetings with PWGSC professionals
- Analyze the program and project requirements.
- Review all the projects' available documents, including phasing development drawings, and the electromechanical technical supplement.
- Visit the building/site and validate the provided documents.
- Confirm the capacity of the building's existing services.
- Identify the elements of the existing building should be replaced and suggest alternatives.
- Identify the necessary modifications to the existing building.
- Identify and follow-up on any missing information and/or ambiguities in the existing documents.

- Review the proposed project timeline and confirm that all milestones can be met.
- Schedule the various project phases and plan for the required temporary spaces.
- Review the cost plan/budget for verification that the costs are realistic and achievable;
- Identify and verify all authorities having jurisdiction over the project;
- Identify the codes, regulations and standards that apply;
- Confirm that proposed works comply with all applicable codes, regulations, and standards.
- Get to know the building's security requirements and those of each government department.
- Coordinate with Shared Services Canada to include their requirements, including any temporary work during the interim phases.
- Review potential for environmental impacts and application of the Canadian Environmental Assessment Act (2012).

Surveys are not included in neither AS2 or RS4 of this RFP. Please see allowance in Appendix B.

2.3 Details

The following non-exhaustive list identifies services expected from each discipline. Some activities may require input from other consultants on the team. The architect must coordinate his/her sub-consultants and specialists, and is responsible for ensuring that all the works in the consultant mandate is carried out. This includes, but is not limited to the following:

- Supervise the team and determine the project objectives, budgets, schedules and design criteria to be met;
- Oversee work progress of own sub-consultants and experts and ensure that all parties concerned have made progress to the appropriate level;
- Summarize and incorporate services provided by various specialists;
- Act as the main contact person for the Departmental Representative throughout the project;
- Distribute information received from the Departmental Representative to the sub-consultants and experts, and vice versa;
- Check and validate to ensure that various disciplines have coordinated their designs among one another;
- Eliminate incompatibilities between various design components and fully coordinate the construction to eliminate worksite disputes;
- When shortcomings are identified, follow-up until they are corrected;
- Produce a consolidated document to be submitted to the Departmental Representative as part of the required submitted documents;
- Fill in the Checklist for the Submission of Construction Documents, included in Doing Business available at Appendix G
- Coordinate work progress with the construction manager and participate in work sessions, along with all key personnel, when required by the departmental representative;
- Coordinate the activities of testing laboratories.

2.3.1 Architecture Documents

- Identify services and temporary space fit-up required during construction, as dictated by the construction phases, including the placement of office trailers.
- Integrate furniture and equipment plans provided by PWGSC and update as required.
- Produce door & frame and hardware schedule: list required standards, fire resistance ratings, etc.
- Provide plans, elevations, sections and details when completing the design where required.
- Identify the scope of work related to the heritage component of the projects.

2.3.2 Structure Documents

- Identify the necessary work to the existing building, if any, and perform the design.
- Seismic Study, if required.

2.3.3 Mechanical Documents

- Meet the requirements of PWGSC's electromechanical technical supplement.
- Drawings showing the initial sizing and layout of the primary distribution of the HVAC system.
- Drawings of plumbing system, showing routing and sizing of major lines and location of pumping and other equipment where required
- Drawings of the fire protection systems showing major components.
- Description of the function and specific mechanical requirements of each area (or room) of a layout.
- For all systems, connect the secondary distribution to the primary distribution.
- Describe the mechanical systems to be provided and their components.
- Explain what acoustical and sound control measures are to be included in the design.
- Identify the amount of air volume to be provided to occupied areas.
- Integrate with the building systems control at all stages of the projects.
- Coordinate with Shared Services Canada for IT requirements.

2.3.4 Electrical Documents.

- Meet the requirements of PWGSC's electromechanical technical supplement
- Site plan showing location of service entrances.
- Distribution diagrams showing the line diagrams to the distribution centers.
- Floor plans complete with locations of major electrical equipment and distribution centres, existing and new.
- Distribution diagrams for wiring, lighting, power, telecommunications, fire protection, security, etc.
- Elementary control diagrams for each system.
- Schedule of motors and controls.
- Electric heating layout and schedule.
- Coordinate with Shared Services Canada for IT requirements.
- Coordinate with the building's electrical service entrance project.

2.3.5 Security documents

- Determine whether or not the existing hardware and software have the capacity to handle the projects' additional requirements;
- Familiarise oneself with the new security works for the various phases of the construction project, as per by government departments' requirements
- New systems, as proposed by the consultant, must be compatible with existing systems. Systems must be fully functional following integration work.

2.3.6 Commissioning

- Define operational requirements, followed by the commissioning requirements.
- Define the parameters for basic and enhanced commissioning: scheduling, testing, stakeholders, forms to be filled out, documents/reports to be provided for assessment by the consultant, etc.
- Prepare a Commissioning Brief describing major commissioning activities for mechanical, electrical and integrated system testing.
- Define and establish project specific archives

2.3.7 Sustainable Development

- Target the appropriate credits for a LEED-CI Silver certification
- Ensure that the project meets the requirements of the Canadian Environmental Assessment Act (2012)

2.4 Deliverables

Comprehensive summary of the projects' requirements/program demonstrating an understanding of the scope of work including:

- Report on existing base building system elements including their condition, deficiencies and life expectancy, and their ability to serve the final spaces as well as the temporary spaces.
- Revised schedule for each project, including all work phases
- Verification of Class B construction cost estimates
- List of the problems, conflicts or other perceived information / clarifying assumptions to be brought to the attention of the project manager
- Code Compliance Report
- Report identifying the targeted LEED-CI credits and explanation of preferred methods to obtain the required certification level
- Finalise the design where required
- Commissioning Plan
- Identify the required additional expertise

AS 3 LEED-CI

3.1 Description

- Be part of the project team from day one, for the entire duration of the projects.
- Complete the necessary documents and assist the departmental representative in registering the projects for LEED-CI certification
- From the beginning, coordinate with the consultant to complete the LEED-CI checklist and the necessary credits to achieve a Silver level certification
- Identify Innovation Credits to achieve, if required
- Collaborate with the consultant and keep a file of all necessary documents
- Recommend to the Departmental Representative which credits to target, favouring those with the shortest payback period
- Work with the commissioning specialist and attain EA Credit 2, Enhanced Commissioning
- Prepare and submit LEED-CI certification requests and achieve Silver level certifications

AS 4 ENHANCED COMMISSIONING

4.1 Description

Specialist commissioning must obtain the LEED-CI EA Credit 2 Enhanced Commissioning. It is also responsible for detailed commissioning activities RS7.

AS 5 ESTIMATING AND COST PLANNING

5.1 Cost Specialist

Delivering this project on time and within budget is a high priority. A fully qualified cost estimating, cost planning and cost control team, referred to herein as the Cost Specialist, with a demonstrated record of successful cost management on large construction projects is required. This Cost Specialist will be conversant with all aspects of construction cost estimating during the design stages including the use of Elemental Cost Analysis, Risk Analysis, Life Cycle Costing and Value Engineering/Management techniques.

The purpose of cost planning and cost control is to assist in the accomplishment of project cost objectives. It is a continuous and interactive process involving planning, action, measurement, evaluation and revision.

5.2 Scope of Services

The Cost Specialist shall provide an interactive and continuous cost consulting service from the beginning of the projects through to construction completion, including the preparation of complete estimates for all construction trades, escalation, inflation and contingency costs.

The Cost Specialist shall provide to PWGSC and the Consultant, a cost advising, and cost monitoring/reporting service.

The Cost Specialist shall attend all project meetings and be prepared to present and defend the estimates directly to the Departmental Representative.

The project delivery method will be Construction Management, with multiple bid packages.

5.3 Services – Basic Activities

The Cost Specialist shall work with and advise the Consultant team and PWGSC of the costs of individual building components and costs of various design systems. Estimates should be prepared in detail and summarized using an Elemental Analysis format.

5.3.1 Reporting

Milestone Reporting

At each of the Milestones specified in this document, provide a complete submission including the required Elemental Summaries, supported by all backup work sheets clearly detailing the process used in preparing the estimate.

The detailed work sheets will be the prime basis on which estimates will be reviewed by PWGSC. Cost comparisons and cost reports identifying and explaining the differences between each succeeding cost estimate and their cost effect are also required.

In addition, the Cost Specialist shall fully coordinate all estimates with schedules.

A typical Milestone Report will contain the following:

- Project Estimate Summary;
- Elemental Estimate Summary;
- Estimate Back-Up Detail:
 - Basis for escalation, inflation and contingency calculations;
 - Detailed measurement and pricing;
- Narrative:

- Outline description of estimate basis;
- Description of information obtained and used in the estimate including the date received;
- Listing of notable inclusions;
- Listing of notable exclusions;
- Listing of items/issues carrying significant risk;
- Notes on past and forecast Cost Specialist activity;
- Estimate Reconciliation:
 - With last submission;
 - With Construction Cost Plan.

Any other relevant information.

Monthly Report

In addition to the Milestone Reports, submit a Monthly Report outlining activities during the previous month, identifying areas of concern and new information received, along with forecast and proposed revisions to the current estimate. This report shall also contain a full up-to-date Elemental Cost Summary:

- Project Estimate Summary;
- Elemental Cost Summary;
- Narrative:
 - Description of the basis for estimate revision;
 - Description of new information used in the estimate including the date received;
 - Listing of notable inclusions;
 - Listing of notable exclusions;
 - Listing of items/issues carrying significant risk;
 - Notes on past and forecast Cost Specialist activity

Exception Report

The Cost Specialist is to provide continuous cost monitoring, timely identification and early warning of all changes that affect or potentially affect the estimated construction costs of the project.

If the estimate falls short of or exceeds the Construction Cost Plan due to such changes, the Cost Specialist with the Consultant team shall fully advise the Departmental Representative. The Cost Specialist with the Consultant team shall submit to PWGSC proposed alternative design solutions and revise the most recent monthly estimate.

An Exception Report will include sufficient description and cost detail to clearly identify:

- Scope Change: Identifying the nature, reason and total cost impact of all identified and potential project scope changes affecting Construction Cost Estimate.
- Cost Overruns and Underruns: Identifying the nature, the reason and the total cost impact of all identified and potential cost variations.
- Options Enabling a Return to Construction Cost Estimate: Identifying the nature and potential cost effects of all identified options proposed to return the project within Construction Cost Estimate.

5.3.2 Submission Standards

Summary Format

- Cost analysis by item: Summaries of estimates must be submitted in an agreed standard analysis format. The Consultant must use Unifomat II.
- Trade Summary: Where a trade summary is required, those following the Masterformat are preferred, except where local practice provides a more suitable alternative.
- Project Cost Subdivision: The estimate shall isolate the costs of each phase of construction. All estimates within these phases shall further isolate and show separately the cost, defined by Workplace 2.0, listed here:
 - Base building
 - Lessee improvements, PWGSC
 - Lessee improvements, government departments
 - Exclusive costs, government departments
 - Temporary works related to interim phases

Media

- Provide three (3) hard copies of all reports including estimate summaries only and one (1) additional hard copy of the full report including the additional estimate support information to PWGSC.
- One soft copy of the total estimate, summary and support detail shall be provided on a CD in an agreed format.

Time frame

Estimates appended to progress reports must be submitted no later than five (5) working days following submission of the Consultant's documents.

Use of all available information

The Cost Specialist is responsible for providing a complete cost estimate even though the information provided during the concept, design development and early working drawing stages is incomplete. Where requirements are not firmly defined, the Cost Specialist shall make assumptions, confirm them with the Consultant and either list them as assumptions or have them incorporated in an outline specification modified by the Consultant.

5.3.3 Techniques

The Cost Specialist is required to be familiar with and make use of a broad range of cost techniques, especially the following:

Risk Analysis

All construction estimates (except the final pre-tender estimate) shall include and identify design, estimating, inflation escalation and currency exchange allowances as are deemed necessary in light of the current information available. The Cost Specialist shall provide a satisfactory explanation of the level and/or amount of all such sums included within any estimate.

Scheduling

The Cost Specialist shall assist the consultants by providing building quantities, building systems information and other quantifiable parameters deemed appropriate to the calculation of a reasoned project time schedule. The Time Specialist shall assist the Cost Specialist by maintaining an up-to-date

schedule of all design activities along with an agreed bidding and Construction Schedule that will be incorporated by the Cost Specialist within the estimates on a timely basis.

Life Cycle Costing

In advising the Consultant of the cost information for alternative materials, methods and systems, it is necessary that the Cost Specialist uses all available information to ensure that a complete cost picture is made available, upon which design and construction decisions will be made.

Continuing Estimate Process

A process of continual adjustment of previous estimates may be used in place of total re-measurement at each milestone reporting point. This is acceptable, provided that at each monthly reporting point a full and up-to-date Elemental Cost Summary is provided and that at each milestone reporting point this Elemental Cost Summary is supported by complete, detailed, stand alone back-up/support documentation, as previously described.

Project Research

The Cost Specialist shall visit the proposed or alternative construction sites to become familiar with site conditions, site access, etc., analyze local labour and material supply conditions, local bidding practices and competition to establish pricing levels. A written report detailing this reconnaissance activity is expected.

5.4 Services – Specific Activities

Familiarisation period

Upon beginning of consultant's work, the Class "B" estimates must be verified.

Construction Documents

During the production of the contract documents a process of continuing cost control progressively more detailed is required. At each review of contract documents, an up-to-date Class "A" estimate shall demonstrate compliance with the Construction Cost Plan. Non-compliance with the Construction Cost Plan will require revisions to the contract documents.

Pre-Tender

Upon completion of the contract documents a pre-tender Class "A" cost estimate will be prepared using 100% measured quantities.

Provide a trade breakdown of the pre-tender estimate for use in reviewing the submitted bids and the successful Contractor's estimate breakdown. Comply with the Submission Standards.

Tender Stage

During the construction manager's tender periods, examine and report on any cost impact created by the issue of tender/contract addenda. Incorporate the results of such addenda review into the final pre-tender estimate (both elemental and trade versions) prior to receipt of bids.

- Bid Review and Analysis: Assist the Departmental Representative, as required, by analyzing and reconciling any differences between the pre-tender estimate and the submitted bids.

- **Negotiation:** Should it be necessary to negotiate with the construction manager prior to awarding the Contract, the Cost Specialist shall provide cost information as needed and enter into the negotiations if requested.
- **Reconciliation:** Upon the signing of a contract with the successful Contractor, the Cost Specialist, if necessary, will reconcile both the elemental and trade estimates, in detail, with the agreed contract sum. These reconciled estimates will be used by the Construction Team during the construction phase of the project.

Cost Specialist Services through Construction

During construction, the Cost Specialist shall assist the Construction Team with cost advice if requested. Such activity may well encompass the following activities:

- Evaluation of change orders;
- Evaluation of work completed;
- Evaluation of cash flow.

Post Contract

The Cost Specialist may be required to assist with the provision of details needed for an evaluation of the project, regarding the Project's cost performance.

5.5 PWGSC Responsibilities

PWGSC will review all aspects of the Cost Specialist's work on a continuing basis to determine the validity and completeness of the information provided. In the event PWGSC may identify areas of concern including errors and omissions as well as areas of inadequate detail or areas that require further explanation, the Cost Specialist shall re-examine the estimates provided and make such revisions as are subsequently agreed to be necessary and/or provide ample acceptable evidence that such corrections or amendments are unnecessary.

No Action Abrogates Consultant's Responsibilities

- No acceptance or approval by PWGSC, whether expressed or implied shall be deemed to relieve the Cost Specialist, or the Consultant, of professional or technical responsibility for the estimates and cost reports.
- Neither does acceptance of an estimate by PWGSC in any way abrogate the Consultant's responsibility to maintain the agreed Construction Cost Plan throughout the life of the project, or the requirement to redesign should the lowest acceptable bid differ significantly from the agreed Construction Cost Plan, unless and until the Departmental Representative indicates otherwise in writing.

AS 6 ADDITIONAL ARCHITECTURAL AND ENGINEERING SERVICES

Services might be required for changes to construction documents following requests from the Departmental Representative, to be authorized as and when required.

The Departmental Representative will transmit in timely manner information on the additional services to be provided.

The Consultant must submit to the Departmental Representative a detail breakdown of additional fees for the requested services in accordance with the established fixed hourly rates. The breakdown will include

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

employee categories, employee names and the estimated number of hours required to provide the services.

The Consultant must receive a written authorization from the Departmental Representative to provide the services, before beginning to render the said services.

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

APPENDIX B - PRICE PROPOSAL FORM / PRICE TABLE

INSTRUCTIONS: Complete this Price Proposal Form and submit in a **separate sealed envelope** with the Name of Proponent, Name of Project, PWGSC Solicitation Number, and the words "PRICE PROPOSAL FORM" typed on the outside of the envelope.

Price Proposals are not to include Applicable Taxes.

PROPOSERS SHALL NOT ALTER THIS FORM

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

CIC MAJOR RENOVATIONS AT 715 PEEL

Name of Proponent:

The following will form part of the evaluation process (CIC)

REQUIRED SERVICES (RS)

Percentage Fee for RS4 to RS9
(R1230D, GC 5 - Terms of Payment)

Firm Percentage Fee of%

Indicative Estimate of Construction Costs
(Category B, excluding taxes): x 9,000,000.00 \$

The actual percentage fee for Required Services will recognize the variability of the Construction Cost Estimate as the project develops (refer to formula specified in GC 5.2 Fee Arrangement(s) for Services). Payments will be made as specified in GC 5.4 Payments for Services.

TOTAL PERCENTAGE FEE FOR REQUIRED SERVICES (RS4 to RS9) \$ ①

ADDITIONAL SERVICES (AS)

Fixed Fee (R1230D, GC 5 - Terms of Payment)

AS1 Bilingual Construction Documents \$

AS2 Project Familiarisation
 electromechanical \$
 architecture and other disciplines \$
 subtotal \$

AS3 Cost Estimate and Planning \$

AS4 LEED-CI Certification \$

AS5 Enhanced Commissioning \$

Maximum Fixed Fee, AS1 to AS5 \$

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

Time-based fees (R1230D, GC 5 - Terms of Payment)

SA6 architectural, engineering and specialty for additional applications (CIC) ¹				
Discipline	Qualification	Hourly Rate ² A	Planned hours B	Total cost A x B
Architecture	Principal Architect		25	
	Senior Architect, Manager		50	
	Senior Architect		100	
	Intermediate Architect		100	
	Junior Architect		100	
	Intern (M. Arch.)		100	
	Senior Technician, Manager		50	
	Senior Technician		100	
	Intermediate Technician		100	
	Junior Technician		100	
	Auxiliary staff		100	
	Engineering	Principal Engineer		25
Senior Engineer, Manager			50	
Senior engineer			100	
Intermediate Engineer			100	
Junior Engineer			100	
Senior Technician, Manager			50	
Senior Technician			100	
Intermediate Technician			100	
Junior Technician			100	
Support Staff			50	
Specialties	LEED		75	
	Commissioning		50	
	Vertical Transportation		50	
	Door Hardware		50	
Maximum AS6 time based fees				

Note 1: Payment will be based on actual hours spent. Travel time and/or expenses will not be reimbursed separately.

Note 2: All inclusive hourly rate is applicable to both regular working hours and any other shift work, as required.

Maximum time based fees, AS6 \$

TOTAL FEE FOR ADDITIONAL SERVICES (SA1 to SA6) \$ ②

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

TOTAL COST OF SERVICES FOR PROPOSAL EVALUATION PURPOSES

The Total Cost of Services includes all disbursements made for the project, without exception, for the purpose of providing Required Services and Additional Services.

TOTAL FEE FOR REQUIRED SERVICES	.....	\$ ①
TOTAL FEE FOR ADDITIONAL SERVICES	.....	\$ ②
TOTAL EVALUATED FEE (CIC)	.....	\$ ③

The following will NOT form part of the evaluation process (CIC)

SURVEYS

A maximum allowance has been set for surveys and translation into drawings of said surveys. The applicable hourly rates are those indicated in AS6 Table. The written authorization of the Departmental Representative must be obtained before the start of any activity related to surveys.

The personnel selected to perform surveys and their qualifications for fee purposes, must be accepted in writing by the Departmental Representative, before the work begins. If the consultant assigns personnel with higher classification for a task usually performed by a lower classification, the hourly rate in this case is the one corresponding to the lower classification. Hours worked must be submitted each week with a clear explanation of the work performed.

MAXIMUM ALLOWANCE FOR SURVEYS **30,000.00 \$**

DISBURSEMENTS

At cost without allowance for mark-up or profit, supported by invoices/receipts - see clause R1230D, GC 5 - Terms of Payment, section GC5.12

Canada may accept or reject any of the following fees, disbursements and/or hourly rates. Canada reserves the right to negotiate on these fees, disbursements and/or hourly rates.

MAXIMUM AMOUNT FOR DISBURSEMENTS **70, 000.00 \$**

Hourly rates, per qualification, listed in Table SA6 Architectural, Engineering and Specialized Services for Additional Requests (CIC), will be used for changes to the contract. These all-inclusive hourly rates must be maintained for the duration of the contract.

End (CIC)

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

CBSA MAJOR RENOVATIONS AT 715 PEEL

Name of Proponent:

The following will form part of the evaluation process (CBSA)

REQUIRED SERVICES (RS)

Percentage Fee for RS4 to RS9
(R1230D, GC 5 - Terms of Payment)

Firm Percentage Fee of%

Indicative Estimate of Construction Costs
(Category B, excluding taxes): x 9,800,000.00 \$

The actual percentage fee for Required Services will recognize the variability of the Construction Cost Estimate as the project develops (refer to formula specified in GC 5.2 Fee Arrangement(s) for Services). Payments will be made as specified in GC 5.4 Payments for Services.

TOTAL PERCENTAGE FEE FOR REQUIRED SERVICES (RS4 to RS9) \$ ④

ADDITIONAL SERVICES (AS)

Fixed Fee (R1230D, GC 5 - Terms of Payment)

AS1 Bilingual Construction Documents \$

AS2 Project Familiarisation
 electromechanical \$
 architecture and other disciplines \$
 subtotal \$

AS3 Cost Estimate and Planning \$

AS4 LEED-CI Certification \$

AS5 Enhanced Commissioning \$

Maximum Fixed Fee, AS1 to AS5 \$

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

Time-based fees (R1230D, GC 5 - Terms of Payment)

SA6 Architectural, Engineering and Specialized Services for Additional Requests (CBSA) ¹				
Discipline	Qualification	Hourly Rate ² A	Planned hours B	Total cost A x B
Architecture	Principal Architect		25	
	Senior Architect, Manager		50	
	Senior Architect		100	
	Intermediate Architect		100	
	Junior Architect		100	
	Intern (M. Arch.)		100	
	Senior Technician, Manager		50	
	Senior Technician		100	
	Intermediate Technician		100	
	Junior Technician		100	
	Auxiliary staff		100	
	Engineering	Principal Engineer		25
Senior Engineer, Manager			50	
Senior engineer			100	
Intermediate Engineer			100	
Junior Engineer			100	
Senior Technician, Manager			50	
Senior Technician			100	
Intermediate Technician			100	
Junior Technician			100	
Support Staff			50	
Specialties	LEED		75	
	Commissioning		50	
	Vertical Transportation		50	
	Door Hardware		50	
Maximum AS6 time based fees				

Note 1: Payment will be based on actual hours spent. Travel time and/or expenses will not be reimbursed separately.

Note 2: All inclusive hourly rate is applicable to both regular working hours and any other shift work, as required.

Maximum time based fees, AS6 \$

TOTAL FEE FOR ADDITIONAL SERVICES (AS1 to AS6) \$ ⑤

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

TOTAL COST OF SERVICES FOR PROPOSAL EVALUATION PURPOSES

The Total Cost of Services includes all disbursements made for the project, without exception, for the purpose of providing Required Services and Additional Services.

TOTAL FEE FOR REQUIRED SERVICES	.....	\$ ④
TOTAL FEE FOR ADDITIONAL SERVICES	.....	\$ ⑤
TOTAL EVALUATED FEE (CBSA)	.....	\$ ⑥

The following will NOT form part of the evaluation process (CBSA)

SURVEYS

A maximum allowance has been set for surveys and translation into drawings of said surveys. The applicable hourly rates are those indicated in AS6 Table. The written authorization of the Departmental Representative must be obtained before the start of any activity related to surveys.

The personnel selected to perform surveys and their qualifications for fee purposes, must be accepted in writing by the Departmental Representative, before the work begins. If the consultant assigns personnel with higher classification for a task usually performed by a lower classification, the hourly rate in this case is the one corresponding to the lower classification. Hours worked must be submitted each week with a clear explanation of the work performed.

MAXIMUM ALLOWANCE FOR SURVEYS **30,000.00 \$**

DISBURSEMENTS

At cost without allowance for mark-up or profit, supported by invoices/receipts - see clause R1230D, GC 5 - Terms of Payment, section GC5.12

Canada may accept or reject any of the following fees, disbursements and/or hourly rates. Canada reserves the right to negotiate on these fees, disbursements and/or hourly rates.

MAXIMUM AMOUNT FOR DISBURSEMENTS **70, 000.00 \$**

Hourly rates, per qualification, listed in Table SA6 Architectural, Engineering and Specialized Services for Additional Requests (CBSA), will be used for changes to the contract. These all-inclusive hourly rate must be maintained for the duration of the contract.

End (CBSA)

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

APPENDIX B - PRICE PROPOSAL FORM (CONTINUED)

TOTAL COST OF SERVICES FOR PROPOSAL EVALUATION PURPOSES

The Total Cost of Services includes all disbursements made for the project, without exception, for the purpose of providing Required Services and Additional Services.

TOTAL EVALUATED FEE (CIC) \$ **3**

TOTAL EVALUATED FEE (CBSA) \$ **6**

TOTAL EVALUATED FEE \$ **7**

END OF PRICE PROPOSAL FORM

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX C - TEAM IDENTIFICATION FORMAT

For details on this format, please see SRE section in the Request for Proposal.

The Prime Consultant and other members of the Consultant Team shall be, or eligible to be, licensed, certified or otherwise authorized to provide the necessary professional services to the full extent that may be required by provincial or territorial law.

I. Prime Consultant (Proponent):

Architecture

Firm or Joint Venture Name: _____

Key Individuals and provincial professional licensing status and/or professional accreditation:

1. Project Manager: _____

2. Designer: _____

YES NO: LEED professional credential

3. _____

4. _____

II. Key Sub Consultants / Specialists:

Engineering

Firm or Joint Venture Name: _____

Key Individuals and provincial professional licensing status and/or professional accreditation:

1. Project Manager: _____

YES NO: mechanical or electrical engineer

2. _____

3. _____

4. _____

Electrical Engineering

Firm or Joint Venture Name: _____

Key Individuals and provincial professional licensing status and/or professional accreditation:

1. Designer: _____

YES NO: LEED professional credential

2. _____

3. _____

4. _____

APPENDIX C - CONSULTANT TEAM IDENTIFICATION FORM (CONTINUED)

Mechanical Engineering

Firm or Joint Venture Name: _____

Key Individuals and provincial professional licensing status and/or professional accreditation:

1. Designer: _____

YES NO: LEED professional credential

2. _____

3. _____

4. _____

Structural Engineering

Firm or Joint Venture Name: _____

Key Individuals and provincial professional licensing status and/or professional accreditation:

1. Designer: _____

2. _____

3. _____

4. _____

Cost Estimate and Planning

Firm or Joint Venture Name: _____

Key Individuals and provincial professional licensing status and/or professional accreditation:

1. Specialist: _____

YES NO: PQS or CEC, member of the CIQS

YES NO: ten (10) years of relevant experience

2. _____

3. _____

LEED

Firm or Joint Venture Name: _____

1. Specialist: _____

YES NO: LEED professional credential

YES NO: completed two (2) LEED certification processes

2. _____

3. _____

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX C - CONSULTANT TEAM IDENTIFICATION FORM (CONTINUED)

Commissioning

Firm or Joint Venture Name: _____

Key people and provincial professional certification and / or professional accreditation:

1. Specialist: _____

YES NO: independent of firms represented on the design and construction team

YES NO: LEED professional credential

YES NO: completed one (1) enhanced commissioning as part of a LEED certification process

2. _____

3. _____

Security Hardware

Firm or Joint Venture Name: _____

Key people and provincial professional certification and / or professional accreditation:

1. Specialist: _____

2. _____

3. _____

Vertical Transportation

Firm or Joint Venture Name: _____

Key people and provincial professional certification and / or professional accreditation:

1. Specialist: _____

2. _____

3. _____

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qcl026
CCC No./N° CCC - FMS No./N° VME

APPENDIX D - DECLARATION/CERTIFICATIONS FORM

Project Title:

Name of Proponent:

Street Address:

Mailing Address:

Proponent's Proposed Site or premises Requiring Safeguard Measures (refer to SI? Security Requirement):

Address:

Street Number / Street Name, Unit / Suite / Apartment Number

City, Province, Territory

Postal Code

Telephone Number: ()

Fax Number: ()

E-Mail:

Procurement Business Number:

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

APPENDIX D - DECLARATION/CERTIFICATIONS FORM (CONT'D)

Federal Contractors Program for Employment Equity - Certification

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

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

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

Complete both A and B.

A. Check only one of the following:

- A1. The Proponent certifies having no work force in Canada.
- A2. The Proponent certifies being a public sector employer.
- A3. The Proponent certifies being a federally regulated employer being subject to the Employment Equity Act.
- A4. The Proponent certifies having a combined work force in Canada of less than 100 employees (combined work force includes: permanent full-time, permanent part-time and temporary employees [temporary employees only includes those who have worked 12 weeks or more during a calendar year and who are not full-time students]).

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

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

OR

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

APPENDIX D - DECLARATION/CERTIFICATIONS FORM (CONT'D)

Former Public Servant (FPS) - Certification

Contracts awarded to former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts awarded to FPS, proponents must provide the information required below before contract award. If the answer to the questions and, as applicable the information required have not been received by the time the evaluation of proposals is completed, Canada will inform the Proponent of a time frame within which to provide the information. Failure to comply with Canada's request and meet the requirement within the prescribed time frame will render the proposal non-responsive.

Definitions

For the purposes of this clause,

"former public servant" is any former member of a department as defined in the *Financial Administration Act*, R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- (a) an individual;
- (b) an individual who has incorporated;
- (c) a partnership made of former public servants; or
- (d) a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the *Public Service Superannuation Act* (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the *Supplementary Retirement Benefits Act*, R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the *Canadian Forces Superannuation Act*, R.S., 1985, c.C-17, the *Defence Services Pension Continuation Act*, 1970, c.D-3, the *Royal Canadian Mounted Police Pension Continuation Act*, 1970, c.R-10, and the *Royal Canadian Mounted Police Superannuation Act*, R.S., 1985, c.R-11, the *Members of Parliament Retiring Allowances Act*, R.S., 1985, c.M-5, and that portion of pension payable to the *Canada Pension Plan Act*, R.S., 1985, c.C-8.

APPENDIX D - DECLARATION/CERTIFICATIONS FORM (CONT'D)

Former Public Servant in Receipt of a Pension

As per the above definitions, is the Proponent a FPS in receipt of a pension?

YES () NO ()

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

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

By providing this information, proponents agree that the successful Proponent's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with Contracting Policy Notice: 2012-2 and the Guidelines on the Proactive Disclosure of Contracts.

Work Force Adjustment Directive

Is the Proponent a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? YES () NO ()

If so, the Proponent must provide the following information:

- (a) name of former public servant;
- (b) conditions of the lump sum payment incentive;
- (c) date of termination of employment;
- (d) amount of lump sum payment;
- (e) rate of pay on which lump sum payment is based;
- (f) period of lump sum payment including start date, end date and number of weeks;
- (g) number and amount (professional fees) of other contracts subject to the restrictions of a work force adjustment program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including Applicable Taxes.

Solicitation No. - N° de l'invitation
EF950-160393/A
Client Ref. No. - N° de réf. du client
EF9502-16-0393

Amd. No. - N° de la modif.
File No. - N° du dossier
QCL-5-38079

Buyer ID - Id de l'acheteur
qc1026
CCC No./N° CCC - FMS No./N° VME

APPENDIX D - DECLARATION/CERTIFICATIONS FORM (CONT'D)

Name of Proponent:

DECLARATION:

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

..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	
..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	
..... name	..... signature
..... title	
I have authority to bind the Corporation / Partnership / Sole Proprietorship / Joint Venture	

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

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

E-mail: _____

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

APPENDIX E – NON DISCLOSURE AGREEMENT

I, _____, recognize that in the course of my work as an employee or

subcontractor of _____, I may be given access to information by or on behalf of Canada in connection with the Work, pursuant to Contract Serial No *EF950-160393* between Her Majesty the Queen in right of Canada, represented by the Minister of Public Works and Government Services, including any information that is confidential or proprietary to third parties, and information conceived, developed or produced by the Consultant as part of the Work. For the purposes of this agreement, information includes but not limited to: any documents, instructions, guidelines, data, material, advice or any other information whether received orally, in printed form, recorded electronically, or otherwise and whether or not labeled as proprietary or sensitive, that is disclosed to a person or that a person becomes aware of during the performance of the Contract.

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

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

I agree that the obligation of this agreement will survive the completion of the Contract Serial No: *EF950-160393*

Signature

Date

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

APPENDIX F - SECURITY REQUIREMENTS CHECK LIST

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

Document off-pagination (3 pages)

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

APPENDIX G -DOING BUSINESS, QUEBEC REGION, ARCHITECTURAL AND ENGINEERING SERVICES (AES), MAY 1, 2013

The document "Doing business, Quebec region, architectural and engineering services (AES), May 1, 2013" appended to the bid solicitation package is to be inserted at this point and forms part of this document.

Document off-pagination (47 pages)

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

APPENDIX H – CADD SUPPLEMENT – QUEBEC REGION, JANUARY 2013

The document “CADD supplement, Quebec region, January 2013” appended to the bid solicitation package is to be inserted at this point and forms part of this document.

Document off-pagination (70 pages)

Solicitation No. - N° de l'invitation

EF950-160393/A

Client Ref. No. - N° de réf. du client

EF9502-16-0393

Amd. No. - N° de la modif.

File No. - N° du dossier

QCL-5-38079

Buyer ID - Id de l'acheteur

qcl026

CCC No./N° CCC - FMS No./N° VME

APPENDIX I - PWGSC STANDARD FORMS

The document "PWGSC standard forms" appended to the bid solicitation package is to be inserted at this point and forms part of this document.

Document off-pagination (144 pages)



Contract Number / Numéro du contrat EF950-16-0393
Security Classification / Classification de sécurité Public / Public

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

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE

1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine Public Works and Government Services Canada	2. Branch or Directorate / Direction générale ou Direction BIENS IMMOBILIERS
---	---

3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant
--	---

4. Brief Description of Work / Brève description du travail
Public Works and Government Services Canada

5. a) Will the supplier require access to Controlled Goods? / Le fournisseur aura-t-il accès à des marchandises contrôlées? No / Non Yes / Oui

5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? / Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques? No / Non Yes / Oui

6. Indicate the type of access required / Indiquer le type d'accès requis

6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? / Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? (Specify the level of access using the chart in Question 7. c.) / Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c.) No / Non Yes / Oui

6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. / Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé. No / Non Yes / Oui

6. c) Is this a commercial courier or delivery requirement with no overnight storage? / S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit? No / Non Yes / Oui

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

Canada <input checked="" type="checkbox"/>	NATO / OTAN <input type="checkbox"/>	Foreign / Étranger <input type="checkbox"/>
--	--------------------------------------	---

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

No release restrictions / Aucune restriction relative à la diffusion <input checked="" type="checkbox"/>	All NATO countries / Tous les pays de l'OTAN <input type="checkbox"/>	No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/>
Not releasable / À ne pas diffuser <input type="checkbox"/>		
Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays:	Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays:	Restricted to: / Limité à: <input type="checkbox"/> Specify country(ies): / Préciser le(s) pays:

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

PROTECTED A / PROTÉGÉ A <input type="checkbox"/>	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ <input type="checkbox"/>	PROTECTED A / PROTÉGÉ A <input type="checkbox"/>
PROTECTED B / PROTÉGÉ B <input checked="" type="checkbox"/>	NATO RESTRICTED / NATO DIFFUSION RESTREINTE <input type="checkbox"/>	PROTECTED B / PROTÉGÉ B <input type="checkbox"/>
PROTECTED C / PROTÉGÉ C <input type="checkbox"/>	NATO CONFIDENTIAL / NATO CONFIDENTIEL <input type="checkbox"/>	PROTECTED C / PROTÉGÉ C <input type="checkbox"/>
CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>	NATO SECRET / NATO SECRET <input type="checkbox"/>	CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>
SECRET / SECRET <input type="checkbox"/>	COSMIC TOP SECRET / COSMIC TRÈS SECRET <input type="checkbox"/>	SECRET / SECRET <input type="checkbox"/>
TOP SECRET / TRÈS SECRET <input type="checkbox"/>		TOP SECRET / TRÈS SECRET <input type="checkbox"/>
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>



PART A (continued) / PARTIE A (suite)

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

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate? No / Non Yes / Oui
Short Title(s) of material / Titre(s) abrégé(s) du matériel :
Document Number / Numéro du document :

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

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

<input checked="" type="checkbox"/> RELIABILITY STATUS COTE DE FIABILITÉ	<input type="checkbox"/> CONFIDENTIAL CONFIDENTIEL	<input type="checkbox"/> SECRET SECRET	<input type="checkbox"/> TOP SECRET TRÈS SECRET
<input type="checkbox"/> TOP SECRET- SIGINT TRÈS SECRET - SIGINT	<input type="checkbox"/> NATO CONFIDENTIAL NATO CONFIDENTIEL	<input type="checkbox"/> NATO SECRET NATO SECRET	<input type="checkbox"/> COSMIC TOP SECRET COSMIC TRÈS SECRET
<input type="checkbox"/> SITE ACCESS ACCÈS AUX EMPLACEMENTS			

Special comments:
Commentaires spéciaux : _____

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

10. b) May unscreened personnel be used for portions of the work?
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail? No / Non Yes / Oui
If Yes, will unscreened personnel be escorted?
Dans l'affirmative, le personnel en question sera-t-il escorté? No / Non Yes / Oui

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

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

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

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

PRODUCTION

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

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

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

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



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

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

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

SUMMARY CHART / TABLEAU RÉCAPITULATIF

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

12. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED? / La description du travail visé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE? No / Non Yes / Oui

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

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED? / La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE? No / Non Yes / Oui

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



Doing Business Quebec Region

Architectural and Engineering Services
May 1st, 2013



TABLE OF CONTENTS

SECTION		PAGE
SECTION 1	INTRODUCTION	3
SECTION 2	PWGSC NATIONAL CADD STANDARD	4
SECTION 3	GUIDE TO PREPARATION OF CONSTRUCTION DOCUMENTS FOR PWGSC	
	GENERAL	4
	SPECIFICATIONS	6
	DRAWINGS	11
	ADDENDA	12
	DOCUMENTS FOR TENDER CALLS	13
SECTION 4	CLASSES OF CONSTRUCTION COST ESTIMATES USED BY PWGSC	14
SECTION 5	TIME MANAGEMENT	16
SECTION 6	RISK MANAGEMENT	24

Appendices

Appendix 'A'	Checklist for the Submission of Construction Documents	28
Appendix 'B'	Sample Addendum Format	33
Appendix 'C'	Sample Index for Drawings and Specifications	34
Appendix 'D'	User Manual on Directory Structure and Naming Conventions Standards for Construction Tender Documents on CDROM, dated May 2005	35
Appendix 'E'	Basic Reference Guide on Converting Construction Drawings into Portable Document Format (PDF), dated May 2005	45



SECTION 1 INTRODUCTION

This document must be used in conjunction with the Terms of Reference TOR (Project brief, Request for proposals or others), as the two documents are complimentary. The TOR describes project-specific requirements while this document deals with information common to all projects. In case of a conflict between the two documents, the requirements of the TOR override this document.

The Consultant shall check with the Project Manager if this document is current. The updated version of the latest is the one applicable to the project.

SECTION 2 PWGSC NATIONAL CADD STANDARD

Drawings shall be in accordance with Public Works and Government Services Canada (PWGSC) National CADD Standards, **Quebec regional version**, and CSA B78.3 of Canadian Standards Association.

Refer to:

<http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html>

For the Quebec region:

<http://www.tpsgc-pwgsc.gc.ca/cdao-cadd/index-eng.html>

The above link is subject to change. The Consultant shall check with the Project Manager to ensure that the link and related information are current and relevant with regards to PWGSC National CADD Standards **for the Quebec region**.

SECTION 3 - GUIDE TO PREPARATION OF CONSTRUCTION DOCUMENTS FOR PWGSC

1 Purpose

This document provides direction in the preparation of construction contract documents (namely specifications, drawings and addenda) for Public Works and Government Services Canada (PWGSC).

Drawings, specifications and addenda must be complete and clear, so that a contractor can prepare a bid without guesswork. Standard practice for the preparation of construction contract documents requires that:

- Drawings are the graphic means of showing work to be done, as they depict shape, dimension, location, quantity of materials and relationship between building components.
- Specifications are written descriptions of materials and construction processes in relation to quality, colour, pattern, performance and characteristics of materials, installation and quality of work requirements.
- Addenda are changes to the construction contract documents or tendering procedures, issued during the tendering process.



2 Principles of PWGSC Contract Documents

PWGSC's contract documents are based on common public procurement principles. PWGSC does not use Canadian Construction Document Committee (CCDC) documents.

The terms and conditions are prepared and issued by PWGSC as well as other related bidding and contractual documents. For information, the clauses are available on the following web site: <http://ccua-sacc.tpsgc-pwgsc.gc.ca/pub/tmtc-eng.jsp>
Any questions should be directed to the Project Manager.

3 Quality Assurance

Consultants are required to undertake their own quality control process and must review, correct and coordinate (between disciplines) their documents before sending them to PWGSC.

SPECIFICATIONS

1 National Master Specification

The National Master Specification (NMS) is a master construction specification available in both official languages, which is divided into 48 Divisions and used for a wide range of construction and/or renovation projects. In preparing project specifications, the Consultant must use the current edition of the NMS in accordance with the "NMS User's Guide".

The Consultant retains overriding responsibility for content and shall edit, amend and supplement the NMS as deemed necessary to produce an appropriate project specification free from conflict and ambiguity.

2 Specification Organization

Narrowscope sections describing single units of work are preferred for more complex work, however, broadscope sections may be more suitable for less complex work. Use either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full-page format.

Start each Section on a new page and show PWGSC Project Number, Section Title, Section Number and Page Number on each page. Specification date, project title, and consultant's name are not to be indicated.

3 Terminology

Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect. "Departmental Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the Departmental Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the Departmental Representative to the Contractor.

Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by "Departmental Representative", should not be indicated in the specifications as this promotes inaccurate and inflated bids. Specifications must permit bidders to calculate all quantities and bid accurately. In exceptional cases, if quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices). Ensure that the terminology used throughout the specifications is consistent and does not contradict the applicable standard construction contract documents.

4 Dimensions

Dimensions are to be in metric only (no dual dimensioning).

5 Standards

As references in the NMS may not be up to date, it is the responsibility of the consultant to ensure that the project specification uses the latest applicable edition of all references quoted. The following is a list of some of the Internet websites which provide the most current publications of standards for reference in the construction specification document.

- CSA standards: <http://www.csa.ca>
- CGSB standards: <http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html>
- ANSI standards: <http://www.ansi.org>
- ASTM Standards: <http://www.astm.org>
- ULC standards: <http://www.ulc.ca>
- General reference of standards: <http://www.techstreet.com/>

The NMS website (<http://www.tpsgc-pwgsc.gc.ca/biens-property/ddn-nms/index-eng.html>) also links to other documents references in the NMS under its "Links" feature.

6 Specifying Materials

The practice of specifying actual brand names, model numbers, etc., is against departmental policy except for special circumstances. The method of specifying materials shall be by using recognized standards such as those produced by Canadian Gas Association (CGA), Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), and Underwriters' Laboratories of Canada (ULC), or by trade associations such as Canadian Roofing Contractors' Association (CRCA) and Terrazzo, Tile, Marble Association of Canada (TTMAC). Canadian standards should be used wherever possible.

If the above method cannot be used and where no standards exist, specify by a non-restrictive, non-trade name "prescription" or "performance" specifications.

In exceptional or justifiable circumstances or, if no standards exist and when a suitable non-restrictive, non-trade name "prescription" or "performance" specification cannot be developed, specify by trade name. Include all known materials acceptable for the purpose intended, and in the case of equipment, identify by type and model number.

Acceptable Materials: set up the paragraph format as follows:

Acceptable Materials:

1. ABC Co. Model [_____].
2. DEF Co. Model [_____].
3. GHI Co. Model [_____].
4. Alternative Materials: Approved by addendum in accordance with Instructions to Tenderers.

Alternatively, include the following article in Part 1 of each Section in which trade names appear:

Acceptable Materials: *Where materials are specified by trade name refer to the "Instructions to Tenderers" for a procedure to be followed in applying for approval of alternatives.*

Alternative materials to those specified may be considered during the solicitation period, however, the onus will be on the Consultant to review and evaluate all requests for approval of alternative materials.

The term “Acceptable Manufacturers” should not be used, as this restricts competition and does not ensure the actual material or product will be acceptable. A list of words and phrases that should be avoided is included in the NMS User’s Guide.

Sole Sourcing: Sole sourcing for materials and work can be used for proprietary systems (ie. fire alarm systems, EMCS – Energy Monitoring and Control Systems). A justification will be required in this context.

Wording for the sole source of work should be in Part 1 as:

“Designated Contractor

.1 Hire the services of [] to do the work of this section.”

Wording for the sole source of Energy Monitoring and Control Systems (EMCS) should be in Part 1 as:

“Designated Contractor

.1 Hire the services of [] or its authorized representative to complete the work of all EMCS sections.”

and in Part 2 as “Materials

.1 There is an existing [] system presently installed in the building. All materials must be selected to ensure compatibility with the existing [] system.

Wording for the sole source of materials (ie. fire alarm systems) should be in Part 2 as:

“Acceptable materials

.1 The only acceptable materials are [].”

Prior to including sole source materials and/or work, the Consultant should contact the Project Manager to obtain the approval for the sole sourcing.

7 Unit Prices

Unit prices are used where the quantity cannot be precisely estimated (eg. earth work). The approval of the Project Manager must be sought in advance of their use.

Use the following wording:

[The work for this section] or [define the specific work if required, e.g. rock excavation] will be paid based on the actual quantities measured on site and the unit prices stated in the Bid and Acceptance Form.

In each applicable NMS section, replace paragraph title "Measurement for Payment" with "Unit Prices".

Refer to Appendix 1 of the Bid and Acceptance Form to view a sample of Unit Price Table.

8 Cash Allowances

Construction contract documents should be complete and contain all of the requirements for the contractual work. Cash allowances are to be used only under exceptional circumstances (ie. utility companies, municipalities), where no other method of specifying is appropriate. Obtain approval from the Project Manager in advance to include cash allowances and then use “Section 01 21 00 - Allowances” of the NMS to specify the criteria.

9 Warranties

It is the practice of PWGSC to have a 12 month warranty and to avoid extending warranties for more than 24 months. When necessary to extend beyond the 12 month warranty period provided for in the General Conditions of the contract, use the following wording in Part 1 of the applicable technical sections, under the heading "Extended Warranty":

- "For the work of this Section [____], the 12 month warranty period is extended to 24 months.
- Where the extended warranty is intended to apply to a particular part of a specification section modify the above as follows: "For [____] the 12 month ... [____] months."

Delete all references to manufacturers' guarantees.

10 Scope of Work

No paragraphs noted as "Scope of Work" are to be included.

11 Summary and Section Includes in Part -1 General of Section

Do not use the terms "Summary" and "Section Includes."

12 Related Sections

In every section of the specification at 1.1 "Related Sections": coordinate the list of related sections and appendices. Ensure co-ordination among the sections of the specification and ensure not to reference any section or appendices which do not exist.

13 Index

List all the plans and specification sections with correct number of pages, section names and correct drawing titles in the format shown in Appendix C.

14 Regional requirements

The Consultant should contact the Project Manager to obtain the regional requirements concerning Division 01 or other short form specifications as might be appropriate. For example, in the Quebec Region, the use of the *Section 01 11 01 – Work related general information* is necessary.

15 Health and Safety

It is required that all project specifications include "Section 01 35 29.06 - Health and Safety Requirements." Confirm with the Project Manager to determine if there are any instructions to meet regional requirements.

16 Designated Substances Report

Include "Section 01 14 25 - Designated Substances Report"

17 Subsurface Investigation Reports

Subsurface Investigation Report(s) are to be included after Section 31 and the following paragraph should be added to Section 31:

Subsurface investigation report(s)

.1 Subsurface investigation report(s) are included in the specification following this section.

When the Project Manager determines that it is not practical to include the subsurface investigation report(s), alternate instructions will be provided.

Where tender documents are to be issued in both official languages, the subsurface investigation report(s) shall be issued in both languages.

In addition to the provision of the Subsurface Investigation Report, the foundation information required by the National Building Code of Canada 2005 (Division C, Part 2, 2.2.4.6) shall be included on foundation drawings.

18 Experience and Qualifications

Remove experience and qualification requirements from specification sections.

19 Prequalification and Pre-award submissions

Do not include in the specification any mandatory contractor and/or subcontractor prequalification or pre-award submission requirements that could become a contract award condition. If a prequalification process or a pre-award submission is required, contact the Project Manager.

There should be no references to certificates, transcripts or license numbers of a trade or subcontractor being included with the bid.

20 Contracting Issues

Specifications describe the workmanship and quality of the work. Contracting issues should not appear in the specifications. Division 00 of the NMS is not used for PWGSC projects.

Remove all references within the specifications, to the following:

- General Instructions to Bidders
- General Conditions
- CCDC documents
- Priority of documents
- Security clauses
- Terms of payment or holdback
- Tendering process
- Bonding requirements
- Insurance requirements
- Alternative and separate pricing
- Site visit (Mandatory or Optional)
- Release of Lien and deficiency holdbacks

DRAWINGS

1 Title Blocks

Use PWGSC title block for drawings and sketches (including addenda).

2 Dimensions

Dimensions are to be in metric only (no dual dimensioning).

3 Trade Names

Trade names on drawings are not acceptable. Refer to SECTION 3, SPECIFICATIONS, 6.0 Specifying Materials for specifying materials by trade name.

4 Specification Notes

No specification type notes are to appear on any drawing.

5 Terminology

Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect. "Departmental Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the Departmental Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the Departmental Representative to the Contractor.

Notes such as: "verify on site", "as instructed", "to match existing", "example", "equal to" or "equivalent to", "to be determined on site by "Departmental Representative", should not appear on drawings as this promotes inaccurate and inflated bids. Drawings must allow bidders to calculate all quantities and bid accurately. In exceptional cases, where quantities are impossible to quantify (i.e. cracks to be repaired), refer to indications contained in section 3, Specifications, 3 Terminology.

6 Information to be included

Drawings should show the quantity and configuration of the project, the dimensions and details of how it is constructed. There should be no references to future work or any information planned to be changed by future addenda. The scope of work should be clearly detailed and elements not in contract should be eliminated or kept to an absolute minimum.

7 Drawing Numbers: Sets of drawings shall be numbered according to the type of drawing and the discipline involved, as indicated in the PWGSC NATIONAL CADD STANDARD.

During the Design Phase of the project each issue and review of documents must be noted on the Notes block of the drawing title, but at the time of construction document preparation, all revision notes should be removed.

8 Presentation Requirements: Present drawings in sets comprising the applicable civil, architectural, structural, mechanical and electrical drawings in that order. All drawings should be of uniform standard size.

9 Prints: Print with black lines on white paper. Confirm with Project Manager the size of prints to be provided for review purposes.

- 
- 10 Binding:** Staple or otherwise bind prints into sets. Where presentations exceed 20 sheets, the drawings for each discipline may be bound separately for convenience and ease of handling.
- 11 Legends:** Provide a legend of symbols, abbreviations, references, etc., on the front sheet of each set of drawings or, in large sets of drawings, immediately after the title sheet and index sheets.
- 12 Schedules:** Where schedules occupy entire sheets, locate them on top of each set of drawings for convenient reference. *See CGSB 33-GP-7 Architectural Drawing Practices for schedule arrangements.*
- 13 North Points:** On all plans include a north point. Orient all plans in the same direction for easy cross-referencing. Wherever possible, lay out plans so that the north point is at the top of the sheet.
- 14 Drawing Symbols:** Follow generally accepted drawing conventions, understandable by the construction trades, and in accordance with PWGSC publications.

ADDENDA

1 Format

Prepare addenda using the format shown in Appendix B. No signature type information is to appear.

Every page of the addendum (including attachments) must be numbered consecutively. All pages must have the PWGSC project number and the appropriate addendum number. Sketches shall appear in the PWGSC format, signed and sealed.

No Consultant information (name, address, phone #, consultant project # etc.) should appear in the addendum or its attachments (except on sketches).

2 Content

Each item should refer to an existing paragraph of the specification or note/detail on the drawings. The clarification style is not acceptable.

DOCUMENTS FOR TENDER CALLS

1 Translation

When required, all documentation included in the construction contract documents shall be in both official languages.

Ensure that English and French documents are equal in all respects. There can be no statement that one version takes precedence over the other.

2 Consultant shall provide:

- Per construction document submission, a completed and signed Checklist for the Submission of Construction Documents. See Appendix 'A'.
- Specification: originals printed one side on 216 mm x 280 mm white bond paper.
- Index: as per Appendix 'C'
- Addenda (if required): as per Appendix 'B' (to be issued by PWGSC).
- Drawings: reproducible originals, sealed and signed by the design authority.
- Tender information:
 - Including a description of all units and estimated quantities to be included in unit price table.
 - Including a list of significant trades including costs. PWGSC will then determine which trades, if any, will be tendered through the Bid Depository.
Government Electronic Tendering System (MERX): Consultants to provide an electronic true copy of the final documents (specifications and drawings) on one or multiple CD-ROM in Portable Document Format (PDF) without password protection and printing restrictions. The electronic copy of drawings and specifications for bidding and construction purposes are required to be signed and sealed by professionals in each discipline. See Appendix 'D' and Appendix 'E'.

3 PWGSC shall provide:

- General and Special Instructions to Bidders
- Bid and Acceptance Form
- Standard Construction Contract Documents

SECTION 4 CLASSES OF CONSTRUCTION COST ESTIMATES USED BY PWGSC

DESCRIPTION OF THE CLASSES OF ESTIMATES USED BY PWGSC FOR CONSTRUCTION COSTING OF BUILDINGS PROJECTS

Class 'D' (Indicative) Estimate:

Based upon a comprehensive statement of requirements, and an outline of potential solutions, this estimate is to provide an indication of the final project cost, and allow for ranking all the options being considered.

Submit Class D cost estimates in elemental cost analysis format latest edition issued by the Canadian Institute of Quantity Surveyors with cost per m² for current industry statistical data for the appropriate building type and location. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class D cost estimate shall be such that no more than a 20% design contingency allowance is required.

Class 'C' Estimate:

Based on a comprehensive list of requirements and assumptions including a full description of the preferred schematic design option, construction/design experience, and market conditions. This estimate must be sufficient for making the correct investment decision.

Submit Class C cost estimates in elemental cost analysis format latest edition issued by the Canadian Institute of Quantity Surveyors with cost per m² for current industry statistical data for the appropriate building type and location. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class C cost estimate shall be such that no more than a 15% design contingency allowance is required.

Class 'B' (Substantive) Estimate:

Based on design development drawings and outline specifications which include the design of all major systems and subsystems, as well as the results of all site/installation investigations. This estimate must provide for the establishment of realistic cost objectives and be sufficient to obtain effective project approval.

Submit Class B cost estimates in elemental cost analysis format latest edition issued by the Canadian Institute of Quantity Surveyors. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class B cost estimate shall be such that no more than a 10% design contingency allowance is required.



Class 'A' (Pre-Tender) Estimate:

Based on completed construction drawings and specifications, prepared prior to calling competitive tenders. This estimate must be sufficient to allow a detailed reconciliation/negotiation with any contractor's tender.

Submit Class A cost estimates in both elemental cost analysis format and trade divisional format latest edition issued by the Canadian Institute of Quantity Surveyors. Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

The level of accuracy of a class A cost estimate shall be such that no more than a 5% design contingency allowance is required.

SECTION 5 TIME MANAGEMENT

5 Time Management, Planning, and Control

The Time Management, Planning, and Control Specialist (scheduler) shall provide a Project Planning and Control System (Control System) for Planning, Scheduling, Progress Monitoring and Reporting and a Time Management, Planning, and Control Report (Progress Report). It is required that a fully qualified and experienced Scheduler play a major role in providing services in the development and monitoring of the project schedule.

The scheduler will follow good industry practices for schedule development and maintenance as recognized by the Project Management Institute (PMI).

PWGSC presently utilizes the Primavera Suite software and MicroSoft Project for it's current Control Systems and any software used by the consultant should be fully integrated with these, using one of the many commercially available software packages.

5.1 Schedule Design

Project Schedules are used as a guide for execution of the project as well as to communicate to the project team when activities are to happen, based on network techniques using Critical Path Method (CPM).

When building a Control System you must consider:

1. The level of detail required for control and reporting;
2. The reporting cycle- monthly and what is identified in the Terms of Reference, but also includes Exception Reports;
3. That the duration must be in days;
4. What is required for reporting in the Project Teams Communications Plan and
5. The nomenclature and coding structure for naming and reporting requirements of activities, schedules and reports.

5.2 Schedule Development

For purposes of monitoring and reporting of project progress and ease of schedule review it is important to maintain a standard for all schedules and reports starting with the Work Breakdown Structure (WBS), identification of Milestones, naming of activities as well as schedule outputs and paper sizing and orientation.

Work Breakdown Structure

When developing the schedule the consultant needs to use PWGSC standards and practices. Two basic requirements are the National Project Management System (NPMS) and a Work Breakdown Structure (WBS), structured supporting the NPMS (Levels 1-4).

The WBS is as follows:

- Level 1 Project Title (NPMS)
- Level 2 Project Stage (NPMS)
- Level 3 Project Phase (NPMS)
- Level 4 Processes to meet Deliverables/Control Points Milestones (NPMS)
- Level 5 Sub-Processes and Deliverables in support of Level 4
- Level 6 Discrete activities. (Work Package)

Not all the Stages, Phases and Processes in the NPMS will be required on all the projects, however the structure remains the same.

Major and Minor Milestones

The Major Milestones are standard Deliverables and Control Points within NPMS and are required in all schedule development. These Milestones will be used in Management Reporting within PWGSC as well as used for monitoring project progress using Variance Analysis. The Minor milestones are process deliverables (Level 4) or sub-process deliverables (level 5) also used in Variance Analysis.

Each Milestone will also be assigned appropriate coding for Status Reporting and Management Reporting.

Milestones must have zero duration and are used for measuring project progress.

Milestones may also be external constraints such as the completion of an activity, exterior to the project, affecting the project.

Activities

All activities will need to be developed based on Project Objectives, Project Scope , Major and Minor Milestones, meetings with the project team and the scheduler's full understanding of the project and it's processes.

Subdivide the elements down into smaller more manageable pieces that organize and define the total scope of work in Levels 5-6 that can be scheduled, costed, monitored and controlled. This process will develop the Activity List for the project.

Each activity is a discrete element of work and is the responsibility of one person to perform.



Each activity will describe the work to be performed using a verb and noun combination (i.e. Review Design Development Report).

Activities should not have durations longer than 2 update cycles, with exception of activities not yet defined in a “Rolling Wave”.

Each activity will be assigned at WBS level 6 and appropriately coded for Status Reporting and Management Reporting.

These elements will become activities, interdependently linked in Project Schedules.

Project Logic

Once the WBS, Milestones and Activity List have been developed the activities and milestones can be linked in a logical manner starting with a Project Start Milestone. Every activity and milestone must be linked in a logical manner using either a Finish to Start (FS), Finish to Finish (FF), Start to Start (SS) or Start to Finish (SF) relationship. There can be no open-ended activities or milestones.

A Finish to Start (FS) is the preferred relationship.

When developing relationships; avoid the use of lags and constraints in place of activities and logic.

Activity Duration

The activity duration (in days) is the estimated length of time it will take to accomplish a task.

Consideration needs to be taken in how many resources are needed and are available, to accomplish any activity. (Example: availability of Framers during a “Housing Boom”.) Other factors are the type or skill level of the available resources, available hours of work, weather etc.

There will be several types of lists and schedules produced from this process, which will form part of the Progress Report.

Activity List

An Activity List identifies all activities including milestones required to complete the whole project.

Milestone List

A Milestone List identifies all project Major and Minor milestones.

Master Schedule

A Master Schedule is a schedule used for reporting to management at WBS level 4 and 5 that identifies the major activities and milestones derived from the detailed schedule. Cash Flow projections can be assigned at WBS level 5 for monitoring the Spending Plan.

Detailed Project Schedule

A Detailed Project Schedule is a schedule in reasonable detail (down to WBS Level 6 and 7) for progress monitoring and control, this will ensure that the schedule shall be in sufficient detail to ensure adequate planning and control.

5.3 Schedule Review and Approval

Once the scheduler has identified and properly coded all the activities; put them into a logical order and then determined the appropriate durations. The scheduler can then analyze the schedule to see if the milestone dates meet the contractual requirements and then adjust the schedule accordingly by changing durations, resource leveling or changing logic.

When the schedule has been satisfactorily prepared the scheduler can present the detailed schedule to the Project Team for approval and be Baseline. There may be several iterations before the schedule meets with the Project Teams agreement and the contractual requirements.

The final agreed version must be copied and saved as the Baseline to monitor variances for reporting purposes.

5.4 Schedule Monitoring and Control

Once Baseline the schedule can be better monitored, controlled and reports can be produced.

Monitoring is performed by, comparing the baseline activities % complete and milestone dates to the actual and forecast dates to identify the variance and record any potential delays, outstanding issues and concerns and provide options for dealing with any serious planning and scheduling issues in report form.

Analyze and report from early start sequence on all activities due to start, underway, or finished for the complete project.

There will be several reports generated from the analysis of the baseline schedule and will form part of the Time Management Report in the Required Services Sections (RS)

Progress Reports

A Progress Report reflects the progress of each activity to the date of the report, any logic changes, both historic and planned, projections of progress and completion the actual start and finish dates of all activities being monitored.

The Progress Report includes:

A Narrative Report, detailing the work performed to date, comparing work progress to planned, and presenting current forecasts. This report should summarize the progress to date, explaining current and possible deviations and delays and the required actions to resolve delays and problems with respect to the Detail Schedule, and Critical Paths.

Narrative reporting begins with a statement on the general status of the project followed by a summarization of delays, potential problems and project status criticality, any potential delays, outstanding issues and concerns and options for dealing with any serious planning and scheduling issues.

A Variance Report, with supporting schedule documentation, detailing the work performed to date, comparing work progress to planned. This report should summarize the progress to date, explaining all causes of deviations and delays and the required actions to resolve delays and problems with respect to the Detail Schedule, and Critical Paths.

A Criticality Report identifying all activities and milestones with negative, zero and up to five days Total Float used as a first sort for ready identification of the critical, or near critical paths through the entire project.

Included in the Progress Report as attachments are: WBS chart, Activity Lists, Milestone Lists, Master Schedules, Detailed Project Schedule

Exception Report

The Scheduler is to provide continuous monitoring and control, timely identification and early warning of all unforeseen or critical issues that affect or potentially affect the project.

If unforeseen or critical issues arise, the Scheduler will advise the Project Manager and submit proposed alternative solutions in the form of an Exception Report.

An Exception Report will include sufficient description and detail to clearly identify:

1. Scope Change: Identifying the nature, reason and total impact of all identified and potential project scope changes affecting the project.
2. Delays and accelerations: Identifying the nature, the reason and the total impact of all identified and potential duration variations.
3. Options Enabling a Return to the project baseline: Identifying the nature and potential effects of all identified options proposed to return the project within baselined duration.

5.5 Standard issue of documents

At each issue of documents or deliverable stage provide a complete and updated Progress Report, the contents of each report will vary with requirements and at each project phase. Typically a Progress Report has:

1. Executive Summary;
2. Narrative Report;
3. Variances Report;
4. Criticality Report;
5. Exception Report (as required)
6. Work Breakdown Structure Chart;
7. Activity List;
8. Milestone List;
9. Master Schedule with Cash Flow Projections;
10. Detail Project Schedule (Network Diagram or Bar Charts);

5.6 Schedule Outputs and Reporting Formats

The sheet sizing and orientation is more a suggestion that a role, changes to the paper format may vary to accommodate the information and column information required.

Progress Reports

Paper Size: Letter
Paper Format: Portrait
Title Format: Project Title; Report Type; Print Date; Data Date; Revision Block
Body Text: Narratives for each report to match other reports generated in the D.S.S.
Variance Report Columns: Activity ID, Activity Name, Planned Finish, Revised Finish, Variance, Activity % Complete,
Criticality Report Columns: Activity ID, Activity Name, Duration, Start, Finish, Activity % Complete, Total Float.

Exception Reports

Paper Size: Letter
Paper Format: Portrait
Title Format: Project Title; Report Type; Print Date; Data Date; Revision
Body Text: Narrative to match other reports generated in the D.S.S.
Paper Size: Letter
Paper Format: Landscape
Title Format: Project Title; Report Type; Print Date; Data Date; Revision
Columns: Activity ID, Activity Name, Duration, Remaining Duration, Start, Finish, Total Float.

Work Breakdown Structure (indent tree):

Paper Size: Letter
Paper Format: Portrait
Columns: WBS Code, WBS Name, Duration, Cost estimate, start and finish dates.
Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Activity Lists

Paper Size: Letter
Paper Format: Portrait
Columns: Activity ID, Activity Name, Start, Finish, Predecessor, Successor.
Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block

Sort with Early Start, then Early Finish, then Activity ID and with the WBS.



Milestone Lists

Paper Size: Letter
Paper Format: Portrait
Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block
Columns: Activity ID, Activity Name, Start, Finish.

Sort with Early Start, then Early Finish, then Activity ID and without the WBS.

Master Schedule (Bar Chart)

Paper Size: 11X17
Paper Format: Landscape
Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block
Columns: Activity ID, Activity Name, Duration, Activity % Complete, Start, Finish,
Total Float.

Sort with Early Start, then Early Finish, then Activity ID and with the WBS.

Detailed Project Schedules (Bar Chart)

Paper Size: 11X17
Paper Format: Landscape
Footer Format: Project Title; Report Type; Print Date; Data Date; Revision Block
Columns: Activity ID, Activity Name, Duration, Activity % Complete, Start, Finish,
Total Float.

Sort with Early Start, then Early Finish, then Activity ID and with the WBS.

SECTION 6 RISK MANAGEMENT

6.1 DEFINITIONS

Procurement Plan: Formal submission for approval to enter into a contract and composed of a (1) cost estimate of the requirement (including cash allowances, and design, estimating and inflation allowances), (2) a contingency and, (3) an anticipated amendment amount.

Allowances: Additional resources included in an estimate to vcover the cost of known but undefined requirements for an individual activity, work item, account or sub account: design allowance, estimating allowance, inflation allowance and other allowances specifically identified are part of a cost estimate

Cash Allowances : a specific amount to be used for specific work item or service.

(a) Cash Allowance Construction: additional resources included in an estimate to cover the cost of known but undefined requirements whose probability of occurrence is high. this allowance is specifically identified in a cost estimate.

(b) Cash Allowance Consultant: additional services included in an estimate to cover the cost of known but undefined requirements whose probability of occurrence is high. this allowance is specifically identified in a cost estimate.

Risk Allowance: Anticipated monetary value of risk events, due to the complexity of the project, market conditions, competitiveness, and timing of project, contingencies are likely to happen and do not form part of cost estimates.

Anticipated Amendments: This is basically the pre-authorization of amending authority to a certain level. Individual contract amendments within this authority must still be approved by the correct level of authority.

The total amount of the Anticipated Amendment to a project cost estimate is determined as the summation of the Expected Monetary Value of risk events reasonably expected to occur during the life cycle of a project.

Risk Management: The art and science of identifying, analyzing, and responding to risk factors throughout the life of a project and in the best interests of its objectives. (PMBOK)

Risk Event: A discrete occurrence that may effect the project for better or worse (i.e. late delivery of a piece of equipment is a “risk event” that may cause a schedule delay).

Probability: The likelihood that an event will occur (i.e. Low, Medium, High).

Impact: The result of the occurrence of an event on the project either positive or negative. (i.e. a schedule delay as a result of late delivery of a piece of equipment may have a high negative impact on a project; increased access to a construction site due to early departure of occupants in an office space may have a positive impact on a project).

The Impact of individual Risk Events can be qualified as low, medium, high or quantified in terms of time, cost (immediate cost or in-service cost (O&M)) or performance.

High risk*: A project (or element of a project) may be assessed as high risk if one or more hazards exist in a significant way and, unless mitigated, would result in probable failure to achieve project objectives.

Medium risk*: A project (or element of a project) may be assessed as medium risk if some hazards exist but have been mitigated to the point that allocated resources and focused risk management planning should prevent significant negative effect on the attainment of project objectives.

Low risk*: A project (or element of a project) should be assessed as low risk if hazards do not exist or have been reduced to the point where routine project management control should be capable of preventing any negative effect on the attainment of project objectives.

**per Treasury Board Secretariat Manuals Chapter 2-2 Project Management*

EMV: Expected monetary value of risk event (i.e. cost or saving to the project if risk event occurs)

6.2 RISK MANAGEMENT CHECKLIST

Probability, impact, over all risk, risk response and risk allowance are to be determined for each item listed below;

Resources External to Project Management Team

- ◆ Planning Resources and Performance
 - errors and omissions
 - low accuracy of estimates (allowances)
 - data inadequacies
 - level of liability insurance
 - potential for misinterpretation / misunderstanding of documents
 - planning inexperience
- ◆ Construction Resources Required & Performance
 - level of liability insurance
 - design versus execution methods
 - suitability of execution methods to design
 - commissioning issues (start up / turnover difficulties)
 - contractor construction strategy
 - reputation of contractor
 - contractor financial stability
 - contractor inexperience
 - resources obtained less qualified than desired
 - availability / suitability / performance of resource



Project Scope Delivery

- ◆ Delivery of Specified Requirement
 - accuracy of client requirements in terms of cost/ schedule / performance / quality and ability to interface with existing environment
 - conflicting client priorities
 - low level of client knowledge

- ◆ Unstated Client Requirements
 - completeness of client requirements in terms of cost/ schedule / performance / quality and ability to interface with existing environment
 - restricted working conditions
 - opportunities for changes / positive impact

- ◆ Stakeholder Requirements, Stated and Unstated
 - low involvement of user groups in scope of definition
 - interface with existing systems
 - restricted working conditions
 - operational needs

Site / Asset / Building Actual Conditions

- ◆ Actual Physical Environment
 - availability / accuracy of as built documentation and existing condition reports
 - high variability / low stability of soils
 - potential for soil contamination
 - presence of hazardous materials
 - availability / access to site
 - presence of other contractors on site
 - climate (winter conditions, rain, wind, water levels)

Government / PWGSC / Client / Context

- ◆ Impact on Adjacent Areas Actual
 - impact on adjacent areas (land / tenants/ traffic / operations)
- ◆ Impact from External Sources
 - legal lawsuits, patent rights, licensing, etc.
 - political impacts including visibility of project
 - social sensibilities
 - potential strikes
 - market risks
 - bad press (media coverage)
- ◆ Impact from Unanticipated Regulatory Change
 - environmental legislation and environmental screening
 - potential changes to Acts, Codes and Regulations
 - municipal building / occupancy permit issues
- ◆ Procedures Known
 - suitability of tender documents
 - suitability of contracting method
 - delays in tendering process
 - client internal coordination
 - change order process
- ◆ Plan Approval / Design Reviews
 - approvals may be required from Client, PWGSC, Treasury Board, FHBRO, Fire Commissioner, Police, Emergency Services, Municipalities, Cities, etc.
 - absence of Investment Analysis
 - unstable / changing client organization
 - heritage building issues
 - health and safety issues
 - potential for “hold orders”
 - design review delays (client / PWGSC / TBS / other)
 - approval delays (client / PWGSC / TBS / other)

APPENDIX 'A' - Checklist for the issue of Construction Documents to PWGSC

Last updated 2011-07-28

Date:		
Project Title:	Project Location:	
Project Number:	Contract Number:	
Consultant's Name:	PWGSC Project Manager:	
Review Stage:	66%	99% 100%

Item	Verified by:	Comments:	Action by:
Specifications:			
1 National Master Specifications			
1a The current edition of the NMS has been used.			
2 Specification Organization			
2a Either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full page format is used.			
2b Each Section starts on a new page and the Project Number, Section Title, Section Number and Page Number show on each page.			
2c Specification date and consultant's name are not indicated.			
3 Terminology			
3a The term Departmental Representative is used instead of Engineer, PWGSC, Owner, Consultant or Architect.			
3b Notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to", "equivalent to" and "to be determined on site by" are not used.			
4 Dimensions			
4a Dimensions are provided in metric only.			
5 Standards			
5a The latest edition of all references quoted is used.			

Item	Verified by:	Comments:	Action by:
Specifications:			
6 Specifications Materials			
6a The method of specifying materials uses recognized standards. Actual brand names and model numbers are not specified.			
6b Identify if non-restrictive, non-trade name “prescription” or “performance” specifications are used.			
6c Indicate if a list of acceptable materials have been used.			
6d The term “Acceptable Manufacturers” is not used.			
6e Indicate if sole sourcing has been used.			
7 Unit Prices			
7a Unit prices are used only for work that is difficult to estimate.			
8 Cash Allowances			
8a Indicate if cash allowances have been used.			
9 Warranties			
9a Indicate if warranties extend more than a 12 or 24 months period.			
9b Manufacturers guarantees are not indicated.			
10 Scope of Work			
10 No paragraphs noted as “Scope of Work” are included.			
11 Summary and Section Includes			
11a In part 1 of section, paragraphs “Summary” and “Section Includes” are not used.			
12 Related Sections			
12a The list of related sections and appendices are coordinated.			
13 Index			
13a The index shows a complete list of drawings and specification sections with the correct number of pages and correct drawing titles and section names.			

Item	Verified by:	Comments:	Action by:
Specifications:			
14 Regional requirements			
14a General Instructions are included (Section 01 11 01 for Quebec region).			
15 Health and Safety			
15a Section 01 35 29.06 - Health and Safety Requirements is included.			
16 Designated Substances Report			
16 a Section 01 14 25 - Designated Substances Report is included.			
17 Subsurface Investigation Reports			
17a Subsurface Investigation Reports are included in Division 31.			
18 Experience and qualifications			
18a Experience and qualification requirements do not appear in the specification sections			
19 Pre-qualifications			
19a There are no mandatory contractor and/or subcontractor pre-qualification requirements or references to certificates, transcripts or license numbers of a trade or subcontractor being included in the bid.			
20 Contracting Issues			
20a Contracting issues do not appear in the specifications.			
20b Division 00 of the NMS is not used.			
21 Quality Issues			
21a There are no specification clauses with square brackets “[]” or lines “_” indicating that the document is incomplete or missing information.			

Item	Verified by:	Comments:	Action By:
Drawings:			
1 Title Blocks			
1a The PWGSC title block is used.			
1b The project information in the title block is coordinated between disciplines.			
2 Dimensions			
2a Dimensions are provided in metric only.			
3 Trade Names			
3a Trade names are not used.			
4 Specification Notes			
4a There is no specification type notes.			
5 Terminology			
5a The term Departmental Representative is used instead of Engineer, PWGSC, Owner, Consultant or Architect.			
5b Notations such as: “verify on site”, “as instructed”, “to match existing”, “example”, “equal to”, “equivalent to” and “to be determined on site by” are not used.			
6 Information to be included			
6a The project quantity and configuration, dimensions and construction details are included.			
6b References to future work and elements not in contract do not appear or are kept to an absolute minimum and clearly marked.			

Item	Verified by:	Comments:	Action By:
Drawings:			
7 Respect of PWGSC standards for electronic format			
7a The electronic format of drawings respects the current CADD standards of PWGSC.			
7b The electronic format of drawings and specifications, in English and French, respects the PWGSC directory structure for electronic tender documents.			

I confirm that the plans and specifications of all disciplines have been thoroughly reviewed and that the items listed above have been addressed or incorporated. I acknowledge and accept that by signing certifying that all items noted above have been addressed, should it be found during the tendering of these documents or implementation of the project, that the items above were not properly addressed, my firm will be responsible to resolve all related issues at my firm's expense and may receive an unsatisfactory consultant performance evaluation which could have an impact on my firm's ability to obtain work from PWGSC in the future.

Consultant's Representative: _____

Firm name: _____

Signature: _____ Date: _____

APPENDIX 'B' - Sample of Addendum

Last updated April 22, 2008

ADDENDUM No. _____

Project Number: _____

The following changes in the bid documents are effective immediately. This addendum will form part of the contract documents

DRAWINGS

SPEC NOTE: indicate drawing number and title, then list changes or indicate revision number and date, and re-issue drawing with addendum.

- 1 A1 Architectural
 .1

SPECIFICATIONS

SPEC NOTE: indicate section number and title.

- 1 Section 01 11 01 – Work related general information

SPEC NOTE: list all changes (i.e. delete, add or change) by article or paragraph

- .1 Delete article (xx) entirely.
- .2 Refer to paragraph (xx.x) and change ...
- 2 Section 23 05 00 - Common Work Results - Mechanical
 - .1 Add new article (x) as follows:

APPENDIX 'C' - Sample of Index for Drawings and Specifications

Last updated April 22, 2008

Project No: _____

Index
Page 1 of ____

DRAWINGS AND SPECIFICATIONS

SPECIFICATIONS:

SPEC NOTE: List all Divisions, Sections (by number and title) and number of pages.

DIVISION	SECTION	NO. OF PAGES
DIVISION 01	01 11 01 – Work related general information.....	.....XX
	01 14 25 - Designated Substances Report.....	.....XX
	01 35 29.06 - Health and Safety.....	.....XX
DIVISION 23	23 xx xx	
DIVISION 26	26 xx xx	

DRAWINGS:

SPEC NOTE: List all Drawings by number and title.

C-1	Civil and landscaping
A-1	Architectural
S-1	Structural
M-1	Mechanical
E-1	Electrical

APPENDIX 'D'

USER MANUAL ON DIRECTORY STRUCTURE AND NAMING CONVENTION STANDARDS FOR CONSTRUCTION TENDER DOCUMENTS ON CD ROM

Issued by:

Real Property Contracting Directorate

PWGSC

May 2005

Last Updated: June 3, 2008

Version 1.0

PREFACE

The Government of Canada (GoC) has committed to move towards an electronic environment for the majority of the services it offers. This covers the advertisement and distribution of contract opportunities, including construction solicitations. As a result, it is now necessary to obtain a copy of construction drawings and specifications (in PDF format *without* password protection) on one or multiple CD-ROM to facilitate for the GoC the transfer of the construction drawings and specifications electronically to the Government Electronic Tendering System (GETS).

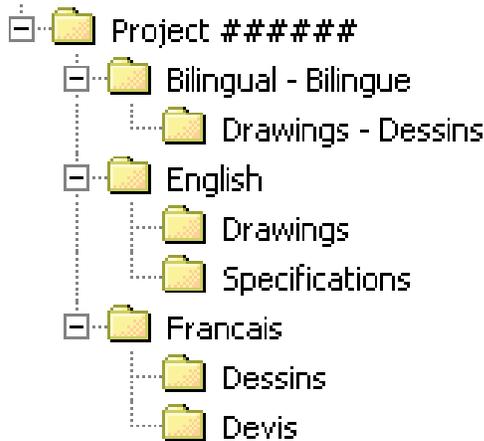
There is therefore a need to adopt a common directory structure and file-naming convention to ensure that the information made available to contractors electronically and in hard (printed) copy is in accordance with the sequence adopted in the real property industries, both for design and construction. This manual defines the standard to be followed by both consultants and print shops at time of formatting and organizing the information, whether drawings and specifications are created by scanning print documents or saved as PDF files from the native software (AutoCAD, NMS Edit, MS-Word, etc...) in which these were created.

It is important to note that the procedure described in this manual is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications. The sole purpose of this manual is to provide a standard for the organization and naming of the electronic files that will be recorded on CD-ROM.

1. DIRECTORY STRUCTURE

1.1 1st, 2nd and 3rd Tier Sub-Folders

Each CD-ROM, whether it is for the original solicitation (tender call) or for an amendment (addendum), must have the applicable elements of the following high-level Directory Structure created:



The following important points are to be noted about the Directory Structure:

- The “*Project #####*” folder is considered the 1st Tier of the Directory Structure where *#####* represents each digit of the Project Number. The Project Number must always be used to name the 1st Tier folder and it is always required. Free text can be added following the Project Number, to include such things as a brief description or the project title;
- The “*Bilingual - Bilingue*”, “*English*” and “*Français*” folders are considered the 2nd Tier of the Directory Structure. The folders of the 2nd Tier **cannot** be given any other names since GETS uses these names for validation purposes. At least one of the “*Bilingual - Bilingue*”, “*English*” and “*Français*” folders is always required, and these must always have one of the applicable sub-folders of the 3rd Tier;
- The “*Drawings - Dessins*”, “*Drawings*”, “*Specifications*”, “*Dessins*” and “*Devis*” folders are considered the 3rd Tier of the Directory Structure. The folders of the 3rd Tier **cannot** be given any other names since GETS also uses these names for validation purposes. There must be always at least one of the applicable 3rd Tier folder in each document.

IMPORTANT: The applicable elements of the Directory Structure (1st, 2nd and 3rd Tier folders) are always required and cannot be modified.

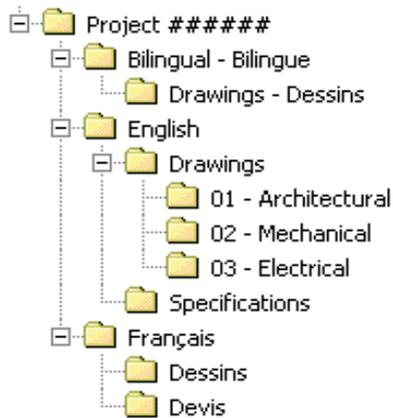
1.2 4th Tier Sub-Folders for Drawings

The “*Drawings – Dessins*”, “*Drawings*” and “*Dessins*” folders must have 4th Tier sub-folders created to reflect the various disciplines of the set of drawings.

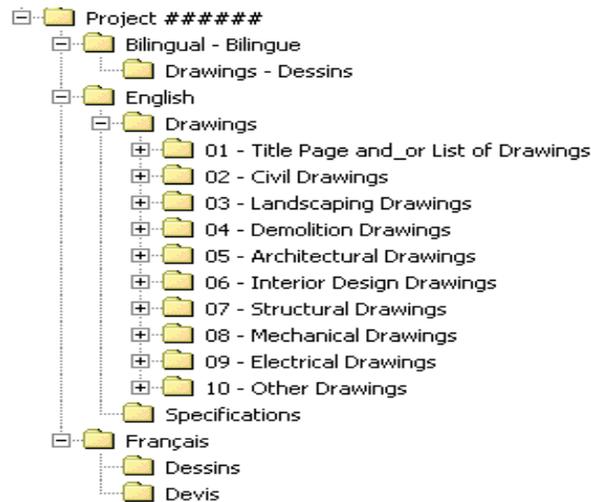
Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “*Drawings – Dessins*”, “*Drawings*” and “*Dessins*” folders.

Note: The first sub-folder must be always reserved for the Title Page and/or the List of Drawings unless the first drawing of the set is an actual numbered discipline drawing.

Examples of 4th Tier sub-folders for drawings:



or



1.2.1 Naming Convention

The 4th Tier sub-folders for drawings must adhere to the following standard naming convention.

For the “Drawings” and “Dessins” folders:

- Y

Where:

= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The title of the folder

Example: 03 – Mechanical

For the “Drawings - Dessins” folder:

- Y - Z

Where:

= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The English title of the folder

Z = The French title of the folder

Example: 04 - Electrical - Électricité

It should be noted that the numbering of the 4th Tier sub-folders is for sorting purposes only and is not tied to a specific discipline. For example, “*Architectural*” could be numbered 05 for a project where there is four other disciplines before “*Architectural*” in the set of drawings or 01 in another project where it’s the first discipline appearing in the set.

It is essential to ensure that the order of the drawings on the CD-ROM be exactly the same as in the hard copy set. GETS will sort each drawing for both screen display and printing as per the following rules:

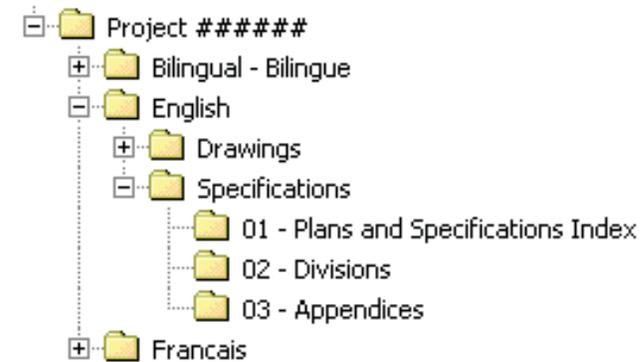
- The alphanumerical sorting is done on an ascending order;
- The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the drawing PDF files in the 01 sub-folder will be printed in alphanumerical order before the drawings in the 02 sub-folder etc...);
- Each drawing PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing (i.e. Drawing A001 will be printed before Drawing A002, Drawing M02 before Drawing M03, etc...).

1.3 4th Tier Sub-Folders for Specifications

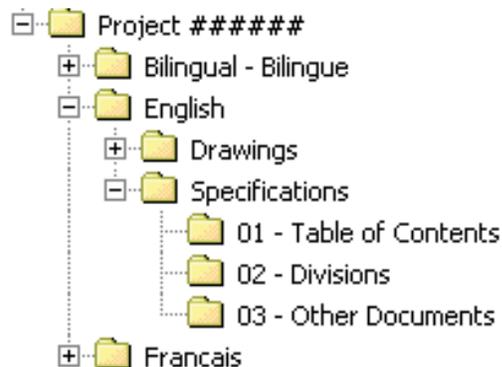
The “*Specifications*” and “*Devis*” folders must have 4th Tier sub-folders created to reflect the various elements of the specifications.

Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “*Specifications*” and “*Devis*” folders.

Examples of 4th Tier sub-folders for specifications:



or



1.3.1 Naming Convention

The 4th Tier sub-folders for specifications must adhere to the following standard naming convention.

For the “*Specifications*” and “*Devis*” folders:

- Y

Where:

= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The title of the folder

Example: 02 – Divisions

It should be noted that the numbering of the 4th Tier sub-folders is for sorting purposes only and is not tied to an element of the specifications.

It is essential to ensure that the order of the elements of the specifications on the CD-ROM be exactly the same as in the hard copy. GETS will sort each element of the specifications for both screen display and printing as per the following rules:

- The alphanumerical sorting is done on an ascending order;
- The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the specifications PDF files in the 01 sub-folder will be printed, in alphanumerical order before the PDF files in the 02 sub-folder, etc...);
- Each specifications PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing (i.e. Division 01 will be printed before Division 02, 01 - Appendix A before 02 - Appendix B, etc...).

2. NAMING CONVENTION FOR PDF FILES

Each drawing, specifications division or other document that are part of the tender documents must be converted in PDF format (without password protection) in accordance with the following standard naming convention and each PDF file must be located in the appropriate sub-folder of the Directory Structure.

2.1 Drawings

Each drawing must be a **separate single page** PDF file. The naming convention of each drawing must be:

X### - Y

Where:

X = The letter or letters from the drawing title block (“A” for Architectural or “ID” for Interior Design for example) associated with the discipline

= The drawing number from the drawing title block (one to three digits)

Y = **The drawing name from the drawing title block (for bilingual drawings, the name in both English and French is to appear)**

Example: A001 - First Floor Details

Each drawing that will be located in the appropriate discipline 4th Tier sub-folders must be named with the same letter (“A” for Architectural Drawings for example) and be numbered. The drawing number used to name the PDF file must match as much as possible the drawing number of the actual drawing (the exception being when leading zeros are required).

The following important points about drawings are to be noted:

- The drawing PDF files within each sub-folder are sorted alphanumerically for both displaying and printing. If there are more than 9 drawings in a particular discipline the numbering must use at least two numerical digits (i.e. A01 instead of A1) in order to avoid displaying drawing A10 between A1 and A2. The same rule applies when there are more than 99 drawings per discipline i.e. three digits instead of two must be used for the numbering (for example M003 instead of M03);
- If drawing PDF files are included in the “*Bilingual - Bilingue*” folder, these cannot be included as well in the “*English*” and/or “*Français*” folders;
- If drawings not associated with a particular discipline are not numbered (Title Page or List of Drawings for example), these will be sorted alphabetically. While this does not represent a problem if there is only one drawing in the sub-folder, it could disrupt the order when there are two or more drawings. If the alphabetical order of the drawings name does not represent the order on the hard copy set, the drawings are to be named as per the following standard convention when converted in PDF format to ensure proper display and printing order.

- Y

Where:

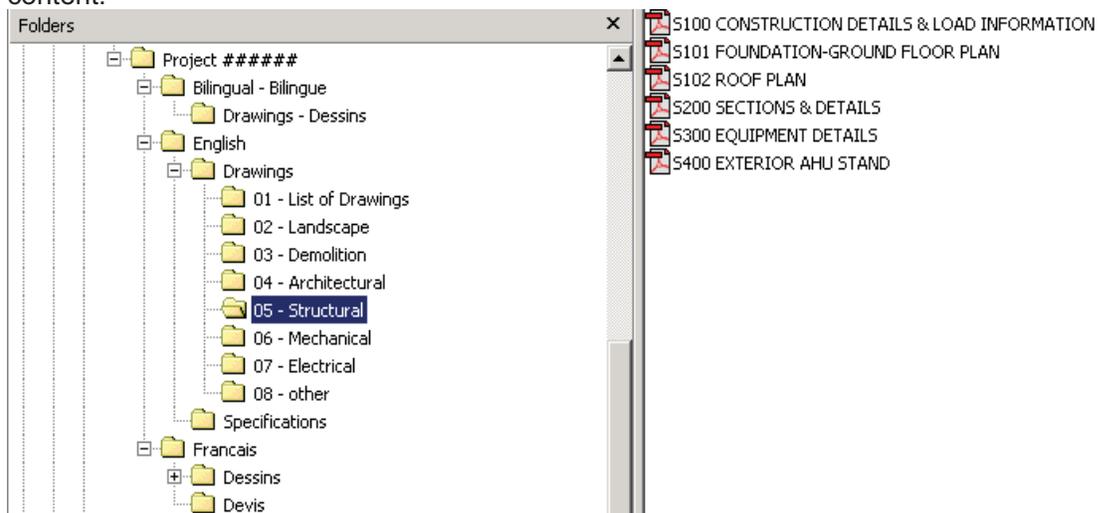
= A two digit number ranging from 01 to 99 (leading zeros must be included)

Y = The name of the drawing

Example: 01 - Title Page
02 - List of Drawings

If numbers are not used in the PDF files name, “*List of Drawings*” will be displayed before “*Title Page*” because “L” comes before “T” in the alphabet.

Example of a 4th Tier Drawings sub-folder’s content:



2.2. Specifications

Each Specifications Division must be a separate PDF file and all pages contained in each PDF file must have the same physical size (height, width). The Plans and Specifications Index must also be a separate PDF file. If there are other documents that are part of the Specifications (e.g. Appendix or other) these are to be separate PDF files as well.

2.2.1 Documents other than Specifications Divisions

Because PDF files within the Specifications sub-folders are sorted alphanumerically (in ascending order) for both on screen display and printing order, all files that appear in folders other than the “*Divisions*” sub-folder must be named using a number:

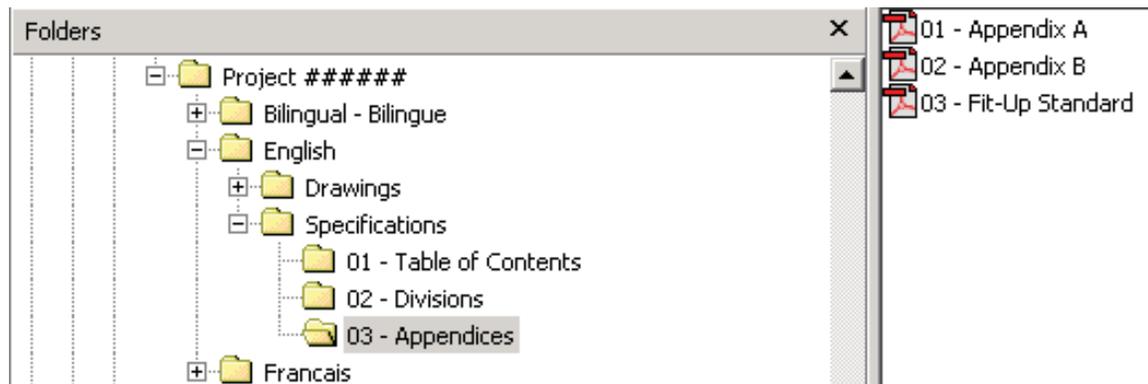
- Y

Where:

= Two digit number ranging from 01 to 99 with leading zeros required
Y = Name of the document

Example: 01 - Plans and Specifications Index

Example of a sub-folder content (sub-folder other than “*Divisions*”):



2.2.2 Specifications Divisions

The Specifications Divisions must be named as follows:

Division ## - Y

Where:

Division ## = The actual word “*Division*” followed by a space and a two digit number ranging from 01 to 99 (with leading zeros required)

Y = Name of the Specifications Division as per **CSC/CSI MasterFormat™**

Example: Division 05 – Metals

The following important point about specifications is to be noted:

- The Numbering of the Divisions **cannot** be altered from **CSC/CSI MasterFormat™** even if some Divisions are not used in a given project. For example, Division 05 will always remain Division 05 even if Division 04 is not used for a given project.

Example of a “*Divisions*” sub-folder content:





3. CD-ROM LABEL

Each CD-ROM is to be labeled with the following information:

Project Number / Numéro de projet
Project Title / Titre du projet
Documents for Tender / Documents pour appel d'offres
CD X of/de X

Example:

Project 123456 / Projet 123456
Repair Alexandra Bridge / Réparation du pont Alexandra
Documents for Tender / Documents pour appel d'offres
CD 1 of/de 1

APPENDIX 'E'

BASIC REFERENCE GUIDE ON CONVERTING CONSTRUCTION DRAWINGS INTO PORTABLE DOCUMENT FORMAT (PDF)

Issued by:
Real Property Contracting Directorate
PWGSC

May 2005 Last Updated: May 3, 2005

Version 1.0

PREFACE

Portable Document Format (PDF) is the standard format for documents that are posted on the Government Electronic Tendering System (GETS). There is therefore a need to obtain from architectural and engineering consultants an electronic copy of drawings and specifications in PDF for tendering Government of Canada (GoC) construction projects.

In order to have the highest quality in term of resolution and printing, consultants should to the greatest extent possible have the PDF drawing and specification files derived from the native software in which they were created. Scanning is permissible but only in special circumstances, for example when there is no electronic version of a drawing being included in a construction tender package.

The purpose of this document is to provide basic information on the conversion of Computer Aided Design and Drafting (CADD) drawings in PDF. Creating a PDF file from a CADD drawing is a relatively simple process once all the necessary configurations and settings are in place. It actually should not take any longer than it would take to create a plot file or to send a drawing to a printer. The information in this guide is not intended to cover all technical aspects of the conversion, which can be done using various methods, but rather to highlight important points about the process and file settings. The conversion of specifications is not covered in this basic reference guide since it does not require any special configuration or setting.

The information provided in this basic reference guide is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications. The sole purpose of this guide is to provide basic information on the PDF conversion process bearing in mind that additional detailed technical information is available from the various software manufacturers.

1.0 PRINTER DRIVERS

Adobe Acrobat provides two different printer drivers that are able to convert CADD drawing into PDF format, Acrobat PDF Writer and Acrobat Distiller. Before creating a PDF file from a CADD drawing, a choice must be made as to which one will be used.

Acrobat PDF Writer is a non-PostScript printer driver that works best with documents that don't contain complex graphics

Acrobat Distiller is a PostScript printer driver that works best with documents that contain PostScript fills, Encapsulated PostScript (EPS) graphics, or other complex elements.

It is recommended that Acrobat Distiller be used to create PDF file of architectural and engineering drawings due to their size and complex graphical nature.

2.0 PRINTER CONFIGURATION

Before converting a CADD drawing to PDF, an Acrobat printer configuration file for the PDF paper size needs to be created. This function can be done in the CADD software rather than using a custom paper size defined for the Acrobat distiller feature. The recommended method is to add a PostScript Adobe plotter in the CADD software and making the necessary setting in terms of media source and size, scale and orientation. The configuration can then be re-used to simplify the conversion process for future files that use the same page size.

As an alternative, although not recommended, a custom-defined size can be created in Acrobat Distiller in the *properties* menu.

3.0 CREATING PDF FILES

Once the printer configuration has been done in the CADD software, open up Acrobat Distiller and make the necessary settings in the *preferences* and *job options* sub-menu. Ensure that the page size match the sheet size selected in the CADD software to create the file. Particular settings can be saved under different names for future use.

With the Acrobat Distiller application open, ensure the required sheet size is displayed in the *job options* window. Then it is simply a matter of bringing the CADD file into the Acrobat Distiller creation box.

A progress bar will show during the conversion and the newly converted PDF file should open up and be displayed for verification.

4.0 PDF FILES SETTINGS

4.1 Security

Adobe Acrobat contains security features that can be used to secure the files by restricting any changes to the files. However, since the files will be posted on GETS and will be used for printing copies, the files **must not** be password protected and **must** allow printing.

4.2 Drawing Orientation

The final PDF drawing files must be displayed on the screen in the same direction that the users are intended to view them. This can be achieved by adjusting the setup of the plotter. If the drawing is not oriented properly after the conversion, it can be rotated manually within Adobe Acrobat.

4.3 Font Type

In order to avoid any problems during the conversion and to minimize the potential for font display errors, the fonts used for the production of construction drawings must be *PostScript* or *True Type fonts*.

4.4 Resolution

Since the PDF files will be used for printing, it is important that a proper resolution be selected. It is recommended to select 600 dots per inch (dpi).

4.5 Scale

When choosing the Plot scale in Adobe, it is important to choose the 1:1 scale to ensure the integrity of the scale from which the drawings were created in the CADD software.

5.0 SCANNING

Scanning is not recommended and should be done only when the drawing is not available electronically. When scanning a drawing, it is important that it be done in real size (scale 1:1) to ensure that the scale remains intact in subsequent printing. It is recommended that each scanned drawing be opened and verified to ensure that the resolution, scale and border are of an acceptable quality.

6.0 FINAL CHECKLIST

When the drawing file has gone through the PDF conversion, it is recommended to open it and verify the following:

- That the sheet size displayed is what was intended to be created (the size is viewable in the lower left corner of the drawing).
- That the orientation of the sheet is correct.
- That the line types, line weights and fonts match the CADD drawing.
- That the PDF file is in black and white.
- That each drawing is a single PDF file.
- That the PDF file is not password protected and printable.

If all the items are verified, the PDF file is useable

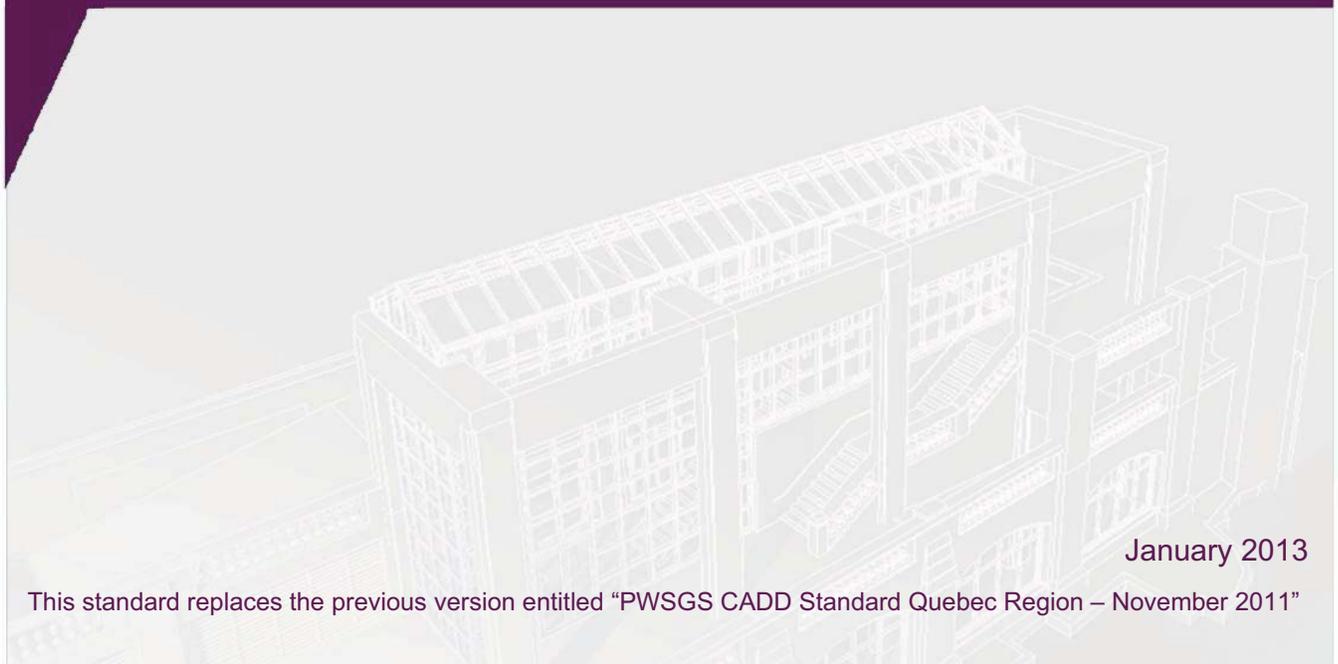
7.0 ADDITIONAL INFORMATION

For more information about the creation of PostScript and EPS files please refer to the User's Guide of the CADD software being used to produce the drawings. For more information about creating PDF file please refer to the Acrobat Distiller User's Guide and/or visit the Adobe Web site at www.adobe.com.



PWGSC Quebec Region CADD Standard Supplement

Computer-Aided Design and Drafting



January 2013

This standard replaces the previous version entitled "PWGS CADD Standard Quebec Region – November 2011"



TABLE OF CONTENTS

1.0 Introduction	5
1.1 Scope	5
2.0 Project Delivery	6
2.1 Drawing File Format	6
2.2 Project Start-up	6
2.3 Quality Assurance of CADD Data	7
2.4 Work Completed	9
2.5 Production of Contract Drawings	10
2.6 Disclaimers and Limitation of Liabilities	10
2.7 Copyright	11
3.0 PWGSC Computer Aided Drafting Standard	12
3.1 File Presentation	12
3.2 Layering Standard	12
3.3 Block Standard	18
3.4 Text Style Standard	20
3.5 Dimension Style / Multileader Style Standard	21
3.6 Linetype and Hatch Standard	23
3.7 Title Blocks and Graphic Scales	24
3.8 Systems of Measurement and Preferred Scales	26
4.0 Drawing File Naming Conventions	27
4.1 Que. File naming convention per region	28
Annex A – CADD Layers	30
Architecture	30
Bridges and Dams Engineering	33
Civil Engineering, Site Design and Landscape Architecture	34
Electrical Systems	39
General Information	44
Mechanical	45
Interior Design	48
Legal Survey	49
Marine	52
Real Property Space Management	56
Structure	58
Annex B – Layer Field Description	59
Group Field	59
Single Layer Field and First Layer Name Extension	60
Second Layer Name Extension	64
Annex C - Glossary	65
Annex D - Quality Control of CADD Data	66
Que. Annex E - Definitions	69

1.0 Introduction

Computer-Aided Design and Drafting (CADD) is an integral component of information management for Public Works and Government Services Canada (PWGSC). The production of digital files by CADD is an important corporate asset. The greatest payback for CADD and related technology is in the reuse of the digital data for facilities management and as a foundation for future projects. If CADD files are to be an effective source of information, they must adhere to a standardized set of criteria that all CADD users will understand.

As an ongoing effort to keep up with changing technology, we are pleased to introduce the third edition of the PWGSC National CADD Standard. A concerted effort has been made not only to simplify the standard, but also to reinforce the requirements in areas we feel are critical to our goals.

PWGSC is aware of the emerging technology and processes related to building information modelling (BIM). As BIM represents a significant change, a new BIM standard, by necessity, will be created, facilitating the transition in the architecture, engineering, and construction (AEC) industry.

In addition, some of the regions have developed a regional CADD standard, which is to be used as a complement to this national standard.

- ❖ The Quebec administrative region has adopted the PWGSC national CADD Standards, with some changes. These regional changes have been added to the national standard, preceded by the word “❖ Que.” in order to highlight provincial particularities.

For questions or further information regarding the PWGSC National CADD Standard, please contact the National CADD Coordinator at the following e-mail address:

CADD-CDAO@pwgsc-tpsgc.qc.ca

- ❖ For more information regarding the Quebec Region PWGSC CADD Standard Supplement, please contact the regional CADD Coordinator at:

QUE.cdaocadd@tpsgc-pwgsc.qc.ca

Or visit the PWGSC National CADD Standard Web site and regional pages at:

<http://www.tpsgc-pwgsc.qc.ca/cdao-cadd/index-eng.html>

1.1 Scope

This standard applies to all services that generate CADD data files for PWGSC, including both internal PWGSC CADD service(s), and external consultant(s).

All CADD data files submitted to PWGSC must meet this standard.

2.0 Project Delivery

2.1 Drawing File Format

PWGSC requires all files to be compatible with Microsoft® Operating Systems. The CADD drawing format required for drawings is the AutoCAD® native format DWG file, i.e., they may not be submitted in Adobe® PDF, Autodesk® DWF, or any other simplified format unless specified in the contract. PWGSC will not supply or accept formats that are no longer supported by Autodesk®.

2.2 Project Start-up

All project drawings must be created using the PWGSC National CADD Standard. To ensure this requirement is met, PWGSC will undertake drawing coordination and quality assurance.

Where CADD services will be provided externally, PWGSC will convey its requirements to the consultant or CADD service. PWGSC will provide the pertinent CADD drawings for the related facility or property, the drawing templates, as well as this CADD Standard document. All new work must meet this standard irrespective of the condition of any existing files provided at the outset of work.

The PWGSC National CADD Standard is available on the PWGSC Web site at <http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html>.

2.2.1 Regional supplement and symbol library

Some of the regions have developed regional supplement and/or a symbol library, which is to be used as a complement to this national standard. The regional supplements are available on the PWGSC Web site at: <http://www.tpsgc-pwgsc.gc.ca/cdao-cadd/index-eng.html>

2.2.2 CADD Base Plans

The CADD base plans maintained by PWGSC have been drawn from building and property surveys. The intent is to use the files for project drawings, and then PWGSC will be in charge of updating the base plans once the project is completed and measurements of the affected area(s) are verified.

Existing digital information, when available, is used to form the foundation for new project drawings. Any areas critical to the project should be verified by field checking.

New digital drawing files created must be modified to include the most up-to-date information contained in the National CADD Standard. Older legacy CADD data that is used in new drawing files must be updated to the current standard.

The project start-up meeting should address the extent to which the existing digital files require verification and updating. All new work must meet this standard irrespective of the condition of any existing files provided at the outset of the work.

- ❖ **Que.** Files provided to the Consultant are for information purposes only, and do not necessarily comply with standards. The consultant is responsible for ensuring that files comply with the standards currently in effect.

2.2.3 Template Drawing

Drawing templates set the default metric units, text styles, and dimension styles. Recognizing the differences between engineering drawings and architectural drawings, the templates are provided with dimension styles and lettering for multiple disciplines. When provided, PWGSC templates must be used to start a new project. Please visit the PWGSC National CADD Standard Web site or contact the PWGSC project manager regarding the use of drawing templates.

- ❖ **Que.** Use of the template is mandatory.

2.3 Quality Assurance of CADD Data

PWGSC will carry out quality assurance of delivered CADD data files to ensure adherence with the PWGSC National CADD Standard and regional supplements.

2.3.1 Digital File Review

• Colour Assignment

PWGSC colour/line weight assignment must be used. ([See 3.2.5 Colour Assignment Standard](#))

- ❖ **Que.** PWGSC-QUE.ctb print style (provided) must be used.

• Layer Management

The PWGSC Layering Standard must be used. ([See 3.2 Layering Standard](#))

Standard layer names must be used.

Entities must be on the correct layers.

• Text Style Management

Only standard AutoCAD® SHX fonts or TTF fonts can be used. ([See 3.4 Text Style Standard](#))

- ❖ **Que.** MTEXT must be used.

• Dimensions Style / Multileader Style Management

The PWGSC naming convention must be used. ([See 3.5 Dimension Style MultiLeader Style Standard](#))

Associative dimensions must be used.

• Linetype and Hatch Pattern Management

Only standard AutoCAD® and/or PWGSC linetypes and hatch patterns can be used. ([See 3.6 Linetype Standard](#))

- ❖ **Que.** Linetypes defined in the "MTQ.lin" file from the Ministère des Transports du Québec are allowed.
- ❖ **Que.** Object linetype must be set "ByLayer".

Linetype display variables must be used correctly.

- ❖ **Que.** If a change in line spacing is required for a small number of lines, you may change the "Object Linetype Scale" rather than changing the "Global Linetype Scale" for the entire drawing.

• External Referencing

The use of external references will be authorized only if certain conditions are met. ([See 2.3.3 External References \(XREF\)](#))

• PWGSC Title Blocks and Graphic Scales

PWGSC title blocks must be used properly if provided. Please visit the PWGSC National CADD Standard Web site or contact the PWGSC project manager.

- ❖ **Que.** Projects carried out for Transport Canada should bear the Transport Canada title block.

Title blocks must contain the minimum information ([See 3.7 Title Blocks and Graphic Scales](#)) if no PWGSC title block is provided

Graphic scales or written scales must accompany all plans, sections, details, and elevations, etc.

- ❖ **Que.** The sheet list must appear on the first page of the plan set for each discipline.

- **1:1 Metric Model**

Drawings must be modelled at full size using metric units.

- **Real-World Coordinate System**

Maintain coordinate systems integrity for 2D drawings.

2.3.2 Drawing file approval

PWGSC has jurisdiction over all drafting-related aspects of the final drawing, including but not limited to drawing content, title block layout, symbols, and font usage continuity throughout a drawing set. All drawings must be completed to the satisfaction of PWGSC.

In the absence of a drawing submission schedule, PWGSC reserves the right to request CADD data files at the midpoint (50%) of the scheduled work to conduct a CADD drafting review.

Note that the content of the digital CADD data file is just as important as the printed content, and no drawing will be accepted as final until all issues are resolved.

Delivered work that fails to meet any requirement in any of these areas will result in the work being deemed unacceptable. The consultant/CADD service will be required to correct the problem(s) at their cost. Furthermore, PWGSC will exercise its option to withhold payment of the contracted work as set out in the contract terms until the work is made right.

Alternatively, PWGSC may, if the consultant/CADD service refuses to correct the problem, make the corrections to the CADD data files and printed drawing plans and deduct the cost thereof from the consultant's/CADD service's fee. The consultant/CADD service grants to PWGSC an irrevocable licence to make such corrections and use the corrected CADD data files and printed drawing plans as it sees fit. Furthermore, PWGSC reserves the right to use the printed drawing plans resulting from the CADD data files with no payment obligation until the CADD data files are corrected.

2.3.3 External References (XREF)

The use of external references will be conditionally authorized if the regional appendix of the CADD standard where the work is being performed permits the use of xrefs.

When this condition is met, xrefs may only be used in conjunction with the "Sheet Set Manager" to support the transmission of drawing files in a compressed format.

- ❖ **Que.** Use of external references (xrefs) is authorized as long as there are no paths attached to the xref (Use the No Path option). Use of the "Sheet Set Manager" is at the user's discretion.
- ❖ **Que.** Reference files must be named according to section 4.0, Drawing File Naming Conventions. All files must be submitted, including image files if used.
- ❖ **Que.** External consultants working with the "Measurement" team may not use XREFs.

In all the other cases, external references must be converted into blocks. (Do not BIND XREFs, instead use BIND INSERT.) **Under no circumstances should a drawing contain referenced symbols; they must be inserted as blocks.**

2.3.4 Raster Images

When separate raster images are included in a drawing, all related files containing images and information on coordinates, rotation angles, scaling, etc. are to be provided. As these files are essential for their geo-referencing, they must be delivered intact. Raster images should be used as a reference only and cannot replace the vector data normally required in drawing files.

2.3.5 Digital Signature

Drawing files containing digital signatures are not accepted and can not legally replace printed copies signed and stamped as original.

2.4 Work Completed

When work is complete and the drawing files are delivered to PWGSC, they must be reviewed for compliance with the National CADD Standard. The CADD service shall maintain the drawings in a suitable manner until all drawings for the project are verified and accepted by PWGSC. Once completed, a PWGSC will archive the file(s) in an electronic document and record management system.

2.4.1 File Delivery

File transfer will be stipulated by PWGSC on a per project basis by one of the methods listed below:

- Submission and upload of drawing files to a project collaboration tool (PCT) designated by the contact person.
- Submission and upload of drawing files to an information management tool designated by the contact person.
- Submission and transfer of drawing files through e-mail.
- Should a file transfer exceed the e-mail file transfer limit, the file can be uploaded to an FTP site if permitted under regional rules.

❖ **Que.** Use of the FTP site is currently forbidden

- In the case of inability to access the FTP site, lack of Internet access, no permission, or security considerations of the drawing content (unencrypted Protected B, Protected C, Confidential, Secret, Top Secret), a portable electronic storage media (CD, DVD, USB key, etc.) will be delivered to the designated contact person.

 **Note:** The FTP site is not secure. Therefore, files containing sensitive information (requiring security clearance greater than Protected A) cannot be uploaded to this site and must be transferred via a portable electronic storage media.

After uploading the file, e-mail the following information to the designated contact person:

- Project location
- Project name
- Project number
- Fully qualified URL path/file name(s) link

 **Notes:**

- Uploaded files must be named using only alphanumeric characters with no spaces.
- All files are deleted from the site every second day. Timely notification is required to ensure file retrieval.
- No files are to be presented as an executable (.exe extension).
- be password-protected
- Files should not contain any electronic signature.
- Drawings should not contain hyperlinks.

2.5 Production of Contract Drawings

The following formats should be applied.

2.5.1 Sheet Size for Page Setup

This table shows the sheet designations and sizes for the drawing page setup. Drawing sheet size will conform to the following specifications:

Sheet Designation	Overall Size (mm)
B1	707 x 1000
A0	841 x 1189
A1	594 x 841
A2	420 x 594
11 x 17 (Tabloid / Ledger)	279 x 432
14 x 8.5 (Legal Landscape)	356 x 216
8.5 x 14 (Legal Portrait)	216 x 356
11 x 8.5 (Letter Landscape)	279 x 216
8.5 x 11 (Letter Portrait)	216 x 279

Note: The paper size naming may vary depending on the printer drivers.

Note: When drawings larger than A0 are required, it is recommended that they use a width of 841mm and a length in increments of 150mm. Digital files of standard PWGSC or client title block formats will be provided in the required standard sizes and **must not be altered or modified without authorization**.

❖ **Que.** For a sample title block, [see section 3.7.2 Information in Title Blocks](#)

2.6 Disclaimers and Limitation of Liabilities

Maps, drawings, and data produced for PWGSC purposes should be considered for illustrative or reference purposes only by users outside of PWGSC.

PWGSC and its agents, consultants, contractors, or employees provide these materials and information "as is" without warranty of any kind, implied or express, as to the information being accurate or complete, and without any warranty of merchantability and fitness for a particular purpose.

PWGSC does not assume any legal liability or responsibility for the accuracy, completeness, or usefulness of the maps, drawings, data, or information incidental thereto. PWGSC recommends that users exercise their own skill and care with respect to their use or seek professional advice.

Under no circumstances will PWGSC be liable to any person or business entity for any direct, indirect, special, incidental, consequential, or other damages as a result of any use of the maps, drawings, data, or any information incidental thereto, including, without limitation, any lost profits or business interruption.

2.7 Copyright

The Copyright Act protects all works (including drawings, charts, photos, etc.) from being copied without permission. Copying a work is called 'copyright infringement'. Copying including 'cutting and pasting', reproducing, publishing or transmitting any work without permission *by any means* is considered copyright infringement. All work is copyright protected even if it does not explicitly say so.

Without prejudice to any rights or privileges of the Crown, where any work is, or has been, prepared or published by or under the direction or control of Her Majesty or any government department, the copyright in the work shall, subject to any agreement with the author, belong to Her Majesty. The copyrights ownership can also be transferred to the client by written contract. **Use of any PWGSC content without permission, in whole or in part, is strictly forbidden.**

3.0 PWGSC Computer Aided Drafting Standard

This section describes the general PWGSC Computer Aided Drafting Standard. Specific instructions can be added in the context of a request for proposal.

3.1 File Presentation

Files presented must conform to the following rules:

- A drawing must be purged of all definitions that are not used, such as layer names, text styles, dimension styles, layer filters, and blocks.
- A drawing must not contain any object definitions without geometry, such as empty text or blocks without objects.
- No objects should reside on layer "0" or "DEFPOINTS" except for objects contained in a block definition and dimensions. Use the "Plot/Non plot" layer property instead of the Defpoints layer.
- A drawing must not contain errors that are detectable using the Audit command.
- Drawings are to be modelled at full scale (real-world units) in model space, with text, symbols, hatch patterns, and line widths adjusted by the required scale factor.

All presented files must also adhere to the following rules of best practice:

- When appropriate to the type of drawing, lines must be drawn in an orthogonal mode.
- All vector endpoint intersections must be drawn with closed corners.
- The drawing must be saved with properly formatted Page Setup (Paper Size, Plot Style, Plot Area, Plot Scale, etc.). The main layout must be active and all the viewports adjusted and locked to the correct scale.
- ❖ **Que.** Drawings must be printed in "extend" mode.
- ❖ **Que.** The sheet list must appear on the first page of the plan set for each discipline.

3.2 Layering Standard

All digital CADD files must follow the PWGSC Layering Standard. The standard facilitates data management by using a layering structure and naming convention to organize the drawing data in the CADD files into related data groups.

[See Annex A – CADD Layers](#) for the complete Standard Layer List.

[See Annex B – Layer Field Descriptions](#) for the abbreviations and descriptions lists used to create layer names.

3.2.1 Sorting Graphic Data into Related Data Groups

Layers are used to sort the graphical data types depicted by the line work into related data groups. (They are not intended for use in sorting line weights, line types, colours, or other schemes.)

Layering is the only way to identify what the entities on a graphical screen represent without resorting to annotations. For example, it answers questions such as whether a rectangle represents a building outline, a concrete pad, a storage tank, or whether it is an annotation box. All digital CADD files must follow the PWGSC Layering Standard to create the appropriate layers to accommodate the grouping of related data.

To simplify the layering, drawing data can be broken into two major groupings: principal data and supporting data. The level of complexity and number of layers required for the two groups are significantly different.

3.2.2 Principal Data

Principal data is contained mainly in the plan views of the facility, i.e., the base plan, floor plan, site plan, etc.

This type of data requires strict adherence to layer naming and proper grouping of data. The line work used to depict facility components must always be drawn using the most up-to-date and accurate information available. Line work depicting objects must be placed in the proper standard layer according to the data type being represented. For example, in a floor plan, the walls, doors, windows, and bathroom fixtures must be grouped under separate layers.

3.2.3 Supporting Data

Supporting data is made up of sections, details, elevations, schedules, legends, and title blocks, etc.

This type of data requires minimal layering breakdown. Line work in a detail representing different components does not need to be placed in separate layers. For example, a building construction detail can be drawn with foundation wall, frame wall, floor, and roof line work in a single layer, although the dimensions, annotation, and hatching should be separated.

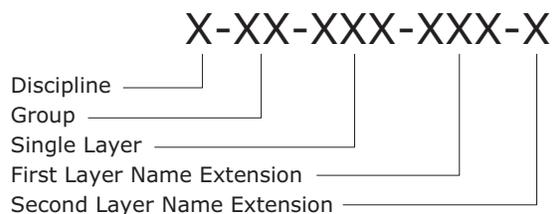
3.2.4 Layering Naming Convention

Layering of CADD information must adhere to the layering naming convention described in this section.

The layer is the basic tool for organizing and managing graphic information. Layers are used to sort graphic objects into groupings of related data. PWGSC has developed a modular, alphanumeric layer nomenclature format designed to sort graphic data in a specific manner.

The layer name format consists of five fields separated by hyphens.

- The first three fields—Discipline, Group, and Single Layer—are mandatory.
- The last two fields—First Layer Name Extension and Second Layer Name Extension—are optional fields that allow a more precise data identification where necessary.



[See Annex A – CADD Layers](#) for a list of the most frequently used layer names and their descriptions.

[See Annex B – Layer Field Descriptions](#) for a complete list of the field abbreviations and descriptions for the last four of the five fields of the layer name structure.

❖ **Que.** In order to ensure the uniformity of the CADD files, only the french abbreviations must be used for the layer name format.

Two-field layer names (X-XX) can only be used under special conditions and must have PWGSC approval.

Discipline Field **X-XX-XXX**

The Discipline field identifies the discipline responsible for the layer content. Where an object cannot be associated with a specific discipline, or is applicable to all disciplines, the special abbreviation of “G” may be used to indicate “General Information.”

Discipline Field Abbreviations List:

A	Architecture
B	Bridges and Dams Engineering
C	Civil Engineering, Site Design, and Landscape Architecture
E	Electrical Systems
G	General Information
H	Mechanical
I	Interior Design
L	Legal Surveys
M	Marine
R	Real Property Space Management
S	Building Structure

Group Field X-~~XX~~-XXX

The Group field identifies groupings of common types of drawing information relevant to each discipline. The Group abbreviations defined for each discipline are listed in the Standard Layer List in [Annex A – CADD Layers](#). In addition, there are some common Group abbreviations defined for use with all disciplines for supporting graphic data such as sections, details, and others. [Annex B – Layer Field Descriptions](#) contains a complete list of all Group abbreviations and their descriptions.

Examples of common Group field abbreviations:

GL	Global
GR	Grid
PL	Plan
SC	Schedules

Single Layer Field X-XX-~~XXX~~

The Single Layer field subdivides the classifications to identify each layer more precisely. Single Layer abbreviations allow information pertaining to Physical Properties, Materials, Graphics, Text and discipline related data such as building systems to be included. The Single Layer abbreviations are listed in the Standard Layer List in [Annex A – CADD Layers](#) and [Annex B – Layer Field Descriptions](#).

First Layer Name Extension (Optional) X-XX-XXX-~~XXX~~-X

The First Layer Name Extension, like the Single Layer field, allows information pertaining to Physical Properties, Materials, Graphics, Text and discipline related data to be included. The extensions use the same abbreviations as the Single Layer field. They may be used with any valid layer from the Standard Layer List. They may also be used as a Single Layer field value where appropriate.

Examples of common Single Layer and First Layer Name Extension abbreviations for all disciplines: ([See Annex B - Layer Field Descriptions](#) for a complete list.)

Physical Properties:

ABV	Above ground, above grade
EME	Emergency
EQP	Equipment
EXT	Exterior
HOR	Horizontal
INT	Interior
NOD	Node, horizontal reference point
OPN	Openings
RET	Return
SUP	Supply
UND	Underground, below grade
VER	Vertical

Materials:

ASP	Asphalt
BLK	Block
BRK	Brick
CON	Concrete
CRP	Carpet
FIN	Finishes
GRV	Gravel
INS	Insulation
PLA	Plastic
STL	Steel
STO	Stone
TIL	Tile
TIM	Timber

Graphics:

3DM	3D model components of 2D symbols
CLR	Colours
DIG	Digitized or vectorized from scanned image
HAT	Hatching
LIN	Line work
OLN	Outlines
PRO	Profiles
SPC	Special
SYM	SymbolsTAB Tables
TMP	Temporary

Texts:

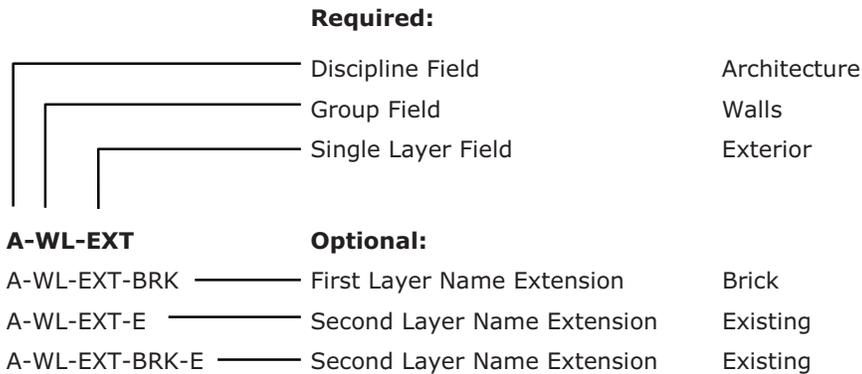
ATT	Attributes
DIM	Dimensions
IDN	Identification numbers or names
SPT	Spot elevations
TXT	Annotation, Text, detail notations, bubbles, graphic scales

Second Layer Name Extension (Optional) X-XX-XXX-XXX-**X**

The Second Layer Name Extension allows information pertaining to Geometry, Construction, Status, Second Language, and Numerical Options to be included. The extensions may be used with any valid layer from the Standard Layer List. [Annex B – Layer Field Descriptions](#) contains a complete list of all Second Layer Name Extension abbreviations and their descriptions.

Valid Layer Name Formats:

Four variants of the layer name format will be accepted, as indicated below:



Free Text Examples:

☞ Add an underscore character at the end of a valid layer name to append free text to the layer name.

M-SN-SPT_-1.0 Soundings at -1.0m depth

M-SN-HWL_January 14, 1990 High Water Line on a specific date

Existing Floor Plan Examples:

☞ Where plans are specifically titled "New" (or "Existing"), the "N" (or "E") Second Layer Name Extension modifier indicating the construction status may be omitted, but all disparate construction status extensions must be included.

- A-WL-INT-N** Architecture - Wall - Interior - New
- A-WL-INT-X** Architecture - Wall - Interior - Remove
- A-WL-OLN** Architecture - Wall Outline - Exterior ("Existing" implied)
- A-DR-INT** Architecture - Door - Interior ("Existing" implied)
- A-DR-INT-N** Architecture - Door - Interior - New
- A-WD-EXT** Architecture - Window - Exterior ("Existing" implied)

Symbols Examples:

☞ When a symbol is placed to represent an object, it must be placed in a symbols layer.

- E-SD-SYM** Electrical - Site Distribution - Symbols (Power poles, luminary, etc.)
- G-GL-SYM** General - Global - Symbols (Key plans, north arrow, bar scale, etc.)

Detail Examples:

Supporting data such as dimensions, annotation, and hatching should be separated as indicated in the examples below. Colour should be set "Bylayer" for the majority of the entities in a layer and specifically where necessary to obtain varying line weights in that layer.

G-DT-LIN	General - Detail - Line work (Wall, floor and roof line work)
G-DT-TXT	General - Detail - Text (Annotations, title, graphic scale, etc.)
G-DT-DIM	General - Detail - Dimensions
G-DT-HAT	General - Detail - Hatching (Insulation, wood grain, etc.)

- ❖ **Que.** For detail layers, you have the option of using material names or colours as set out in Annex A, except for the layers listed above.

Schedule Examples:

A-SC-LIN	Architecture - Schedule - Line work (Schedule grid or Line work)
A-SC-TXT	Architecture - Schedule - Text (Schedule data, annotation)

Plan Views Examples:

Supporting data can also appear on plan views.

H-PL-TXT	Mechanical - Plan - Text (Titles, graphic scale, annotation bubbles)
S-PL-DIM	Structural - Plan -Dimensions

3.2.5 Colour Assignment Standard: Layer Colours and Pen Weights

Colour is to be used as a method of defining line weight to the plotter. Layers must be assigned appropriate colours and entities should be created with colour "Bylayer" where possible, except as provided for in the creation of symbols. If a CTB is provided by PWGSC, it must be used.

Suggested Line Weight Settings:**Extra Thin - 0.10 mm**

Hatching

Thin - 0.15 to 0.25 mm

Dimension Lines	Centre Line	Intermediate Contour Lines
Leader and Extension	Phantom Lines	Grid Lines

Medium - 0.30 mm to 0.50 mm

Hidden Lines	Index Contour Line	Text Normal (0.3 mm)
Text - Sub Headings (0.5 mm)		Visible Object Outlines

Thick - 0.70mm

Cutting Lines	Match Lines	Reference Lines
Section Lines	Text - Titles/Major Headings	Viewing Planes

Extra Thick - 1.00mm

Title Sheet Border

❖ Que. Colour and Pen assignment table

No.	Colours	Grid	Pen	Width
1	Red	100%	1	0.20
2	Yellow	100%	2	0.80
3	Green	100%	3	0.35
4	Cyan	100%	4	0.25
5	Blue	100%	5	0.25
6	Magenta	100%	6	0.35
7	White/Black	100%	7	0.50
8		100%	8	0.20
9		100%	9	0.20
10		100%	10	0.05
11		100%	11	0.13
12		100%	12	0.13
13		80%	13	0.20
14		70%	14	0.20
15		60%	15	0.20
16		50%	16	0.20
17		40%	17	0.20
18		30%	18	0.20
19		15%	19	0.20
253		20%	253	0.20

3.2.6 Provision for Creation of New Layers

Because the Standard Layer List ([Annex A – CADD Layers](#)) does not cover all possibilities, the layering standard provides for the ability to create new layer names for new objects as required.

As in the following example of E-SD-SYM, a quick look in the Standard Layer List under the Electrical Systems section would indicate that this layer name is invalid since it is not on the list. However, it is an acceptable layer name created by adding an existing *First Layer Name Extension* to an existing *Discipline-Group* abbreviation.

The rules for creating new layer names are as follows:

- A proper standard layer name for the object must not already exist.
- Must follow the standard layer name format.
- Must use an existing Discipline abbreviation. (**E-SD-SYM**)
- Must use an existing Group abbreviation. (**E-SD-SYM**)

Must use an existing three-character Single Layer field abbreviation or First Layer Name Extension. (**E-SD-SYM**)

3.3 Block Standard

AutoCAD® blocks are used to group entities. Graphic blocks shall **not** be exploded. Blocks representing simple objects or simple symbols shall not contain nested blocks (blocks made of blocks). The use of groups is preferable when grouping blocks together, for example, a table with chairs around it. Most symbols should be created with linetype and colour "Byblock." This allows complete control over the

appearance of the symbol. By default a symbol will take on the properties of the layer it is placed on, but it can be changed to suit requirements independent of the layer settings.

There are two different ways of creating and inserting AutoCAD® blocks, depending on their complexity. The basic rules are as follows:

1. Simple blocks with one data type, e.g., toilet fixtures, furniture:

- a) Create the block on layer "0."
- b) The block must be inserted on the proper layer, e.g., office chair inserted on layer I-FU-SET.

2. Complex graphics requiring the use of multiple data types:

- a) Create each data type on its proper layer.
- b) Colour and linetype must be "Bylayer" or "Byblock" so that these two attributes may be assigned to the symbol regardless of the layer properties the symbol is inserted on, e.g., title blocks created with objects on different layers.

Objects that could be represented by AutoCAD® blocks are categorized as being either symbols or graphics.

3.3.1 Graphics

Graphics are AutoCAD® blocks that are dimensionally accurate pictorial representations of real objects. A graphic may be a simplified representation of a building component or assembly such as a desk or chair, but it is accurate with respect to the component's principal dimensions.

Drawing scale does not affect the insertion of graphics. Graphics may be fixed or variable, and basic rules for their creation and insertion must be followed:

1. Fixed - Not scaled
 - a) Objects must be created full size.
 - b) Graphics must be inserted with 1-by-1 scale in model space.
2. Variable - Scaled to represent different size objects such as doors, round tables, etc.
 - a) Objects must be created inside a 1-by-1 square
 - b) Blocks must be inserted using the actual dimensions of the objects they represent in model space.

3.3.2 Symbol (Annotative)

Symbols are AutoCAD® blocks that are pictorial representations of objects not drawn to scale, such as an electrical outlet symbol. Drawing scale affects symbols in the same manner as annotation and therefore must be inserted into a working drawing at a scale factor corresponding to the drawing or plot scale as required.

 Note: It is now possible to create annotative blocks that can scale themselves automatically to any given scale. To avoid confusion, it is strongly recommended to use only one method throughout each project drawing set: the traditional method that lets the user choose the insertion scale, or the Annotative option that automatically manages the insertion scale.

Basic rules for the creation of symbols must be followed:

- a) Symbols should be drawn at actual plotted size and not smaller than 2.5mm. The Annotative option can also be selected when creating the block.

- b) Symbols should be inserted using the plotted scale if they are inserted in model space, and 1 if they are inserted in paper space (layout), i.e., 50x on a 1:50 floor plan in model space, or 1x on a 1:1 drawing sheet in paper space. If the block was created with the annotative option selected, it will scale itself automatically during the insertion.

3.3.3 Block Library

Taking into account the specific needs of each project and the huge diversity, there is no national block library.

- a) If a block library is provided with a project, the consultant/CADD service must use it.
- b) All the blocks should be created respecting the rules described in this block standard.
- c) Use of blocks should be uniform throughout each project drawing set.
- d) If no blocks are provided, the consultant/CADD service must have their block library pre-approved by PWGSC.

3.3.4 Block Naming

A good structure for block naming is very important to allow for the creation and management of schedules, inventories, legends, etc. If the consultant/CADD service uses their own block library, they need to use a pertinent naming convention that must be pre-approved by the lead technologist.

3.4 Text Style Standard

Text styles for use in drawings must be created using Standard AutoCAD® SHX, the following TTF font files: Arial, Arial Narrow, and StylusBT and any font files specifically provided by PWGSC.

Annotative text styles are allowed.

Text style usage should be uniform throughout each project drawing set and limited to a maximum of four different font files per project that will be determined in collaboration with PWGSC.

The height of text styles must be set to 0 (not fixed) so that it can be changed to suit different scaling requirements.

All French characters should be accented whether upper or lower case.

Private company logos must not contain a special font file.

- ❖ **Que.** Paragraph text must be created using "MTEXT" objects and not forced in colour, style or height within the text editor.
- ❖ **Que.** Official languages used shall be unilingual (FRENCH) and bilingual (FRENCH/ENGLISH) as a standard for texts.

 **Note:** It is now possible to create annotative text styles that can size themselves automatically to any given scale. To avoid confusion, it is strongly recommended to use only one method throughout each project drawing set: traditional text styles or annotative text styles.

3.4.1 Text Style Naming

Text style names should reflect the information below:

- Usage
- Font name
- Any other special effects (if required)

Examples:

NOTES_SIMPLEX	Text style with SIMPLEX used for notes
TITLE_ARIAL_WF-1.2	Text style with ARIAL and width factor 1.2 used for titles
SPECIAL_SIMPLEX_OA-20	Text style with SIMPLEX, oblique angle 20 used for special notes
NOTES_ARIAL_ANNNO	Text style with ARIAL and Annotative property enabled for notes

3.4.2 Text height**Standard text height for:**

❖ Que. Special	1.8mm
Notes, dimensions, annotations, etc.	2.5mm
Major headings	4.5mm, 5.0mm
Subheadings	3.5mm.

Text smaller than 2.5mm can only be used under special conditions and must have PWGSC approval.

3.5 Dimension Style / Multileader Style Standard

All dimensioning must be created on entities in model space with associative dimensions.

Annotative dimension styles and Multileader Styles are now allowed. However, as for blocks and text styles, it is strongly recommended to use only one method throughout each drawing set: traditional dimension styles set with different overall scales to suit different printing scales, or annotative dimension styles that are set up automatically based on the drawing scale.

Two formats are used to cover most applications for PWGSC projects:

- a) Engineering with arrowheads for dimension and leader terminators
- b) Architectural with ticks for dimension terminators and arrowheads for leader terminators

3.5.1 Dimension Style Naming

Dimension style usage should be uniform throughout each project drawing set. Using dimension styles reduces the time necessary to create, edit, and maintain dimensions. Dimension styles are created by specifying values for a number of dimension variables and saving the style with a unique name. The dimension style controls the appearance of all the dimensions created while the dimension style is active. Changes to the dimension style will automatically be reflected in the associated dimensions.

Use of Dimension Style Overrides properties is not allowed and the dimensions must be associative. A new dimension style should be created to work with different properties.

Dimension style names have the following format:

E_100mm_0

E = Engineering

A = Architecture

Any Letter = User-Defined

Drawing Scale: 100 = 1:100

50 = 1:50

0 = Annotative

Units: mm = Millimetres, m= Metres

Modifiers: None = Normal

0 = Both extension lines suppressed

1 = First extension line suppressed

2 = Second extension line suppressed

CL = Centreline extension lines

Anno = Annotative (always as last modifier)

Examples:

- A_50mm** Normal Architectural dimension for floor plans
- A_0mm_Anno** Architectural dimension with Annotative property enabled
- A_50mm_0** Architectural dimension with no extension lines to dimension to grid lines
- E_1000m** Normal Engineering dimension for site plans with metres as base unit
- A_50mm_CL** Architectural dimension with centreline extension lines
- E_100mm_CL Anno** Annotative Engineering dimension with centreline extension lines

3.5.2 Multileader Style Naming

Multileader style usage should be uniform throughout each project drawing set.

Multileader style names have the following format: **E_100mm_D1**

E = Engineering

A = Architecture

Any Letter = User-Defined

Drawing Scale: 100 = 1:100

50 = 1:50

0 = Annotative

Units: mm = Millimetres, m = Metres

Modifiers: None = Normal Mtext Multileader

D1 = Multileader with Detail Callout Block (D2, D3, etc. for alternate Detail callout Blocks)

S = Multileader with Slot Callout Block

C = Multileader with Circle Callout Block

B = Multileader with Box Callout Block

H = Multileader with Hexagon Callout Block

T = Multileader with Triangle Callout Block

Anno = Annotative

Examples:

A_50mm	Normal Mtext Multileader with Architectural font
A_0mm Anno	Annotative Mtext Multileader with Architectural font
E_50mm_D1	Normal Engineering Detail Callout Multileader
E_0mm_C Anno	Annotative Engineering Circle Callout Multileader

3.6 Linetype and Hatch Standard

The appearance of linetypes in a drawing is determined by the system variables LTSCALE, PSLTSCALE, MSLTSCALE, and MEASUREMENT.

- The MEASUREMENT variable determines which linetype description file to use for linetype loading:
 - "1"** sets the default files to the **metric** unit files **acadiso.lin** and **acadiso.pat**. (See Note 1 below.)
 - "0"** sets the default files to the **imperial** unit files **acad.lin** and **acad.pat**. These must not be used. (See Note 2 below.)
- The LTSCALE variable sets the global linetype scale factor.
- The PSLTSCALE controls linetype appearance in paper space.
- The MSLTSCALE controls the linetype appearance in model space in conjunction with the annotative scale (CANNOSCALE system variable in AutoCAD 2008+). When using MSLTSCALE, the variable LTSCALE should be set to between 0.5 and 1.

Note 1: Drawings must not contain linetypes, complex linetypes or hatch patterns other than those respectively defined in the acadiso.lin and acadiso.pat files supplied with the AutoCAD® based Autodesk products or other linetypes supplied by PWGSC.

Note 2: The linetypes and hatch patterns contained respectively in the acad.lin and acad.pat files should not be used because they are drawn to be used with imperial drawings. For consistent linetype appearance and plotting results, the required values for the variables are as follows:

1. Final Drawings: Title sheet must be in paper space with multiple, variously scaled VIEWPORTS.

- a) MEASUREMENT = 1
- b) LTSCALE between 0.5 and 1.0 (See Note 3 below.)
- c) PSLTSCALE = 1 (On)

Note 3: The LTSCALE value should be set between 0.5 and 1.0 while printing in paper space depending on the size of the linetypes used in the drawing.

Do not set the linetype scale at the entity level. The Current Object Scale in the Linetype Properties dialog box (system variable CELTSCALE) must be set to 1.0 to ensure that the creation of new entities do not have entity-level linetype scaling.

For consistent hatch pattern plotting and scanning results, gray scale SOLID hatch patterns are not permitted on contract drawings.

- ❖ **Que.** Linetypes defined in the "MTQ.lin" file from the Ministère des Transports du Québec are allowed.
- ❖ **Que.** Object linetype must be set "ByLayer".

3.7 Title Blocks and Graphic Scales

3.7.1 Title Block Set-up

Completed drawings must adhere to the following composition standard:

- a) Title block sheets must always be inserted in a layout (paper space) at 0,0,0 with scale factor of 1 and rotation angle of 0.
 - b) Model space graphics must appear in the layout in correctly scaled VIEWPORTS.
 - c) There must be only one (1) title block per layout.
 - d) The title block is not to be exploded. Attributes must be used to enter title block information.
 - e) No entities outside the title block perimeter.
- ❖ **Que.** Users using the "Sheet Set Manger" may replace attributes with fields from the "Sheet Set," while leaving in place existing information.

3.7.2 Information in Title Blocks

All project drawings must be compiled on standard sheets and must be in accordance with the PWGSC corporate identity. The lead technologist for each project will coordinate the size of the sheet to be used and provide a standard title block and the content of the title block fields.

- ❖ **Que.** All fields must be completed. See opposite example.

Each title block must contain the information below:

- a) Project name
- b) Address
- ❖ **Que.** Discipline
- c) Drawing name, e.g. floor plan, building
- d) Measured or designed by and date
- e) Drawn by and date
- f) Approved by and date
- g) Project manager
- h) PWGSC project number
- i) Tender
- j) Drawing or plan number
- k) Revision chart
- l) Consultant or CADD service identification
- m) North arrow
- ❖ **Que.** Graphic Scale
- n) Site plan or key plan (if pertinent)
- ❖ **Que.** Classification number (if required)

The diagram shows a title block form with the following fields and labels:

- CORPORATE IDENTITY** (points to the top left section)
- DEPARTMENT USE ONLY** (points to the top right section)
- BUILDING KEY PLAN WITH MAIN AXIS, HIGHLIGHTED PROJECT AREA, STREETS SURROUNDING THE BUILDING BLOCK AND NORTH ARROW** (points to a key plan diagram)
- PRINCIPAL CONSULTANT AND SUB-CONSULTANTS IDENTIFICATION AND SEAL** (points to a signature line)
- PROGRESS STATE AND DATE ARE MANDATORY** (points to a table with columns for 'Progress' and 'Date')
- ORIGIN AND REFERENCE DRAWING NUMBERS ARE MANDATORY** (points to a table with columns for 'Origin' and 'Reference')
- DISCIPLINE** (points to a dropdown menu)
- SUBTITLES MUST BE DESCRIPTIVE (EX: DETAIL-INDICATE DETAIL TYPE)** (points to a text field for 'SOUS-TITRE FRANÇAIS' and 'SUBTITLE ENGLISH')
- FILE NAME (SEE 4.0)** (points to a text field)
- DRAWING OR PLAN NUMBER (SEE 3.7.4)** (points to a text field)
- DISCIPLINE AND SHEET NUMBER/DISCIPLINE TOTAL SHEETS NUMBER** (points to a text field)

3.7.3 Headings, Titles, and Graphic Scales

To facilitate scaling from reduced or enlarged reproductions, each plan, section, detail, elevation, profile, etc. on a completed drawing sheet shall be accompanied by a graphic scale. The graphic scale shall be located immediately below the pertinent heading on final plot.

3.7.4 Que. Layout Tab Naming Convention

Each tab must bear the name of the file or of the sheet set that it represents.

R_XXXXX_XXX_DPP-GF-EXT

R_XXXXX_XXX = PWGSC project number. Substitute dots « . » by underscoring character « _ »)

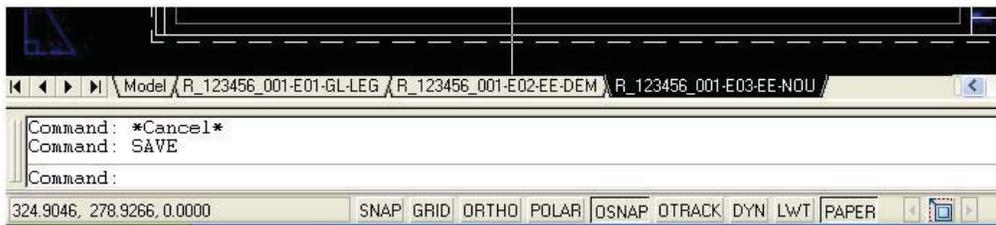
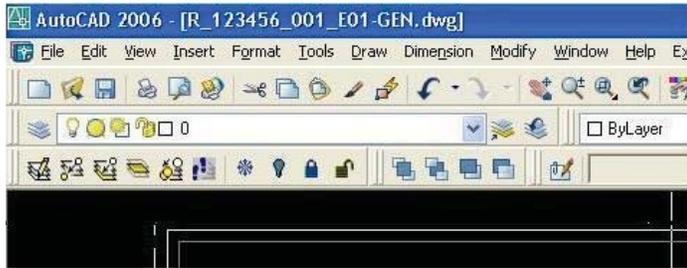
D = Discipline (see section 4.0)

PP: Page number

GF: Group Field

EXT : Extension

Exemple: R_123456_001_E01-LE-PLN



3.8 Systems of Measurement and Preferred Scales

The International System of Units (S.I.) must be used to prepare all drawings.

The unit for linear dimensioning is the millimetre, except where the scope of the drawing requires the use of the metre, such as in site plans.

Integers shall indicate millimetres, e.g. 435, 4300. Decimal numbers with three decimal places shall indicate metres, e.g. 5.435, 4.300.

All other dimensions and notations should be followed by the unit symbol.

Preferred Viewport Scale:

1:1	1:25	1:500
1:2	1:50	1:1000
1:5	1:100	1:2000
1:10	1:200	1:5000
1:20	1:250	1:10000

❖ **Que.** Graphic scales are mandatory for all plans and details.

4.0 Drawing File Naming Conventions

All CADD information submitted must be arranged in a logical format so that it can be easily accessed and modified by the user. This standard provides a framework for the information and will assist in data entry, manipulation, storage, and retrieval at different stages of the design and operation of the facility over its life cycle.

❖ **Que.** Discipline fields for saving file names only

A	Architecture
B	Bridges and Dams Engineering
C	Civil Engineering, Site Work, Landscaping and Marine Work
E	Electrical Systems
G	General Information
M	Mechanical
I	Interior Design
L	Legal Surveys
R	Real Property Space Management
S	Structure

❖ **Que.** Note 1: Be careful not to confuse the discipline fields for title blocks with those for file names – they may be different.

❖ **Que.** Note 2: When a plan classification number is required for a file name, the project manager will supply that number.

4.1 Que. File naming convention per region

PWGSC Montreal office

Disciplines: Architecture, Interior Design, Electricity, Mechanical, Structure, and Measurement

X_XXXXXX_XXX-XXX-XX-XXX.DWG

Project number _____
 Discipline and sheet number _____
 Sheet description (Annex B - 4.1 and 4.2) _____

Example:

R_999999_001-A06-DT-PAR.DWG

Project no. R.999999.001 _____
 Architecture, sheet no. 6 _____
 Parapet detail _____

Discipline: Arpentage

X-XXX-XXX-X-XX.DWG

Sheet size _____
 Year of project _____
 Plan classification number _____
 Discipline _____
 Sheet _____

Example:

A-2009-0001-L-01.DWG

Size A _____
 Year 2009 _____
 Plan classification no. 0001 _____
 Legal Survey _____
 Sheet no. 1 _____

PWGSC Quebec office

Disciplines: Architecture, Interior Design, Electricity, Mechanical, Structure, and Measurement

XXX-XX-XXX-X_XXXXXX_XXX.DWG

Discipline and sheet number

Sheet descriptionn (Annex B - 4.1 and 4.2)

Project number

Example:

E01-EE-ALU-R_999999_001.DWG

Electricity

Lighting - emergency power

Project no. R.999999.001

PWGSC Quebec and Rimouski office

Discipline : Marine

XX-XX-XXXX-XX-XX.DWG

PWGSC Office

QU= Québec

RM= Rimouski

Year of project

Plan classification number

Discipline

Sheet

Example:

RM-09-0001-C-01.DWG

Rimouski Office

Year 2009

Classification number 0001

Marine discipline (C)

Sheet 01

Annex A – CADD Layers

The Standard Layer List below lists the most-used layer names defined under the PWGSC Layering Standard. New layer names can always be created using the field abbreviations and extensions listed in [Annex B – Layer Field Descriptions](#). The French abbreviations are listed just as a reference and should only be used with drawings annotated in French.

- ❖ **Que.** In order to ensure the uniformity of the CAD files, only the french abbreviations must be used on the drawings.

A layer name may include an additional subdivision for grouping subsets of layers that represent building systems or categories of related data. Each subdivision contains a primary layer (underlined) and supplementary layers (in gray) to subdivide the information with greater precision. The use of supplementary layers is optional and depends on a drawing's requirements.

Architecture		
English Abvn	Description	French Abvn
A-CI	Circulation	A-CI
A-CI-CVY	Horizontal conveyors, moving sidewalks	A-CI-HOR
<u>A-CI-ELE</u>	<u>Elevators</u>	<u>A-CI-ELE</u>
A-CI-ELE-BRF	Lift platforms for barrier-free access	A-CI-ELE-ACF
<u>A-CI-RMP</u>	<u>Ramps</u>	<u>A-CI-RAM</u>
A-CI-RMP-BRF	Barrier-free ramps	A-CI-RAM-ACF
<u>A-CI-STR</u>	<u>Stairs, stairwells, and ladders</u>	<u>A-CI-ESC</u>
A-CI-STR-ESC	Escalators	A-CI-ESC-ROU
A-CL	Ceilings	A-PF
A-CL-BKH	Bulkheads	A-PF-GYP
❖ A-CL-DIM	Ceiling dimensions	A-PF-DIM
<u>A-CL-FIN</u>	<u>Ceiling finishes</u>	<u>A-PF-FIN</u>
A-CL-FIN-IDN	Ceiling finishes description	A-PF-FIN-NUI
<u>A-CL-GRD</u>	<u>Physical ceiling grid</u>	<u>A-PF-TRA</u>
A-CL-GRD-SCD	Planning grid lines	A-PF-TRA-SCD
❖ A-CL-HAT	Ceiling hatching	A-PF-HAC
A-CL-OPN	Openings, penetrations, skylights	A-PF-OUV
❖ A-CL-TXT	Ceiling text	A-PF-TEX
A-DK	Deck	A-TR
A-DK-BAR	Deck railings	A-TR-BAR
A-DK-OLN	Deck outline	A-TR-CON
A-DR	Doors	A-PO
<u>A-DR-EXT</u>	<u>Exterior doors, jambs, casework, swings</u>	<u>A-PO-EXT</u>
A-DR-EXT-IDN	Exterior doors identification numbers	A-PO-EXT-NUI
<u>A-DR-INT</u>	<u>Interior doors, jambs, casework, swings</u>	<u>A-PO-INT</u>
A-DR-INT-IDN	Interior doors identification numbers	A-PO-INT-NUI
A-DR-INT-PRT	Interior doors in a partition wall	A-PO-INT-CLS
A-DT	Details	A-DT
❖ A-DT-005	Line weight 0.05	A-DT-005
❖ A-DT-013	Line weight 0.13	A-DT-013
❖ A-DT-020	Line weight 0.20	A-DT-020
❖ A-DT-035	Line weight 0.35	A-DT-035

❖ A-DT-050	Line weight 0.50	<i>A-DT-050</i>
❖ A-DT-080	Line weight 0.80	<i>A-DT-080</i>
❖ A-DT-AXE	Detail: axis	<i>A-DT-AXE</i>
❖ A-DT-DIM	Detail: dimension	<i>A-DT-DIM</i>
❖ A-DT-HAC	Detail: hatching	<i>A-DT-HAC</i>
❖ A-DT-ISO	Detail: insulation	<i>A-DT-INS</i>
❖ A-DT-MEM	Detail: membrane	<i>A-DT-MEM</i>
❖ A-DT-PAR	Detail: air barrier	<i>A-DT-PAR</i>
❖ A-DT-PVA	Detail: vapour barrier	<i>A-DT-PVA</i>
❖ A-DT-REV	Detail: lining	<i>A-DT-REV</i>
❖ A-DT-SOL	Detail: flashing	<i>A-DT-SOL</i>
❖ A-DT-TEX	Detail: text	<i>A-DT-TEX</i>
❖ A-DT-TRI	Detail: line	<i>A-DT-TRI</i>
❖ A-DT-TRM	Detail: screening	<i>A-DT-TRM</i>

A-EM	Emergency	A-UR
<u>A-EM-HAT</u>	<u>General hatching</u>	<u>A-UR-HAC</u>
A-EM-HAT-COR	Corridor hatching	<i>A-UR-HAC-COR</i>
A-EM-HAT-STR	Staircase hatching	<i>A-UR-HAC-ESC</i>
A-EM-HAT-WAL	Wall hatching	<i>A-UR-HAC-MUR</i>
<u>A-EM-OLN</u>	<u>General outline</u>	<u>A-UR-CON</u>
A-EM-OLN-COR	Corridor outline	<i>A-UR-CON-COR</i>
A-EM-OLN-STR	Staircase outline	<i>A-UR-CON-ESC</i>
A-EM-OLN-WAL	Wall outline	<i>A-UR-CON-MUR</i>
A-EM-SYM	Emergency symbols: exit signs, stairs, first aid kit location, etc.	<i>A-UR-SYM</i>
A-EM-TXT	Emergency text	<i>A-UR-TEX</i>

A-FL	Floors	A-PC
<u>A-FL-CTP</u>	<u>Countertops</u>	<u>A-PC-CMP</u>
A-FL-CTP-PRT	Countertops on partitions	<i>A-PC-CMP-CLS</i>
❖ A-FL-DIM	Floor dimensions	<i>A-PC-DIM</i>
<u>A-FL-FIN</u>	<u>Floor finishes</u>	<u>A-PC-FIN</u>
A-FL-FIN-IDN	Floor finishes description	<i>A-PC-FIN-NUI</i>
❖ A-FL-HAT	Floor hatching	<i>A-PC-HAC</i>
A-FL-LEV	Floor level changes, ramps, truck wells	<i>A-PC-NIV</i>
A-FL-MIL	Architectural specialties, casework and millwork	<i>A-PC-EBE</i>
A-FL-OPN	Openings, floor hatching	<i>A-PC-OUV</i>
A-FL-OVH	Overhead items, skylights, overhangs, soffits	<i>A-PC-SUS</i>
A-FL-RAS	Raised floors	<i>A-PC-SUR</i>
❖ A-FL-SFT	Vertical shafts	<i>A-PC-PUV</i>
❖ A-FL-TXT	Floor text	<i>A-PC-TEX</i>

A-FU	Built-in Furniture	A-MO
❖ A-FU-MIL	Shelf, counter top, cupboard	<i>A-MO-EBE</i>

A-GL	General	A-GL
A-GL-ATT	Attributes	<i>A-GL-ATT</i>
A-GL-DIM	General architectural dimensions	<i>A-GL-DIM</i>
A-GL-HAC	General hatching	<i>A-GL-HAT</i>
A-GL-IDN	Identification, elevation points	<i>A-GL-NUI</i>

A-GL-RME	Read Me general drawing info.	<i>A-GL-LIS</i>
A-GL-TMP	Under construction lines, temporary aids	<i>A-GL-TEM</i>
A-GL-TXT	General text (street names)	<i>A-GL-TEX</i>
A-LG	Legend	A-LE
❖ A-LG-TXT	Text legend	<i>A-LE-TEX</i>
A-PL	Plan Information	A-PN
A-PL-OLN	Open-to-Below plan information outline	<i>A-PN-CON</i>
A-RF	Roofs	A-TO
A-RF-OLN	Roofs edge and features	<i>A-TO-CON</i>
A-RF-OPN	Roof openings for fans, stacks and ducts	<i>A-TO-OUV</i>
A-RF-OVH	Overhead items, roof above, canopies, soffits	<i>A-TO-SUR</i>
A-RF-WLK	Roof boardwalks, catwalks	<i>A-TO-PAS</i>
A-WD	Windows	A-FN
A-WD-EXT	Exterior window panes and frames	<i>A-FN-EXT</i>
<u>A-WD-INT</u>	<u>Interior window panes and frames, side windows</u>	<i>A-FN-INT</i>
A-WD-INT-PRT	Interior windows in a partition wall	<i>A-FN-INT-CLS</i>
A-WD-OVH	Overhead windows, skylights	<i>A-FN-SUR</i>
A-WD-SIL	Window sills	<i>A-FN-ALL</i>
A-WL	Non-Structural Walls	A-MU
<u>A-WL-ACC</u>	<u>Architectural or protection elements, guards</u>	<i>A-MU-ACC</i>
A-WL-ACC-BRF	Barrier-free accessories (grab bars, etc.)	<i>A-MU-ACC-ACF</i>
❖ A-WL-DIM	Wall dimensions	<i>A-MU-DIM</i>
<u>A-WL-EXT</u>	<u>Exterior walls</u>	<i>A-MU-EXT</i>
A-WL-EXT-HAT	Exterior walls hatching	<i>A-MU-EXT-HAC</i>
<u>A-WL-FIN</u>	<u>Wall finishes</u>	<i>A-MU-FIN</i>
A-WL-FIN-IDN	Wall finishes description	<i>A-MU-FIN-NUI</i>
<u>A-WL-HED</u>	<u>Door and window headers</u>	<i>A-MU-LIN</i>
A-WL-HED-PRT	Door and window headers on partition	<i>A-MU-LIN-CLS</i>
❖ A-WL-INS	Acoustic insulation of walls	<i>A-MU-ISO</i>
<u>A-WL-INT</u>	<u>Interior walls</u>	<i>A-MU-INT</i>
A-WL-INT-LOW	Interior walls - low walls	<i>A-MU-INT-BAS</i>
A-WL-INT-LOW-PRT	Interior partitions - low walls	<i>A-MU-INT-BAS-CLS</i>
A-WL-INT-PRT	Interior partition walls	<i>A-MU-INT-CLS</i>
A-WL-OLN	Wall outlines, building footprints, sheds, etc.	<i>A-MU-CON</i>
A-WL-WSR-PRT	Washroom partitions	<i>A-MU-SAT-CLS</i>

Bridges and Dams Engineering		
English Abvn	Description	French Abvn
B-AP	Approach Slabs	B-DA
B-AP-PLN	Approach slabs in plan view	B-DA-PLN
B-DK	Deck and Components	B-TA
B-DK-BAR	Barriers, railings	B-TA-BAR
B-DK-CRB	Curbs, sidewalks	B-TA-BOR
B-DK-DRN	Deck drains	B-TA-DRA
B-DK-JNT	Expansion joints	B-TA-JOC
B-DK-PLN	Deck plan	B-TA-PLN
B-DK-REB	Deck reinforcing	B-TA-ACR
B-DK-STG	Steel grating	B-TA-GRI
B-GL	General	B-GL
B-GL-DIM	Dimensions	B-GL-DIM
B-GL-HAT	Hatching	B-GL-HAC
B-GL-LAY	Layout line work	B-GL-TRI
B-GL-TXT	Text	B-GL-TEX
B-SB	Substructure	B-SO
B-SB-ABU	Abutments	B-SO-CUL
B-SB-APR	Approach slabs	B-SO-APR
B-SB-BRG	Bearing	B-SO-POR
B-SB-FTG	Footing	B-SO-SEM
B-SB-LIN	Bearing plan line work	B-SO-TRI
B-SB-PIR	Piers	B-SO-PIL
B-SB-REB	Substructure reinforcing	B-SO-ACR
B-SR	Scour Protection	B-PA
B-SR-GAB	Gabions	B-PA-GAB
B-SR-RRP	Riprap	B-PA-PIR
B-SS	Superstructure	B-SP
B-SS-BEM	Beams	B-SP-POU
B-SS-BRC	Bracing	B-SP-ENT
B-SS-CTW	Catwalks	B-SP-PAS
B-SS-REB	Superstructure reinforcing	B-SP-ACR
B-SS-SNL	Stringers	B-SP-LON

Civil Engineering, Site Design and Landscape Architecture		
English Abvtn	Description	French Abvtn
C-BH	Borehole Data (Geotechnical)	C-FO
C-BH-IDN	Borehole identification numbers	C-FO-NUI
C-BH-LOG	Borehole logs and data	C-FO-SCH
C-BH-SMP	Soil sample locations	C-FO-SON
C-BH-SPR	Stratigraphic profiles	C-FO-STR
C-BH-SYM	Symbols	C-FO-SYM
C-BH-WEL	Geotechnical or environmental monitoring wells	C-FO-PUA
C-DI	Diesel Fuel Distribution	C-DI
C-DI-MAN	Diesel fuel manholes	C-DI-PUA
C-DI-MET	Diesel fuel meters	C-DI-CPT
C-DI-PIP	Diesel fuel pipelines	C-DI-PIP
C-DI-VAL	Diesel fuel valves	C-DI-VAN
C-EN	Environment	C-EN
C-EN-CTM	Contamination zone	C-EN-CTM
C-EN-PLM	Plume outline	C-EN-CPA
C-EN-TNK	Holding tank	C-EN-RSV
C-GL	General	C-GL
C-GL-PIC	Inserted pictures	C-GL-IMA
C-HY	Hydrology	C-HY
C-HY-CAT	Catchments area	C-HY-BAV
C-HY-FLO	Flow, discharge	C-HY-ECO
C-HY-ICE	Ice thickness	C-HY-GLA
C-LD	Landscaping	C-AX
C-LD-ANT	Antenna	C-AX-ANT
C-LD-ART	Artwork, special features	C-AX-ART
C-LD-BRD	Foot bridges	C-AX-PAS
C-LD-CON	Concrete features, slabs	C-AX-BET
C-LD-FEN	Fencing	C-AX-CLO
C-LD-FIL	Filling zone	C-AX-REM
C-LD-FLG	Flagpoles	C-AX-MAT
C-LD-FTN	Fountains, pools	C-AX-BSN
C-LD-FUR	Site furnishings, benches, garbage cans, etc.	C-AX-MOB
C-LD-GRA	Grading	C-AX-NVL
<u>C-LD-IRR</u>	<u>Irrigation system</u>	<u>C-AX-IRR</u>
C-LD-IRR-PIP	Irrigation system piping	C-AX-IRR-TUY
C-LD-IRR-SYM	Irrigation heads, controls, valves	C-AX-IRR-SYM
C-LD-RWL	Retaining walls	C-AX-SOU
C-LD-SPO	Equipment, sports facilities, goal nets, shooting targets, etc.	C-AX-EQU
C-LD-STR	Stairs (not attached to buildings)	C-AX-ESC
C-LD-SWK	Sidewalks	C-AX-TRO
C-LD-TER	Terraces, courtyards, patios (not attached to buildings)	C-AX-TER

C-LD-TOE	Toe of erosion control, armourstone, riprap, berms	<i>C-AX-BRV</i>
C-LD-TOP	Crest of erosion control, armourstone, riprap, berms	<i>C-AX-HRV</i>
C-LD-TRL	Trails, footpaths	<i>C-AX-SEN</i>
C-LD-TUN	Tunnels	<i>C-AX-TUN</i>
C-LD-TXT	Descriptive information text	<i>C-AX-TEX</i>
C-NZ	Natural Gas Distribution	C-GN
C-NZ-MAN	Natural gas manholes	<i>C-GN-PUA</i>
C-NZ-MET	Natural gas meters	<i>C-GN-CPT</i>
C-NZ-PIP	Natural gas pipelines	<i>C-GN-PIP</i>
C-NZ-VAL	Natural gas valves	<i>C-GN-VAN</i>
C-OI	Oil Distribution	C-PE
C-OI-MAN	Oil manholes	<i>C-PE-PUA</i>
C-OI-MET	Oil meters	<i>C-PE-CPT</i>
C-OI-PIP	Oil pipelines	<i>C-PE-PIP</i>
C-OI-VAL	Oil valves	<i>C-PE-VAN</i>
C-PG	Propane Gas Distribution	C-GP
C-PG-MAN	Propane gas manholes	<i>C-GP-PUA</i>
C-PG-MET	Propane gas meters	<i>C-GP-CPT</i>
C-PG-PIP	Propane gas pipelines	<i>C-GP-PIP</i>
C-PG-VAL	Propane gas valves	<i>C-GP-VAN</i>
C-PR	Profile Data	C-PR
C-PR-HOR	Horizontal profiles	<i>C-PR-HOR</i>
C-PR-VER	Vertical profiles	<i>C-PR-VER</i>
C-RO	Roads	C-RO
C-RO-ACR	Fire department access routes	<i>C-RO-URG</i>
C-RO-ALI	Alignment	<i>C-RO-TRC</i>
C-RO-ASP	Asphalt road	<i>C-RO-ASP</i>
C-RO-BAR	Barrier	<i>C-RO-BAR</i>
C-RO-BRD	Bridges, overpasses, etc.	<i>C-RO-PON</i>
C-RO-CLI	Road centreline	<i>C-RO-MED</i>
C-RO-CNT	Highway construction staging	<i>C-RO-CNT</i>
C-RO-CRB	Curbs	<i>C-RO-BOR</i>
C-RO-GRL	Guides, guard rails, median dividers, bollards	<i>C-RO-PRT</i>
C-RO-GRV	Gravel road	<i>C-RO-GRV</i>
C-RO-GUT	Gutter lines	<i>C-RO-CAN</i>
C-RO-HWY	Highway plan	<i>C-RO-TRR</i>
C-RO-JER	Jersey barrier	<i>C-RO-JER</i>
C-RO-MRK	Markings and road striping	<i>C-RO-MAC</i>
C-RO-MSH	Mass hauling diagrams	<i>C-RO-SCH</i>
C-RO-RMP	Ramps, on-ramps, loading docks, etc.	<i>C-RO-RAM</i>
<u>C-RO-ROD</u>	<u>Drivable road limits (asphalt) road, lots</u>	<u><i>C-RO-LIM</i></u>
C-RO-ROD-APX	Drivable road limits' approximate location	<i>C-RO-LIM-APX</i>
C-RO-SHO	Shoulders	<i>C-RO-ACT</i>
C-RO-STG	Staging layout plan	<i>C-RO-PHA</i>
C-RO-STR	Bridge abutments, piers, and supports	<i>C-RO-PIL</i>
C-RO-SWK	Sidewalks	<i>C-RO-TRO</i>

C-RO-TRL	Trails, footpaths	C-RO-SEN
C-RO-TUN	Road tunnels, underpasses, etc.	C-RO-TUN
C-RO-TXT	Road description, information text	C-RO-TEX
C-RW	Railways	C-CF
C-RW-ALI	Alignment	C-CF-TRC
C-RW-BRD	Bridges	C-CF-PON
C-RW-CLI	Rail centrelines	C-CF-MED
C-RW-RAI	Railway lines, switches	C-CF-DIA
C-RW-RMP	Ramps	C-CF-RAM
C-RW-STR	Bridge abutments, piers, trestles, and supports	C-CF-PIL
C-RW-TUN	Tunnels	C-CF-TUN
C-SA	Sanitary Sewer	C-ES
C-SA-CAT	Drainage catch areas	C-ES-BAV
C-SA-CLE	Cleanout	C-ES-RNT
C-SA-IND	Industrial sewer	C-ES-IND
C-SA-IOT	Sanitary inlet outlet structure	C-ES-SES
C-SA-MAN	<u>Sewer manholes, catch basins</u>	C-ES-PUA
C-SA-MAN-IDN	Text regarding t/g elevation, inverts elevation, etc.	C-ES-PUA-TEX
C-SA-PMP	Pumping stations	C-ES-PMP
C-SA-SEP	<u>Septic system</u>	C-ES-SEP
C-SA-SEP-FIL	Septic field filling zone	C-ES-SEP-REM
C-SA-SEP-PIP	Septic field piping	C-ES-SEP-TUY
C-SA-SEP-TNK	Septic tank	C-ES-SEP-RSV
C-SA-SEW	<u>Sewer lines system</u>	C-ES-EGO
C-SA-SEW-ABN	Abandoned sanitary sewer lines	C-ES-EGO-ABN
C-SA-SEW-CMB-MLI	Combined main sewer lines	C-ES-EGO-CMB-PRI
C-SA-SEW-CMB-SLI	Combined service sewer lines	C-ES-EGO-CMB-SEV
C-SA-SEW-MLI	Main sanitary sewer lines	C-ES-EGO-PRI
C-SA-SEW-SLI	Sanitary service sewer lines	C-ES-EGO-SEV
C-SA-SYM	<u>Junction symbols</u>	C-ES-SYM
C-SA-SYM-IDN	Text description - type of junction	C-ES-SYM-TEX
C-SA-TMT	Sewage treatment areas	C-ES-TEU
C-SA-TXT	General text: length of sewer, slope, material, etc.	C-ES-TEX
C-SF	Natural Site Features	C-CS
C-SF-DBR	Debris, rubble, loose rock and soil	C-CS-DEB
C-SF-MAR	Marshes, wetlands	C-CS-TEH
C-SF-PIT	Borrow pit	C-CS-BEM
C-SF-RMN	<u>Archaeological remnants</u>	C-CS-VST
C-SF-RMN-ABV	Archaeological remnants above ground	C-CS-VST-AUD
C-SF-RMN-UND	Archaeological remnants underground	C-CS-VST-SOU
C-SF-TRE	<u>Trees, tree lines</u>	C-CS-ARB
C-SF-TRE-TXT	Text describing trees	C-CS-ARB-TEX
C-SF-TXT	Site feature description text	C-CS-TEX
C-SF-WTR	Natural boundaries watercourses, shorelines	C-CS-LBM

C-SI	Signs and Guideposts	C-SI
C-SI-GDP	Guideposts	<i>C-SI-POT</i>
C-SI-SGL	Sign layouts and details	<i>C-SI-DET</i>
C-SI-SGN	Signs	<i>C-SI-ECR</i>
C-SI-TXT	Signage text	<i>C-SI-TEX</i>
C-SV	Survey Control, Non-Legal	C-LV
C-SV-BEN	Local bench marks	<i>C-LV-RNL</i>
C-SV-BND	Non-legal boundaries	<i>C-LV-LIP</i>
C-SV-CHN	Chainage	<i>C-LV-CHI</i>
C-SV-CLN	Radial ties, traverse lines, control lines	<i>C-LV-LCH</i>
<u>C-SV-CPT</u>	<u>Control points</u>	<u><i>C-LV-POA</i></u>
C-SV-CPT-HOR	Horizontal control points	<i>C-LV-POA-HOR</i>
C-SV-CPT-VER	Vertical control points	<i>C-LV-POA-VER</i>
C-SV-GRD	Survey grid	<i>C-LV-QUA</i>
C-SV-HOR	Horizontal alignment	<i>C-LV-HOR</i>
C-SV-LIM	Limits of contract, non-legal	<i>C-LV-LIM</i>
C-SV-LIN	Survey feature connectivity line work	<i>C-LV-TRI</i>
C-SV-MON	Found monuments (non-legal)	<i>C-LV-RAR</i>
<u>C-SV-PAR</u>	<u>Parcel line work (non-legal)</u>	<u><i>C-LV-PAC</i></u>
C-SV-PAR-TXT	Parcel text (non-legal)	<i>C-LV-PAC-TEX</i>
C-SV-SEL	Super elevation	<i>C-LV-SUE</i>
<u>C-SV-SPT</u>	<u>Survey points</u>	<u><i>C-LV-POL</i></u>
C-SV-SPT-DES	Survey point description	<i>C-LV-POL-DES</i>
C-SV-SPT-ELV	Survey point elevation	<i>C-LV-POL-ELV</i>
C-SV-SPT-NUM	Survey point number text	<i>C-LV-POL-NUI</i>
C-SV-SPT-PNT	Survey points	<i>C-LV-POL-PTS</i>
<u>C-SV-STA</u>	<u>Station equation labels</u>	<u><i>C-LV-STA</i></u>
C-SV-STA-IDN	Station labels	<i>C-LV-STA-NUI</i>
C-SV-STA-PNT	Station points	<i>C-LV-STA-PTS</i>
C-SV-STB	Setbacks	<i>C-LV-MAR</i>
C-SV-VER	Vertical alignment	<i>C-LV-VER</i>
C-SW	Storm Water Drainage and Systems	C-EP
C-SW-CAT	Drainage catchments areas	<i>C-EP-BAV</i>
C-SW-CUL	Culverts	<i>C-EP-PON</i>
C-SW-DCL	Ditch centre lines	<i>C-EP-MED</i>
C-SW-IOT	Storm inlet outlet structure	<i>C-EP-SES</i>
<u>C-SW-MAN</u>	<u>Catch basins, manholes</u>	<u><i>C-EP-PUA</i></u>
C-SW-MAN-IDN	Manhole description text: elevation, direction	<i>C-EP-PUA-TEX</i>
C-SW-MNG	Storm water management pond	<i>C-EP-BSN</i>
C-SW-PMP	Pumping stations	<i>C-EP-PMP</i>
<u>C-SW-SEW</u>	<u>Sewer lines system</u>	<u><i>C-EP-EGO</i></u>
C-SW-SEW-ABN	Abandoned storm sewer lines	<i>C-EP-EGO-ABN</i>
C-SW-SEW-MLI	Storm main sewer lines	<i>C-EP-EGO-PRI</i>
C-SW-SEW-SLI	Storm service sewer lines	<i>C-EP-EGO-SEV</i>
C-SW-SUB	Subdrains	<i>C-EP-DRA</i>
<u>C-SW-SYM</u>	<u>Junction symbols</u>	<u><i>C-EP-SYM</i></u>

C-SW-SYM-IDN	Junction description text	C-EP-SYM-TEX
C-SW-TXT	Text describing length of sewer, slopes, material	C-EP-TEX
C-TP	Topographical Information	C-TG
C-TP-MAJ	Major contours	C-TG-COP
C-TP-MIN	Minor contours	C-TG-COS
C-TP-SPT	Spot elevation	C-TG-POC
<u>C-TP-SRF</u>	<u>Surface model line work</u>	<u>C-TG-MNT</u>
C-TP-SRF-BRL	Surface model break lines	C-TG-MNT-LCO
C-TP-SRF-TXT	Surface calculation text	C-TG-MNT-TEX
C-TP-TOE	Bank (toe)	C-TG-BRV
C-TP-TOP	Top of bank	C-TG-HRV
C-VG	Vegetation	C-VG
<u>C-VG-FLW</u>	<u>Flowers</u>	<u>C-VG-FLR</u>
C-VG-FLW-ANN	Annual flowers	C-VG-FLR-ANN
C-VG-FLW-PER	Perennial flowers	C-VG-FLR-VIV
<u>C-VG-GCV</u>	<u>Ground cover</u>	<u>C-VG-CVS</u>
C-VG-GCV-DEC	Deciduous ground cover	C-VG-CVS-CDC
C-VG-GCV-EVR	Evergreen ground cover	C-VG-CVS-PST
C-VG-GCV-ORN	Ornamental ground cover	C-VG-CVS-ORN
<u>C-VG-GRS</u>	<u>Grass area</u>	<u>C-VG-PEL</u>
C-VG-GRS-SED	Seeded grass area	C-VG-PEL-ESM
C-VG-GRS-SOD	Sodded grass area	C-VG-PEL-EGZ
<u>C-VG-SRB</u>	<u>Shrubs</u>	<u>C-VG-ABT</u>
C-VG-SRB-DEC	Deciduous shrubs	C-VG-ABT-CDC
C-VG-SRB-EVR	Evergreen shrubs	C-VG-ABT-PST
C-VG-SRB-ORN	Ornamental shrubs	C-VG-ABT-ORN
<u>C-VG-TRE</u>	<u>Trees</u>	<u>C-VG-ARB</u>
C-VG-TRE-DEC	Deciduous trees	C-VG-ARB-CDC
C-VG-TRE-ORN	Flowering trees, fruit trees	C-VG-ARB-ORN
C-VG-VIN	Vines	C-VG-VIG
C-WM	Water and Fire	C-CE
C-WM-FHY	Fire hydrants	C-CE-BOI
C-WM-FRL	Fire lines	C-CE-CAX
<u>C-WM-MAN</u>	<u>Manholes, storage, valves</u>	<u>C-CE-PUA</u>
C-WM-MAN-IDN	Text describing; t/g elevation, t/pipe elevation	C-CE-PUA-TEX
C-WM-PMP	Pumping stations	C-CE-PMP
C-WM-RAW	Raw water lines	C-CE-CEN
<u>C-WM-SYM</u>	<u>Junction symbols</u>	<u>C-CE-SYM</u>
C-WM-SYM-IDN	Text describing type of junction	C-CE-SYM-TEX
C-WM-TXT	Water main descriptive text	C-CE-TEX
C-WM-WEL	Water wells	C-CE-PUE
<u>C-WM-WLI</u>	<u>Water line</u>	<u>C-CE-CED</u>
C-WM-WLI-MLI	Water main	C-CE-CED-PRI
C-WM-WLI-SLI	Water service line	C-CE-CED-SEV

Electrical Systems

English Abv'n	Description	French Abv'n
E-CK	Clock Systems	E-HO
E-CK-EQP	Clock equipment	E-HO-EQU
❖ E-CK-NPR	Clock power	E-HO-ANV
E-CK-REC	Clock locations	E-HO-PRS
E-CK-WRG	Wiring	E-HO-CAB
E-DA	Data Systems	E-DN
E-DA-EQP	Data equipment	E-DN-EQU
E-DA-OUT	Data outlets, jacks	E-DN-PRS
E-DA-WRG	Wiring	E-DN-CAB
E-EG	Emergency Generation	E-AS
E-EG-COD	Conduits	E-AS-COD
E-EG-EQP	Emergency power generation equipment	E-AS-EQU
E-EG-GEN	Generators, control switchboards	E-AS-GEN
E-EL	Emergency Lighting	E-EU
E-EL-CLG	Emergency luminaries ceiling-mounted	E-EU-PFD
E-EL-ESG	Exit signs	E-EU-SOS
E-EL-EXT	Emergency outside luminaries attached to buildings, poles	E-EU-EXT
E-EL-WAL	Emergency luminaries wall-mounted	E-EU-MUR
E-EP	Emergency Power Equipment	E-RU
E-EP-CTL	Motors and controls	E-RU-COM
E-EP-DCB	DC battery systems	E-RU-ACU
E-EP-REC	Receptacles	E-RU-PRS
E-EP-TEN	Special tenant systems	E-RU-LOC
E-EP-UPS	UPS and conditioned power	E-RU-ASC
E-EW	Emergency Power Wiring and Cabling	E-CU
E-EW-CBT	Cable trays, ducts, and raceways	E-CU-CCC
E-EW-CLG	Ceiling-mounted wiring	E-CU-PFD
E-EW-CLT	Control wiring for emergency lighting	E-CU-COM
E-EW-EXP	Exposed inside/outside wiring	E-CU-EXT
<u>E-EW-HVD</u>	<u>High voltage wiring</u>	<u>E-CU-HTE</u>
E-EW-HVD-CLG	High voltage in ceiling space	E-CU-HTE-PFD
<u>E-EW-LVD</u>	<u>Low voltage wiring</u>	<u>E-CU-BTE</u>
E-EW-LVD-CLG	Low voltage in ceiling space	E-CU-BTE-PFD
E-EW-LVD-FLR	Low voltage under floor	E-CU-BTE-PCH
E-EW-PAN	Electrical panel for emergency power	E-CU-PAN
E-EW-UPS	Uninterruptible power system (UPS)	E-CU-ASC
E-FR	Electrical Fire Protection	E-AI
E-FR-ELD	Electromagnetic locking devices	E-AI-DVE
E-FR-EQP	Equipment: master fire warning panel, alarm, annunciator panels etc.	E-AI-EQU
E-FR-SIG	Signalling devices	E-AI-SIG
E-FR-SYM	Electrical FP symbols: pull stations, heat, smoke detectors	E-AI-DDA
<u>E-FR-VCE</u>	<u>Emergency voice communication</u>	<u>E-AI-CVU</u>
E-FR-VCE-WRG	Emergency voice communication wiring	E-AI-CVU-CAB

E-FW	Flat Wiring	E-CP
E-FW-CBL	Flat wiring cable location	E-CP-CAB
E-FW-CNB	Flat wiring connection boxes	E-CP-BOJ
E-GD	Grounding	E-MT
E-GD-EQP	Equipment and devices (rods, bus plates)	E-MT-EQU
E-GD-WRG	Wiring	E-MT-CAB
E-GL	General	E-GL
❖ E-GL-ATT	General attributes	E-GL-ATT
E-LG	Legend	E-LE
❖ E-LG-LIN	Legend linework	E-LE-TRI
❖ E-LG-TXT	Legend text	E-LE-TEX
E-LP	Lightning Protection	E-PT
E-LP-EQP	Equipment and devices	E-PT-EQU
E-LP-WRG	Wiring	E-PT-CAB
E-NG	Normal Power Generation	E-AN
❖ E-NG-ATT	Normal Power generation attributes	E-AN-ATT
E-NG-COD	Conduits	E-AN-COD
E-NG-EQP	Normal power generation equipment	E-AN-EQU
E-NG-GEN	Generators, control switchboard	E-AN-GEN
E-NL	Normal Lighting	E-EN
E-NL-CLG	Luminaries ceiling-mounted	E-EN-PFD
E-NL-CTL	Lighting controls	E-EN-COM
E-NL-EXT	Outside luminaries attached to buildings, poles	E-EN-EXT
E-NL-WAL	Luminaries in workspace and wall-mounted	E-EN-MUR
E-NP	Normal Power Equipment	E-RN
E-NP-CTL	Motors and controls	E-RN-COM
E-NP-EQP	Normal power equipment: ceiling fans, etc.	E-RN-EQU
E-NP-HVD	High voltage distribution	E-RN-HTE
E-NP-LVD	Low voltage distribution	E-RN-BTE
E-NP-MEC	Electrical connections to mechanical equipment	E-RN-MEC
E-NP-OUT	Outlets, receptacles	E-RN-PRS
E-NP-PAN	Electrical panels	E-RN-PAN
E-NP-RAD	Radiant heating panels	E-RN-RAY
E-NP-TEN	Special tenant systems	E-RN-LOC
E-NW	Normal Power Wiring and Cabling	E-CN
E-NW-CBT	Cable trays, ducts, and raceways	E-CN-CCC
E-NW-CTL	Control wiring lighting	E-CN-COM
E-NW-EXP	Exposed inside/outside wiring	E-CN-EXT
<u>E-NW-HVD</u>	<u>High voltage wiring</u>	<u>E-CN-HTE</u>
E-NW-HVD-CLG	High voltage wiring in ceiling space	E-CN-HTE-PFD
<u>E-NW-LVD</u>	<u>Low voltage wiring</u>	<u>E-CN-BTE</u>
E-NW-LVD-CLG	Low voltage wiring in ceiling space	E-CN-BTE-PFD
E-NW-LVD-FLR	Low voltage under floor	E-CN-BTE-PCH
E-NW-LVD-WOR	Low voltage in workspace	E-CN-BTE-PTV

E-NW-PST	Power poles with receptacles	E-CN-COL
E-NW-TEN	Tenant systems in workspace	E-CN-LOC
E-NW-UPS	Ups and conditioned power	E-CN-ASC
E-PA	Sound and PA Systems	E-SV
E-PA-EME	Emergency	E-SV-URG
E-PA-EQP	Sound equipment, speakers	E-SV-EQU
E-PA-OUT	Outlets	E-SV-PRS
E-PA-SYM	Symbols	E-SV-SYM
E-PA-WRG	Wiring	E-SV-CAB
E-PH	Telephone Systems	E-TE
E-PH-EQP	Equipment	E-TE-EQU
E-PH-OUT	Outlets	E-TE-PRS
E-PH-PAN	Telephone panel	E-TE-PAN
E-PH-WRG	Wiring	E-TE-CAB
E-SD	Site Distribution and Electrical Equipment	E-DS
E-SD-COD	Conduits	E-DS-COD
E-SD-DUC	Concrete ducts	E-DS-CBE
E-SD-EQP	Site distribution equipment: transformers, pedestals	E-DS-EQU
<u>E-SD-HVD</u>	<u>High voltage distribution</u>	<u>E-DS-HTE</u>
E-SD-HVD-ABV	High voltage distribution - above grade	E-DS-HTE-AER
E-SD-HVD-UND	High voltage distribution - below grade	E-DS-HTE-SOU
<u>E-SD-LTG</u>	<u>Lighting and wiring</u>	<u>E-DS-ECL</u>
E-SD-LTG-ABV	Lighting and wiring - above grade	E-DS-ECL-AER
E-SD-LTG-UND	Lighting and wiring - below grade	E-DS-ECL-SOU
<u>E-SD-LVD</u>	<u>Low voltage distribution</u>	<u>E-DS-BTE</u>
E-SD-LVD-ABV	Low voltage distribution - above grade	E-DS-BTE-AER
E-SD-LVD-UND	Low voltage distribution - below grade	E-DS-BTE-SOU
<u>E-SD-MAN</u>	<u>Manhole, handwells, junction box, pull pit ground inspection box</u>	<u>E-DS-PUA</u>
E-SD-MAN-IDN	Text describing; t/g elevation, line elevation	E-DS-PUA-IDN
E-SD-MUN	Municipal and utility services	E-DS-MUN
E-SD-POL	Poles and towers (electrical, communication)	E-DS-POT
E-SD-SUB	Substations	E-DS-SST
<u>E-SD-TEL</u>	<u>Telephone lines</u>	<u>E-DS-TEL</u>
E-SD-TEL-ABV	Telephone lines - above grade	E-DS-TEL-AER
E-SD-TEL-UND	Telephone lines - below grade	E-DS-TEL-SOU
E-SD-TXT	Text describing type of distribution system	E-DS-TEX
<u>E-SD-VID</u>	<u>Video lines</u>	<u>E-DS-VID</u>
E-SD-VID-ABV	Video lines - above grade	E-DS-VID-AER
E-SD-VID-UND	Video lines - below grade	E-DS-VID-SOU
E-SE	Security Systems	E-SS
E-SE-ALM	Intrusion alarms	E-SS-SAA
E-SE-CTL	Intrusion controls and controllers	E-SS-COM
E-SE-ELK	Electrical security locks	E-SS-VEE
E-SE-LAN	Intrusion system LAN	E-SS-REL

E-SE-SEN	Motion sensors	<i>E-SS-DEI</i>
E-SE-VCL	Video controllers (digital)	<i>E-SS-CMV</i>
E-SE-VCM	Video cameras and monitors	<i>E-SS-EQU</i>
E-SE-WRG	Intrusion controller wiring	<i>E-SS-CAB</i>
E-SG	Signal Systems	<i>E-SI</i>
E-SG-EQP	Equipment	<i>E-SI-EQU</i>
E-SG-OUT	Outlets	<i>E-SI-PRS</i>
E-SG-WRG	Wiring	<i>E-SI-CAB</i>
E-SM	Electrical Schematics	<i>E-SM</i>
E-SM-CLK	Clock system schematics	<i>E-SM-HOL</i>
E-SM-DAS	Data systems schematics	<i>E-SM-DAT</i>
E-SM-EFP	Electrical fire protection schematics	<i>E-SM-ALI</i>
<u>E-SM-EPR</u>	<u>Emergency distribution schematics</u>	<i>E-SM-ALU</i>
E-SM-EPR-EQP	Emergency power equipment	<i>E-SM-ALU-EQU</i>
E-SM-EPR-GEN	Emergency generation schematics, generators	<i>E-SM-ALU-GEN</i>
E-SM-EPR-LTG	Emergency lighting schematics	<i>E-SM-ALU-ECL</i>
E-SM-EPR-MMS	MMS tag numbers for emergency distribution	<i>E-SM-ALU-SGE</i>
E-SM-EPR-TXT	Text for emergency distribution	<i>E-SM-ALU-TEX</i>
E-SM-EPR-WRG	Emergency wiring schematics	<i>E-SM-ALU-CAB</i>
E-SM-GND	Grounding schematics	<i>E-SM-MIT</i>
<u>E-SM-HVD</u>	<u>High voltage (>750v) emergency distribution</u>	<i>E-SM-HTE</i>
E-SM-HVD-MMS	MMS tag numbers for high voltage distribution	<i>E-SM-HTE-SGE</i>
E-SM-KRK	Kirk key interlocks	<i>E-SM-KRK</i>
E-SM-LAN	Local area network schematics	<i>E-SM-REL</i>
E-SM-LTP	Lightning protection schematics	<i>E-SM-PRF</i>
E-SM-LVD	Low voltage emergency distribution	<i>E-SM-BTE</i>
E-SM-MMS	Maintenance management system (MMS) tag numbers	<i>E-SM-SGE</i>
<u>E-SM-MTR</u>	<u>Metering</u>	<i>E-SM-CPT</i>
E-SM-MTR-EQP	Metering equipment, switch board	<i>E-SM-CPT-EQU</i>
E-SM-MTR-TXT	Metering text	<i>E-SM-CPT-TEX</i>
E-SM-MTR-WRG	Metering wiring	<i>E-SM-CPT-CAB</i>
<u>E-SM-NPR</u>	<u>Normal power distribution schematics</u>	<i>E-SM-ANV</i>
E-SM-NPR-EQP	Normal power distribution equipment	<i>E-SM-ANV-EQU</i>
E-SM-NPR-LTG	Normal lighting schematics	<i>E-SM-ANV-ECL</i>
E-SM-NPR-MMS	MMS tag numbers for normal power distribution	<i>E-SM-ANV-SGE</i>
E-SM-NPR-TXT	Text for normal power distribution	<i>E-SM-ANV-TEX</i>
E-SM-NPR-WRG	Normal power wiring	<i>E-SM-ANV-CAB</i>
E-SM-PAS	Public address system schematics	<i>E-SM-COV</i>
E-SM-SGN	Signal schematic	<i>E-SM-SGN</i>
E-SM-TEL	Telephone schematics	<i>E-SM-TEL</i>
E-SM-UPS	Uninterruptible power system (UPS)	<i>E-SM-ASC</i>
E-SM-VID	Video system schematics	<i>E-SM-VID</i>

E-SY	Electricity on System Furniture	E-EA
❖ E-SY-ATT	Screening system attributes	E-EA-ATT
E-SY-LAN	LAN network jack	E-EA-REL
E-SY-LTG	Normal powered lighting	E-EA-ECL
E-SY-OUT	Electrical outlet	E-EA-PRS
E-SY-PST	Electrical posts on system furniture	E-EA-COL
E-SY-TEL	Telephone outlet	E-EA-TEL
E-VD	Video Conferencing Systems	E-VD
E-VD-EQP	Equipment	E-VD-EQU
E-VD-OUT	Outlets	E-VD-PRS
E-VD-WRG	Wiring	E-VD-CAB

General Information		
English Abvn	Description	French Abvn
G-DT	Details	G-DT
G-DT-DIM	Detail, section, elevation dimensions	<i>G-DT-DIM</i>
G-DT-HAT	Detail, section, elevation hatching	<i>G-DT-HAC</i>
G-DT-LIN	Detail, section, elevation linework	<i>G-DT-TRI</i>
G-DT-TXT	Detail, section, elevation annotation, text	<i>G-DT-TEX</i>
G-GL	General	G-GL
G-GL-SYM	Symbols, key plan, north arrow, bar scale	<i>G-GL-SYM</i>
<u>G-GL-TXT</u>	<u>Text, Callout blocks</u>	<u><i>G-GL-TEX</i></u>
G-GL-TXT-E	English text	<i>G-GL-TEX-A</i>
G-GL-TXT-F	French text	<i>G-GL-TEX-F</i>
G-GL-XRE	External reference	<i>G-GL-XRE</i>
G-LG	Legend	G-LE
G-LG-LIN	Symbol legend line work	<i>G-LE-TRI</i>
G-LG-TXT	Symbol legend text	<i>G-LE-TEX</i>
G-TL	Title Block	G-CT
G-TL-ATT	Attributes for title block	<i>G-CT-ATT</i>
G-TL-CRT	Stamps, Certificates	<i>G-CT-CRF</i>
G-TL-LGO	Logos	<i>G-CT-LOG</i>
G-TL-LIN	Line work for title block	<i>G-CT-TRI</i>
G-TL-RME	Title block read me layer	<i>G-CT-LIS</i>
G-TL-TBK	Title block insertion Layer	<i>G-CT-CAR</i>
G-TL-TXT	Text for title block	<i>G-CT-TEX</i>
G-TL-VPT	Viewport boundaries	<i>G-CT-MET</i>

Mechanical		
English Abv'n	Description	French Abv'n
H-CS	Control Systems	H-SR
H-CS-AIR	Control air piping	H-SR-AIR
H-CS-EQP	Control systems equipment	H-SR-EQU
H-CS-SYM	Control system symbols: thermostats, humidistat, sensors, etc.	H-SR-SYM
H-CS-TXT	Control system text	H-SR-TEX
H-CS-WRG	Control wiring	H-SR-CAB
H-DW	Domestic Water	H-ED
H-DW-CLD	Domestic cold water	H-ED-EFR
H-DW-EQP	Domestic water equipment: pumps, water softeners, filters, etc.	H-ED-EQU
<u>H-DW-FIX</u>	<u>Plumbing fixtures</u>	<u>H-ED-APP</u>
H-DW-FIX-PRT	Plumbing fixtures on partitions	H-ED-APP-CLS
<u>H-DW-HOT</u>	<u>Domestic hot water</u>	<u>H-ED-ECD</u>
H-DW-HOT-RCL	Domestic hot water recirculation	H-ED-ECD-REC
H-DW-HOT-TNK	Domestic hot water tanks	H-ED-ECD-RSV
H-DW-ROW	Reverse osmosis water (medical)	H-ED-EOI
H-FP	Fire Protection	H-PI
<u>H-FP-CEX</u>	<u>Chemical extinguishing system</u>	<u>H-PI-EXC</u>
H-FP-CEX-EQP	Chemical extinguishing equipment	H-PI-EXC-EQU
H-FP-CEX-PIP	Chemical extinguishing piping	H-PI-EXC-TUY
H-FP-EPE	Explosion-proof equipment	H-PI-EQA
H-FP-EQP	Fire protection equipment: fire hose cabinet, fire dampers, etc.	H-PI-EQU
<u>H-FP-FEX</u>	<u>Foamed extinguishing system</u>	<u>H-PI-EXM</u>
H-FP-FEX-EQP	Foamed extinguishing equipment	H-PI-EXM-EQU
H-FP-FEX-PIP	Foamed extinguishing piping	H-PI-EXM-TUY
<u>H-FP-SPK</u>	<u>Sprinkler system</u>	<u>H-PI-GIC</u>
H-FP-SPK-EQP	Sprinkler equipment	H-PI-GIC-EQU
H-FP-SPK-PIP	Sprinkler piping	H-PI-GIC-TUY
H-FP-SPK-SYM	Sprinkler system symbols: sprinkler heads, backflow preventer, etc.	H-PI-GIC-SYM
H-FP-SPK-TXT	Sprinkler system text	H-PI-GIC-TEX
H-FP-SPK-ZNS	Sprinkler system zones	H-PI-GIC-ZON
<u>H-FP-STP</u>	<u>Standpipe system</u>	<u>H-PI-CMG</u>
H-FP-STP-EQP	Standpipe equipment	H-PI-CMG-EQU
H-FP-STP-PIP	Standpipe piping	H-PI-CMG-TUY
H-FP-SYM	Fire protection symbols: fire extinguisher, hydrants Siamese connections, etc.	H-PI-SYM
H-FP-TXT	Fire protection text	H-PI-TEX
H-GL	General	H-GL
❖ H-GL-ATT	General attributes	H-GL-ATT
❖ H-GL-TXT-E	English text	H-GL-TEX-A
❖ H-GL-TXT-F	French text	H-GL-TEX-F
H-LG	Legend	H-LE
❖ H-LG-LIN	Legend linework	H-LE-TRI
❖ H-LG-TXT	Legend text	H-LE-TEX

H-HC	Heating and cooling	H-CH
H-HC-CHL	Chilled water	H-CH-ERF
H-HC-CHL-RET	Chilled water return	H-CH-ERF-RET
H-HC-CHL-SUP	Chilled water supply	H-CH-ERF-ALM
H-HC-CNV	Convectors	H-CH-CNV
H-HC-COT	Cooling tower water	H-CH-TRF
H-HC-COT-RET	Cooling tower water return	H-CH-TRF-RET
H-HC-COT-SUP	Cooling tower water supply	H-CH-TRF-ALM
H-HC-GLY	Glycol	H-CH-GLY
H-HC-GLY-RET	Glycol return	H-CH-GLY-RET
H-HC-GLY-SUP	Glycol supply	H-CH-GLY-ALM
H-HC-HWA	Heating water	H-CH-ECF
H-HC-HWA-RET	Heating water return	H-CH-ECF-RET
H-HC-HWA-SUP	Heating water supply	H-CH-ECF-ALM
H-HC-HYD	Hydronic equipment	H-CH-HYD
H-HC-RAD	Radiant heat tubing	H-CH-RAY
H-HC-REF-EQP	Refrigerant equipment	H-CH-FRI-EQU
H-HC-RFG	Refrigerant gas	H-CH-GAF
H-HC-RFL	Refrigerant liquid	H-CH-FLF
H-HC-STM	Steam	H-CH-VAP
H-HC-STM-EQP	Steam equipment	H-CH-VAP-EQU
H-HC-STM-RET	Steam condensate (return)	H-CH-VAP-RET
H-HC-STM-SUP	Steam supply	H-CH-VAP-ALM
H-PB	Plumbing	H-PB
H-PB-CMA	Compressed air	H-PB-AIC
H-PB-CMA-EQP	Compressed air equipment	H-PB-AIC-EQU
H-PB-CO2	Carbon dioxide gas	H-PB-CO2
H-PB-DWV	Drainage waste and vent system	H-PB-REV
H-PB-DWV-SYM	Symbols: roof drains, floor drains, etc.	H-PB-REV-SYM
H-PB-DWV-VEN	Ventilating circuit, vents	H-PB-REV-EVE
H-PB-DWV-WST	Drainage circuit	H-PB-REV-EEU
H-PB-EQP	Plumbing equipment: pumps, coils motors, grease interceptor, etc.	H-PB-EQU
H-PB-FOI	Fuel oil	H-PB-MAZ
H-PB-FOI-EQP	Fuel equipment	H-PB-MAZ-EQU
H-PB-FOI-RET	Fuel oil return	H-PB-MAZ-RET
H-PB-FOI-SUP	Fuel oil supply	H-PB-MAZ-ALM
H-PB-FOI-VEN	Fuel oil vent	H-PB-MAZ-EVE
H-PB-HEG	Helium gas	H-PB-HEL
H-PB-HYG	Hydrogen gas	H-PB-HYG
H-PB-MAN	Access holes	H-PB-PUA
H-PB-MEG	Methane gas	H-PB-MTH
H-PB-NGA	Natural gas	H-PB-GAN
H-PB-NIT	Nitrogen gas	H-PB-AZO
H-PB-OXY	Oxygen gas	H-PB-OXY
H-PB-PGA	Propane gas	H-PB-GAP

H-PB-SYM	Plumbing symbols: gauges, fittings, valves elbows, unions, reducer	<i>H-PB-SYM</i>
H-PB-VAC	Cleaning system, vacuum	<i>H-PB-NET</i>
H-PP	Fuel and Process Piping	H-TC
H-PP-MAN	Manholes fuelling stations	<i>H-TC-PUA</i>
H-PP-MET	Meters	<i>H-TC-CPT</i>
H-PP-PIP	Fuel and process piping	<i>H-TC-TUY</i>
H-PP-PMP	Pumping stations	<i>H-TC-PMP</i>
H-PP-TNK	Fuel tanks	<i>H-TC-RSV</i>
H-PP-VAL	Valves	<i>H-TC-VAN</i>
H-SM	Mechanical Schematics and Riser Diagrams	H-SM
H-SM-CTL	Control system schematics	<i>H-SM-COM</i>
H-SM-DRS	Duct riser diagrams	<i>H-SM-CMC</i>
H-SM-DUC	Duct schematic diagrams	<i>H-SM-COD</i>
H-SM-PIP	Piping schematic diagrams	<i>H-SM-TUY</i>
H-SM-PRS	Piping riser diagrams	<i>H-SM-CMT</i>
H-SM-SYM	Symbols	<i>H-SM-SYM</i>
H-SM-WST	Waste schematics	<i>H-SM-EEU</i>
H-VA	Ventilation and Air Conditioning	H-VC
H-VA-COA	Combustion air ductwork	<i>H-VC-ACO</i>
H-VA-EQP	Equipment: fans, dampers, coils, filters, etc.	<i>H-VC-EQU</i>
<u>H-VA-EXH</u>	<u>Exhaust air system</u>	<i>H-VC-AEV</i>
H-VA-EXH-DUC	Exhaust air ductwork	<i>H-VC-AEV-COD</i>
H-VA-EXH-GRI	Exhaust grilles	<i>H-VC-AEV-GRI</i>
H-VA-INS	Duct insulation, acoustical lining	<i>H-VC-ISO</i>
<u>H-VA-OTA</u>	<u>Outside air system</u>	<i>H-VC-AEX</i>
H-VA-OTA-DUC	Outside air ductwork	<i>H-VC-AEX-COD</i>
H-VA-OTA-GRI	Outside air grilles	<i>H-VC-AEX-GRI</i>
<u>H-VA-RET</u>	<u>Return system</u>	<i>H-VC-REP</i>
H-VA-RET-DUC	Return ductwork	<i>H-VC-REP-COD</i>
H-VA-RET-GRI	Return grills	<i>H-VC-REP-GRI</i>
<u>H-VA-SUP</u>	<u>Supply system</u>	<i>H-VC-AMA</i>
H-VA-SUP-DIF	Supply diffusers	<i>H-VC-AMA-DIF</i>
H-VA-SUP-DUC	Supply ductwork	<i>H-VC-AMA-COD</i>
H-VA-VAV	Variable air volume boxes	<i>H-VC-DAV</i>
H-VA-VEN	Flue, vent, breaching	<i>H-VC-EVE</i>

Interior Design

English Abvn	Description	French Abvn
I-BP	Blocking Plan	I-BE
I-BP-DIM	Dimensions	I-BE-DIM
I-BP-OLN	Sector outlines	I-BE-CON
I-BP-TXT	Text, notes	I-BE-TEX
I-EI	Employee Information	I-EM
I-EI-IDN	Employee identification	I-EM-NUJ
I-EQ	Equipment	I-EQ
I-EQ-CMP	Computers	I-EQ-ORD
I-EQ-OEQ	Office equipment	I-EQ-EXI
I-EQ-SPC	Special equipment	I-EQ-SPE
I-FU	Furniture	I-MO
I-FU-ACC	Accessories, coat trees, racks	I-MO-ACC
I-FU-ART	Artwork	I-MO-ART
I-FU-CAB	Storage cabinets, files	I-MO-RAG
I-FU-CLR	Furniture colour	I-MO-COU
I-FU-DSK	Desks, freestanding work surfaces	I-MO-SUT
I-FU-NOF	Non-office furniture, first aid room beds, etc.	I-MO-APE
I-FU-PLT	Plants	I-MO-PLT
I-FU-SET	Seating	I-MO-SIE
I-FU-SHL	Shelving	I-MO-ETA
I-FU-TAB	Tables	I-MO-TAB
I-FU-TXT	Annotations, text furniture	I-MO-TEX
I-FU-SIZ	Furniture size	I-MO-DIM
I-SI	Signage	I-SI
I-SI-EQP	Barrier-free signs	I-SI-ACF
I-SI-OFF	Office signage	I-SI-BUR
I-SI-SPC	Special signage	I-SI-SPE
I-SY	System Furniture	I-EA
I-SY-CLR	Panel colour	I-EA-COU
I-SY-OVH	Panel overhead storage, etc.	I-EA-SUR
I-SY-SCR	Panels, screens	I-EA-ECA
I-SY-SIZ	Panel sizes	I-EA-DIM
I-SY-SUR	Work surfaces for system furniture	I-EA-SUT

Legal Survey

- ❖ **Que.** For Legal Survey layers, the Quebec region has adopted the "Ministère des transports du Québec (MTQ) layering standard. In order to facilitate data transfer, the layer names are based on P-codes for survey layout with a Total Station and an Electronic Notebook

Layer Name	Description	Layer Name	Description
(1) CPV	ControlPhotoVerti(DP)	(90)PLL	PlantationLimite(RL)
(2) CPH	ControlPhotoHoriz(DP)	(91)POB	PoinCotBathymetri(RP)
(3) CPT	ControlPhotoTridi(DP)	(94)POA	PoinCotAltimetriq(RP)
(4) CLU	Clou(DP)	(95)CHP	ChangementPente(BL)
(6) CPK	ClouPK(DP)	(96)CPA	ChangementPentApprox(BL)
(7) MOD	MonumentDelimitat(DP)	(97)PAA	PoinCotAltiApprox(RP)
(8) PIB	PiquetBoisRepere(DP)	(98)ALR	RochesAlignement(DL)
(9) RGI	RepereGeodesInteg(DP)	(99)BEM	BancEmprunt(RL)
(10) RGN	RepereGPSNonInteg(DP)	(108)FME	FrontierModelExte(EL)
(14) RAI	RepereAltimIntegr(DP)	(109)FMI	FrontierModelInte(IL)
(15) RAP	RepereArpenPrimit(DP)	(110)BAT	BatimentDivers(DL)
(17) RCS	RepereChemStation(DP)	(111)BBT	ToitureBord(DL)
(18) RAL	RepereAltimetriq(DP)	(112)BIN	BatimentInstitu(DL)
(19) RIP	RepereIdentPlante(DP)	(113)BRE	BatimentReligieux(DL)
(20) TUF	TuyauFer(DP)	(116)BAA	BatimentAgricole(DL)
(21) RAT	RepereArpenTrouve(DP)	(120)BAC	BatimentCommercial(DL)
(24) TIF	TigeFer(DP)	(121)BAR	BatimResidentiel(DL)
(26) ALP	Arbre/LignePlaque(DP)	(123)ABR	Abribus(BL)
(27) MGR	MarqueGravee(DP)	(124)CAT	CabineTelephoniqu(DP)
(28) BAL	BalisePoinGeodesi(DP)	(126)BAS	BatimSecondAutres(DL)
(29) PIC	PiquetCloture(DP)	(127)ABA	AbriAuto(DL)
(30) LIR	LigneReference(DL)	(128)BCO	BatimConstruction(DL)
(56) ALA	ArbresAlignement(DL)	(129)BAI	BatimIndustriel(DL)
(61) CLO	ClotureAutre(RL)	(130)BRU	BatimentRuine(DL)
(63) CLM	CloturMaillesSerr(RL)	(131)MAA	MassifAncrag/Base(DL)
(65) FOF	FosseFond(BL)	(133)ESC	Escalier(RL)
(67) DAL	DalotDrainage(DL)	(134)FON	FondationBatiment(DL)
(68) CAN	Caniveau(BL)	(135)ELD	ElementDecoratif(BL)
(69) FOC	FosseCentre(BL)	(136)CLI	CulturelLimite(RL)
(70) FOB	FossBordLimitExca(BL)	(137)POU	PoteauUtilitaire(DP)
(71) OCC	OccupationLimite(RL)	(138)PAT	Patio/Terrasse(DL)
(73) PRO	Prolongement(RP)	(139)PIL	Pilier(DL)
(74) ENB	EauxNormalesBasse(DL)	(140)PCR	PiscineCreusee(BL)
(75) BOL	BoiseLimite(RL)	(141)PHT	PiscineHorsTerre(RL)
(76) EAJ	EauxJour(BL)	(142)IPE	IlotPompeEssence(DP)
(77) CEC	CoursEauCentre(BL)	(144)DAB	DalleBeton(BL)
(78) ENH	EauxNormalesHaute(DL)	(145)TOU	TourAntenneAutres(DP)
(79) EAE	EauxExtremes(DL)	(146)JNT	JointDilatation(DL)
(80) HAC	HaieCentre(DL)	(147)QUA	Quai(BL)
(81) TAH	TalusHaut(BL)	(148)PHA	Phare(DL)
(82) TAB	TalusBas(BL)	(151)MOC	MonumentCommemorat(BL)
(83) MUS	MurSoutenement(BL)	(152)BRS	BoucheReserSouter(DP)
(84) DEC	DecrochemTerrain(BL)	(153)REV	ReservoirLimite(DL)
(87) MUM	MurMitoyenAxe(DL)	(155)CHE	ChampEpuration(RL)
(88) MAP	MurAmenaPays/Acou(BL)	(156)GAL	Galerie(DL)
(89) ROC	RocLimite(BL)	(157)FOE	FoyerExterieur(BL)

(160)FOP	FossePurin(DL)	(212)POT	PoteauTelephone(DP)
(161)FPS	FutPannPetiteSign(DP)	(213)PET	PoteauElectTeleph(DP)
(162)MDC	MarqAxialDouCont(BL)	(214)POG	PoteauGuide(DP)
(163)MDM	MarqAxialDoubMixt(BL)	(215)PTR	PoteauElectTransf(DP)
(164)FSL	FutSuperSignalLate(DP)	(216)PTT	PoteauEleTelTrans(DP)
(165)FSA	FutSuperSignaAeri(DL)	(217)PEL	PoteauElectLampad(DP)
(166)MCO	MarquageContinuit(BL)	(218)PTL	PoteauEleTelLampa(DP)
(167)MAG	MarquageGuidage(RL)	(219)PLT	PoteauEleLampTran(DP)
(168)MAC	MarquaSimplContin(BL)	(220)PLR	PotEleTelLampTran(DP)
(169)MAD	MarqAxialSimpDisc(BL)	(221)HAU	Hauban(DP)
(170)ANB	AccoteNonPaveBord(BL)	(222)MTI	MassifTirage(DP)
(171)MVR	MarquVoiReservee(BL)	(223)PYL	MassifPyloneElect(DL)
(172)FPP	FutPannPublicitai(DP)	(224)LAS	LampadaireSimple(DP)
(173)PAN	PanneauSignalBord(DL)	(225)LAD	LampadaireDouble(DP)
(174)MPI	MarquagePictogram(DP)	(226)LAM	LampadaireMultipl(DP)
(175)PAC	PavageCentre(BL)	(227)LAP	LampadairPromenad(DP)
(176)GRC	GravierCentre(BL)	(228)LAV	LanterneVerticale(DP)
(177)VFC	VoieFerreeCentre(BL)	(229)LAH	LanternHorizontal(DP)
(178)RBI	RailBordInterieur(DL)	(230)LAL	LanternLampadaire(DP)
(179)PAR	Parapet(DL)	(231)PUC	PuisardCirculaire(DP)
(180)ECG	EntreeChemPriGrav(BL)	(232)REG	RegardNonIdentif(DP)
(181)PAB	PavageBord(BL)	(233)RPU	RegardPuisard(DP)
(182)GRB	GravierBord(BL)	(234)PRP	PuisarRect350x600(DP)
(183)ECP	EntreechemPriPavel(BL)	(235)FOS	FosseSeptique(DP)
(184)GNI	GlissNonIdentFace(DL)	(236)PUI	Puits(DP)
(185)BOR	BordureBord(BL)	(237)LPI	LanternPietons(DP)
(186)APB	AccotemenPavelBord(BL)	(238)BOF	BorneFontaine(DP)
(187)TRO	TrottoirBord(BL)	(239)BIM	BornInjecMousCarb(DP)
(188)SEM	Semelle(DL)	(240)VAQ	ValveAqueduc(DP)
(189)PON	TablierPont(BL)	(241)PRR	Puisar/RegardFond(DP)
(190)CUL	Culée (BL)	(242)RCT	RepCabTelecomSout(DP)
(191)GTB	GlisTolPotBoiFace(DL)	(243)RGZ	RepereGazoduc(DP)
(192)GTA	GlisTolPotAciFace(DL)	(244)IPN	IndicPassagNiveau(DP)
(193)GBD	GilssBet2FacCentr(BL)	(245)LPN	LanternPassagNivo(DP)
(194)GCA	GlisCabPotAciFace(DL)	(246)BPN	BarrierPassagNivo(DP)
(195)TTP	TuyauThermoplasti(DL)	(247)AVF	AiguilVoiFerree(DP)
(196)TBA	TuyauBetonArme(DL)	(248)BJE	BoiteJoncDistElec(DP)
(197)TTO	TuyauToleOndulee(DL)	(249)PTG	PoteauTelegraphe(DP)
(198)BPR	BorneProtection(DP)	(250)TES	TransLignElecSout(DP)
(199)PBA	PonceauRectBetArm(DL)	(251)RAQ	RegardAqueduc(DP)
(200)BRR	BarriereCloture(DP)	(252)REC	RegardEgoutCombin(DP)
(201)GBU	GlissBet1FaceCentr(BL)	(253)BJT	BoiteJoncDistTele(DP)
(202)GCB	GlisCabPotBoiFace(DL)	(254)BOP	Boite postale (BL)
(203)GTU	GlisTubPotAciFace(DL)	(255)DEB	Debarcadere(BL)
(204)BUS	Buse(DP)	(256)GAZ	Gazoduc(DL)
(205)PNI	PoteauNonIdentifi(DP)	(257)REP	RegardEgoutPluvial(DP)
(206)LAC	LanternClignotant(DP)	(258)REE	RegarChambEleSout(DP)
(207)BOD	BoucleDetection(DP)	(259)RET	RegarChambTelSout(DP)
(208)PUV	PuitsVentilation(DL)	(260)RES	RegardEgoutSanita(DP)
(209)RCE	ReperCabElecSout(DP)	(261)RGA	RegardGazoduc(DP)
(210)LPO	LampadairePotence(DP)	(262)OLE	Oléoduc (DL)
(211)POE	PoteauElectricite(DP)	(263)REO	RepereOleoduc(DP)

(264)SON	SondageGeotechniq(DP)	(348)PAI	PalierLimiteInter(BL)
(266)PRG	PuisarRect450x900(DP)	(349)PDR	PreDecoupageRoc(BL)
(267)BRG	BandeRugueuse(DL)	(350)TNA	TerrainNaturel(BL)
(280)ARC	ArbreConifere(DP)	(351)TVG	TerreVegetale(BL)
(281)ARF	ArbreFeuille(DP)	(352)ROS	RocSurface(BL)
(282)ARB	Arbuste(DP)	(353)SAV	Savane(BL)
(283)MAR	MarecageBord(BL)	(354)SOI	SolInitial(BL)
(286)DRA	DrainFiltre(RP)	(355)ROI	RocInitial(BL)
(287)BAG	Barrage(BL)	(356)SOF	SolFinal(BL)
(288)PAS	TablierPasserelle(DL)	(357)ROF	RocFinal(BL)
(289)EMP	Empilement/Ebouli(BL)	(358)SEF	SectionFinale(BL)
(290)EPR	EmpierAntiErosion(BL)	(359)SPR	SousProfil(BL)
(295)CTA	CableTelecomAeriel(DL)	(360)RER	RevetemenRoulemen(BL)
(296)CEA	CableElectrAerien(DL)	(361)REB	RevetementBase(BL)
(298)DIV	Divers(RL)	(362)FND	FondationRoute(BL)
(299)PCT	PoinCalculTerrain(DP)	(363)FIN	FondationInferieu(BL)
(300)PCB	PoinCalculBureau(DP)	(364)SFO	SousFondationRout(BL)
(347)PAE	PalierLimiteExter(BL)	(365)INF	Infrastructure(BL)

Codes following descriptions

Operational Functions

R	Random
B	Breakline
D	DoNotContour
E	Extérieur
I	Intérieur

Geometric features

L	Linéaire
P	Ponctuel

GDA Specific codes

	Description
(373)FRA	FermetureDistanAltitu
(374)FRP	FermeturePente
(375)FRD	FermetureDistance
(376)PRC	PointRencontre2Couche

Control Codes

(1)DC	DébutChaine
(2)FF	FermerFigure
(3)CC	CommencementCourbe
(4)FC	FinCourbe
(5)PL	PlanimetrieSeulement
(8)FR	Rectangle3Points
(9)NZ	ElevationNonValide
(n/d)DI	DistancePerpendiculaire
(n/d)GA	GabaritElements
(n/d)JC	JoindreUnCode
(n/d)JP	JoindreUnPoint
(n/d)NO	NoteDescriptive(ASK)
(n/d)RE	Rectangle2Points
(n/d)RO	RotationSymbole

Marine		
English Abvn	Description	French Abvn
M-BW	Breakwater Features	M-BL
M-BW-OLN	Breakwater outline	M-BL-CON
M-BW-TOE	Toe of breakwater	M-BL-BRV
M-BW-TOP	Crest of breakwater, berms	M-BL-HRV
❖ n/a	Dolosse	M-BL-DOL
❖ n/a	Corelock	M-BL-KOR
❖ n/a	Tetrapods	M-BL-TET
❖ n/a	Tribars	M-BL-TRB
M-GL	General	M-GL
M-GL-DIM	Dimensions	M-GL-DIM
M-GL-HAT	Hatching	M-GL-HAC
M-GL-LAY	Layout line work	M-GL-TRI
M-GL-TXT	Text	M-GL-TEX
❖ n/a	Center line	M-GL-AXE
❖ n/a	Boat, launch, offshore	M-GL-BCH
❖ n/a	Chainage	M-GL-CHI
❖ n/a	Wharf face	M-GL-FAQ
❖ n/a	Borehole + date if necessary	M-GL-FOR_date
❖ n/a	Demolition boundary	M-GL-LIM-D
❖ n/a	Parking divisions	M-GL-LST
❖ n/a	Limits of construction	M-GL-LTR
❖ n/a	Viewports	M-GL-MET
❖ n/a	Equipment numbers	M-GL-EQU-NUI
❖ n/a	Photo or picture number	M-GL-IMA-NUI
❖ n/a	Structure number	M-GL-NST
❖ n/a	Signalisation	M-GL-SIN
❖ n/a	As-built	M-GL-TQC
❖ n/a	Basic grid	M-GL-TRA
❖ n/a	Verticality	M-GL-VER
M-NV	Navigation	M-NA
M-NV-BUO	Buoys	M-NA-BOU
❖ n/a	Fog horn	M-NA-CRI
M-NV-CAR	Cards	M-NA-SYM
M-NV-CNL	Navigation channels, corridors	M-NA-CNL
M-NV-EQP	Floating aids, marker buoys, fog horns	M-NA-EQU
M-NV-SPA	Spars	M-NA-MAT
❖ n/a	Navigation tower	M-NA-TOU
M-SK	Skid-way, Haul-outs, Slipways, wharf structure	M-CA
M-SK-BED	Vessel beds	M-CA-PLF
M-SK-BLK	Anchor blocks, haul out blocks	M-CA-BLC
M-SK-FTG	Footings	M-CA-SEM
M-SK-GUA	Guards	M-CA-GUA
M-SK-OLN	Skid-way outline	M-CA-CON

M-SK-RAI	Railway	<i>M-CA-TRC</i>
M-SK-SKD	Skid timbers, skid poles, girder	<i>M-CA-POU</i>
M-SK-SLB	Concrete slabs, precast panels	<i>M-CA-DPP</i>
M-SK-SSP	Steel sheet piling	<i>M-CA-PAL</i>
❖ n/a	Steel reinforcement	<i>M-CA-ARR</i>
❖ n/a	Shoulder	<i>M-CA-ACT</i>
❖ n/a	Building	<i>M-CA-BAT</i>
❖ n/a	Concrete girder	<i>M-CA-CDB</i>
❖ n/a	Trench	<i>M-CA-CAN</i>
❖ n/a	Wooden cribwork	<i>M-CA-EBO</i>
❖ n/a	Jersey wall	<i>M-CA-JER</i>
❖ n/a	Construction joint	<i>M-CA-JOC</i>
❖ n/a	Geotextile membrane	<i>M-CA-MGE</i>
❖ n/a	Prefabricated panel	<i>M-CA-PAN</i>
❖ n/a	Parapet	<i>M-CA-PRP</i>
❖ n/a	Walkway	<i>M-CA-PAS</i>
❖ n/a	Asphalt paving	<i>M-CA-ASP</i>
❖ n/a	Piling	<i>M-CA-PIE</i>
❖ n/a	Floating dock, pontoon	<i>M-CA-QUF</i>
❖ n/a	Crane support	<i>M-CA-SGR</i>
❖ n/a	Tunnel	<i>M-CA-TUN</i>
M-SN	Hydrographic Survey Information, Non Legal	<i>M-RH</i>
M-SN-DAT	Chart datum contour, 0.00 m	<i>M-RH-ZDC</i>
M-SN-DRG	Dredged area or limits	<i>M-RH-LID</i>
M-SN-HNT	High normal tide	<i>M-RH-MHN</i>
M-SN-HWL	High water lines	<i>M-RH-LHM</i>
M-SN-LNT	Low normal tide	<i>M-RH-MBN</i>
M-SN-LWL	Low water lines	<i>M-RH-LBM</i>
M-SN-MAJ	Major sea bottom contours	<i>M-RH-PFM</i>
M-SN-MIN	Minor sea bottom contours	<i>M-RH-SFM</i>
<u>M-SN-SPT</u>	<u>Soundings, spot elevations</u>	<u><i>M-RH-SON</i></u>
M-SN-SPT-DES	Survey point description	<i>M-RH-POL-DES</i>
M-SN-SPT-ELV	Survey point elevation	<i>M-RH-POL-ELV</i>
M-SN-SPT-NUM	Survey point number text	<i>M-RH-POL-NUI</i>
M-SN-SPT-PNT	Survey points	<i>M-RH-POL-PTS</i>
M-SN-TID	Tide gauges, tidal equipment, tide datum	<i>M-RH-EQU</i>
M-WF	Wharf Features	<i>M-CQ</i>
M-WF-BEM	Pile caps, beams	<i>M-CQ-POU</i>
M-WF-BRC	Bracing, wales	<i>M-CQ-ENT</i>
M-WF-CAI	Caissons	<i>M-CQ-FLO</i>
M-WF-CRW	Crown slopes, crowns	<i>M-CQ-SOM</i>
M-WF-CTW	Catwalks	<i>M-CQ-PAS</i>
M-WF-CWK	Cribwork, ballast floor	<i>M-CQ-CCV</i>
M-WF-CWL	Cope walls, cope beams	<i>M-CQ-MPC</i>
M-WF-DRK	Derricks, cranes, gallows	<i>M-CQ-GRU</i>
M-WF-DRN	Drains, scuppers	<i>M-CQ-DRA</i>

M-WF-FND	Fenders	<i>M-CQ-DEF</i>
M-WF-FST	Floating wharves	<i>M-CQ-QUF</i>
M-WF-FTG	Footings, mattresses, deck substructures	<i>M-CQ-SEM</i>
M-WF-FWL	Firewalls	<i>M-CQ-MCF</i>
M-WF-GUA	Guards, wheel guard	<i>M-CQ-BAR</i>
M-WF-GWY	Gangways	<i>M-CQ-PAE</i>
M-WF-JNT	Construction, control joints	<i>M-CQ-JOC</i>
M-WF-LAD	Ladders	<i>M-CQ-ECH</i>
M-WF-MOR	Mooring cleats, mooring rings, bollards	<i>M-CQ-TAA</i>
M-WF-OLN	Wharf and dolphin outlines	<i>M-CQ-CON</i>
M-WF-PIL	Piles and bents	<i>M-CQ-PIL</i>
M-WF-SSP	Steel sheet piling	<i>M-CQ-PAL</i>
M-WF-TIE	Tie rods, anchor blocks, tie back walls	<i>M-CQ-TBA</i>
❖ n/a	Docking ring	<i>M-CQ-ANN</i>
❖ n/a	Mooring bitt	<i>M-CQ-BIT</i>
❖ n/a	Mooring bollard	<i>M-CQ-BOA</i>
❖ n/a	Buoy	<i>M-CQ-BOU</i>
❖ n/a	Luminary	<i>M-CQ-LAM</i>
❖ n/a	Boom	<i>M-CQ-EST</i>
❖ n/a	Service platform	<i>M-CQ-ILO</i>
❖ n/a	Bumper	<i>M-CQ-PAD</i>
❖ n/a	Projector	<i>M-CQ-PJT</i>
❖ n/a	Protective post	<i>M-CQ-POP</i>
❖ n/a	Berth	<i>M-CQ-POS</i>
❖ n/a	Receptacle for boat	<i>M-CQ-PPB</i>
❖ n/a	General service	<i>M-CQ-SEV</i>
❖ n/a	Telephone connection box	<i>M-CQ-TEL</i>
❖ n/a	Lighting tower	<i>M-CQ-TOU</i>
❖ n/a	Winch	<i>M-CQ-TRE</i>
❖ n/a	Emergency	<i>M-CQ-URG</i>
n/a	Underground lines	M-LS
❖ n/a	Sulfurous acid	<i>M-LS-ASU</i>
❖ n/a	Domestic water line	<i>M-LS-CED</i>
❖ n/a	CIP pipe	<i>M-LS-CIP</i>
❖ n/a	Free electrical conduit	<i>M-LS-COD</i>
❖ n/a	Low voltage distribution – underground	<i>M-LS-BTE-SOU</i>
❖ n/a	Storm sewer	<i>M-LS-EGO</i>
❖ n/a	Industrial sewer	<i>M-LS-EGO-IND</i>
❖ n/a	Sanitary sewer	<i>M-LS-EGO-SAN</i>
❖ n/a	Salt water	<i>M-LS-ESA</i>
❖ n/a	High voltage distribution – underground	<i>M-LS-HTE-SOU</i>
❖ n/a	Abandoned pipelines	<i>M-LS-PIP-ABN</i>
❖ n/a	Esso pipeline	<i>M-LS-PIP-ESS</i>
❖ n/a	Hydro-Quebec pipeline	<i>M-LS-PIP-HYD</i>
❖ n/a	Shell pipeline	<i>M-LS-SHE</i>
❖ n/a	Texaco pipeline	<i>M-LS-PIP-TXC</i>
❖ n/a	Ultramar pipeline	<i>M-LS-PIP-ULT</i>
❖ n/a	Telephone cable - underground	<i>M-LS-TEL-SOU</i>

❖ n/a	Television cable – underground	<i>M-LS-TEV-SOU</i>
n/a	Survey Control, Non Legal	M-LV
❖ n/a	Coordinates	<i>M-LV-COO</i>
❖ n/a	Easement boundary	<i>M-LV-DRO</i>
❖ n/a	Fix	<i>M-LV-FIX</i>
❖ n/a	Leased property boundary	<i>M-LV-LIM</i>
❖ n/a	Other property boundary	<i>M-LV-LIP-AUT</i>
❖ n/a	Fishing property boundary	<i>M-LV-LIP-PEC</i>
❖ n/a	PWGSC property boundary	<i>M-LV-LIP-TPC</i>
❖ n/a	Transport property boundary	<i>M-LV-LIP-TRP</i>
❖ n/a	Geodesic point	<i>M-LV-POG</i>
❖ n/a	Survey points + date	<i>M-LV-POL_ddd</i>
❖ n/a	Levelling survey (BM)	<i>M-LV-RNL</i>
n/a	Above grade services	M-SA
❖ n/a	High voltage distribution - above grade	<i>M-SA-BTE</i>
❖ n/a	Low voltage distribution - above grade	<i>M-SA-HTE</i>
❖ n/a	Telephone cable – above grade	<i>M-SA-TEL</i>
❖ n/a	Television cable – above grade	<i>M-SA-TEV</i>
n/a	Harbor services	M-SH
❖ n/a	Scale	<i>M-SH-BAL</i>
❖ n/a	Barrier	<i>M-SH-BAR</i>
❖ n/a	Hydrant	<i>M-SH-BOI</i>
❖ n/a	Fence	<i>M-SH-CLO</i>
❖ n/a	Panel, electrical input	<i>M-SH-PAN</i>
❖ n/a	Vent	<i>M-SH-EVE</i>
❖ n/a	Decompression grid	<i>M-SH-GDD</i>
❖ n/a	Surface grid	<i>M-SH-GRI</i>
❖ n/a	Guy	<i>M-SH-HAU</i>
❖ n/a	Tide gauge	<i>M-SH-MGR</i>
❖ n/a	Flagpole	<i>M-SH-MAT</i>
❖ n/a	Identification panel	<i>M-SH-PAI</i>
❖ n/a	Electrical pole	<i>M-SH-POE</i>
❖ n/a	Guardrail	<i>M-SH-PRT</i>
❖ n/a	Manhole	<i>M-SH-PUA</i>
❖ n/a	Pull pit	<i>M-SH-PUT</i>
❖ n/a	Storm sewer manhole	<i>M-SH-PLU</i>
❖ n/a	Sanitary sewer manhole	<i>M-SH-RSA</i>
❖ n/a	Septic tank	<i>M-SH-SEP</i>
❖ n/a	Access door	<i>M-SH-TAC</i>
❖ n/a	Valve	<i>M-SH-VAN</i>

Real Property Space Management

English Abvn	Description	French Abvn
R-BC	Building Common Areas "Accessory B"	R-CB
R-BC-COR	Shared public corridors	R-CB-COR
R-BC-OLN	General shared building outline	R-CB-CON
R-BC-RMS	Shared rooms	R-CB-SAL
R-BS	Building Service Areas	R-SB
R-BS-OLN	General building service outline	R-SB-CON
R-BS-RMS	Building service rooms	R-SB-SAL
R-BS-SFT	Vertical shafts, elevators, stairs (takes walls over RMS)	R-SB-PUV
R-EX	Exterior Site Areas	R-EX
R-EX-OLN	Exterior site areas	R-EX-CON
R-FC	Floor Common Areas	R-AE
R-FC-CNV	Convectors (baseboard, radiators)	R-AE-CNV
R-FC-COL	Building structure, columns (interior and perimeter)	R-AE-COL
R-FC-COR	Primary circulation	R-AE-COR
R-FC-ENC	Encroachments (unusable space)	R-AE-EMP
R-FC-FIR	Fire egress cross over areas, fire refuge areas	R-AE-SOS
R-FC-LOB	Floor elevator lobbies	R-AE-HAL
R-FC-OLN	General outline of floor common areas	R-AE-CON
R-FC-RMS	Electrical, telecom, janitor's closets	R-AE-SAL
<u>R-FC-WSR</u>	<u>Washrooms</u>	<u>R-AE-SAT</u>
R-FC-WSR-BRF	Accessible washrooms	R-AE-SAT-ACF
R-GA	Gross Area	R-AB
R-GA-EXT	Exterior gross area	R-AB-EXT
R-GA-INT	Interior gross area	R-AB-INT
R-GL	General	R-GL
R-GL-TXT	Street names for space audit	R-GL-TEX
R-PK	Parking	R-ST
R-PK-0000-BRF	Barrier-free parking	R-ST-0000-ACF
R-PK-0000-DEP	Parking number - department name (Special use only)	R-ST-0000-MIN
R-PK-DIV	Parking divisions	R-ST-DIV
R-PK-EXT	Exterior parking (Special use only)	R-ST-EXT
R-PK-IDN	Parking identification numbers	R-ST-NUI
R-PK-INT	Interior parking (Special use only)	R-ST-INT
R-PK-OLN	Outlines	R-ST-CON
R-PK-SPC	Special parking	R-ST-SPE
R-SU	Surface Maintenance Building	R-SU
R-SU-CLG	Ceiling finishes	R-SU-PFD
R-SU-COR	Primary corridors	R-SU-COR
R-SU-DEP	Space allocation by department	R-SU-MIN
R-SU-DIV	Division of area	R-SU-DIV
R-SU-EXT	Exterior finishes	R-SU-EXT

R-SU-FLR	Floor finishes	<i>R-SU-PCH</i>
R-SU-FLR-HIG	High-traffic area	<i>R-SU-PCH-ELV</i>
R-SU-FLR-LOW	Low-traffic area	<i>R-SU-PCH-BAS</i>
R-SU-GRP	Space allocation by group / branch	<i>R-SU-GRP</i>
R-SU-IDN	Surface identification number	<i>R-SU-NUI</i>
R-SU-OLN	Outlines	<i>R-SU-CON</i>
R-SU-RMS	Rooms	<i>R-SU-SAL</i>
R-SU-SFT	Shafts	<i>R-SU-PUV</i>
R-SU-SPC	Special surfaces	<i>R-SU-SPE</i>
R-SU-WAL	Walls	<i>R-SU-MUR</i>
R-SU-WIN	Windows	<i>R-SU-FEN</i>
R-UC	User Common	R-AC
R-UC-COR	Shared public corridors	<i>R-AC-COR</i>
R-UC-OLN	General shared user outline	<i>R-AC-CON</i>
R-UC-RMS	Shared rooms (Conference room, day care, mail, etc.)	<i>R-AC-SAL</i>
R-US	Usable	R-AU
R-US-001, 002...	Usable area polygons by location	<i>R-AU-001, 002</i>
R-US-COR	Primary circulation areas	(Special use only) <i>R-AU-COR</i>
R-US-DEP	Space allocation by department	(Special use only) <i>R-AU-MIN</i>
R-US-DIV	Division of areas	<i>R-AU-DIV</i>
R-US-GRP	Space allocation by group / branch	(Special use only) <i>R-AU-GRP</i>
R-US-IDN	Location identification numbers	<i>R-AU-NUI</i>
R-US-OLN	General usable outlines	(Special use only) <i>R-AU-CON</i>
R-US-RMS	Room identification numbers	(Special use only) <i>R-AU-SAL-NUI</i>
R-US-UNT	Space allocation by units	(Special use only) <i>R-AU-UNI</i>
R-ZN	Zoning	R-ZO
R-ZN-CLE	Cleaning zoning	<i>R-ZO-NET</i>
R-ZN-FIR	Fire egress zoning	<i>R-ZO-SOS</i>
R-ZN-SEC	Security zoning	<i>R-ZO-SEU</i>

Structure		
English Abvn	Description	French Abvn
S-CL	Ceilings	S-PF
S-CL-BEM	Ceiling beams	S-PF-POU
S-FL	Floors	S-PC
S-FL-BEM	Floor beams	S-PC-POU
S-FL-BRC	Bracing	S-PC-ENT
S-FL-DEK	Decking, waffle	S-PC-PLA
S-FL-FRM	Framing	S-PC-CHR
S-FL-JNT	Joints, expansion, construction	S-PC-JOC
S-FL-JST	Joists	S-PC-PLP
S-FL-OLN	Floor outlines	S-PC-CON
S-FL-OPN	Floor openings	S-PC-OUV
S-FL-SLB	Floor slabs	S-PC-DPP
S-FL-STR	Structural landings	S-PC-ESC
S-FN	Foundations	S-FD
S-FN-BEM	Pile caps, cap beams, grade beams	S-FD-POU
S-FN-FIL	Backfill, soil line	S-FD-REM
S-FN-FTG	Footings	S-FD-SEM
S-FN-OLN	Foundation outlines	S-FD-CON
S-FN-PIL	Piles, caissons, piers	S-FD-PIE
S-GR	Structural Grid	S-QU
❖ S-GR-DIM	Structural grid dimensions	S-QU-DIM
S-GR-EXT	Structural grid lines outside building	S-QU-EXT
S-GR-INT	Structural grid lines inside building	S-QU-INT
❖ S-GR-TXT	Structural grid text	S-QU-TXT
S-RF	Roofs	S-TO
S-RF-BEM	Beams	S-TO-POU
S-RF-BRC	Bracing	S-TO-ENT
S-RF-DEK	Decking, waffle	S-TO-PLA
S-RF-FRM	Framing	S-TO-CHR
S-RF-JNT	Joints, expansion, construction	S-TO-JOC
S-RF-JST	Joists	S-TO-PLP
S-RF-OLN	Roof outlines	S-TO-CON
S-RF-OPN	Roof openings	S-TO-OUV
S-RF-SLB	Roof slabs	S-TO-DPP
S-RF-TRU	Roof Trusses	S-TO-FER
S-WL	Walls, Columns	S-MU
S-WL-BRC	Cross bracing	S-MU-ENT
S-WL-BRG	Bearing walls	S-MU-POR
S-WL-COL	Columns	S-MU-COL
S-WL-JNT	Joints, expansion, construction	S-MU-JOC
S-WL-OPN	Wall openings	S-MU-OUV
S-WL-RWL	Retaining walls	S-MU-STM

Annex B – Layer Field Description

Group Field

The following table lists the Group field abbreviations that can be used to create new layer names. This is the second part of the layer name following the Discipline field:

X-**XX**-XXX

AP	Approach Slabs	PB	Plumbing
AZ	Airport Zoning	PG	Propane Gas
BC	Building Common Areas "Accessory B"	PH	Telephone Systems
BH	Borehole Data (Geotechnical)	PK	Parking
BP	Blocking Plan	PL	Plan
BS	Building Service Areas	PP	Fuel and Process Piping
BW	Breakwater Features	PR	Profile Data
CF	Cadastral Fabric	RF	Roofs
CI	Circulation	RO	Roads
CK	Clock Systems	RW	Railways
CL	Ceilings	SA	Sanitary Sewer
CS	Control Systems	SB	Substructure
DA	Data Systems	SC	Schedules
DI	Diesel Fuel Distribution	SD	Site Distribution and Electrical Equipment
DK	Deck	SE	Security Systems
DR	Doors	SF	Natural Site Features
DT	Details	SG	Signal Systems
DW	Domestic Water	SI	Signage
EG	Emergency Generation	SK	Skid-way, Haul-outs, Slipways
EI	Employee Information	SM	Schematics
EL	Emergency Lighting	SN	Hydrographic Survey Information, Non-Legal
EM	Emergency	SP	Legal Site Plan
EN	Environment	SR	Scour Protection
EP	Emergency Power Equipment	SS	Superstructure
EQ	Equipment	SU	Surface Maintenance Building
EW	Emergency Power Wiring and Cabling	SV	Survey
EX	Exterior Site Areas	SW	Storm Water and Drainage
FC	Floor Common Areas	SY	System Furniture
FL	Floors	TL	Title Block
FN	Foundations	TP	Topographical Information
FP	Fire Protection	UC	User Common
FR	Electrical Fire Protection	US	Usable
FU	Furniture	VA	Ventilation and Air Conditioning
FW	Flat Wiring	VD	Video Conferencing Systems
GA	Gross Area	VG	Vegetation
GD	Grounding	WD	Windows
GL	Global	WF	Wharf Features
GR	Grid	WL	Walls, Columns
HC	Heating and Cooling	WM	Water and Fire
HY	Hydrology	ZN	Zoning
LD	Landscaping		
LG	Legend		
LP	Lightning Protection		
NG	Normal Power Generation		
NL	Normal Lighting		
NP	Normal Power Equipment		
NV	Navigation		
NW	Normal Power Wiring and Cabling		
NZ	Natural Gas		
OI	Oil Distribution		
PA	Sound and PA Systems		

Single Layer Field and First Layer Name Extension

Ext.	Description	Ext.	Description
------	-------------	------	-------------

The following table lists the Single Layer field and First Layer Name Extension abbreviations that can be used to create new layer names. This is the third or fourth part (if required) of the layer name following the Group field:

X-XX-**XXX** X-XX-XXX-**XXX**-X

3DM	3D model components of 2D symbols	CLK	Clock system
ABN	Abandoned	CLN	Control lines
ABU	Abutments	CLR	Colours
ABV	Above ground, above grade	CLS	CLSR boundaries, reserves, parks
ACC	Accessories	CLT	Control wiring for emergency lighting
ACR	Fire department access routes	CMA	Compressed air
AIR	Control air piping	CMB	Combined sewers
ALI	Alignment	CMP	Computers
ALM	Intrusion alarms	CNB	Flat wiring connection boxes
ANN	Annual flowers	CNL	Navigation channels, corridors
ANT	Antenna	CNT	Construction
APC	Approach surface (airport)	CNV	Convectors
APR	Approach slabs	CO2	Carbon dioxide gas
APX	Approximate	COA	Combustion air ductwork
ART	Artwork	COD	Conduits
ASP	Asphalt	COL	Columns
ATT	Attributes	CON	Concrete
AWP	Acid waste piping (medical)	COR	Corridors
BAR	Barriers, railings	COT	Cooling tower
BDY	Legal limits, fee simple, admin., control	CPT	Control points
BED	Vessel beds	CRB	Curbs
BEM	Beams	CRP	Carpet
BEN	Local benchmarks	CRT	Certificates, stamps
BIR	Bird hazard (airport)	CRW	Crown slopes, crowns
BKH	Bulkheads	CTL	Controls
BLK	Block	CTM	Contamination (environment)
BND	Boundaries	CTP	Countertops
BRC	Bracing	CTW	Catwalks
BRF	Barrier-free	CUL	Culverts
BRD	Bridges	CVY	Horizontal conveyors, moving sidewalks
BRG	Bearing	CWL	Cope walls, cope beams
BRK	Brick	CWK	Cribwork, ballast floor
BRL	Break lines	DAS	Data systems schematics
BUO	Buoys	DAT	Chart datum contour, 0.00 m
BYP	By-pass box	DBR	Debris, rubble, loose rock and soil
CAB	Cabinet	DCB	DC battery systems
CAI	Caissons	DCL	Ditch centre lines
CAL	Callout blocks	DEC	Deciduous
CAN	Canadian boundaries	DEK	Deck
CAR	Cards	DEP	Space allocation by department
CAT	Catchments area	DES	Description
CBL	Flat wiring cable location	DIF	Diffusers
CBT	Cable trays, ducts, and raceways	DIG	Digitized or vectorized from scanned Image
CEX	Chemical extinguisher		
CHL	Chilled water	DIM	Dimensions
CHN	Chainage	DIV	Divisions
CLD	Cold water	DRG	Dredged area or limits
CLE	Cleaning, clean out	DRK	Derricks, cranes, gallows
CLG	Ceiling-mounted equipment, wiring, or finishes	DRN	Drains, scuppers
CLI	Centrelines	DRS	Duct riser diagrams
		DSK	Desks, work surfaces, tables

Ext.	Description	Ext.	Description
DUC	Ducts	GWY	Gangways
DWV	Drainage waste and vent system	HAT	Hatching
EAS	Easement	HED	Door and window headers
EFP	Electrical fire protection schematics	HEG	Helium gas
ELD	Electromagnetic locking devices	HIG	High
ELE	Elevators	HNT	High normal tide
ELK	Electrical security locks	HOR	Horizontal
ELV	Elevation (survey points)	HOT	Hot water
EME	Emergency	HVD	High voltage distribution
ENC	Encroachments (unusable space)	HWA	Heating water
EPE	Explosion-proof equipment	HWL	High water lines
EPR	Emergency power wiring & equipment	HWY	Highway plan
EQP	Equipment	HYD	Hydronic equipment
ESC	Escalator	HYG	Hydrogen gas
ESG	Exit signs	ICE	Ice thickness
EVR	Evergreen	IDN	Identification
EXH	Exhaust	IMP	Imports (Revit families)
EXP	Exposed inside/outside wiring	IND	Industrial
EXT	Exterior	INS	Insulation
FEN	Fencing	INT	Interior
FEX	Foamed extinguisher	IOT	Inlet outlet
FHY	Fire hydrants	IRR	Irrigation system
FIL	Backfill, soil line	JER	Jersey wall
FIN	Finishes	JNT	Joints
FIR	Fire egress	JST	Joists
FIX	Plumbing fixtures	KRK	Kirk key interlocks
FLG	Flagpoles	LAD	Ladders
FLO	Flow, discharge	LAN	Local area network
FLR	Floor-mounted equipment, wiring or finishes	LAY	Layout line work
FLW	Flowers	LEV	Floor level changes, ramps, truck wells
FND	Fenders	LGO	Logos
FOI	Fuel oil	LGT	Lighting control schematics and diagrams
FRL	Fire lines	LIM	Limits
FRM	Framing	LIN	Line work
FST	Floating wharfs	LNT	Low normal tide
FTG	Footing	LOB	Floor elevator lobbies
FTN	Fountains, pools	LOG	Borehole logs and data
FUR	Site furnishings, benches, garbage cans, etc.	LOW	Low
FWL	Fire walls	LTG	Normal powered lighting
GAB	Gabions	LTP	Lightning protection schematics
GCV	Ground cover	LVD	Low voltage distribution
GDP	Guideposts	LWL	Low water lines
GEN	Generators	MAJ	Major contours
GLY	Glycol	MAN	Manholes
GLZ	Glass, glazing	MAR	Marshes, wetlands
GND	Grounding schematics	MEC	Electrical connections to mechanical equipment
GPS	Global Positioning System	MEG	Methane gas
GRA	Grading	MET	Meters
GRD	Grid	MIL	Architectural specialties, casework and millwork
GRI	Grilles	MIN	Minor contours
GRL	Guides, guardrails, median dividers, bollards	MLI	Main lines
GRP	Space allocation by group / branch	MMS	Maintenance Management System
GRS	Grass, lawn area	MNG	Storm water management pond
GRV	Gravel	MON	Monuments
GUA	Guards	MOR	Mooring cleats, bollards
GUT	Gutter lines	MRK	Markings and road striping
		MSH	Mass hauling diagrams

Ext.	Description	Ext.	Description
MTR	Metering wiring & equipment	RMN	Remnants (archaeology)
MUN	Municipal and utility services	RMP	Ramps
NGA	Natural gas	RMS	Rooms
NIT	Nitrogen (medical)	ROD	Drivable road limits (asphalt) road, lots
NOD	Node, horizontal reference point	ROW	RO water or distilled water (medical)
NOF	Non-office furniture, first aid room beds, etc.	RPL	Reference plan
NPR	Normal power schematics, risers	RPS	Real Property information
NUM	Number	RRP	Riprap
OEQ	Office equipment	RWL	Retaining walls
OFF	Office signage	SAF	Life safety
OLN	Outlines	SCD	Secondary
OPN	Openings	SCR	System furniture panels, screens
ORN	Ornamental	SEC	Security zoning
OTA	Outside air	SED	Seeded area
OTH	Other	SEL	Super elevation
OUT	Outlets	SEN	Motion sensors
OVH	Overhead	SEP	Septic (field, tank, etc.)
OXY	Oxygen (medical)	SET	Seating
PAN	Distribution panel (electrical, telephone)	SEW	Sewer
PAR	Parcel line work	SFT	Shafts
PAS	Public address system schematics	SGL	Sign layouts and details
PER	Perennial	SGN	Signs
PGA	Propane gas	SHL	Shelving
PIC	Inserted pictures	SHO	Shoulder
PIL	Piles	SIG	Signalling devices
PIP	Pipes, piping	SIL	Window sills
PIR	Piers	SIZ	Size
PIT	Borrow pit	SKD	Skid timbers, skid poles
PLA	Plastic	SLB	Slabs
PLM	Plume outline	SLI	Service lines
PLN	Approach slabs in plan view	SMP	Soil sample locations
PLT	Plants	SND	Sand
PMP	Pumping stations	SNL	Stringers
PNT	Points	SOD	Sodded
POL	Poles and towers (electrical, communication)	SPA	Spars
PRF	Profiles	SPC	Special
PRI	Primary	SPK	Sprinkler system
PRO	Provincial boundaries	SPO	Sports facilities, goal nets, etc.
PRS	Piping riser diagrams	SPR	Stratigraphic profiles
PRT	Partitions (walls)	SPT	Spot elevations
PST	Posts	SRB	Shrubs
PTS	Station points	SRF	Surface model line work
RAD	Radiant heat	SSP	Steel sheet piling
RAI	Railway	STA	Stations (survey)
RAS	Raised floors	STB	Setbacks
RAW	Raw water lines	STG	Staging layout plan
RCK	Rock	STI	Strip (airport)
RCL	Recirculation	STL	Steel
REB	Reinforcing	STM	Steam
REC	Receptacles	STO	Stone
REF	Refrigerant equipment	STP	Standpipe
REG	Regional and municipality boundaries	STR	Stairs, stairwells, and ladders
RET	Return	SUB	Sub
RFG	Refrigerant gas	SUP	Supply
RFL	Refrigerant liquid	SUR	Work surfaces, D-tops, P-tops, etc.
RLN	Reference lines	SWK	Sidewalks
RME	Read Me info	SYM	Symbols
		TAB	Tables
		TBK	Title block

Ext.	Description	Ext.	Description
TEL	Telephone	VAL	Valves
TEN	Tenant	VAV	Variable air volume boxes
TER	Terraces	VCE	Emergency voice communication
TID	Tide gauges, tidal equipment, tide datum	VCL	Video controllers (Digital)
TIE	Tie rods, anchor blocks, tie-back walls	VCM	Video cameras and monitors
TIL	Tile	VEN	Vents
TIM	Timber	VER	Vertical
TMP	Temporary	VID	Video system schematics
TMT	Sewage treatment areas	VIN	Vines
TNK	Tanks	VPC	Valve pump chamber
TOE	Toe of bank, breakwater, berms	VPT	Viewports
TOP	Top of bank, crest of breakwater, berms	WAL	Wall-mounted equipment or wiring
TRE	Trees	WEL	Well
TRL	Trails	WIN	Windows
TRS	Transitional surface (airport)	WLI	Water lines
TRU	Trusses	WLK	Roof boardwalks, catwalks
TUN	Tunnels	WNG	Wing wall
TXT	Text	WOR	Working area
UCD	Underlying cadastral fabric, deeds, lots, plans	WRG	Wiring
UND	Underground, below grade	WSR	Washrooms
UNT	Space allocation by units	WST	Waste schematics
UPS	Ups and conditioned power	WTR	Watercourse
VAC	Vacuum piping	XRE	External reference
		ZNS	Zoning surfaces

Second Layer Name Extension

Ext.	Description	Ext.	Description
------	-------------	------	-------------

The following table lists the Second Layer Name Extension abbreviations that can be used to create new layer names. This is the fourth or fifth part of the layer name following the Single Layer field or First Layer Name Extension:

X-XX-XXX-**X** X-XX-XXX-XXX-**X**

1 to 9	Options or Phases 1 to 9
A	English Text (Anglais)
B	As Built (As Constructed)
E	Existing
F	French Text
M	To be Moved or Relocated
N	New
P	Planned or Proposed
S	Base
X	To Be Removed

Annex C - Glossary

"As-built" shall mean a set of construction drawings reflecting on-site changes required during the project as well as the original design intent.

"AutoCAD®" shall mean the CADD software developed by Autodesk® Inc.

"Base plan" shall mean a clean, two-dimensional floor plan of a building drawn from field surveys containing all pertinent graphic information. The intent is to use base plan files for project drawings, then update them once a project is complete and the area affected is re-measured.

"CADD" shall mean Computer-Aided Design and Drafting.

"CLSR" shall mean Canada Lands Survey Records.

"Layers" shall mean the AutoCAD® system of dividing drawing elements.

"Legacy drawings" shall mean older hardcopy drawings, microfiche aperture cards not in digital format, or older CADD files not produced to the present standard.

"PWGSC" shall mean the Department of Public Works and Government Services Canada.

"RPB" shall mean Real Property Branch, a branch of PWGSC

Annex D - Quality Control of CADD Data

The items shown highlighted indicate a zero tolerance with regard to the non-compliance

Article	Quality Control requirements	Compliance		
		Yes	No	n/a
Layers		Yes	No	n/a
3.2	Layer names are compliant with the PWGSC National CADD Standard			
3.2.1	Objects are on the correct layers			
3.1	No object resides on layer 0 or DEFPOINTS			
3.2.6	No new layer name was created when the proper standard layer already exists			
2.3.3	No layer names with an external reference "Bind" prefix			
Color assignment		Yes	No	n/a
3.2.5	❖ The colors assigned to layers are set up to obtain the correct line thickness using the appropriate PWGSC regional pen charts. (Que. 3.2.5)			
3.2.5	Objects are created with colour "ByLayer" (except for objects in blocks)			
Blocks		Yes	No	n/a
3.3.3	The block library provided by the regional PWGSC office is used (if applicable)			
3.3.3	The use of blocks is uniform throughout the project drawing set			
3.3.3	The blocks are created respecting the rules described in the PWGSC National CADD Standard (i.e. Created on layer "0", colour and linetype "ByBlock" or "ByLayer", appropriate scale and dimension, etc.)			
3.3	Blocks are not exploded			
Text styles		Yes	No	n/a
3.4	Text Styles are created using only standard AutoCAD® SHX fonts or Arial, Arial Narrow and StylusBT TTF font files			
3.4.1	Text Styles names are compliant with the PWGSC National CADD Standard			
3.4.2	Proper use of text height			
Dimension and multileader styles		Yes	No	n/a
3.5	All dimensions are associative			
3.5.1	Dimension and Multileader Style names are compliant with the PWGSC National CADD Standard			

3.5	Layout of dimensioning follows one of the two accepted formats (Engineering or Architectural)			
Linetypes and hatch patterns		Yes	No	n/a
3.6	Only standard AutoCAD® and/or PWGSC linetypes / hatch patterns are used			
3.6	Linetypes and hatch patterns are metric			
3.6	Linetype display variables are set up correctly (i.e. LTSCALE, PSLTSCALE)			
External references and raster images		Yes	No	n/a
2.3.3	Drawings do not contain any external reference (except if certain conditions are met and are inserted with path type set to "No Path")			
2.3.4	Raster images and related coordinates information files used in the drawings are included in the submission			
Drawing set up and page layout		Yes	No	n/a
3.7.1	The appropriate PWGSC regional title blocks are inserted in the layouts at coordinates (0,0,0) with scale factor of 1 and rotation angle of 0			
3.7.1	Only one title block is inserted per layout			
3.7.1	Title blocks are not exploded			
3.7.2	Title blocks contain all the required information ❖ The informations proper to the Quebec region are completed (see example 3.7.2).			
3.1	Viewports are set to the preferred scale and locked			
3.7.3	Each plan, section, detail, elevation, etc. is accompanied by a heading, the appropriate graphic scale and, if required, a north arrow			
❖ 3.1	❖ The list of sheets is shown on the first sheet of the set of drawings for each discipline.			
❖ 2.2.3	❖ The PWGSC template is used.			
3.7	Annotations objects such as notes, dimensions, hatch patterns, linetypes, blocks, etc are scaled accordingly to match final viewport or block insertion scaling			
System of measurement and coordinate system		Yes	No	n/a
3.8	Drawings are modeled at full-size using metric units in the model space. Buildings/structures plans and details are in millimeters. Site plans are in meters			
2.3.1	The coordinate systems integrity is maintained for 2D drawings			
Drawing Presentation		Yes	No	n/a
3.0	Good drafting practices are used in the project to make the drawings easy to interpret: good positioning of annotations and dimensions, use of legends and schedules, layout of structural grid and cross-referencing bubbles.			
3.0	A key plan is placed in the title sheet that locates the structure for large projects			
3.1	Lines are drawn in an orthogonal mode when appropriate to the drawing			

3.1	Vector endpoint intersections are drawn with closed corners			
3.0	Drawings do not contain unnecessary frozen or off layers For Tender and As-built drawings			
File presentation		Yes	No	n/a
3.1	Drawings are purged of all definitions that are not used			
3.1	Drawings do not contain any object definitions without geometry, such as empty text or blocks without objects			
3.1	Drawings do not contain errors that are detectable using the Audit command			
4.0	Drawing files are named according to the appropriate PWGSC regional standard. When there is no regional naming convention, names are arranged in a logical format			
2.4.1	The files are not compressed in EXE format, not password-protected, do not contain any electronic signature or hyperlink			
3.1	Drawings are saved with properly formatted Page Setup and the main layout zoomed out and active			
❖ 2.3.1	❖ The printing is done using the printing style TPSGC-QUE.ctb			

❖ Que. Annex E - Definitions

Departmental

Representative:

The individual with the delegated authority to make and carry out decisions of an operational nature, on behalf of the Department.

Consultant:

Firm hired by PWGSC to deliver professional technical services. The consultant is responsible for providing the requested services in the project implementation phase. The consultant is responsible for overseeing the services provided by sub-consultants hired to carry out certain parts of the mandate by coordinating the necessary services with them.

Consultant

Representative:

Person authorized to make and enforce operational decisions on behalf of the consultant.

File author:

Any person, in respect of a given job, with the knowledge, training and experience needed to carry out that job properly and safely.

Project manager:

Executant who provides service to the client. The project manager is responsible for the implementation phase of the project and works in consultation with the owner/investor. The project manager is responsible for managing the consultants and the required construction and procurement contracts and for monitoring implementation.

Project authority:

Professional or specialist with the expertise in a particular discipline needed to review the plans and specifications and provide comments as the project proceeds.

Project:

A set of activities designed to meet the needs of clients with specific objectives, including content, quality, performance, cost and schedule.

Facility:

Physical entity, such as an office building, special-purpose building, road, wharf, service facility, port facility or any type of agreement on the leasing or purchase of such facilities or any parcel of land or auxiliary service.

Technical document:

The concept of "technical document" is abstract because its purpose is to establish an inventory of the physical files that were used to develop those technical documents. The concepts of "master technical document file" and "project technical document file" will be used in these directives.

File:

Always means the set of master plans (files), project plans (files), master documents (files), project documents (files) and administrative documents (files).

Master file:

Set of master plans and master technical documents to be submitted to Consultants. Files submitted to the Consultant are for information purposes only,

and do not necessarily comply with instructions. The Consultant is responsible for ensuring that files comply with the instructions currently in effect.

Project file: Set of project plans and project documents.

Master plan file: Technical document the content of which is valid and applicable at all times. Consequently, the content is continually being updated for the purpose of operating a facility. Master technical documents (e.g., operating manuals) are write-protected.

Master technical document file: Technical document developed in the course of a project. A project technical document cannot be changed once the project is complete; these documents are linked to the projects for which they were developed.

Status: Status of a plan. The possible values are:

- "PRELIMINARY"
- "IN PROGRESS" 33%, 50%, 66%, 99%
- "APPROVED FOR BID"
- "ISSUED FOR CONSTRUCTION"
- "AS BUILT"

 Note: Electronic document transmission forms can be found in E-DRM #330755.



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

Canada



PWGSC Commissioning Manual (CP.1)

**4th edition
November 2006**

Prepared by
National Commissioning Committee

Issued by
Real Property Branch

GENERAL

Development

This document has been developed under the direction of Mechanical and Maintenance Engineering, AES with the participation and contributions of the following members of the National Commissioning Committee:

Edward Durand	NCA
Paul Sra	NCA
Mike Cavan	NCA
Ralph Collins	NCA
John Hutchins	Pacific Region
Stuart Davison	Western Region
John Lee	Ontario Region
Yvon Rajotte	Quebec Region
Michael Devine	Atlantic Region

Feedback

Corrections, recommendations, suggestions for modifications or additional information and instructions that will improve this document are invited. For this purpose the attached form entitled "*Request for change to this manual*" may be used and mailed or faxed to the address shown. E-mail or other forms of electronic transmission may also be used for this purpose.

Conflicts

Any area of conflict between this document and the Project Brief must be brought to the attention of the Project Manager as soon as it is noted.

PWGSC COMMISSIONING MANUAL (CP.1)

4th edition

November 2006

Request for changes to this manual

Return this form to :

National Manager
Mechanical and Maintenance Eng. Group
Architectural and Engineering Resources
Professional and Technical Program
Real Property Branch
PWGSC
Tel: (819) 956-3972 FAX: (819) 956-4441

Type of change suggested: Please indicate which applies:
1. Correction of information
2. Deletion of information
3. Additional information to be added

Details of suggested changes: If necessary, make the suggested changes to a photocopy of the relevant page(s) of this manual and attach to this sheet.

Page: Chapter: Paragraph no:

Details of suggested changes

(Use additional sheets if necessary)

Signature: _____ Date: _____

Preface to the 4th edition - November 2006

In 1977, a Building Commissioning Section was established in the Facilities Maintenance Division of the former Property Administration Branch of the former Public Works Canada (now Public Works and Government Services Canada [PWGSC]). This Building Commissioning Section recognised the need for early involvement in the Project Delivery System (PDS) but faced two big obstacles. On its own part, there was a lack of practical experience in commissioning; on the part of the design community, there was a certain resistance to change in the status quo.

In 1987 a Buildings Commissioning Working Group was formed in the, then, Architectural and Engineering Services Branch (AES) at Headquarters and included representatives from the Facilities Maintenance Division. Its mandate was to establish a clear understanding of commissioning, to define its objectives, and to establish the technical requirements for commissioning mechanical and electrical systems in buildings for inclusion in project briefs. This working group was determined to provide a "seamless" approach to commissioning. Research on the subject included examination of source documents and practices from the United States (including ASHRAE), the United Kingdom and Australia. When the working group examined current practices in Canada, it became clear that commissioning, as it was then defined in the PWGSC six-phase Project Delivery System, was rarely carried out. One reason for this was that responsibility and accountability for commissioning had not been clearly identified.

In February 1989, the working group produced a series of draft commissioning documents. In 1991 these documents were further refined, developed to cover all disciplines and consolidated into one manual - *The Project Commissioning Manual*, produced in 1993.

A continuation of this initiative resulted in further refinements, the development of generic commissioning briefs and commissioning specifications and the release of CP.1 - *"The Project Commissioning Manual - Revised January 2000"*.

In 2000, a National Commissioning Committee was established. Its membership included representatives from AES and AFMS and was co-chaired by the Director/Manager of these groups. Its terms of reference included, among other things:

1. To review, improve and update commissioning documents
2. To develop new commissioning practices
3. To create, maintain and update commissioning information database.
4. To promote commissioning in PWGSC
5. To prepare "Lessons Learned" documentation
6. To organize annual commissioning workshops
7. To receive, evaluate and share information and experiences with the Regions.

As a result of the work of this committee, further changes were made to the manual in order to make it even more easily referenced by Project Managers, Commissioning Managers and others. The Commissioning Manual now consists of two binders:

- ***PWGSC Commissioning Manual*** - addresses the requirements of the Commissioning Policy and includes issues which are of major concern to the PWGSC Project Manager and the Project Leader.
- ***PWGSC Commissioning Guidelines*** - contains the remaining documents and is generally for the benefit of in-house designers, consultants and their sub-consultants and Commissioning Managers.

In 2006, the PWGSC Project Delivery System (PDS) was changed to the National Project Management System (NPMS). The Commissioning Manual and Guidelines were subsequently modified to suit the NPMS and its terminology.

The PWGSC Commissioning Manual and the *PWGSC Commissioning Guidelines* have been structured so that each Region is able to adapt them to suit regional requirements, since it is recognized that each Region has a different approach to the practice of commissioning and that this will affect how each uses the *PWGSC Commissioning Manual*. It is suggested that each Region select from the *PWGSC Commissioning Guidelines* those elements which are most applicable to the Region's requirements and that will enable each Region to develop a quality deliverable which is acceptable to the Client.

It is also recognized that the organizational structure of each Region is unique and subject to change. *The PWGSC Commissioning Manual (CP.1)* has therefore been written around commissioning activities and is not reliant upon the reporting organizational structures of the PWGSC Regions.

It is suggested that each Region develop its own partnership agreement between the relevant branches of PWGSC relating to roles and responsibilities throughout the commissioning process so as to reflect the distinctive organizational structure of each Region. It will also promote commissioning as a tool for enhancement of client satisfaction.

Partnership between all branches of PWGSC

The role of PWGSC in commissioning and in the production of the PWGSC Commissioning Manual and the accompanying PWGSC Commissioning Guidelines has always been fully recognized by all branches of PWGSC.

Architectural and Engineering Resources will continue to provide national leadership for commissioning, while AFM will continue to provide management of the overall commissioning activities as it relates to specific projects.

It is also recognized that PWGSC, through its Design Quality Review Team, has a very important role to play in the identification of Design Criteria, Design Intents, Design

Assumptions and Design Solutions to meet these Design Criteria. It is also recognized that commissioning can be properly delivered only by combining the design expertise of Architectural and Engineering Resources and the operational expertise of Maintenance and Operational Assurance (MOA) Commissioning Manager in NCA, and the Maintenance Management Commissioning Manager in the Regions.

Future Developments

As noted above, the National Commissioning Committee will continue to direct and advise on all matters relating to commissioning.

Future editions of this manual will include experiences gained from commissioning activities in PWGSC Regions, as well as knowledge gained from the professional community and from the construction industry. This is essential to the provision of an up-to-date, viable and useful Project Commissioning Manual.

Since the issuance of this manual, generic Installation/Commissioning Checklists and Product Information (PI) and Performance Verification (PV) Report Forms have been developed and proven by use on a number of projects. These are currently being reviewed to improve format and content. This is a long process and will form part of future developments.

Regional Commissioning Contacts

For specific commissioning services in your region, please contact SNGP.NPMS@tpsgc-pwgsc.gc.ca.

Acknowledgements

This manual has been based on many consultations with all branches of PWGSC, many other government departments, organizations such as ASHRAE, the private sector, and many private individuals having a great deal of expertise in commissioning. We wish to thank all those who responded and to assure them that all comments and suggestions provided were carefully examined and, where deemed appropriate, incorporated into the manual. It is only through such co-operation that the best possible document can be produced.

PWGSC Commissioning Manual (CP.1)

Table of Contents

(in this binder)

Chapter 1: General requirements

- 1.1 Introduction
- 1.2 Commissioning
- 1.3 Commissioning requirements
- 1.4 Objectives of commissioning
- 1.5 Risks of inadequate commissioning
- 1.6 Benefits of commissioning
- 1.7 Extent of commissioning
- 1.8 Costs of commissioning
- 1.9 Commissioning of a facility
- 1.10 Project teams
- 1.11 Roles and responsibilities - General comments
- 1.12 Roles and responsibilities - Traditional design capital construction projects
- 1.13 Roles and responsibilities - Smaller design-construction projects
- 1.14 Roles and responsibilities - Design-build projects
- 1.15 Roles and responsibilities - AFD-managed facilities - Projects over \$200K.

Chapter 2 Commissioning documentation

- 2.1 Introduction
- 2.2 Project archives
- 2.3 Commissioning documentation package
- 2.4 Investment Analysis Report (IAR)
- 2.5 Request For Proposal (RFP)
- 2.6 Functional requirements and operational requirements
- 2.7 Design criteria
- 2.8 Commissioning Brief
- 2.9 Conceptual Design Report
- 2.10 Detailed design development
- 2.11 Working documents
- 2.12 Commissioning specifications
- 2.13 Commissioning Plan
- 2.14 Installation/Start-up Check Lists
- 2.15 Product Information (PI) and Performance Verification (PV) report forms
- 2.16 Commissioning of heritage Buildings
- 2.17 Building Management Manuals
- 2.18 Commissioning reports

- 2.19 Final Commissioning (Evaluation) report
- 2.20 Other documents

Appendix A Samples of commissioning documentation
Appendix B Commissioning Glossary (CP.2)

PWGSC Commissioning Guidelines (in separate binder)

<i>CP.3 Guide to the development of the Commissioning Plan</i>	3rd Edition Nov.2003
<i>CP.4 Guide to the development of Building Management Manuals</i>	3rd Edition Nov.2003
<i>CP.5 Guide to the preparation of Training Plans</i>	3rd Edition Nov.2003
CP.6 Reserved for future development	
<i>CP.7 Design guideline for facility operation and maintenance</i>	3rd Edition Nov.2003
<i>CP.8 Guide to the preparation of Commissioning Reports</i>	3rd Edition Nov.2003
<i>CP.9 Guide to the development and use of Check lists</i>	3rd Edition Nov.2003
<i>CP.10 Guide to the development and use of Report Forms and Schematics</i>	3rd Edition Nov.2003
<i>CP.11 Guide to the preparation of Commissioning Briefs</i>	3rd Edition Nov.2003
<i>CP.12 Guide to the development and use of Generic Commissioning Specifications</i>	3rd Edition Nov.2003
<i>CP.13 Facility Maintenance Policy, Guidelines and Requirements</i>	3rd Edition Nov.2003

All rights reserved. No part of this information may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, or stored in a retrieval system without prior written permission of the Minister of Public Works and Government Services, Ottawa, Ontario, Canada K1A 0S5

PWGSC Commissioning Manual (CP.1)

Chapter 1 General requirements

1.1 Introduction

This manual is for the use of the PWGSC Project Leader, Project Manager, Commissioning Manager and designers in order to give them a clear understanding of commissioning and to provide guidance in the implementation of commissioning to all PWGSC projects.

In addition, this manual will assist members of the Project Team and personnel from client departments representing the occupants' interests in applying the principles of commissioning as described in this manual.

In addition to this manual, there are various commissioning guidelines for the implementation of commissioning. These guidelines are referenced in the preface to this document.

The PWGSC Commissioning Manual provides detailed information on commissioning as an integral part of the National Project Management System (NPMS) and outlines a clear and consistent approach to commissioning for all members of the Project Team in all stages of NPMS .

Commissioning applies to all PWGSC projects including new projects and renovations, leased premises, AFD-managed facilities, Design-build projects and fit-ups.

1.2 Commissioning (Cx)

Commissioning is a planned program of activities that advances built works from the earliest phases of the project identification stage to a condition of full operation, meeting all objectives of commissioning as defined herein. The commissioning process starts in NPMS Project Identification stage with the production of the Investment Analysis Report (IAR) and ends when the delivered, fully occupied facility has been proven to operate satisfactorily under all weather and occupancy conditions and the Evaluation Report has been written and accepted. Commissioning addresses not only technical systems requirements and the functional and operational needs of the occupants and the Owner including health and safety, security, comfort, and cost effectiveness of operations and maintenance but also protection of the architectural character of new buildings and the heritage character of historical buildings.

Much like the commissioning of ships, commissioning of buildings ensures that when the built works are handed over to its owner occupant or operator as an operating entity it will meet all requirements as described in the Request for Proposal (RFP) or the Project

Brief. It requires coordinated efforts on the part of the Project Planning Team, the Design Team, the Commissioning Team, the Construction Team and the Project Management Team.

During construction, **commissioning** applies to the implementation phase of the NPMS Project Delivery stage in which system and environmental performances are verified, and the project is moved from a static form to a dynamic state and the facility is accepted for occupancy. Commissioning:

- provides a bridge between construction activities and ongoing operation and maintenance,
- provides the necessary technology transfer (training) tools for O&M activities to be performed properly for the entire service life of the facility,
- focuses on the operation of all systems as an integrated whole and verifies the performance and interaction of all systems operating together under a full range of operating conditions with simulated full occupancy.

1.3 Commissioning requirements

All PWGSC construction projects shall undergo a commissioning process as outlined in this manual.

1.4 Objectives of commissioning

The objectives of commissioning are to:

- .1 document the design intent of the overall project, including the architectural characteristics (in the case of new buildings), protection of the heritage features and character (in the case of historical buildings) and the proposed building systems and components and to verify and demonstrate that all functional and operational requirements have been correctly interpreted in the design solution.
- .2 minimize O&M costs through the careful selection of design solutions (for economy, reliability, durability, accessibility, maintainability, etc.), construction materials, installation practices and performance verification procedures.
- .3 verify that selected design solutions and the resultant built works protect the safety, health, welfare and comfort of occupants and O&M personnel.
- .4 define responsibility areas for meeting these operational requirements in the contract documents and include a process to demonstrate compliance.
- .5 demonstrate that the client's and the department's requirements are met during the project implementation and commissioning phases of the project and to support quality management of construction and installation through verification of building components, systems and environments.
- .6 verify and demonstrate that all systems operate consistently at peak efficiencies, under all normal load conditions, and within the specified energy budget.
- .7 provide comprehensive documentation of the operational, maintenance and building management.
- .8 implement a comprehensive training program.
- .9 transfer the completed works to qualified and trained facility operators.

1.5 Risks of inadequate commissioning

There is an inherent risk that certain penalties are likely to result from a poorly commissioned facility. The Owner/Investor, represented by the Project Leader, must weigh the costs of good commissioning practices against the risks of inadequate commissioning. Such risks and penalties might include:

Impact on heritage character of historical buildings: *Inadequate training and information could result in inadequate attention to protection of heritage character and design intent.*

Unclear design criteria and design intents: These lead to inability to meet project and client requirements and failure to meet federal government objectives.

User discontent: Facility occupants may suffer discomfort or inconvenience as a result of inadequate commissioning. This can lead to complaints to the Owner/Investor, costly remedial measures or loss of clientele.

High O&M costs: Inadequate training of O&M staff, poor system documentation or limited performance verification procedures may result in higher utility and O&M costs over the life of the facility (a factor of significant proportions to the Property Manager.)

Inappropriate maintenance practices: Maintenance is likely to be inappropriate when O&M staff have not been fully involved in commissioning activities, resulting in under- or over-maintenance. Either of these will cause unnecessary higher life-cycle costs.

Possible injury: Insufficient protection of system components, not revealed in thorough commissioning, could expose O&M personnel to unnecessary danger.

Expensive corrective measures: High costs and/or major difficulties in retrofitting so as to correct problems which could have been small (or avoided altogether) if addressed during planning or design.

1.6 Benefits of commissioning

Protection of heritage character: The training and documentation provided and involvement of O&M staff in commissioning is the basis for informed maintenance that is sensitive to the needs of heritage materials and assemblies.

Reduced life-cycle costs: In the long term, the projected life-cycle costs of buildings and facilities will be reduced as a result of the integrated efforts of the Designer and the building operators to meet commissioning requirements. When building quality is translated into higher productivity and reduced absenteeism of the occupants, the overall savings become even more significant.

More cost-effective maintenance: Involvement of O&M staff in commissioning, plus the training and documentation provided, is the basis for more effective operation, maintenance and management throughout the life of the facility.

Knowledge transfer:

- .1 Systematic development of commissioning documentation facilitates knowledge transfer from one phase of delivery to the next and from the delivery process to the ensuing ongoing operation of the facility.
- .2 Feedback through project management and report mechanisms can provide benefits to other projects by reporting on experience gained through the Validation and Acceptance Process.

Occupant satisfaction: The primary and immediate beneficiaries of a properly designed, constructed and commissioned facility are the occupants. They will enjoy the advantages of living or working in comfortable, safe, pleasant and properly functioning surroundings that meet their everyday needs. Further benefits will accrue to the Owner/Investor as a result of having satisfied tenants in a quality building that complies with the requirements of the investment plan.

Quality assurance: The Owner/Investor is assured that a quality facility and a "surprise-free" product/environment have been provided. This will be achieved by ensuring that:

- .1 the contract documents include all commissioning specifications,
- .2 the requirements of these specifications will be met,

Fully documented tests and inspections will prevent minor errors from developing into serious operational flaws.

System documentation: Provision of accurate and useful historical records is assured. Such records provide important data for O&M efforts as well as for future renovations, upgrades or repairs. Technical reports and other commissioning documents serve as benchmarks for future system testing, re-commissioning and for maintenance or renovation activities.

System performance verification: Commissioning extends into the project delivery stage, close-out phase, in order to verify performance under a full range of operating conditions. This practice aims to provide a "no-surprises" operation cycle for both Owners and O&M staff. A thorough process will help to avoid unforeseen or hidden O&M expenses later.

LEED and BREEAM certification: Commissioning as performed in accordance with *the PWGSC Commissioning Manual (CP.1)* and its associated *PWGSC Commissioning Guidelines* will meet or exceed the fundamental and additional requirements of various programs such as Leadership in Environmental and Energy Design (LEED), Building Research Establishment Environmental Assessment Method (BREEAM), Quality Guideline C2000 and enable the project to obtain the appropriate certification.

1.7 Extent of commissioning

The extent of commissioning is determined through discussions among all stakeholders such as the Project Leader, Project Manager and Commissioning Manager and is then defined in the Commissioning Brief and the Request for Proposal (RFP) document.

On the other hand, there is a cost associated with insufficient commissioning (refer to 1.5 "*Risks of Inadequate Commissioning*", above).

A detailed guideline relating to the extent of commissioning is contained in CP.11: "*Guide to the preparation of Commissioning Briefs*".

1.8 Costs of commissioning

Many commissioning activities detailed in this manual and the supporting documentation are already being performed as normal standard practice and do not constitute extra costs. Other commissioning activities, traditionally not provided by the design and construction industry, represent additional responsibilities for the Project Manager, Designer and Contractor.

In balance, there will undoubtedly be some additional initial costs to carrying out commissioning procedures. These will depend upon the degree of risk of non-compliance with the occupant's requirements or the life-cycle quality and cost plan the Owner is prepared to undertake. Experience to date indicates that full commissioning adds between 1% and 4% to the mechanical and electrical construction cost of projects. These extra costs can be attributed to the provision of services not usually included in design and construction projects, such as consultations between design and property management personnel; more intensive site services; more extensive systems documentation; and enhanced O&M documentation and training.

It has often been observed that O&M costs during the first year of operation are 50% to 150% higher than during following years. Experience, however, also indicates that the cost of commissioning is more than recovered through reduced O&M costs during this initial year of operation.

Increases in project costs attributable to commissioning may be summarized as follows:

1. Costs due to the Designer's involvement in:
 - a. Preparation of a Commissioning Plan,
 - b. Preparation of enhanced O&M documentation,
 - c. Preparation of test protocols for inclusion in project specification,
 - d. Increased involvement in site inspections and testing during construction,
 - e. Greater involvement in commissioning,
 - f. Responsibilities for, and involvement in, training,
 - g. Prolongation of involvement during the warranty period.

2. Costs due to the involvement of PWGSC Design Quality Review Team and the PWGSC Project Commissioning Team in:
 - a. Activities related to preparation and review of commissioning briefs,
 - b. Review of Commissioning Plan,
 - c. O&M design reviews,
 - d. Review of commissioning specifications,
 - e. Installation and commissioning inspections,
 - f. Performance verification testing,
 - g. Review of Building Management Manual and other commissioning documentation,
 - h. Commissioning.

3. Costs to the Contractor due to:
 - a. Refinement of Commissioning Plan and preparation of Commissioning Schedule
 - b. Greater involvement in training of O&M personnel,
 - c. Temporary instrumentation for commissioning,
 - d. More intensive involvement in performance verification for commissioning,
 - e. The hiring of a qualified Commissioning Agent,
 - f. Prolongation of involvement during the Warranty Period.

The exact amount will depend on a variety of factors such as the size, location and complexity of the facility and its systems and the extent of commissioning required. For instance, a research laboratory with stringent air quality and ventilation requirements will necessitate more extensive and costly commissioning than a general-purpose warehouse. Early involvement of the Commissioning Manager to help prepare the Commissioning Plan and Budget will be instrumental in achieving control over the costs of commissioning.

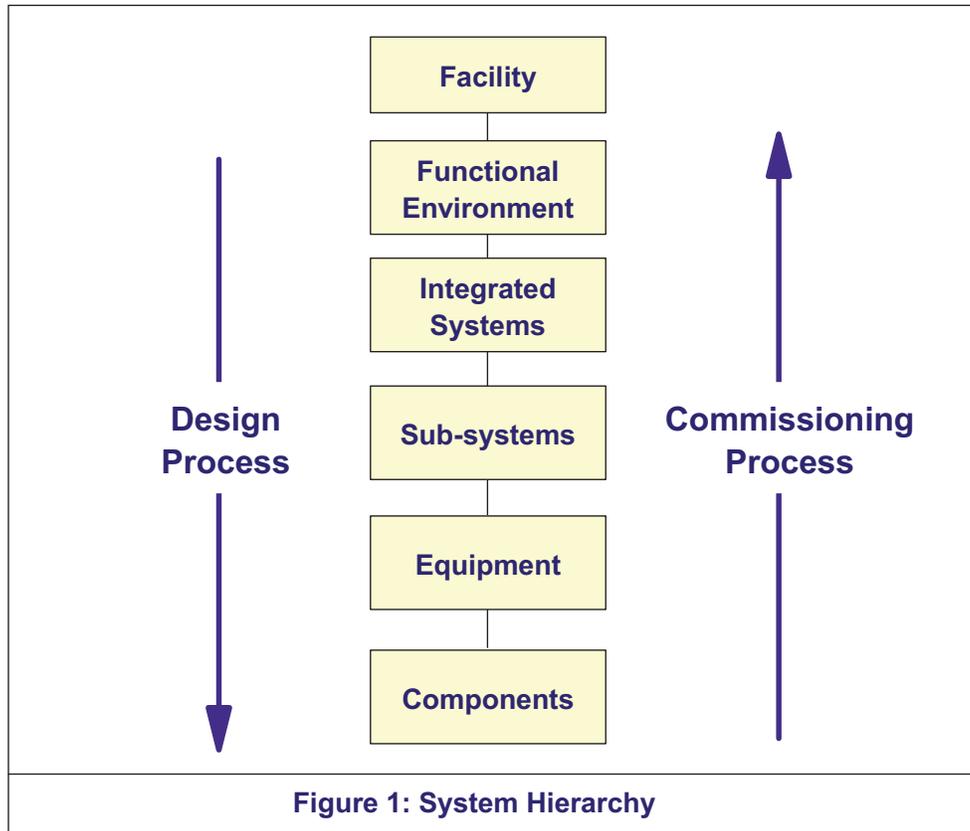
1.9 Commissioning of a facility

An operational facility can be regarded as the architectural building (including, if necessary, its heritage characteristics) a number of integrated systems, each of which delivers a functional environment such as indoor air, visual environment, operational services, security, or emergency services. Each integrated system and its resultant environment is achieved through the proper operation of systems, subsystems, equipment and components which, together, form the integrated system.

The functional environment referred to in Figure 1 below should include any special environmental goals such as those required by Heritage buildings.

The interaction of the system hierarchies is illustrated in Figure 1.

1.10



Project teams

The team structure for a typical moderate to large project may be comprised of the following project teams.

The make-up of each team varies according to the type, size and complexity of the project. Project team members may participate in one or more teams.

1. ***The Project Planning Team*** is assembled for the purpose of developing an Investment Analysis Report (IAR) and consists of the Project Leader, Project Manager and others involved in the preparation of the IAR.

2. ***The Project Design Team*** consists of the Design Coordinator, the PWGSC Design Quality Review Team, the Commissioning Manager and Architectural, Structural, Mechanical and Electrical Designers. The PWGSC Design Quality Review Team consists of engineers and specialists from all disciplines within PWGSC and is selected by the Project Manager. The Project Design Team is usually engaged by the Project Manager through business agreements, usually (but not always) at the end of the NPMS project identification stage, and usually continues to work as a team until the end of the project delivery stage, close out phase.
3. ***The Project Commissioning Team*** consists of (as appropriate during project delivery) the Project Design Team, the Project Construction Team, the Property Management Team and the Commissioning Manager. The Project Commissioning Team is usually represented by the Commissioning Manager starting during the project identification stage, analysis phase, or, the project delivery stage, planning phase. As design and construction proceeds, other players form part of the team insofar as their responsibilities relate to commissioning. The Project Commissioning Team reaches peak involvement at the project delivery stage, implementation phase.
4. ***The Project Construction Team*** consists of the Contractor, sub-trades, manufacturers and suppliers. The Project Construction Team is usually engaged following successful bidding on the project and being awarded the construction contract. This team usually completes its work at the end of the project delivery stage, implementation phase, when the completed project is passed to the Property Management Team for operation. The services of the Project Construction Team is required during the project delivery stage, close out phase for post- construction commissioning and to address all deficiencies.
5. ***The Property Management Team*** receives the facility and operates it throughout its useful life, consists of (as appropriate during project delivery) the Property Manager, the O&M staff, Service Contractors, the Project Design Team, the Project Construction Team and the Commissioning Manager.
6. ***The Evaluation Team***, is assembled for the purpose of conducting post-occupancy evaluation as defined in the project delivery stage, close out phase, and shall include, but not necessarily be limited to the Project Leader, the Project Manager and the Commissioning Manager..

1.11 Roles and responsibilities - General comments

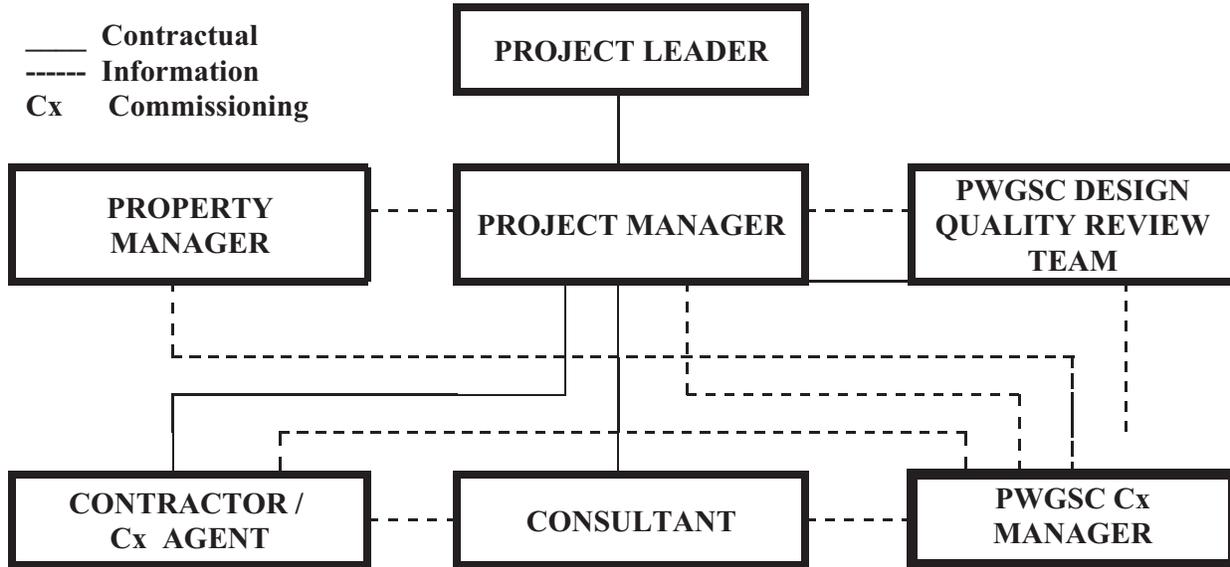
Commissioning is an integrated team effort among all parties involved in the project. It demands full cooperation in all stages of planning, design, construction, installation, activation and performance verification and operation. It also requires clear communications among all parties to achieve understanding of all requirements. This includes full documentation of major decisions and activities.

Successful delivery of a satisfactory project will be achieved only by a well-informed project management group. Similarly, successful delivery of accommodation satisfying User needs can only be achieved by a properly trained property management team that has all the tools to operate and maintain the facility.

The following paragraphs provide roles and responsibilities for the four major types of construction projects used by PWGSC:

- ** 1.12 Roles and responsibilities - Traditional Design Capital Construction Projects
 - ** 1.13 Roles and responsibilities - Smaller Design Construction Projects
 - 1.14 Roles and responsibilities - Design-Build Projects
 - 1.15 Roles and responsibilities - AFD Managed Facilities - Projects over \$200K.
- ** The decision as to which of these shall apply depends upon discussions relating to the type, size, and complexity of the project.

1.12 Roles and responsibilities - Traditional design capital construction projects



NOTE: The above is an example ONLY. Stakeholders should refer to the project-specific communications and organization structure as established by the Project Manager.

Definition:

Traditional Design Capital Construction Projects may be defined as new projects, renovations and fit-ups for the installation of components, equipment, subsystems, systems and/or integrated systems which are complex and large in scope.

The Project Leader is responsible for initiating the project on behalf of the Owner/Investor, for accepting the facility from the Project Manager and for handing it over to the Property Manager for operation. The Project Leader is also responsible to securing approved project funding.

The Project Manager has overall responsibility for managing the project, and for demonstrating to the Project Leader that the installed systems and overall facility meet the requirements defined in the Project Brief.

PWGSC Design Quality Review Team: reviews all aspects of design from development of the RFP to Conceptual Design Report, agreement with proposed design solutions, quality assurance, quality control, quality management, detailed design, working documents, and the final evaluation including value for money, adherence to standards.

PWGSC QA Commissioning Manager: provides planning and technical advice on O&M matters, coordinates commissioning activities from project identification to close out phase; ensures O&M concerns are addressed, provides quality assurance and reviews commissioning

documentation at all stages of project delivery including accuracy of Product Information (PI), Performance Verification (PV) and commissioning reports. Communications between the Commissioning Manager, the Designer and the Contractor is through the Project Manager. The Project Manager may delegate authority to the Commissioning Manager in matters relating to commissioning, while retaining overall responsibility for the project.

Consultant (Designer): refers to the private sector consultant with its internal commissioning resources or a firm having experience in commissioning and to in-house designers. The Consultant develops the Commissioning Plan, design intent, proposed design solutions, prepares commissioning specifications, building management manual, and other commissioning documentation, develops training plan, witnesses and certifies performance of all commissioning activities and organizes and monitors all activities as per the Contract Agreement, and is responsible for its contractual design, construction, and warranty-related commitments. The appointment of a Commissioning Manager does not permit the Consultant to abrogate traditional contracted professional responsibilities (e.g. site supervision and ensuring that construction conforms to the design intent).

The Contractor/Commissioning Agent: carries out many start-up and performance verification activities and carries out demonstrations and acceptance tests and related procedures. He acts as a coordinator only in matters relating to commissioning, refines the Commissioning Plan develops the Commissioning Schedule, coordinates all commissioning activities in accordance with contract documents, including all tests for equipment, systems and integrated systems and provides required documentation. The Contractor identifies both the site coordinator and the Commissioning Agent.

The Property Manager represents the Operator and is responsible for the day-to-day management and operation of the completed facility after it has been accepted from the Project Leader. During commissioning, he consults with the Project Manager on the acceptability of the facility, including training and documentation, before accepting the project for operation.

SAMPLE1

Commissioning services - Traditional Design Capital Construction Projects

Designer may be either in-house Designer or private sector Consultant with his own commissioning resource person or a commissioning firm
NOTE: All stakeholders must follow communications plan as established by the Project Manager

4th edition - July 2006

Copyright reserved

Commissioning services - TRADITIONAL DESIGN CAPITAL CONSTRUCTION PROJECTS					
Project Leader (PL) Project Manager (PM) responsibilities	PWGSC Design quality review team responsibilities	Designer - (Consultant responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
NPMS Project Identification Stage, Analysis Phase					
Project Leader prepares IAR					IAR
PL identifies & BUDGETS FOR Cx in IAR			Provides input into Commissioning Budget		Commissioning budget
NPMS Project Delivery Stage, Planning Phase					
Project Mgr., develops RFP including commissioning	Provides design input into RFP		Provides input into RFP		Request for Proposal (RFP) and Project Brief
NPMS Project Delivery Stage - Design Phase					
	Reviews DESIGN CRITERIA, FUNCTIONAL REQ'TS	Establishes Design Criteria, functional & Operational requirements	Reviews OPERATIONAL REQUIREMENTS		Design Criteria, Functional Req'ts, Operational Req'ts
	Reviews Design Energy Budget	Establishes PRELIMINARY O&M BUDGET	Reviews Preliminary O&M budget		Preliminary O&M budget
PM Reviews & accepts CONCEPTUAL DESIGN REPORT	Reviews Conceptual Design Report	Produces CONCEPTUAL DESIGN REPORT Submits to Project Manager Develops commissioning plan	Provides input re O&M items to Concept. Design Reviews Conceptual Design Report Co-ordinates and reviews commissioning plan		Conceptual Design Report Preliminary commissioning plan
NPMS Project Delivery Stage - Implementation Phase - Working Documents					
PM accepts working documents	Reviews DETAILED DESIGN at all stages of development	Develops WORKING DOCUMENTS including schematic, line diagrams, using new or generic Cx documentation, Identifies factory, on-site tests	Reviews detailed Design from operational perspective as required Provides generic Cx documentation Reviews Cx specs		Working documents Cx specifications, PI and PV Report forms, Installation/Start-up Check Lists Cx specifications added to Construction specs

Commissioning services - TRADITIONAL DESIGN CAPITAL CONSTRUCTION PROJECTS

Project Leader (PL) Project Manager (PM) responsibilities	PWGSC Design quality review team responsibilities	Designer - (Consultant responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
	Reviews Design data on PI forms	Prepares Cx SPECS for subsystems, systems, integrated systems Develops CHECK LISTS, PI & PV REPORT FORMS Develops TRAINING PLAN Applies MMS to working documents Develops BUILDING MANAGEMENT MANUAL Adds DESIGN DATA TO PI FORMS INTER - DISCIPLINARY COORDINATION	Reviews Check Lists Reviews & accepts PI & PV forms Reviews & accepts Training Plan Reviews application of MMS to Working Doc'ts Reviews Building Management Manual Reviews design data on PI forms		Training Plan 90% completed Building Management Manual
PM accepts Commissioning Plan		Updates COMMISSIONING PLAN	Coordinates & reviews updated Commissioning Plan		Updated Commissioning Plan
		Prepares DETAILED O&M BUDGET	Reviews & validates detailed O&M Budget		Detailed O&M Budget
	Reviews updated Design Energy Budget	Updates DESIGN ENERGY BUDGET	Reviews updated Design Energy Budget		Updated Design Energy Budget
Reviews updated Commissioning Budget		Updates COMMISSIONING BUDGET Studies DE-Cx req'ts of present facilities	Reviews updated Commissioning Budget		Updated Commissioning Budget
NPMS Project Delivery Stage, Implementation Phase - Construction					
PM accepts Commissioning Schedule		Reviews COMMISSIONING SCHEDULE	Reviews & recommends acceptance of comm'g sch	Develops Cx schedule Refines Cx Plan	Commissioning Schedule
	Reviews selected shop drawings for MAJOR EQUIPMENT for design	Reviews and accepts SHOP DRAWINGS	Reviews selected shop drawings for O&M	Submits SHOP DRAWINGS	Accepted shop drawings
	Witness FACTORY TESTS if required	Reviews completed PI forms	Accepts completed PI forms	Inputs data on to PI forms	Completed PI report forms

Commissioning services - TRADITIONAL DESIGN CAPITAL CONSTRUCTION PROJECTS

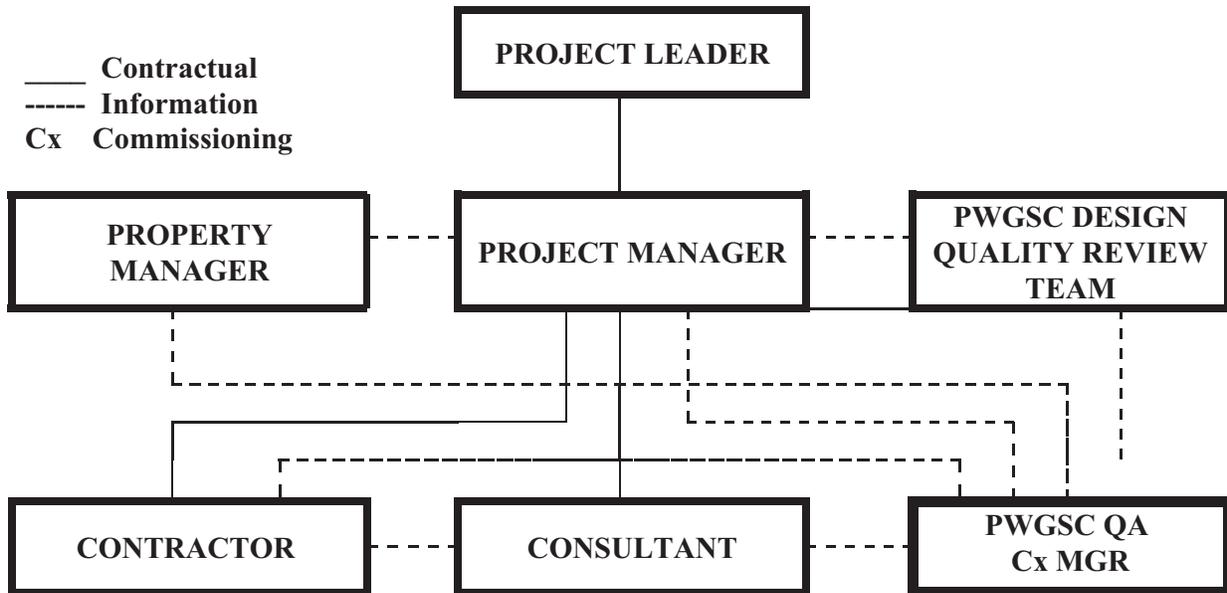
Project Leader (PL) Project Manager (PM) responsibilities	PWGSC Design quality review team responsibilities	Designer - (Consultant responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
	Reviews TAB REPORTS if required	Develops INSTALLATION /START-UP CHECK LISTS Witnesses & verifies TAB . Reviews TAB REPORTS for acceptance	Review Installation/ Start-up Check Lists Reviews & validates TAB REPORTS	Verifies, utilizes Installation/ Start-up Check Lists Conduct TAB . Prepare TAB REPORTS	Installation/Start-up Check lists Approved TAB Reports
NPMS Project Delivery Stage, Implementation Phase - Commissioning					
PM accepts completed Building Management Manual	Reviews completed Building Management Manual	Completes OPERATING MANUAL (part of BMM). Completes BUILDING MANAGEMENT MANUAL	Reviews, recommends acceptance of completed BLDG MANAGEMENT MANUAL (BMM)	Assemble MAINTENANCE MANUAL (part of BMM) Assists in completion of OPERATING MANUAL .	Completed Building Management Manual (BMM)
PM accepts Approved System & Integrated system PV reports	Participates in selected SYSTEMS and INTEGRATED SYSTEMS tests for performance verification	Monitors COMMISSIONING ACTIVITIES Certifies SYSTEMS and INTEGRATED SYSTEMS TESTS .	Witnesses selected systems & integrated systems tests & reviews test reports Monitors contract commissioning activities	Conducts component, equipment, subsystem, systems & integrated systems tests. Prepares PV Reports Coordinates all commissioning activities	Approved System & Integrated system PV reports
Conditional acceptance (if necessary		Provides TRAINING on design intent & on system design,	Coordinates participants for training, monitors training	Coordinates & implements Training	
Conditional acceptance (if necessary		Agrees to witness and certify DEFERRED TESTS	Approves DEFERRED COMMISSIONING TESTS due to seasonal or occupancy requirements	Identifies deferred comm'g tests due to seasonal or occupancy requirements	
Conditional acceptance (if necessary		Certifies rectification of OUTSTANDING DEFICIENCIES	verifies rectification of OUTSTANDING DEFICIENCIES	Addresses OUTSTANDING DEFICIENCIES	
PM accepts and distributes “As-Built” plans & specifications		Assists in RESOLVING ALL ISSUES RELATING TO COMMISSIONING	Review all issues relating to commissioning	Address all issues relating to commissioning	
PM issues CERTIFICATE		Produces “AS-BUILT” PLANS & SPECIFICATIONS from project records	Reviews & recommends acceptance of “As-Built” plans & specifications	Maintains accurate project records & assists in production of “As-Built”	o “As-Built” plans & specifications
		Recommends to PM interim	Recommends INTERIM	Requests Issuance of	Certificate of Interim

Commissioning services - TRADITIONAL DESIGN CAPITAL CONSTRUCTION PROJECTS

Project Leader (PL) Project Manager (PM) responsibilities	PWGSC Design quality review team responsibilities	Designer - (Consultant responsibilities acceptance	PWGSC QA Cx Manager responsibilities ACCEPTANCE to Designer	Contractor responsibilities Interim Acceptance	Deliverables Acceptance
OF INTERIM ACCEPTANCE for occupancy					
NOTE: Successful completion of commissioning (except for deferred commissioning, fine-tuning, trend logging and adjustment of ventilation rates to promote good IAQ is a requirement for issuance of the Interim Certificate					
PM accepts and distributes final commissioning documentation		Provides FINAL COMMISSIONING DOCUMENTATION	Accepts & recommends use of final commissioning documentation	Assists in prep'n of final comm'g documentation	Final Commissioning documentation
PM issues FINAL CERTIFICATE OF COMPLETION		Signs off & recommends FINAL ACCEPTANCE to Project Manager	Recommend final acceptance to Designer		Final Certificate of completion
NPMS Project Delivery Stage, Close Out Phase					
	Assists as required	Assists in FINE-TUNING of systems & equip't as req'd.	Assists in fine-tuning as required	Fine-tunes systems & equipment as required	
PM accepts DEFERRED COMMISSIONING TEST REPORTS		WITNESSES DEFERRED Cx TESTS. Reviews and accepts test reports	Witnesses deferred Cx as required. Reviews & accepts deferred Cx test reports	Performs deferred commissioning tests	Deferred commissioning test reports
	Reviews report of ENVIRONMENTAL & SYSTEMS CHECKS	Assists in systems & environmental checks	Assists in systems & environmental check. Reviews report.	Performs systems & environmental checks. Prepares Report	Systems & Environmental Checks Report
Initiates POST- WARRANTY REVIEW		Performs POST- WARRANTY REVIEW	Participates in POST- WARRANTY REVIEW	Addresses WARRANTY ISSUES	
PM reviews, accepts FINAL COMMISSIONING REPORT		Provides input into FINAL COMMISSIONING REPORT	Prepares FINAL COMMISSIONING REPORT	Provides input into FINAL COMMISSIONING REPORT	Final Commissioning Report
PM prepares FINAL EVALUATION REPORT for PL	Provides input to PM in prep'n of Final Evaluation Report	Assists PM in prep'n of Final Evaluation Report	Provides input to PM in prep'n of Final Evaluation Report	Provides input to PM in prep'n of Final Evaluation Report	Final Evaluation Report

**SYSTEMS FOUND TO BE UNCOMMISSIONABLE DUE TO DESIGN ERRORS AND/OR OMISSIONS
SHALL BE REDESIGNED BY THE DESIGNER AND RE-COMMISSIONED AT HIS OWN EXPENSE**

1.13 Roles and responsibilities - Smaller design construction projects



Definition:

NOTE: The above is an example ONLY. Stakeholders should refer to the project-specific communications and organization structure as established by the Project Manager.

SMALLER DESIGN CONSTRUCTION PROJECTS may be defined as projects for the installation of equipment, subsystems, systems and/or integrated systems having a limited scope and complexity. It also includes renovations and fit-ups

The scope of commissioning is identified by the stakeholders on a project-by-project basis..

The Project Leader is responsible for initiating the project on behalf of the Owner/Investor, for accepting the facility from the Project Manager and for handing it over to the Property Manager for operation. The Project Leader is also responsible to securing approved project funding.

The Project Manager has overall responsibility for managing the project after PDS Phase 1, and for demonstrating to the Client that the installed systems and overall facility meet the requirements defined in the Project Brief.

PWGSC Design Quality Review Team: reviews all aspects of design from development of the RFP to detailed design documents, agreement with proposed design solutions, quality assurance,

quality control, quality management, and the final evaluation including value for money and adherence to standards.

PWGSC QA Commissioning Manager: provides planning and technical advice on O&M matters, coordinates commissioning activities from project identification to close out phases, ensures O&M concerns are addressed, provides quality assurance and reviews commissioning documentation at all stages of project delivery including accuracy of Product Information (PI), Performance Verification (PV) and commissioning reports. Communications between the Commissioning Manager, the Designer and the Contractor is through the Project Manager. The Project Manager may delegate authority to the Commissioning Manager in matters relating to commissioning, while retaining overall responsibility for the project.

Consultant (Designer): refers to private sector consultant with its internal commissioning resources and to in-house designers. Develops Commissioning Plan, design intent and proposed design solutions, prepares commissioning specifications and other commissioning documentation, develop the Training Plan, witnesses and certifies performance of all commissioning activities, organizes and monitors all activities as per the Contract Agreement, and is responsible for its contractual design, construction, and warranty- related commitments. The appointment of a Commissioning Manager does not permit the Consultant (Designer) to abrogate traditional responsibilities (e.g. site supervision and ensuring that construction conforms to the design intent).

Contractor/Commissioning Agent carries out many start-up and performance verification activities, and carries out demonstrations and acceptance tests and related procedures. He acts as a coordinator only in matters relating to commissioning, refines the Commissioning Plan, develops the Commissioning Schedule, coordinates all commissioning activities in accordance with contract documents, including all tests for equipment, systems and integrated systems, and provides required documentation. The Contractor shall identify both the coordinator and the Commissioning Agent.

The Property Manager represents the Operator and is responsible for the day-to-day management and operation of the completed facility after it has been accepted from the Project Leader. During commissioning, he consults with the Project Manager on the acceptability of the facility, including training and documentation, before accepting the project for operation.

SAMPLE 2

Commissioning services - SMALLER DESIGN CONSTRUCTION PROJECTS

Designer may be either in-house Designer or private sector Consultant with his own commissioning resource person

NOTE: All stakeholders must follow communications plan as established by the Project Manager

Commissioning services - SMALLER DESIGN CONSTRUCTION PROJECTS					
Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - (Consultant) responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
NPMS Project Identification Stage, Analysis Phase					
PL identifies COMMISSIONING BUDGET			Provides input to Commissioning Budget		Commissioning Budget
NPMS Project Delivery Stage, Planning Phase					
PM develops CX REQ'TS and SCOPE OF WORK	Reviews Cx REQ'TS and SCOPE OF WORK		Develops Cx REQ'TS and SCOPE OF WORK		Scope of Work Document or Terms of Reference
NPMS Project Delivery Stage, Design Phase					
	Reviews DESIGN CRITERIA, FUNCTIONAL REQUIREMENTS	Establishes DESIGN CRITERIA, FUNCTIONAL & OPERATIONAL REQ'TS	Reviews Design Criteria, operational requirements		Design Criteria Functional & Operational requirements
	Reviews Design Energy Budget if required	Establishes DESIGN ENERGY BUDGET if req'd	Reviews impact of Design energy budget on O&M if req'd		Design Energy Budget if required
Reviews & accepts CONCEPTUAL DESIGN REPORT	Reviews Conceptual Design Report	Produces CONCEPTUAL DESIGN REPORT Submits to Project Manager Develops commissioning plan	Provides input re O&M items. Reviews Conceptual Design Report Co-ordinates and reviews commissioning plan		Conceptual Design Report Preliminary commissioning plan
NPMS Project Delivery Stage, Implementation Phase - Working Documents					
PM accepts working documents	Reviews DETAILED DESIGN at all stages of development	Develops WORKING DOCUMENTS for sub-systems, systems, integrated systems	Reviews working documents at all stages of design from operational & mtce perspective		Working documents

Commissioning services - SMALLER DESIGN CONSTRUCTION PROJECTS

Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - (Consultant) responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
PM accepts Commissioning Plan		Develops PI & PV REPORT FORMS Develops TRAINING PLAN Updates COMMISSIONING PLAN INTER- DISCIPLINARY COORDINATION	Reviews, accepts PI & PV Forms Reviews training plans Coordinates & reviews updated commissioning plan		PI and PV Report forms Training Plan Updated Commissioning Plan
		Updates BUILDING MANAGEMENT MANUAL Prepares O&M BUDGET	Reviews Building Management Manual Validates impact of O&M Budget		Updated Building Management Manual O&M Budget

NPMS Project Delivery Stage, Implementation Phase - Construction

PM accepts Commissioning Schedule	Reviews shop drawings for selected major equipment for design Witnesses FACTORY TESTS if required	Reviews COMMISSIONING SCHEDULE Reviews and accepts SHOP DRAWINGS	Reviews Cx schedule Reviews selected shop drawings from O&M perspective	Develops Cx Schedule. Refines Cx Plan Submits shop drawings. Inputs data on to PI forms	Commissioning Schedule Accepted shop drawings Completed PI forms
	Reviews TAB REPORTS if required	Witnesses & verifies TAB Reviews & accepts TAB reports	Reviews & validates TAB reports	Conducts TAB Prepares TAB reports	Approved TAB Reports

NPMS Project Delivery Stage, Implementation Phase - Commissioning

PM accepts PV Reports	Reviews PV REPORTS Participate in selected system & integrated system tests for PV	Verifies & accepts SYSTEMS and INTEGRATED SYSTEMS TESTS Reviews PV Reports	Reviews and verifies PV Reports	Conducts component, equipment, subsystem, system and integrated system tests and performance verification. Prepares PV REPORTS	Approved PV Reports
PM accepts completed O&M Manual		Reviews COMPLETED OPERATING & MAINTENANCE MANUAL	Reviews Operating & Maintenance Manual	Completes assembly of Operating & Maintenance Manual	Approved Operating & Maintenance Manual

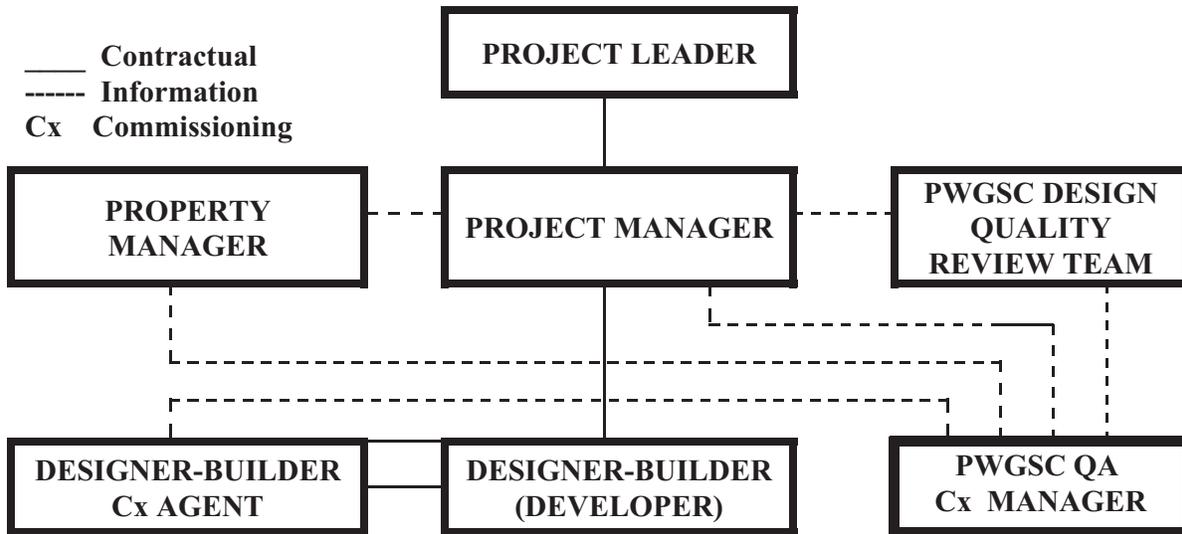
Commissioning services - SMALLER DESIGN CONSTRUCTION PROJECTS

Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - (Consultant) responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
PM accepts Systems and Integrated systems PV reports		Witnesses SYSTEMS & INTEGRATED SYSTEMS TESTS , reviews & accepts test reports Monitors COMMISSIONING ACTIVITIES	Witnesses selected systems & integrated systems tests & reviews test reports Monitors comm'g activities	Conducts systems & integrated systems tests Coordinates all commissioning activities	Approved System & Integrated system test reports
		Provides TRAINING on design intent & on system design,	Coordinates participants monitors training	Coordinates & implements Training	
PM accepts and distributes "AS-BUILT" PLANS & SPECS		Produces "AS-BUILT" PLANS & SPECS from project records	Reviews "As-Built" records	Maintains accurate project records & assists in production of "As-Built"	o "As-Built" plans & specs
	Assists in fine-tuning as required	Assists in FINE-TUNING of systems & equip't as req'd. Identifies DEFICIENCIES	Assists in fine-tuning as required Verifies rectification of deficiencies	Fine-tunes systems & equipment as required Rectifies all deficiencies	
PM Produces CERTIFICATE OF INTERIM ACCEPTANCE FOR OCCUPANCY		Recommends to PM interim acceptance	Signs-off systems and recommends interim acceptance to Designer	Requests issuance of Interim Acceptance	Certificate of Interim Acceptance
NOTE: Successful completion of commissioning (except for deferred commissioning, fine-tuning, trend logging and adjustment of ventilation rates to promote good IAQ is a requirement for issuance of the Interim Certificate					
PM accepts and distributes "As-Built" plans & specifications		Produces "AS-BUILT" PLANS & SPECIFICATIONS from project records	Reviews & recommends acceptance of "As-Built" plans & specifications	Maintains accurate project records & assists in production of "As-Built"	o "As-Built" plans & specifications
PM issues FINAL CERTIFICATE		Signs off & recommends final acceptance to Project Manager	Signs off, recommends final acceptance to PM		Final Certificate of completion
NPMS Project Delivery Stage, Close Out Phase					
		Address WARRANTY ISSUES	Comments on warranty issues	Addresses warranty issues	

Commissioning services - SMALLER DESIGN CONSTRUCTION PROJECTS					
Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - (Consultant) responsibilities	PWGSC QA Cx Manager responsibilities	Contractor responsibilities	Deliverables
PM reviews, accepts FINAL COMMISSIONING REPORT		Provides input into FINAL COMMISSIONING REPORT	Prepares FINAL COMMISSIONING REPORT	Provides input into FINAL COMMISSIONING REPORT	Final Commissioning Report
PM prepares EVALUATION REPORT for PL	Provides input to PM in preparation of EVALUATION REPORT	Assists PM in preparation of EVALUATION REPORT	Provides input to PM in prep'n of EVALUATION REPORT	Provides input to PM in prep'n of EVALUATION REPORT	Evaluation Report

SYSTEMS FOUND TO BE UNCOMMISSIONABLE DUE TO DESIGN ERRORS AND/OR OMISSIONS SHALL BE REDESIGNED BY THE DESIGNER AND RE-COMMISSIONED AT HIS OWN EXPENSE

1.14 Roles and responsibilities - Design-build projects



NOTE: The above is an example ONLY. Stakeholders should refer to the project-specific communications and organization structure as established by the Project Manager.

The Project Leader is responsible for initiating the project on behalf of the Owner/Investor, for accepting the project from the Project Manager and for handing it over to the Property Manager for operation. The Project Leader is also responsible for securing approved project funding.

The Project Manager has overall responsibility for managing the project , and for demonstrating to the Project Leader that the installed systems and overall facility meet the requirements defined in the Project Brief.

PWGSC Design Quality Review Team: reviews all aspects of design from development of the RFP to Conceptual Design Report, agreement with proposed design solutions, quality assurance, quality control, quality management, detailed design, working documents, and the final evaluation including value for money and adherence to standards.

PWGSC QA Commissioning Manager: provides planning and technical advice on O&M matters, coordinates commissioning activities from project identification to close out phase, ensures O&M concerns are addressed, provides quality assurance and reviews commissioning documentation at all stages of project delivery including accuracy of PV and commissioning reports. Communications between the Commissioning Manager, the Designer and the Contractor is through the Project Manager. The Project Manager may delegate authority to the Commissioning Manager in matters relating to commissioning, while retaining overall responsibility for the project.

Designer-Builder (Developer): is responsible to develop design solutions meeting the requirements of the Client, prepare commissioning specifications and other commissioning

documentation and to develop the Training Plan. As the Builder: is responsible for the construction / installation of the project and for all commissioning activities including witnessing of performance testing.

Design-Builder's Commissioning Agent: is responsible to fulfill the commissioning program, prepare and submit a Commissioning Plan, develop Commissioning Schedules, for detailed coordination of commissioning activities, executing all commissioning activities in accordance with the contract documents, providing direction for all matter relating to commissioning including tests of systems, integrated systems and equipment and providing all required documentation.. The Design-Builder's Commissioning Agent acts as a coordinator in all matters relating to commissioning. He coordinates all commissioning activities, making sure that commissioning activities are implemented in accordance with the Commissioning Schedule. On major projects, the Contractor shall identify both the coordinator and the Commissioning Agent.

The Property Manager represents the Operator and is responsible for the day-to-day management and operation of the completed facility after it has been accepted from the Project Leader. During commissioning, he consults with the Project Manager on the acceptability of the facility, including training and documentation, before accepting the project for operation.

SAMPLE 3
Commissioning services - DESIGN-BUILD PROJECTS

Designer may be either in-house Designer or private sector Consultant with his own commissioning resource person
NOTE: All stakeholders must follow communications plan as established by the Project Manager

Commissioning services - DESIGN-BUILD PROJECTS					
Project Leader (PL) / Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - Builder (Developer) responsibilities	PWGSC QA Commissioning Manager responsibilities	Design-Builder / Designer's Commissioning Agent responsibilities	Deliverables
NPMS Project Identification Stage, Analysis Phase					
Project Leader prepares IAR					IAR
PL identifies & BUDGETS for COMMISSIONING in IAR			Provides input to Commissioning Budget		Commissioning budget
NPMS Project Delivery Stage, Planning Phase					
Project Mgr. develops RFP including commissioning	Provides design input into RFP		Provides commissioning input into RFP		Request for Proposal (RFP)
PM develops DESIGN-BUILD SPECS Incorporates into RFP	Provides design input into DESIGN-BUILD SPECS		Reviews design input into DESIGN-BUILD SPECS Reviews Comm'g specs & documentation to suit RFP		Design-Build specifications
NPMS Project Delivery Stage, Design Phase					
	Reviews DESIGN CRITERIA and FUNCTIONAL REQ'TS	Reconfirms Design Criteria, functional & Operational requirements from RFP Establishes O&M BUDGET	Reviews & coordinates OPERATIONAL & MTCE REQ'TS Reviews O&M budget		Design Criteria, Functional & Operational req'ts O&M budget
	Reviews Design Energy Budget	Establishes DESIGN ENERGY BUDGET	Review impact of Design Energy Budget on O&M		Design Energy Budget
Reviews & accepts CONCEPTUAL DESIGN REPORT	Reviews Conceptual Design Report	Produces CONCEPTUAL DESIGN REPORT Submits to Project Manager Develops commissioning plan	Reviews Conceptual Design Report for O&M issues. Co-ordinates and reviews commissioning plan		Conceptual Design Report Preliminary Commissioning Plan
NPMS Project Delivery Stage, Implementation Phase - Working Documents					
PM accepts working documents	Reviews DESIGN DEVELOPMENT at	Develops WORKING DOCUMENTS including schematics, line diagrams,	Reviews DESIGN DEVELOPMENT at all		Working documents

Commissioning services - DESIGN-BUILD PROJECTS

Project Leader (PL) Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - Builder (Developer) responsibilities	PWGSC QA Commissioning Manager responsibilities	Design-Builder / Design- Builder's Commissioning Agent responsibilities	Deliverables
	all stages of development from functional perspective		stages from operational & Mtee. perspectives		
		Prepares Cx SPECS for subsystem, system, integrated system	Review commissioning specifications		Commissioning specifications
		Develops PI & PV Report Forms and Check Lists	Reviews PI & PV Report Forms		PI & PV Report Form and Check Lists
PM accepts Commissioning Plan		Updates COMMISSIONING PLAN	Coordinates & Reviews updated Commissioning Plan		Updated Commissioning Plan
		Prepares TRAINING PLAN	Reviews and accepts Training Plan		Training Plan
	Provides input to Building Management Manual	Develops BUILDING MANAGEMENT MAN'L	Coordinates & Reviews Bldg Manage't Manual		Building Management Manual
		INTER-DISCIPLINARY COORDINATION			
		Prepares DETAILED O&M BUDGET	Validates impact of detailed O&M Budget		Detailed O&M Budget
	Reviews updated Design Energy Budget	Updates DESIGN ENERGY BUDGET	Reviews impact of Design Energy Budget on O&M		Updated Design Energy Budget
Reviews updated Commissioning Budget		Updates Cx BUDGET	Reviews updated Commissioning Budget		Updated Commissioning Budget
NPMS Project Delivery Stage, Implementation Phase - Construction					
PM accepts Commissioning Schedule	Reviews shop drgs for MAJOR EQUIP'T for design Witnesses FACTORY TESTS as required	Reviews Cx SCHEDULE Reviews and accepts SHOP DRAWINGS	Reviews commissioning schedule Reviews selected shop drawings for O&M Witnesses FACTORY TESTS as req'd. Submits report to Project Mgr. Accepts completed PI forms Reviews & accepts Check Lists	Develops Cx schedule. Refines Cx Plan. Submits shop drawings Inputs data on to PI forms Utilizes Installation/ Start-up Check Lists	Commissioning Schedule Approved shop drawings Completed PI Forms Installation/Start-up Check Lists
	Reviews TAB REPORTS if required	Witnesses & verifies TAB.	Reviews & verifies TAB reports	Conduct TAB Prepare TAB REPORTS	Approved TAB Reports

Commissioning services - DESIGN-BUILD PROJECTS

Project Leader (PL) Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - Builder (Developer) responsibilities	PWGSC QA Commissioning Manager responsibilities	Design-Builder / Design- Builder's Commissioning Agent responsibilities	Deliverables
	Reviews TAB reports for acceptance	Reviews TAB reports for acceptance			
NPMS Project Delivery Stage, Implementation Phase - Commissioning					
	Witnesses FACTORY TESTS as required	Monitors all Cx ACTIVITIES	Monitors contract commissioning activities	Coordinates all commissioning activities	
PM accepts approved System PV Reports	Reviews PV REPORTS if required	Verify & approve SYSTEMS TESTS	Witnesses selected systems tests	Conducts component, equip't START-UP, PERFORMANCE VERIFICATION	Completed PV reports
PM accepts approved integrated system PV Reports	Reviews COMPLETED BLDG MANAGEMENT MANUAL	Reviews completed BUILDING MANAGEMENT MANUAL (BMM)	Reviews completed Building Management Manual	Prepares PV REPORTS	Completed Building Management Manual
		Witnesses INTEGRATED SYSTEMS TESTS	Witnesses selected integrated systems tests & reviews test reports	Conducts integrated systems tests	Approved System & Integrated system test reports
		Provides TRAINING on design intent & on system design.	Coordinates participants for training, monitors training	Coordinates & implements Training	
		Compiles list of deferred commissioning tests	Approves DEFERRED COMMISSIONING TESTS due to seasonal or occupancy	Identifies deferred comm'g tests due to seasonal or occupancy requirements	
		Assists in RESOLVING ALL ISSUES RELATING TO COMMISSIONING	Reviews all issues relating to commissioning	Addresses all issues relating to commissioning	
		Identifies DEFICIENCIES	Verifies rectification of deficiencies	Rectifies all deficiencies	
Conditional acceptance of deferred commissioning (if necessary)		Agrees to review DEFERRED Cx	Reviews results of DEFERRED Cx	Agrees to perform DEFERRED Cx	
Conditional acceptance of O/S deficiencies (if necessary)		Agrees to verify OUTSTANDING DEFICIENCIES	Verifies completion of OUTSTANDING DEFICIENCIES	Agrees to rectify OUTSTANDING DEFICIENCIES	

Commissioning services - DESIGN-BUILD PROJECTS

Project Leader (PL) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - Builder (Developer) responsibilities	PWGSC QA Commissioning Manager responsibilities	Design-Builder / Designer-Builder's Commissioning Agent responsibilities	Deliverables
PM issues CERTIFICATE OF INTERIM ACCEPTANCE for occupancy	Requests interim acceptance	Requests interim acceptance	Recommends sign-off of systems		Certificate of Interim Acceptance
NOTE: Successful completion of commissioning (except for deferred commissioning, fine-tuning, trend logging and adjustment of ventilation rates to promote good IAQ is a requirement for issuance of the Interim Certificate)					
PM accepts and distributes FINAL COMMISSIONING DOCUMENTATION	Reviews final commissioning documentation	Provides FINAL COMMISSIONING DOCUMENTATION	Accepts final commissioning documentation	Assists in prep'n of final Cx documentation	Final Commissioning documentation
PM issues FINAL CERTIFICATE OF COMPLETION	Sigs off & recommends final acceptance to Project Manager	Sigs off & recommends final acceptance to Project Manager	Sigs off & recommends final acceptance to Designer-Builder		Final Certificate of completion
NPMS Project Delivery Stage, Close Out Phase -					
	Assists as required	Assists in FINE-TUNING of systems & equip't as req'd.	Assists in fine-tuning as required	Fine-tunes systems & equipment as required	
PM accepts DEFERRED COMMISSIONING TEST REPORTS		Witnesses DEFERRED COMMISSIONING TESTS and accepts test reports	Witnesses DEFERRED COMMISSIONING as required. Reviews test reports	Performs DEFERRED COMMISSIONING TESTS	Deferred Commissioning reports
		Assists in RESOLVING ALL ISSUES RELATING TO CX	Review all issues relating to commissioning	Address all issues relating to commissioning	
	Reviews report of ENVIRONMENTAL & SYSTEMS CHECKS	Assists in systems & environmental checks, Reviews & accepts reports	Assists in systems & environmental check, Reviews report.	Performs systems & environmental checks. Prepares Report	Systems & Environmental Checks Report
		Identifies DEFICIENCIES	Verifies rectification of deficiencies	Rectifies all deficienciesAddresses WARRANTY ISSUES	
Initiates POST WARRANTY REVIEW		Performs POST WARRANTY REVIEW	Participates in POST WARRANTY REVIEW		
PM reviews and accepts FINAL COMMISSIONING REPORT		Provides input into FINAL COMMISSIONING REPORT	Develops FINAL COMMISSIONING REPORT	Provides input into FINAL COMMISSIONING REPORT	Final Commissioning Report

Commissioning services - DESIGN-BUILD PROJECTS					
Project Leader (PL) Project Manager (PM) responsibilities	PWGSC DESIGN QUALITY REVIEW TEAM responsibilities	Designer - Builder (Developer) responsibilities	PWGSC QA Commissioning Manager responsibilities	Design-Builder / Design- Builder's Commissioning Agent responsibilities	Deliverables
PM prepares EVALUATION REPORT for PL.	Provides input to PM in preparation of EVALUATION REPORT	Assists PM in preparation of EVALUATION REPORT	Provides input to PM in prep. of EVALUATION REPORT	Provides input to PM in preparation of EVALUATION REPORT	Evaluation Report

**SYSTEMS FOUND TO BE UNCOMMISSIONABLE DUE TO DESIGN ERRORS AND/OR OMISSIONS SHALL BE REDESIGNED
BY THE DESIGNER AND RE-COMMISSIONED AT HIS OWN EXPENSE**

1.15 Roles & responsibilities - AFD managed facilities - Projects over \$200K

.1 General

The contractual and information movement organizational chart and all information regarding the participants to commissioning shall be in full accordance with the *"AFD Management Handbook - Standard Operating Procedures for Commissioning Projects over \$200K in AFD Managed Buildings"* - latest edition.

.2 Commissioning services

Commissioning Services for projects in AFD - Managed facilities shall be in accordance with Table 1 forming part of the *"AFD Management Handbook - Standard Operating Procedures for Commissioning Projects over \$200K in AFD Managed Buildings"* (latest edition).

Chapter 2 Commissioning documentation

2.1 Introduction

Commissioning documentation is a complete set of data and information fully describing the completed project as a built, finished, functional and operational facility presented in a form in which it can be operationally-occupied, maintained, updated and used over the life of the building. The transfer of a completed facility to the Project Leader must include appropriate documentation on how the facility is designed and constructed, and how to operate, maintain, repair, clean, manage and modify it.

A comprehensive set of system documents serves as a common database for all project team members from all disciplines. Quality documentation of all components, systems and environments as commissioned is also essential for use in the training of O&M personnel and for the operation, maintenance, servicing and repair of all systems, components and equipment in the facility. It serves as a project archive for future reference base data for operations and maintenance, renovations and inspection purposes. It can provide a valuable record of experience for feedback to other projects.

Commissioning documentation maintain a paper trail of design decisions, trade-offs, etc., made during the entire project, commencing at the NPMS project identification stage, analysis phase provides:

- .1 a record of user requirements for use by the Design Team,
- .2 a description of the Design Intent and limitations of various systems,
- .3 design decisions, design assumptions, trade-offs necessary to arrive at the approved design solution,
- .4 a complete record of each system and building component,
- .5 changes made to the design prior to hand-over and acceptance,
- .6 a documented measure of quality control throughout the progress of the project,
- .7 a record of performance levels and acceptance tests,
- .8 information on how to operate the building,
- .9 estimated costs for operating the building,
- .10 heritage character statement and conservation guidelines (for heritage buildings).

2.2 Project archives

An archival operation needs to be defined and set up by the Commissioning Manager in conjunction with the Project Manager in the project delivery stage, planning phase. The Project Archives should include all commissioning documents that contain data deemed essential to a comprehensive record of the project and its component systems. The purpose is to provide:

- .1 a complete historical record of the project
- .2 procedures and performance levels for re-commissioning

- .3 documentation control
- .4 feedback mechanism for knowledge transfer

Provision shall be made for the controlled storage of all commissioning documentation within the project archive.

2.3 Commissioning documentation package

The intent is to maintain a paper trail of design decisions, trade-offs, etc., made during the entire project, commencing at the project identification stage, analysis phase. It should include:

- 1. design decisions, design assumptions, trade-offs necessary to arrive at the approved design solution,
- .2 changes made to the design prior to hand-over and acceptance.

The whole package of commissioning documentation comprises the following documents, each of which is described in detail in subsequent paragraphs of this chapter:

- .1 The Investment Analysis Report
- .2 The Request for Proposal containing the Commissioning Brief
- .3 Design Criteria and Design Intents
- .4 Working Documents revised to show all work as actually constructed and installed
- .5 Building Management Manual (BMM) for the complete building. BMM for heritage buildings require additional information on how to maintain (standards, methods, materials, skills) and a technical maintenance manual for the property.
- .6 Training documentation
- .7 Commissioning Reports, produced at the end of the project delivery stage, implementation phase and close out phase.
- .8 Final Commissioning Report

2.4 Investment Analysis Report (IAR)

This is the document from which the Request for Proposal (RFP) or the Project Brief is developed.

2.5 Request For Proposal (RFP)

This is the outcome of the IAR . It must include sections describing:

- .1 the Client's FUNCTIONAL and OPERATIONAL requirements - see item 2.6, below,
- .2 O&M requirements,
- .3 commissioning requirements in the form of a Commissioning Brief. See item 2.8, below.

2.6 Functional requirements and operational requirements

These form the very foundation of the entire design. If these are given the very serious consideration that they deserve from the outset, there is every possibility that the entire project will be effectively commissioned and client satisfaction is assured. Functional requirements and operational requirements must not be open to any misinterpretation or misunderstanding. If these are not established by the client they may be established by the Project Manager or the designer.

FUNCTIONAL REQUIREMENTS include:

1. design criteria, design intents, design assumptions, design issues, design solutions,
2. issues of health, welfare, comfort and safety of the occupants and operating personnel,
3. indoor environmental space requirements, IAQ, acoustical privacy, physical security,
4. and other special requirements of the user. These could include client's specific requirements for systems' commissioning.

OPERATIONAL REQUIREMENTS include:

1. spatial requirements for O&M personnel,
2. cost-effective O&M,
3. provisions for re-commissioning, adjustment and fine-tuning of the facility during its entire life,
4. provisions for complete documentation, including ease of addressability, storage facilities,
5. training of O&M personnel (and user),
6. Life Safety Systems.

2.7 Design criteria

Design Criteria are identified in the RFP or Project Brief and may be established by the Client, or by various codes, standards and regulations (enforced by an authorities having jurisdiction, to be identified). These may include, but are not necessarily limited to:

- .1 conservation guidelines, heritage character statements,
- .2 various PWGSC standards,
- .3 environmental standards including ASHRAE Standards 90.1, 62, and 55.
- .4 Security and access requirements as established by the Authority Having Jurisdiction,
- .5 Accessibility standards.
- .6 Operational characteristics such as:
 - .a Spatial requirements for O&M facilities and services,

- .b O&M and life cycle costs, reliability, durability, operability, maintainability, accessibility, serviceability
- .7 Partial and phased occupancy,
- .8 Disruption of normal environmental conditions,
- .9 Life support systems, security, access, power, vertical transportation, etc., for present occupants (this would apply particularly to renovation projects),
- .10 Hours of occupancy - normal, and extended.

For existing buildings, design criteria should be based upon considerations such as age and condition of the building, architectural and structural considerations, exterior environmental conditions, previous usage, etc.

Design criteria must include:

- .1 **design tolerances** (eg. design margins, safety factors, standby and redundancy, etc.)
- .2 **application tolerance** for each system which must be realistic and attainable. Both of these items must be the result of careful examination of the functional and operational requirements contained in the RFP.

If design criteria are not established by the client, they may be established by the Project Manager in the RFP. In this case, they must be approved by the PWGSC Design Quality Review Team during the development of the Conceptual Design Report. They must be based upon considerations such as building age, heritage value, architectural and structural considerations, condition, of the existing building, exterior environmental conditions, previous usage, etc.

Design criteria for Design-build projects: These are especially important because of the limited involvement and opportunity for defining project requirements by A&ES and Property and Facilities Management (PFM) during the project identification stage, planning phase. It is therefore critical that, without limiting the freedom of the designer-builder to develop innovative design solutions, that all the appropriate design criteria, performance criteria, etc., be clearly established in the RFP. All commissioning roles and commissioning activities must be clearly defined within the design-build Request For Proposal (RFP).

2.8 Commissioning Brief

This is the section of the Project Brief in which commissioning requirements are clearly defined. The Commissioning Brief identifies the Owner's/Investor's/ Client's expectations – what needs to be done together with estimated costs for commissioning; the Commissioning Plan identifies the systems and delineates the procedures and schedules.

The Commissioning Brief defines the deliverables from an O&M perspective and describes the scope of commissioning and associated budget (normally established in the IAR).

2.9 Conceptual Design Report

The Conceptual Design Report contains the designer's proposed solutions to the requirements contained in the RFP and must include all design intents (i.e. the methodology by which the designer proposes to meet the design criteria).

The designer must be very careful and judicious in the practice of adding "safety factors" to design calculations. Unless strictly controlled, these accumulated factors will often lead to over-sizing of equipment and systems, resulting in difficulties in commissioning.

The Conceptual Design Report for mechanical systems must include decisions relating to the introduction of good quality outside air in well-controlled and measurable quantities into HVAC systems in order to maintain satisfactory IAQ at all times. Unless considered at the outset of the project this may well be forgotten, or squeezed out for want of the small amount of additional space in the Mechanical Equipment Room.

The Conceptual Design Report for heritage buildings must include the documents which define the heritage character of the property and a description of the conservation approach which outlines how this will be balanced with functional goals.

2.10 Detailed design development

This must include very careful attention to details including:

- .1 what system and equipment must be connected to emergency power.
- .2 the impacts of standby capacity and redundancy.
- .3 careful and appropriate selection of construction materials, installation practices and performance verification procedures, etc. WHMIS data sheets for all materials to be incorporated into the project must be carefully examined at this stage of the project's development.
- .4 Specifications must reflect this concern for quality assurance in design. They must be complete, and include requirements for commissioning.

Increasing complexity of control systems requires that DDC, EMCS and BAS systems, fire alarm systems and life safety systems receive special consideration when preparing specifications.

The insistence on quality assurance in design must flow into the insistence on quality control during construction. All parties to a construction project take much great care in all aspects of project management. Once design solutions have been established, and system selection with its associated equipment selection have been accepted, it is very often difficult, if not impossible to change to a design that will more readily comply with the requirement to minimize O&M costs.

2.11 Working documents

The working documents consist of the plans and specifications developed by the designer to describe the built works. They set out the quality control and quality assurance for the project. Plans and specifications are used by the Project Commissioning Team to verify that the built works conform to all commissioning deliverables.

2.12 Commissioning specifications

Although these form an integral part of the working documents, they are listed separately because of their importance in commissioning the built works. They must include sufficient details to enable the contractor to understand all requirements clearly and to submit an accurate price for commissioning and must include:

1. The Commissioning Plan which has been agreed with the PWGSC Commissioning Manager. For detailed description, refer to *CP.3: "Guide to Development of the Commissioning Plan"*.
2. All required performance verification procedures if not already covered in the Commissioning Procedures Manual of the discipline involved.
3. The Building Management Manual: to include all design intent and design criteria, objectives of commissioning and manner of operation of all systems, equipment and components, desired results and functions to be performed.
4. All requirements for preparation of the Maintenance Manual, including maintenance materials, spare parts, special tools, together with instructions for identification, inventory, storage and instructions for use.
5. A list of all factory and on-site performance tests; all to be witnessed and certified.
6. List of activities to be performed by the contractor as part of the Add-on Contract during the Warranty Period.
7. All conditions under which installed equipment may be temporarily operated by the Contractor and all refurbishing requirements.
8. Training requirements.
9. Requirements for preparation of O&M documentation.

2.13 Commissioning Plan

This is the project-specific document which has been approved by the PWGSC Commissioning Manager and which describes the process for verifying that all built works meet the Investor's requirements within the limits of the working documents.

The Commissioning Plan may, with the approval of the PWGSC Commissioning Manager, have to be amended by the contractor, then reviewed by the designer, at the commencement of construction in the light of the systems and equipment approved for installation, the contractor's construction/completion schedule and the occupancy schedule.

2.14 Installation/Start-up Check Lists

These are the lists to ensure that the equipment and systems as installed are complete, ready for start-up and for commissioning. The lists prepared by PWGSC must be considered as generic and illustrative only, and must be tailored to suit the project requirements.

2.15 Product Information (PI) and Performance Verification (PV) report forms

These forms are used throughout the commissioning phase and indicate the basic requirements expected from the PV procedures. The samples provided by PWGSC should be considered as generic only and may need to be tailored to suit requirements of the project.

2.16 Commissioning of heritage buildings

When changes are made to interior environments, commissioning should allow for ramping up to new set points over a period of weeks or months, rather than sudden start for new temperature and humidity levels. This allow for the building and its contents to adjust slowly to the changed conditions.

2.17 Building Management Manual

Is fully described in *CP.4: Guide to the development of Building Management Manuals*. It consists of five discrete sections:

- Section 1: Containing names of participants, functional and operational requirements, description of the project and its systems, accessibility, any FHBRO statements.
- Section 2: Design criteria, design intents, design philosophy, applicable codes and standards.
- Section 3: Standard Operating Procedures and Operation and Maintenance (O&M) manuals.
- Section 4: Maintenance and service contracts.
- Section 5: Supporting appendices such as: architectural, structural, fire protection and fire prevention, mechanical, electrical, appendices, WHMIS information manual, O&M budget, “as-built” construction documents.

2.18 Commissioning reports

These documents describe the commissioning processes used during the delivery cycle and provides assessment of the facility as to its compliance with the requirements identified in the IAR and the Project Brief.

2.19 Final Commissioning (Evaluation) Report

The Final Commissioning, or Evaluation, Report is prepared by the PWGSC QA Commissioning Manager at the end of the project delivery stage, close out phase.

It is essentially a debriefing report and building evaluation summary and includes:

1. a complete assessment of the project.
- .2 lessons learned from this project and any necessary recommendations.
- .3 variances between the actual and planned levels of performance as defined in the IAR and Project Brief.
- .4 an evaluation of the validation and acceptance process and of the commissioning phase.
- .5 what components and systems which were not commissioned reasons for this
- .6 a remedial work plan outlining recommended follow-up actions or projects to be undertaken by PWGSC.
- .7 other related information.

2.20 Other documents

The Project Leader may identify in the Project Brief other documents to be delivered. This may occur more often on projects for special purpose facilities.

END

**PWGSC
COMMISSIONING MANUAL
(CP.1)**

Project Commissioning Appendix A Samples of Commissioning Documentation

Rather than being typical of what will be produced, with a few exceptions, this Appendix contains a number of sample commissioning documentation that has been prepared for projects that have been undertaken in NCA.

The items listed include:

Tab A:	Sample of Commissioning Brief
Tab B:	Sample of Commissioning Plan
Tab C:	Sample of Standard Operating Procedures Manual
Tab D:	Sample of Training Plan
Tab E:	Sample of Installation / Start-up Check List
Tab F:	Sample of MMS input into working documents
Tab G:	Sample of Product Information (PI) and Performance Verification (PV) Forms
Tab H:	Schematics used in Manuals and Commissioning Reports
Tab I:	Sample of Commissioning Schedules
Tab J:	Sample of Equipment Performance Verification specification
Tab K:	Sample of Integrated System specification

Sample of Commissioning Brief

NOTE: *This is a sample (only) of the type of Commissioning Brief which might be used with a traditional type of Consultant Design / Contractor construct project.*

A model generic Commissioning Brief may be found in CP.11: Guide to the preparation of Commissioning Briefs.

IMPORTANT NOTES TO WRITER OF COMMISSIONING BRIEFS:

1. This model Commissioning Brief has been developed **specifically for use with the traditional Consultant Design / Contractor construct type of project.**
2. This model Commissioning Brief shall be used in the preparation of project-specific Commissioning Briefs for new projects, existing installations where systems have to be substantially modified or for remaining existing systems as appropriate.
3. Material in this Commissioning Brief that is in *ITALICS* is for the benefit of the writer of the Commissioning Brief and is **NOT** intended to be incorporated into the Commissioning Brief.

1. Commissioning objectives

The objectives of commissioning are:

- .1 To document the design intent of the overall project and the proposed building systems and components and to verify and demonstrate that all functional and operational requirements have been correctly interpreted in the Design solution.
- .2 To document the operational, maintenance and building management requirements.
- .3 To minimize O&M costs through the careful selection of design solutions (for economy, reliability, durability, accessibility, maintainability), construction materials, installation practices, performance verification procedures.
- .4 To verify that selected design solutions and the resultant built works protect the safety, health, welfare and comfort of occupants and O&M personnel.
- .5 To define responsibility areas for meeting these operational requirements in the contract documents and include a process to demonstrate compliance.
- 6 To demonstrate that the Client's and the Department's requirements are met during the project implementation and commissioning phases of the project and to support quality management of construction and installation through verification of building components, systems and environments.
- .7 To verify and demonstrate that all systems operate consistently at peak efficiencies, under all normal load conditions, and within the specified energy budget.
- .8 To provide comprehensive documentation of the operational, maintenance and building management.
- .9 To implement a comprehensive training program.
- .10 To transfer the completed works to qualified facility operators verifying that the building systems operate consistently at peak efficiencies, under all normal load conditions, and within the specified energy budget.
- .11 To ensure the heritage character of the building is protected through appropriate maintenance schedules, methods, materials and procedures.

2. General description of commissioning

- .1 Commissioning shall be carried out in accordance with the **PWGSC Commissioning Manual (CP.1)** , current edition, and all associated Guidelines but suited to the specific requirements of the project. These documents consist of:
 - CP.1: Project Commissioning Manual*
 - CP.2: Commissioning Glossary (forms Appendix B of CP.1)*
 - CP.3: Guide to development of the **Commissioning Plan***
 - CP.4: Guide to the development of the **Building Management Manual***
 - CP.5: Guide to preparation of **Training Plans***
 - CP.7: Commissioning for **Facilities Management and Operation***
 - CP.8: Guide to the preparation of **Commissioning Reports***
 - CP.9: Guide to the development and use of **Check Lists***
 - CP.10: Guide to the development and use of **Report Forms and Schematics***
 - CP.11: Guide to the preparation of **Commissioning Briefs***
 - CP.12: Guide to the development and use of **Commissioning specifications***
 - CP.13: **Facility Maintenance Policy, Guidelines and Requirements***
- .2 The **PWGSC Commissioning Manual (CP.1)** and all associated PWGSC Guidelines are available from the Project Manager.
- .3 Commissioning includes architectural, structural, interior and landscape systems, as well as the usual mechanical and electrical systems.
- .4 The Designer must deliver concise and comprehensive information and reports on commissioning to PWGSC.
- .5 A enhanced commissioning program is required and will apply to all construction phases , base building and fit up work.

3. **Roles and responsibilities:**

- .1 **PWGSC Project Manager:** Has overall responsibility for managing the project and delivering the project to the Project Leader on time and on budget. Upon completion, the Project Manager hands the facility over to the Project Leader.
- .2 **PWGSC Commissioning Manager:** As a member of the PWGSC Technical Advisory Team, the Commissioning Manager:
 - .1 represents the Project Manager during the commissioning process;
 - .2 maintains overall responsibility for representing the Client’s interests in the implementation of commissioning, including:
 - .1 assuring that all program issues have been addressed,
 - .2 reviewing all documentation at all stages of project development and delivery,
 - .3 monitoring of all commissioning activities,
 - .4 verification of the accuracy of all reported results.
 - .3 ensures that all O&M aspects are addressed to the satisfaction of the Department,
 - .4 reviews Designer’s submissions,
 - .5 monitors the Designer’s commissioning services during the commissioning process,
 - .6 witnesses and certifies with the developer’s designer all integrated systems test results,

- .7 in consultation with the Designer, review staffing, service contracts and requirements for supply and storage of spare parts, special tools and maintenance materials.

.3 Designer (Consultant): The Designer shall:

- .1 establish Design Criteria, functional and operational requirements, if not already established in the RFP or Project Brief,
- .2 establish a Design Energy Budget and, if necessary, revise and update with each submission,
- .3 prepare a preliminary O&M budget and revise and update with each submission, containing detailed breakdowns of various items such as estimated electrical, mechanical, or specialty equipment annual energy consumption and systems maintenance, operation and/or service contract costs,
- .4 prepare a preliminary Commissioning Budget and revise and update with each submission,
- .5 prepare a preliminary Commissioning Plan in accordance with *CP.3: Guide to development of the Commissioning Plan*,
- .6 prepare commissioning specifications for components, equipment, systems and integrated systems in accordance with *CP.12: Guide to the development and use of Commissioning Specifications* and incorporate same into the construction specifications,
- .7 prepare a complete maintenance management documentation in accordance with *CP.4: Guide to the preparation of Building Management Manuals*, to be sufficiently complete for use during training, and to include:
 - .1 explanation of the purpose of the facilities, what the building is meant to do,
 - .2 outline of the design intent of all systems,
 - .3 provide a narrative description of the project's conceptual framework,
 - .4 document all design decisions made throughout the project,
 - .5 description of each building system; including architectural, structural, mechanical, electrical, civil, fire protection, acoustical and other building as well as site systems,
 - .6 include all relevant documentation.
- .8 plan the commissioning and performance verification (PV) activities, processes and their output, including development of project-specific:
 - .1 Installation / Start-up Check Lists prepared in accordance with *CP.9: Guide to the development and use of Check Lists*,
 - .2 Product Information (PI) Report Forms and Performance Verification (PV) Report Forms prepared in accordance with *CP.10: Guide to the development and use of Report Forms and Schematics*,
 - .3 Add all design data to PI and PV report forms.
- .9 prepare a detailed Training plan in accordance with *CP.5: Guide to preparation of Training Plans*,
- .10 incorporate PWGSC MMS identification codes to all components, equipment and systems into all working documents; all in accordance with *CP.13: Facility Maintenance Policy, Guidelines and Requirements*,
- .11 review the **CONTRACTOR'S** detailed commissioning schedule for components, equipment, systems, and integrated systems. (PV tests will be performed by the Contractor),
- .12 identify Contractor and subcontractor commissioning, PV and testing responsibilities,

- .13 review shop drawings and product data and accompanying Product Information (PI) as completed by the Contractor,
 - .14 monitor commissioning activities, provide quality control reports to the PWGSC commissioning Manager throughout the construction, commissioning and operational phases of the work, including but not necessarily limited to:
 - .1 inspection and verification of as installed components, sub system and systems on a regular basis during construction,
 - .2 witnessing tests, as required by PWGSC,
 - .3 reviewing and verifying testing, adjusting and balancing (TAB) reports,
 - .4 reviewing and verifying Performance Verification (PV) Reports prepared in accordance with *CP.8: Guide to the preparation and use of Commissioning Reports*,
 - .5 witness and certifying systems and integrated systems tests,
 - .6 any test which cannot be commissioned due to design errors or omission has to be redesigned and recommissioned.
 - .15 participate in the Training Plan by providing training on design philosophy, design intent and systems designs,
 - .16 witness and certify deferred tests, commissioning activities, PV, review and accept reports,
 - .17 identify and verify the rectification of all outstanding deficiencies,
 - .18 assist in the resolution of all issues relating to commissioning,
 - .19 prepare “as-built” documentation (plans and specifications) as described elsewhere in the RFP or Project Brief,
 - .20 assist in fine-tuning of systems and equipment as required during the warranty period,
 - .21 coordinate with the PWGSC Commissioning Manager to ensure that O&M requirements are addressed,
 - .22 assist in systems checks and environmental checks during the warranty period,
 - .23 participation in warranty inspections and production of warranty inspection reports and address all warranty issues that may arise,
 - .24 ensure that the final product meets the Design Criteria, functional and operational requirements, the project objectives and all requirements of the RFP and Project Brief,
 - .25 recommend acceptance of the completed project,
 - .26 assist the PWGSC project manager in the preparation of a debriefing (Evaluation) report. To include, but not necessarily be limited to:
 - .1 a building evaluation summary with recommendations,
 - .2 lessons learned from the project.
- .4 Designer’s commissioning resource:** To assist in fulfilling a fully integrated and comprehensive commissioning program, the Designer shall appoint a full-time commissioning resource with proven expertise in implementing commissioning programs, and who shall be responsible for detailed coordination of commissioning and provide direction for all matter relating to commissioning as described herein. The name of this resource shall be provided to the PWGSC Project Manager and Commissioning Manager.
- .5 Contractor:** In accordance with the commissioning requirements specified in the Construction Documents, the Contractor:
- .1 develops a critical path commissioning activities schedule for review and approval of the Designer, PWGSC Commissioning Manager and Project Manager,
 - .2 executes all commissioning activities in accordance with the Contract Documents, such as:

- .1 input data from drawings on to Product Information (PI) Report Forms,
- .2 assemble maintenance sections of the Building Management Manual as described in *CP.4 - Guide to the preparation of Building Management Manuals*,
- .3 assist in assembly of section relating to operation of components, equipment, sub-systems, systems and integrated systems as described in *CP.4: Guide to the preparation of Building Management Manuals*,
- .4 utilize Installation/Start-up Check Lists when conducting pre-start-up inspections,
- .5 coordinate all commissioning activities,
- .6 perform testing, adjusting and balancing (TAB), prepare TAB reports,
- .7 conduct performance verification (PV) tests of components, equipment, sub-systems, systems and integrated systems, complete PV Report Forms, prepare PV Reports,
- .8 coordinate and implement training as described in *CP.5: Guide to preparation of Training Plans*,
- .9 address all issues relating to commissioning,
- .10 assist the Designer in the preparation of commissioning documentation,
- .11 assist the Designer in the preparation of “as-built” documentation,
- .12 fine-tune components, equipment, sub-systems, systems and integrated systems during the warranty period,
- .13 perform systems and environmental checks during warranty period and prepare reports,
- .14 address all warranty issues,
- .15 provide input to the Designer in the preparation of a debriefing (Evaluation) report.

- .6 Contractor’s commissioning resource**, assigned by the Contractor, qualified and experienced in the implementation of all commissioning, to coordinate, direct and verify all commissioning activities and procedures. The name of this resource shall be provided to the PWGSC Project Manager and PWGSC Commissioning Manager for approval.

4. Occupancy requirements

Identify facility management requirements, including move-in procedures; security systems; staffing; signage; safety and accessibility for persons with disabilities.

User occupancy requirements include consideration of the need for and implications of:

- .1 early, late and/or phased completion, take-over, acceptance and occupancy, including the effects upon the User's present accommodation (such as early decommissioning, need for extension etc.).
- .2 requirements for initial, interim and substantial occupancy including, for reasons of health and safety, full commissioning of all life safety systems. It may also include some form of "interim commissioning" of all non-life safety systems.

- .3 overlapping of construction, commissioning and initial occupancy. This requires consideration of the effects of partial commissioning, delay of commissioning activities, the effects on insurance, warranties, certification, repetition of commissioning activities after full occupancy, and/or completion of fit-up contracts.
- .4 post-occupancy commissioning activities during Operation which will often be necessary for certain systems and equipment under these circumstances.

5. Operational criteria

NOTES TO READER :

- 1. *This paragraph applies mainly to renovation projects.*
- 2. *Rewrite this paragraph to suit project requirements.*

- .1 [This building will be decommissioned during the renovation and construction process and the Contractor will bear the full responsibility for the base building.]
or
[This building will be occupied during the demolition, construction and fit-up process. Part of the building will be decommissioned during the first construction (demolition) contract. The Contractor will bear full responsibility for the base building].
or
[This building will be partially occupied during the demolition, construction and fit-up process. Part of the building will be decommissioned during the first construction (demolition) contract].
- .2 The Contractor may use base building systems, utilities and steam from the Central Heating Plant during renovation stages. The cost for energy used will be borne by [PWGSC] [the Contractor].
- .3 [Start-up, PV and acceptance will include phased activities (both within individual contracts and involving several contracts). Testing, PV, commissioning and training must be developed bearing these variables in mind. Cooperate and coordinate testing procedures and schedule with user. Once the renovated building has been occupied, further testing activities will be subject to User's approval and may be refused during normal working hours].
or
[Start-up, PV and acceptance will include phased activities (both within individual contracts and involving several contracts). Testing, PV, commissioning and training must be developed bearing these variables in mind. For example:

NOTE TO READER: Modify this table to suit the project

Nominal hours of operation/occupancy:	0600 - 1800, [5] days/week
Extended hours of operation/occupancy:	1800 - 0600, [5] days/week
Nominal hrs. of operation (presence) of O&M staff:	0830 - 1600, 5 days/week
Security staff presence:	24 hours/day, 7 days/week
Cafeteria and meeting rooms:	[0700 - 2100] [varies], 7 days/week
Restrictions to testing:	Life-support: Off-hours Emergency power: Off-hours
Ventilation for off-gassing:	[During occupied periods and] during off-hours for first [8] weeks after completion of installation of furnishings].

Once the renovated building has been occupied, further testing activities will be subject to User's approval and may be refused during normal working hours.

6. Life cycle costing criteria

If not prescribed within the RFP or Project Brief, when developing life cycle cost analyses for each option, use the following criteria:

1. [25] years to next refit,
2. [50] year investment horizon,
3. costs of utilities (e.g. Central Heating and Cooling Plant (CHCP) steam, hot water heating, chilled water, electricity), fuel consumption, potable water and sewage),
4. reliability, durability, operability, maintainability, accessibility and serviceability,
5. systems selection and staffing in response to annual operating cost criteria.

7 Cooperation and coordination

Throughout the Commissioning Process, the Project Design Team, the Project Construction Team, the Project Commissioning Team, and the Property Management Team, all as defined in *The PWGSC Commissioning Manual (CP.1)*, will work closely together to implement all commissioning activities.

8 Training

In consultation with the PWGSC Commissioning Manager, prepare a comprehensive training plan for the training of the Facility Management personnel, User (where deemed necessary) and operations and maintenance staff.

If required by the RFP or the Project Brief, training shall be in English and French.

The training plan which will enable O&M personnel to identify repair and maintenance needs that might otherwise go undetected for long periods with possibly serious consequences.

Training shall enhance monitoring and diagnostic capabilities and result in more efficient, cost-effective operation of the facility.

The training plan shall be in accordance with the requirements of *CP.5 Guide to preparation of Training Plans*. Training plans shall be reviewed, revised, updated and resubmitted as required.

The names of all trainees (obtained from the PWGSC Project Manager) and all training personnel shall be submitted to the PWGSC Project Manager for review, comment and approval at least two (2) weeks prior to the proposed training dates.

Training must clearly relay:

- .1 A clear understanding of the intent of the design,
- .2 All limitations of the systems,
- .3 Reasons for the choice of systems.

Coordinate the dates of all training sessions with the PWGSC Project Manager. Update the training plan as required to reflect the project schedule. The PWGSC Project Manager will organize the location

The training plan shall recognize both short-term and long-term requirements.

Upon completion, prepare a summary of the training sessions, indicating dates, subject matter, all training personnel and all trainees present and submit to the Project Manager.

9 Correction of deficiencies

The Designer, in consultation with the PWGSC Commissioning Manager, shall:

- .1 instruct the contractor to correct all the deficiencies identified and recorded during the performance verification,
- .2 provide solutions during the PV process with respect to the variances from the design parameters,
- .3 adjust or alter the systems to achieve the design parameters. This shall include re-testing,
- .4 immediately notify the PWGSC Project Manager when tests fail to meet project requirements and when corrective work and re-tests affect construction and completion schedule,
- .5 report in writing to the PWGSC Project Manager and the PWGSC Commissioning Manager indicating compliance or anomalies regarding witnessed events. The consultant is to investigate and recommend in writing any corrective actions to be taken to facilitate compliance with design intent and design criteria.

10 Facility maintenance policy, guidelines and requirements

For full details, the Designer shall refer to *CP.13: Facility Maintenance Policy, Guidelines and Requirements*.

11. Acceptance of the project

The project will be accepted and the Interim Certificate of Completion will be issued only after:

1. successful completion of all integrated systems tests, life safety support systems tests and after all other requirements of the authority having jurisdiction are satisfied,
2. all test certificates, commissioning reports and commissioning documentation have been approved and accepted by the PWGSC Project Manager.

12. Commissioning documentation

Commissioning documentation is a complete set of data and information fully describing the completed project as a built, finished, functional and operational facility and presented in a form that can be maintained, updated and used over the life of the building.

In preparing project-specific commissioning documentation, use all existing generic commissioning documentation to the maximum extent possible. However, the Designer retains over-riding responsibility for the content of all project-specific commissioning documentation and for editing, amending and supplementing as required and as is appropriate for the project.

Produce in accordance with the requirements of *The PWGSC Commissioning Manual (CP.1)* in consultation with PWGSC centre of expertise and the PWGSC Commissioning Manager as appropriate.

Comply with all requirements contained in the RFP relating to electronic production of commissioning documentation.

Commissioning documentation shall include:

- .1 **The Commissioning Plan**, the master planning document for all commissioning activities and deliverables, revised, refined, updated and reviewed at each stage of design development and re-submitted for review by the PWGSC Commissioning Manager. Use the PWGSC Model Commissioning Plan (see CP.3) as a reference model.
- .2 **The Building Management Manual**, containing all documentation for the project and providing a complete “paper trail” relating to project delivery. Responsibilities for development and timing of delivery are described in *CP.4: Guide to the development of Building Management Manuals*.
- .3 **Commissioning specifications**. For details of requirements, refer to *CP.12 - Guide to the development and use of Commissioning Specifications*.
- .4 **Training Plans**. Refer to *CP.5 Guide to the preparation of Training Plans*. For more details refer to relevant paragraph below.
- .5 **Installation Check Lists** for use during pre-start-up and pre-commissioning inspections. Refer to *CP.9 Guide to the development and use of Check Lists*.
- .6 **Product Information (PI) report forms** to document all details of equipment, components and systems - refer to *CP.10 Guide to the development and use of Report Forms and Schematics*.
- .7 **Performance Verification (PV) report forms** and include thereon all Design Criteria, Design Intents and other relevant design information. Refer to *CP.10 Guide to the development and use of Report Forms and Schematics*.
- .8 **MMS requirements**, Apply to all drawings before Tender call . Refer to *CP.13 Facility Maintenance Policy, Guidelines and Requirements*.
- .9 **"As-built" drawings and specifications:** to be completed prior to, and available for, pre-start-up inspections and to include:
 - .1 amendments to show all measured and approved results of PV procedures, settings of all controls, systems and equipment as finally set upon completion of commissioning,
 - .2 project specifications amended by insertion of addenda, change notices, etc. ,
 - .3 flow diagrams and piping schematics as installed at each major item of equipment complete with valves controllers, etc., identified with numbered tags.
- .10 **Occupants' Comments/Complaints Audit System** for use during the Warranty Period.
- .11 **TAB and commissioning reports** to be prepared in accordance with *CP.8: Guide to the preparation and use of Commissioning Reports*.
- .12. **Final evaluation report,** in accordance with *CP.8: Guide to the preparation and use of Commissioning Reports*.
- .13 **Any other documents and reports**

13 Commissioning deliverables:

- .1 First technical submission by the Designer:** Provide following:
 - .1 Conceptual Design Report:** From the commissioning perspective, the Conceptual Design Report shall include:
 - .1 description of the design** describing the Design Criteria, Design Intent, the design philosophy, the rationale for system selection based on life cycle cost analysis, the functional and operational requirements and the conceptual framework for the operation and use of the proposed building, its components and systems, how the proposed design meets the Client's requirements, corporate and project objectives. To be updated at each stage of project development.
 - .2 design criteria, Design intents,**
 - .3 O&M Report.** To include:
 - .1 O&M budget including projected utility consumption
 - .2 spatial requirements for O&M staff (office, lockers, kitchen, showers, washrooms, flow of people and supplies, storage for special tools, spare parts, and maintenance materials),
 - .3 cleaning requirements (janitor closets, receptacle for vacuum, equipment supply and storage),
 - .4 other requirements associated with O&M aspects including, but not necessarily limited to:
 - .1 operating standards and operator requirements,
 - .2 equipment and system reliability requirements,
 - .3 delivery, content and form of O&M documentation,
 - .4 tools, equipment, spare parts and maintenance materials,
 - .5 emergency procedures,
 - .6 identification and other similar needs,
 - .7 waste management requirements,
 - .8 preventive maintenance tasks.Further information may be obtained from *CP.7: "Commissioning for Facility Management and Operation"*.
 - .4 Comprehensive documentation, design information/data** and comments to allow the PWGSC Commissioning Manager to:
 - .1 prepare service and staffing contracts,
 - .2 prepare a list of spare parts, special tools, maintenance materials and other special equipment to be provided by the Contractor.
 - .5** capacity of the facility to change in response to program changes over its life expectancy,
 - .6** requirements for operation and maintenance of the project over its life expectancy,
 - .7** occupancy during construction,
 - .8** "phased" construction program,

- .9 assessment of staffing and skill requirements to operate and maintain the project,
- .10 preliminary commissioning plan,
- .11 sample of PI/PV report forms and tracking software,
- .12 preliminary building management manual,
- .13 define project archives and how these archives will be managed, updated, and submitted at the end of the project.

.2 33% Submission:

- .1 Extent of commissioning determined,
- .2 Factory and on-site tests of components, sub-systems, systems and integrated systems during construction, installation and commissioning determined,
- .3 Outline commissioning specifications using PWGSC generic commissioning specifications PLUS outline project-specific commissioning specifications,
- .4 Updated Commissioning Plan,
- .5 Updated Building management manual,
- .6 Updated Design Intent Document,
- .7 Updated O&M Budget,
- .8 Outline PI and PV forms. Provide for all components, equipment and systems to be tested,
- .9 Maintenance management system (MMS) codes identified for all equipment shown on the construction documents,
- .10 Preliminary Training Plan.

.3 66% Submission:

- .1 Factory and on-site tests of components, sub-systems, systems and integrated systems during construction, installation and commissioning defined and detailed in commissioning specs,
- .2 Commissioning activities to be deferred to Operational Phase and Warranty Period identified,
- .3 Detailed commissioning specifications,
- .4 Updated Commissioning Plan, etc.,
- .5 Detailed Building management manual,
- .6 Updated Design Intent Document,
- .7 Updated O&M Budget,
- .8 Updated Training Plan,
- .9 Maintenance Management System (MMS) codes identified for all equipment shown on the construction documents, schematics and line diagrams,

- .10 Complete PI and PV forms. Provide for all components, equipment and systems to be tested.

.4 99% Submission:

- .1 Commissioning specifications integrated into project specifications,
- .2 90% Commissioning plan,
- .3 90% complete Building Management Manual,
- .4 90% Design intent document detailing each building system, including all engineering calculations,
- .5 Final O&M Budget,
- .6 Maintenance Management System (MMS) codes identifiers shown on the construction documents and indicated on each PI and PV form,
- .7 100% Training Plan, indicating scope and duration of training,
- .8 Design information added to PI forms.

.5 100% Submission:

- .1 This submission incorporates all revisions required by the review of the 99% submission,
- .2 Complete Commissioning Plan,
- .3 Update the design intent document to reflect any changes from the 99% submission.

14 Construction and Commissioning:

.1 General:

- .1 Upon Contract award, review and Update the PI and PV Forms, installation/start-up Check Lists, Commissioning Plan, Training Plan, commissioning specifications, and Commissioning Schedule to ensure relevance to construction changes to the work. Refer to *CP.9 - Guide to the development and use of Check Lists*, and *CP.10 - Guide to the development and use of Report Forms and Schematics*.
- .2 In consultation with the Contractor, review/select the test instruments to be used and instrument calibration.
- .3 Incorporate relevant data from approved shop drawings and installed component data immediately upon approval.
- .4 Review contractors compliance with the contract documents.
- .5 Witness and certify tests, including those tests conducted before concealment and start up.
- .6 Verify that each system is completed, safe to operate and ready for start-up.
- .7 Review all test reports and take necessary action with Contractor when work fails to comply with contract.
- .8 Immediately notify the PWGSC Project Manager when tests fail to meet project requirements and when corrective work will affect schedule.

- .9 Ensure that all deficiencies are rectified and acknowledge that the installation of components and systems is ready for the commissioning phase.
- .10 Assist Departmental Representative in evaluating testing firm's invoices for services performed.
- .11 Review all maintenance management nomenclature and submissions prepared by the contractor. Ensure completion of on-site implementation and tagging of systems and equipment.

.2 Manuals and Reports - Refer to *CP.4 - Guide to the development of Building Management Manuals*:

- .1 4 weeks before training is due to commence, assemble, review and approve:
 - .1 All commissioning documentation, including PV documentation, procedures and expected output.
 - .2 In consultation with the Contractor, review/select the test instruments to be used and instrument calibration.
 - .3 Revise the Building Management Manual as construction progresses, ensuring that it reflects the installed systems.
 - .4 Finalize the SOP Manual: Verify, and certify, completeness, relevance and accuracy. Produce [4] sets and submit to the PWGSC Project Manager prior to implementation of Training Plan. The Contractor shall retain one copy of each volume for his record and for use during the implementation of the Training Plan.
 - .5 Review the O&M Manual: Verify for, and certify, completeness, accuracy, relevance and format. Submit [4] sets to the PWGSC Project Manager in accordance with Section [01730][01732][01007] of project specification prior to interim acceptance or implementation of Training Plan. Ensure Contractor assembles all certified tests results and incorporates into the O&M manuals. The Contractor shall retain one copy of each volume for his record and use during the instruction period.

.3 Training: Implement the Training Plan. Refer to *CP.5 - Guide to the development of Training Plans*.

- .1 Submit the Training Plan to the PWGSC Project Manager for review and comment at least two weeks prior to the proposed training dates. Update and resubmit as required. Include an agenda and a course outline summarizing the content and duration of training. The training provided must clearly relay:
 - .1 An understanding of the intent of the design.
 - .2 Limitations of the systems.
 - .3 Reasons for the choice of systems.
- .2 Coordinate the date(s) of the training session(s) with the PWGSC Project Manager. The PWGSC Project Manager to organize the location and provide the lists of participants.

- .3 Prepare a summary of the training sessions. Indicate dates, subject matter, and all personnel present for training. After training, submit the training summary to the PWGSC Project Manager.
- .4 Make necessary arrangement for site O&M staff familiarization during construction/ installation.
- .5 Consultant to provide training sessions on design intent and operational philosophy of each building system, including architectural systems, and the integrated building systems (all together). Utilize the O&M Manual and design intent document for training sessions.
- .6 Contractor to provide training sessions on the operations and maintenance of components, equipment, sub-systems, systems and integrated systems.
- .7 Record the time, date and subject matter of training sessions as they occur. Indicate all those who are present at each training session.

.4 Spare Parts:

- .1 Finalize the delivery, inventory and storage of all specified spare parts, special tools, maintenance materials.

.5 Component, sub-systems, Systems, and Integrated System Performance Verification (PV)

- .1 Test all the components, subsystems, systems and integrated systems in accordance with the provisions of the contract documents, Ensure the work meets the design intent and requirements of ULC and TB Guidelines on Life Safety and Health. The Designer shall witness, certify and approve all tests.
- .2 Certify and date all PV procedures and test results.
- .3 Report in writing to the PWGSC Project Manager and PWGSC Commissioning Manager indicating compliance or anomalies regarding witnessed events. The consultant is to investigate and recommend in writing any corrective actions to be taken to facilitate compliance with design intent and design criteria.
- .4 Provide solutions during the PV process with respect to the variances from the design parameters.
- .5 In consultation with the PWGSC Commissioning Manager, instruct the contractor to rectify all deficiencies identified and recorded during the performance verification and adjust or alter the systems to achieve the design parameters. Re-test to verify compliance.
- .6 In consultation with the PWGSC Commissioning Manager, and PWGSC Project Manager, recommend take over of the facility subject to performance of PV and commissioning which were previously agreed to be deferred until the operational phase.
- .7 Prior to interim inspection, debrief the PWGSC Project Manager and the PWGSC Commissioning Manager on the commissioning process including training; problems; required changes to systems (with costs) which are outside the contractor's responsibility, but which are deemed necessary to meet project requirements; commissioning procedures and other information, experiences and suggestions for future projects. Submit a

report to the PWGSC Commissioning Manager. Repeat this process when 80% occupancy is achieved.

.6 Design intent document and Building Management Manual:

- .1 Update the design intent document and Building Management Manual. Immediately prior to the issuance of the Interim Certificate of Acceptance develop this document so as to become the complete “Building Management Manual” to reflect the final as-built works. Reflect all changes, modifications, revisions and adjustments. This may include the incorporation of reports such as *the Area Measurement and Space Usage Report*, Fire protection Manual, etc.

END

CP.11: MODEL COMMISSIONING BRIEF

Sample of Commissioning Plan

NOTE: *This is a sample (only) of the type of Commissioning Plan which might be used with the normal type of Consultant Design and Contractor construct project for upgrading, extending, and replacing existing laboratory facilities.*

PWGSC Project no. xxx xxx [project title] [date]

Contents

1. Importance of the Commissioning Plan
2. Roles and responsibilities
3. Revisions to this Commissioning Plan
4. Risk assessment
5. Objectives of commissioning
6. Extent of commissioning
7. Deliverables relating to O&M perspectives
8. Deliverables relating to the commissioning process
9. Deliverables relating to the administration of commissioning
10. Payments for commissioning
11. The commissioning process
12. Training Plan

1. Importance of the Commissioning Plan

The Commissioning Plan is the master planning, management and communications tool relating to commissioning, setting out scope, standards, roles and responsibilities, expectations, deliverables, etc., and is addressed to all members of the Commissioning Team. It provides an overview of commissioning, and sets out the process and the methodology for successful commissioning of the above-mentioned project.

2. Roles and responsibilities

The Commissioning Plan is intended to be used by the:

- .1 **PWGSC Project Manager:** who has the overall responsibility for the project and is the sole point of contact between the Client, the Designer, the PWGSC Commissioning Manager and all other members of the project team.
- .2 **PWGSC design Quality Review Team:** conducts detailed reviews during all stages of the design to ensure appropriate design criteria, design intents, design solutions, that designs are well-developed, commissioning specifications are appropriate to this laboratory, transmits technical design information to the Designer. During construction, may conduct periodic site reviews to observe general progress.
- .3 **PWGSC Commissioning Manager:** ensures that all commissioning activities are carried out so as to ensure the delivery of a fully operational project complete in every respect.. This includes reviews of all commissioning documentation, reviews for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under all conditions of operation, protection of health, welfare, safety and comfort of occupants and O&M personnel.
- .4 **Designer (i.e.. Consultant):** designs the facility to meet the Client's functional and operational requirements and budget, prepares all working documents, including incorporation of commissioning specifications in to construction specifications, monitoring commissioning activities, witnessing and certifying the accuracy of reported results, witnessing and certifying TAB and other tests, develops the PI and PV Report Forms,

develops the Building Management Manual, ensures the implementation of this Commissioning Plan, performing verification of performance of all installed systems, implementation of Training Plan.

- .5 **Construction Team:** consists of Contractor, sub-contractors, suppliers and other support disciplines, and is responsible for construction/installation in accordance with the contract documents, including testing and the delivery of training, required documentation.
- .6 **Contractor's Commissioning Agent:** to implement all commissioning activities required by the specifications, including demonstrations, training, testing, preparation and submission of test reports.. This is a responsibility that is distinct from that of the Contractor's site supervisor. Commissioning Agent to be available for emergency and troubleshooting service during the first year of occupancy by the User for adjustments and modifications outside the responsibility of the O&M personnel.
- .7 **Commissioning Agencies:** will include:
 - .1 **The installing contractor** or installing sub-contractor.
 - .2 **Equipment manufacturer:** e.g.. elevators, emergency generators.
 - .3 **Specialist sub-contractor:** e.g.. EMCS.
 - .4 **Specialist commissioning agency:** e.g., environmental space conditions, indoor air quality and other installations providing environments which are essential to the Client's program but are outside the scope or expertise of other Commissioning Agencies on this project. If not specified in the commissioning specifications, the identity of this specialist will be provided at a later date.
 - .5 **TAB agency:** equipment and systems involving the measurement and adjusting of flow rates and pressures to meet indicated or specified values (e.g. ducted air and hydronic systems, fans, pumps).

All Commissioning Agencies will be available for emergency service during the first year of occupancy by the User for adjustments and modifications outside the responsibility of the O&M personnel. These include changes to ventilation rates to meet changes in off-gassing, changes to heating or cooling loads beyond the ranges of the EMCS, and changes to EMCS control strategies beyond the training level provided to the O&M personnel.

The names of commissioning personnel, details of the instruments which will be used and commissioning procedures which will be followed will be provided at least three months prior to the scheduled starting date so as to permit proper review and approvals.

- .8 **Client's move:** the move from the existing accommodation into the new building, although not part of commissioning should be given serious consideration by the Designer so as to ensure only very minor interruption in his program activities.
- .9 **Property Manager:** has responsibility for receiving the renovated facility and is responsible for day-to-day operation and maintenance of the facility and represents the lead role in the Operation Phase and onwards.

3. **Revisions to this Commissioning Plan**

This Commissioning Plan will be reviewed, revised, refined and updated as detailed design and production of the Working Documents proceeds and, if required, during construction.

Each time it is revised, the revision number and date will also be revised. The revised Commissioning Plan shall be submitted to the PWGSC Project Manager and PWGSC Commissioning Manager for review and approval.

4. Risk assessment

For the construction of Laboratory Buildings, the performance of each system will affect the performance of all other systems, and non-performance places the conclusions of scientific research at very considerable risk (with possible negative impact on confidence by the scientific community in the reliability of such research). It is planned, therefore, to verify the performance of all systems and equipment installed in the new Laboratory building before acceptance by the User.

5. Objectives of commissioning

Commissioning will provide a fully functional facility:

- .1 whose systems, equipment and components have been proven to meet all Client's functional requirements before the date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under all normal loads.
- .2 in which the Client and O&M personnel will have been fully trained in all aspects of all installed systems,
- .3 having optimized life cycle costs,
- .4 having complete documentation relating to all installed equipment and systems.

6. Extent of commissioning

Since this preliminary Commissioning Plan is based upon the RFP and has been prepared prior to the development of the Conceptual Design Report, it is possible at this time to refer to systems only in very general terms. Systems to be commissioned shall include:

.1 Architectural and Structural

- Accessibility and operational safety
- Raised floor systems
- Elevator service **
- Vertical transportation systems **
- Kitchen equipment
- Special doors in laboratories
- Door and window hardware
- Protection of heritage character of this building

.2 Mechanical

- Environmental control systems, indoor space conditions, IAQ, noise & vibration
- Exhaust systems and related make-up systems
- Heat recovery systems
- Smoke control systems **
- Plumbing and other building services
- Fire suppression and fire protection systems **

.3 Electrical

- High voltage switch gear and transformation equipment and distribution systems
- Low voltage (below 750 V) distribution systems
- Emergency power generation, uninterruptible power, battery systems, lighting **
- Lighting equipment and distribution systems **

- Fire exit emergency signage **
- Transfer switches, controllers, fire alarm systems, control panels, enunciators **
- Voice communications and audio/video systems **
- Electronic data and communications information systems
- Intrusion and access security and safety systems **
- Lightning protection systems

** . These systems are identified as life safety systems.

7. Deliverables relating to O&M perspectives

The following list of deliverables is a brief overview. The Designer shall utilize a computer-based data management system. This will include the cost of all labour, material and EDP equipment to deliver the program (e.g. "as-built" drawings and specifications, PV and commissioning documentation, Building Manual, Training Plan). Separate manuals shall be compiled – one in French, one in English. Deliverables will include duplicate discs and [two] hard copies. All documentation shall be required to be transferred to the Property Manager in a computer-compatible format that can be readily inputted for data management.

- .1 Facility Operation and Maintenance Report:** This is a study to show how the facility will be operated. It will include the number of O&M personnel, security staff, janitorial staff, O&M spatial requirements, organization relating to flow of materials into and out of the facility, etc. It will be prepared by the Designer with input from the PWGSC Commissioning Manager and the Property Manager [and User].
- .2 Operation and maintenance budget:** This will be based upon the Facility O&M Report. As the design develops, it will include breakdowns to show the various elements of operations and maintenance (e.g. cleaning, service contracts), etc. It will be prepared by the Designer with input from the PWGSC Design Quality Review Team, the PWGSC Commissioning Manager and Property Manager and Client.
- .3 Design energy budget:** This will be prepared by the Designer with input from the PWGSC Commissioning Manager and the PWGSC Design Quality Review Team, and presented with the Conceptual Design Report. To be updated at the completion of the working documents.
- .4 Building Management Manual:** This will provide comprehensive information relating to the design, implementation, operation and maintenance of the entire project. It will include, but not necessarily limited to the following:
 - .1 Standard Operating Procedures (SOP) Manual:** To include description of each system together with a description of all operating modes. It will be produced by the Designer as the design develops. It shall be 90% complete prior to Tender Call. During the commissioning phase, revisions and refinements will be incorporated by the Designer, so that it will be 100% complete prior to issuance of the Interim Certificate. It will be further refined during the Warranty Period when all systems undergo fine tuning, set-point adjustments are made, etc.
 - .2 Operating and Maintenance (O&M) Manual:** This will be produced by the Contractor as construction/installation proceeds and reviewed by the Designer. It will be 90% complete prior to start-up inspections. During the commissioning stage, all missing data will be added, so that it will be 100% complete prior to issuance of

the Interim Certificate. During the Warranty Period, it will be refined as required. This manual will be organized so that keeping it up-to-date will require minimum time and resources.

- .3 **Life Safety Compliance (LSC):** Emergency information relating to all possible emergencies such as the presence of smoke, fire, floods, gas, failure of electrical power, water supply, heating, cooling, elevators, escalators, emergency evacuation, refrigerant release, chemical spills, heating and cooling generation plant emergencies, failure of fuel supplies and breach of security. Information is to be immediately available and comprehensible to technical and non-technical users. This manual is to be based upon the PWGSC LSC Manual, but enhanced to be made facility specific. Samples of existing LSC Manuals are available from the PWGSC Commissioning Manager for reference purposes.
- .4 **WHMIS information:** separate binder containing all information relating to products used in building operation and maintenance. This manual is to be subdivided by supplier, then by product. A detailed index is to appear at the beginning of the manual.
- .5 **Way-finding signage:** referred to in Part 1: General Project Requirements. To follow the Treasury Board Federal Identity Program Manual.
- .6 **Performance verification tests and inspections conducted at factory:** These will be witnessed by the PWGSC Design Quality Review Team and witnessed and certified by the Designer. The PWGSC Commissioning Manager may elect to participate.
- .7 **Warranties:** A complete inventory will be provided by the Contractor to the Designer who will review same before submission to the PWGSC Commissioning Manager who, in turn, recommends acceptance by the PWGSC Project Manager.
- .8 **Service Contracts** Although service contracts are not part of commissioning, the Designer and the PWGSC Commissioning Manager will assist the Property Manager in development by providing a complete description of all items included in the service contract.
- .9 **"As-built" Drawings and Specifications:** These will be produced by the Designer from the project record documents maintained on the site and kept up-to-date with all changes marked thereon by the Contractor. Accuracy will be verified by the Designer and the PWGSC Commissioning Manager before preparation and after submission by the Designer. They shall be completed in time to be used during pre-start-up inspections.
- .10 **Training Plan:** This will be produced by the Designer and approved by the PWGSC Commissioning Manager to meet project-specific requirements. It will include details provided by the Property Manager relating to numbers and prerequisite qualifications and skills of trainees, type of training (i.e. observation, hands-on, classroom), etc. Instructors will include the Designer, Contractor, specialist sub-contractors, equipment suppliers or manufacturers. Duration of training for each system, instruction aids, etc. will depend on complexity and PFM needs. It will also include provisions for long-term ongoing training needs (e.g. video taping), etc. Training will be under the direction of the Designer and monitored by the PWGSC Commissioning Manager.

- .11 **Inventory of spare parts, special tools, maintenance materials:** Inventory will be identified during the design stage by the Designer with input from the PWGSC Commissioning Manager and the Property Manager, based upon consideration of the complexity of the project and immediacy of availability; specified by the Designer; checked by the Contractor immediately upon delivery to ensure each is complete with instructions for use; inventoried, packaged and identified by the Contractor; and stored by the Contractor in facilities to be designated by the PWGSC Project Manager and the PWGSC Commissioning Manager.

8. Deliverables relating to the commissioning process

- .1 **Description of pre-commissioning activities** and production of related documentation: For every item, the extent of involvement of the members of the Commissioning Team will be determined (e.g. who reviews, performs, monitors, certifies). This schedule will be prepared by the Designer with input from the PWGSC Commissioning Manager and will include items such as:
 - .1 **In-plant performance operational verification tests.** In-plant tests and results (including reports) may be witnessed and reviewed by PWGSC Commissioning Manager, verified by the PWGSC Design Quality Review Team and certified by the Designer.
 - .2 **Pre-start-up tests:** These will include pressure, static, flushing, cleaning, "bumping", etc. conducted during construction and will be performed by the Contractor and witnessed and certified by the Designer. The completed documentation will be included in the Commissioning Report.
 - .3 **Pre-start-up inspections** conducted by the Designer prior to start-up and rectification of deficiencies, using approved installation check lists. The completed documentation will be included with the Commissioning Report.
 - .4 **Start-up:** This will be by the Contractor, equipment manufacturer, supplier and/or installing specialist sub-contractor under the direction of the Designer. It will also include rectification of all start-up deficiencies by the Contractor to the satisfaction of the Designer and PWGSC Commissioning Manager.
 - .5 **TAB and performance verification** will be performed by the approved Commissioning Agencies, repeated where necessary until results are acceptable to the Designer. Procedures may have to be modified to suit project requirements. Reported results will be witnessed and certified by the Designer using approved PI and PV forms. The completed Commissioning Reports will be approved by the Designer and provided to the PWGSC Commissioning Manager who reserves the right to verify up to [30]% of all reported results. Any failure of randomly selected item shall result in the rejection of the TAB report or the report of system startup and testing.
- .2 **Schedule of commissioning of integrated systems** and production of related documentation will be prepared conjointly by the Designer and the PWGSC Commissioning Manager. It will also identify integrated systems to be commissioned over and above those listed herein:
 - Fire alarm systems
 - Fire pumps and controllers

- Voice communications systems
- Emergency power generator
- Transfer switch and controllers
- Emergency lighting systems
- Life safety systems identified above
- Smoke control systems
- Environmental space condition and IAQ

Commissioning will be performed by the Contractor or specified Commissioning Agencies, using procedures developed by the Designer and approved by the PWGSC Commissioning Manager. They will be witnessed by, and results certified by, the Designer. Reported results will be witnessed and certified by the Designer using approved PV forms. Upon satisfactory completion, the Commissioning Agency performing the tests will prepare the required Commissioning Report which will be certified by the Designer and forwarded to the PWGSC Commissioning Manager who reserves the right to verify a percentage of all reported results at no cost to the contract.

- .3 Identification:** The PWGSC Commissioning Manager, in cooperation with the Property Manager, will establish an identification system for all systems and equipment which will reflect final MMS (Maintenance Management System) identification requirements. This will be reflected in the identification system used in the working documents by the Designer. During commissioning and before hand-over and acceptance, the Designer, Contractor, Property Manager and PWGSC Commissioning Manager will cooperate to complete inventory data sheets and provide assistance to PWGSC forces in the full implementation of the MMS identification system.
- .4 Commissioning specifications:** Commissioning specifications will be developed and submitted at the same time as the Design Development Report. Final versions will be prepared by the Designer during the working document stage and inserted into the project specifications. PWGSC generic commissioning specifications will be provided and will be edited by the Designer so as to become project- specific. They may have to be supplemented by project-specific commissioning specifications prepared by the Designer, reviewed by the PWGSC Project Manager and approved by the PWGSC Commissioning Manager. They will also include samples of PI and PV Report forms.
- .5 Installation Start-up Check Lists:** These are required to inform the PWGSC Commissioning Manager of those systems which are ready for commissioning. A generic list is provided by the PWGSC Commissioning Manager to the Designer, who will tailor them to meet the requirements of the project.. Where these are not available, they will be developed by the Designer and approved by the PWGSC Commissioning Manager.
- .6 Product Information (PI) report forms:** All product information relating to equipment and components supplied and installed on this project will be reported on approved PI report forms similar to the samples attached to the commissioning specifications. Some PI report forms already exist. Others will be prepared by the Designer, reviewed by the discipline specialists and approved by the PWGSC Commissioning Manager no later than [10] weeks after approval of shop drawings for the equipment concerned. Instructions for use will be included in the commissioning specifications. All completed PI report forms will be certified by the Designer. After review and verification by the PWGSC Commissioning Manager, these report forms will be included in the Building Management Manual.
- .7 Performance Verification (PV) report forms:** All results of tests and commissioning will be entered on approved PV report forms similar to the samples attached to the commissioning

specifications. Some PV report forms already exist. Others will be prepared by the Designer, reviewed by the discipline specialists and approved by the PWGSC Commissioning Manager no later than [10] weeks after approval of shop drawings for the equipment concerned. Instructions for use will be included in the commissioning specifications. All completed PV report forms will be certified by the Designer. After review and verification by the PWGSC Commissioning Manager, these report forms will be included in the relevant Commissioning Reports.

- .8 Commissioning Reports:** The completed PV report forms will be included in properly formatted Commissioning Reports. Before any reports are accepted, all reported results will be subject to verification by the PWGSC Commissioning Manager.
- .9 Activities during the Warranty Period:** While all commissioning activities must be completed before the issuance of the Interim Certificate, it is anticipated that certain commissioning activities will be necessary during the Warranty Period, including:
 - fine tuning of environmental control systems.
 - adjustment of ventilation rates to promote good indoor air quality and reduce the deleterious effects of VOCs generated by off-gassing from construction materials and furnishings, etc..
 - full-scale emergency evacuation exercises.
- .10 Tests to be performed by the Client:** Will be identified at a later stage in the project development.

9. Deliverables relating to the administration of commissioning

Operating effectiveness of seasonal-sensitive equipment and systems will be significantly affected by changes in temperature, wind speed, humidity and barometric pressure. These variations must be identified during design development.. As detailed design develops, the Commissioning Plan will be revised to include provisions for testing all parameters to the full range of operating conditions and to check responses of all such equipment and systems under all conditions. This is required because the operation of all systems are of paramount importance to health, safety, comfort and welfare of occupants and users.

The completion of the renovations to the existing laboratory facilities within the stipulated time frame is essential to the continuance of Client's operations with minimum interruption.

Since access into secure or sensitive areas will be very difficult after take-over, it is necessary to complete commissioning of occupancy-, weather- and seasonal-sensitive equipment and systems in these areas before the building is occupied. Include 6 months in the completion schedule for verification of performance in opposite seasons and weather conditions.

Detailed requirements relating to the timing of the various commissioning activities relative to the commissioning of other systems will be included in the commissioning specifications.

- .1 Commissioning Schedules:** Commissioning will be organized so that there will be no delays in the review and approvals process. The required milestones in the review, approval and commissioning process will be included in the commissioning specifications.
- .2 Commissioning activities scheduling:** A detailed critical path schedule will be prepared by the Commissioning Agent and submitted to the Designer, PWGSC Commissioning Manager and PWGSC Project Manager for review and approval at the same time as the Construction

and Completion Schedule. After approval, it will be incorporated into the Contractor's Construction and Completion Schedule. The Designer, Commissioning Agent, Contractor and PWGSC Commissioning Manager will monitor progress of commissioning against this schedule.

A separate detailed schedule in day-by-day format will be provided by the Commissioning Agent for commissioning of all systems and equipment. This schedule will include a detailed training schedule so as to demonstrate that there will be no conflicts with testing.

10. Payments for commissioning

This will be developed as detailed design progresses.

11. Commissioning process

.1 General: The Contractor shall perform the role of Commissioning Agent. This includes the responsibility for managing the commissioning process including monitoring, training, warranties, etc. The Project Commissioning Team and the Designer will be involved in the process, during their regular reviews, comment on the acceptability of the installations as they are installed, and in particular, witnessing tests of completed systems. The Commissioning Agent is not empowered to determine acceptability of installations. Contractor testing remains the responsibility of the individual sub-trades. However, tests will be witnessed by the Commissioning Agent and, maybe, the Designee. Acceptance of equipment and or systems lies solely with the parties normally granted this authority within the contract.

As defined in the specifications, there are a number of phases to commissioning - documentation, installation, testing and verification of the installed equipment and systems. Static, or pre-start, tests are defined for all equipment. These include duct and pipe pressure test and "megger" testing. Sign-off of the equipment by way of pre-start check sheets is outlined in the specifications. Once individual pieces of equipment or systems have been checked for conformance, start-up will be able to commence.

.2 Systems to be tested as required by codes: Where testing is required as part of a regulatory process and where commissioning procedures are fully developed and are appropriate to the project, the PWGSC Commissioning Manager shall ensure that all tests as required by such codes are performed. The PWGSC Commissioning Manager will witness these tests as part of the Quality Assurance role.

.3 Systems to be commissioned:

.1 Architectural:

.1 Exterior walls: Thermographic surveys will be conducted to ensure appropriate level of tightness after the exterior envelope has been completed, the permanent HVAC systems are able to provide appropriate negative or positive pressure, a temperature of at least 20°C can be maintained between inside and outside and the wind speed is less than 10 kph.

.2 Mechanical

- .1 HVAC System Testing:** It is envisaged that each piece of HVAC equipment will be initially started up, "bumped", in their "stand-alone" mode, i.e. without mechanical control and fire alarm interfaces being complete. During this period, pre-start checks will be completed and the relevant documentation completed. In the case of hydronic systems, after the pumps have been bumped and the pre-start checks completed, the cleaning process can commence. Items covered at this stage will be those which might have a detrimental effect on the operation of the particular item of equipment, such as noise and vibration, it is realized that the system balancing can have an effect on some parameters. Once individual pieces of equipment have been started up, the systems will be checked out in parallel with the control systems. System documentation will be completed by the Commissioning Agent before verification or training begins.
- .2 Plumbing Systems:** Will be started up and commissioned in a manner similar to that described for HVAC systems. The majority of the equipment will be started up in the stand-alone mode, automatic operation will be checked on a system-by-system basis in parallel with the control systems. System documentation will be completed by the Commissioning Agent and submitted for review before verification or training begins.
- .3 Controls:** Testing and commissioning is specified in the specifications, and the acceptance of the control system is well defined. It is envisaged that the contractor testing i.e. point-by-point testing will be performed in parallel with contractor start up. A complete point-by-point verification will be done as part of system verification and will be witnessed by the Designer and PWGSC Commissioning Controls Specialist. The PWGSC Commissioning Manager may elect to participate. Demonstration of the controls systems will be witnessed by both the EMCS Commissioning Agent and the Contractor's Commissioning Agent prior to the thirty day Final Acceptance test. The final Commissioning is considered to be performed during these two stages and the only additional testing required at the end of the "Final Operational Test" would be the off seasonal test. System documentation will be completed by the Commissioning Agent and submitted for review before verification or training begins.
- .4 Fume Hood and Bio-Safety Cabinets:** All fume hoods and bio-safety cabinets are to be performance tested as specified and in

accordance with T.B 5. 1 (Guideline for testing fume cabinets). Testing to be done by TAB Contractor as part of the overall balancing of the building and systems. Certification of all the cabinets is to be performed by a qualified, recognized, and independent testing authority after final balancing of the air systems. No integrated system testing should be performed until the cabinets have been certified.

.3 Electrical

- .1 Distribution:** Testing and commissioning of the main distribution system is defined within the specifications, requiring an independent testing company to perform a series of pre-energisation and post-energisation tests. Test reports are to be submitted for review before verification of system takes place. Contractor testing apart from this is restricted to "megger" testing of feeders.
- .2 Low Voltage Systems:** These systems, including Communication Systems, and low voltage lighting controls, will be checked out in accordance with the contract documents. Designer to witness system test.
- .3 Alternate Power Systems:** Emergency lighting level outlined in the specification will be initially checked by switching off normal power feeds and checking coverage. Transfer switches will be tested by simulating a loss of power. Power availability will be checked at all required equipment requiring emergency power (e.g.. Lights).
- .4 Elevators and Fans etc.:** Designer to witness all systems test.

.4 Life Safety Systems:

- .1 Sprinkler / Standpipe:** Wet and Dry pipe station and sprinkler flow testing will be performed as part of the Fire Alarm System ULC 537 and 536 checks. Designer and Commissioning Agent to witness all tests.
- .5 Fire Alarm Systems:** Fire Alarm System cannot be fully verified until all aspects of the life safety and security are completed. Contractor testing will include a complete verification in accordance with ULC-CAN-SS37-M90. Once the commissioning Agent has submitted a certification report all devices and zones will be demonstrated as to ULC 536. Designer and PWGSC Commissioning Manager to witness all tests.

- .6 Designer’s commissioning verification:** The Designer is to witness all system and integrated system tests.

- .7 Documentation:**
 - .1 Building Management Manual will be compiled as separate manuals in English and French. The Designer will review and accept manuals.
 - .2 Record drawings will be provided for the Designer to produce “As Built” drawings. These drawings will comprise a combination of marked up contracts print information and updated contractor working drawings.
 - .3 Spare parts and maintenance materials: A comprehensive list of all spare parts and maintenance material provided under the contract is to be provided. This will become more detailed as recommended parts/tools are identified by the various manufacturers.

- .8 Training:** A comprehensive training plan will be provided by the Commissioning Agent to the operations staff in the final stages of commissioning. Specific requirements are to be included in the specification.

- .9 Warranty/Service Contracts:** A comprehensive list of all warranties and service contracts will be provided by the Contractor. This list will include standard one year warranties and any non standard warranties.. Information on service contracts will provide a complete description of all items included in the contract.

- .10 Commissioning Schedule:** A critical path Commissioning Schedule to be provided by the Commissioning Agent within three (3) months after award of contract and incorporated in the main construction schedule. It will monitor progress of installation and the sequence of testing, commissioning, documentation, training. A separate detailed schedule in day by day format to be provided by the Commissioning Agent for commissioning of all equipment and systems. Training should be indicated on this schedule to ensure that that training does not conflict with testing.

12. Training Plan

- .1 General:** The following is the preliminary Training Plan and will be developed in greater detail as design progresses and as the working documents are developed. The commissioning schedule will indicate in detail how training will be implemented, the duration of each training session, the trainers, trainees, etc.

.2 Development of the Training Plan: The Training Plan shall be complete [within 3 months after award of Contract] [before construction contract is 50% complete].

.3 Responsibilities: The Designer will be responsible for training and will monitor all training activities including:

1. Preparation of agenda and outlines
2. Videotaping of all sessions

The Contractor will be responsible for implementation of training activities, quality of instruction and training materials and for coordination among the instructors.

.4 Instructors: Instructors and trainers will include the Designer, Contractor, factory-trained and certified equipment suppliers and manufacturers, factory-trained and certified maintenance specialist personnel and the service contractors holding service contracts for the following:

- EMCS including fume hood and BSC controls
- fire alarm systems and emergency systems
- security systems
- lighting control systems
- elevators

and any other service contracts that may be implemented during this project.

.5 Trainees: These will include the Property Manager, building operators, maintenance staff, security staff, technical specialists as necessary and facility occupants as necessary. The following is a list of O&M personnel, property management staff and others requiring requisite training, and the PWGSC Commissioning Manager will coordinate their attendance at agreed-upon times.

	Number
Facility Property Manager (already in place)	1
Operating staff: Building operators (already in place)	7-8
Maintenance staff: Plouffe Park shops	??
Building Maintenance (already in place)	7-8
Service contractors (e.g. cleaning)	??
Security staff: (already in place):	7-24

.6 Prerequisite skills and qualifications: To be identified.

.7 Scheduling of training: Training sessions relating to the design philosophy are to be given by the Designer and shall be presented within three months after award of contract. This will permit all involved in the construction and future operation of this facility to become familiar with all aspects of the design philosophy.

If the O&M personnel have not been identified or are not available at this time, these sessions will be repeated during the Contractor-led training sessions.

All training will be completed prior to issuance of the Interim Certificate.

.8 Details of training: Training will meet all identified qualification requirements of installed equipment and systems. Training will include:

1. all aspects of operation under all normal, emergency and "what-if" modes, over the full range of operating ranges.
2. detailed maintenance, troubleshooting, regular, preventive and emergency maintenance.
3. training will consist of the following elements, to be completed, with demonstration of completeness, before date of acceptance:

- .1 random on-site familiarization and observations during construction, installation, layout of equipment, systems and components, start-up and testing of the work, access to approved shop drawings, equipment operating and maintenance data. On-site observations will include still-photo records as deemed necessary by the O&M personnel – particularly of concealed elements.
- .2 hands-on instruction relating to start-up; shut-down; emergency procedures; features of controls; monitoring; servicing; maintenance; performance verification and commissioning; reasons for, results of and implications on associated systems of adjustment of set points of control, limit and safety devices; interaction among systems during integrated operation; and troubleshooting diagnostics. Other elements will include system operating sequences, step-by-step directions for operation of valves, dampers, switches, adjustment of control settings and other specialized training relating to installed systems. Duration will be as specified in the commissioning specifications.
- .3 formal classroom sessions relating to functional and operational requirements, system philosophy, limitations of each system, and operation and use of Building Management Manual. Duration of these sessions will be as specified in the commissioning specifications, using space to be identified.
- 4. training sessions on design philosophy, organized around the Building Management Manual and will include:
 - 1. overview of how each system is intended to operate
 - 2. description of design parameters and operating requirements
 - 3. description of operating strategies
 - 4. information to assist in troubleshooting system operating problems
- .9 Training materials:** Training materials will be in a form permitting future training procedures to be in the same degree of detail and will include at least the following:
 - .1 "As-built" contract documents
 - .2 Building Management Manual
 - .3 TAB and PV Reports
 - .4 transparencies for overhead projectors and 35 mm slides
 - .5 manufacturers' training videos (after prior screening for suitability)

- .6 equipment models
The number of hours for these training sessions must be identified – by equipment, systems, etc.
- .10 Videotaping:** Hands-on and classroom sessions will be videotaped for future reference and retraining but will be held only after all systems have been fully commissioned. Production will be of professional quality and organized into several short modules to permit incorporation of changes. Videotaping shall be in VHS format.
- .11 Standard of training:** Training will be in sufficient detail and of sufficient duration to ensure:
- .1. safe, reliable, cost-effective, energy-efficient operation of all systems in normal and emergency modes and under all conditions,
 - .2. effective ongoing inspection, measurements of system performance,
 - .3. proper preventive maintenance diagnosis, troubleshooting,
 - .4. ability to update documentation,
 - .5. ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.
- .12 Limitations:** Long-term ongoing training will not be included. However, the training courses and training materials will permit further ongoing training as well as training of new personnel.
- .13 Demonstrations:** Training will include demonstrations by the trained personnel to show their confidence in, and depth of understanding of, all installed systems and equipment and to demonstrate completeness of their training.
- .14 Manufacturers' video-based training:** Video will be used as training tool after Engineer's review of videos and written approval at least three months prior to static completion. To be included in Construction and Completion Schedule.

END OF SAMPLE COMMISSIONING PLAN

Sample Standard Operating Procedures Manual

2.11. VENTILATION SYSTEMS

DELETE NON-APPLICABLE SYSTEMS AS REQUIRED

(INCLUDES ALL SYSTEMS THAT CONDITION AND DELIVER INDOOR AIR)

30-050-* AIR HANDLING UNIT**
30-030-*: SPLIT A/C UNIT**



INVENTORY MENU		
MMS. NO.	TYPE/GENERAL INFORMATION / REFERENCE	PAGE

⚠ CAUTION ⚠

IMPORTANT → All control set points and limits outlined in **Table 1** are to be set, calibrated and maintained only by those persons authorized to do so according to the “**OPERATING ENGINEERS ACT**” (1979 or more recent) guidelines and/or service contracts.

VERY IMPORTANT → Should actual set points or limits differ from what is outlined in Table 1, or from what may be outlined throughout the text of this manual, ***it must be brought to the attention of the building operations supervisor immediately for corrective action by authorized personnel.***

SAFETY SHUTDOWNS → Should the system shut down due to tripping of a safety/protection device (e.g. High condenser pressure, motor overload, etc.) verify the cause of the activation of the interlock and, if necessary, request the services of the appropriate personnel to inspect and/or repair accordingly before restarting the system.

IMPORTANT → For your own safety, follow only **PWGSC** established in-house procedures when resetting or restarting the system or any of its components following a safety shutdown.

PROLONGED SHUTDOWNS → Whenever it is necessary to shut down the system for maintenance, repair, or for the season, do so by opening and locking out the main disconnect at the unit before performing any work on the system.

IMPORTANT → Ensure that all equipment lockout and safety practices (including **confined space entry** procedures where applicable) are observed.

SYSTEM	
VENTILATION	
TYPE:	<i>variable air volume</i>
MMS. NO.:	30-050-AHU001
LOCATION	
Room 400	
AREA SERVED	
Building West Wing	



PLENUM TYPE	MANUFACTURER	MODEL	SERIAL NO.
Galvanized Steel	McQuay	LSL 150	97K054100
SUPPLY AIR TEMPERATURE	SUPPLY AIR FAN CAPACITY	COMPRESSOR CAPACITY	
12-18	27,945 CFM	70 tons	
COILS (HEATING/COOLING)		FRESH AIR MAKE-UP VOLUME	
One (1) heating Coil One (1) cooling coil			
BURNER CAPACITY: →	N/A		
HUMIDIFICATION: →	Nortec Steam humidifier		
FILTERS: →	PREFILTER:	20-24x24x2mini pleat	
	FILTER:	12-24x24x4 mini pleat	
AUXILIARIES: →	NA		
DRIVE CONTROL: →	<i>e.g. variable speed frequency controller</i>		
CONTROL: →	<input type="checkbox"/> PNEUMATIC	<input type="checkbox"/> ELECTRIC	<input type="checkbox"/> COMPUTER
SOURCE OF POWER: →	<i>e.g. starter/disconnect switch/stop/stop-start device/mcc</i>		

EQUIPMENT/COMPONENTS	PAGE
FANS	
PUMPS	
HUMIDIFIERS	
GAS DETECTORS	
CONDENSERS	

OPERATION CRITERIA

SCHEDULE OF OPERATION

Units normally operate full time throughout the year, with scheduled downtime for maintenance, and as required for unscheduled repairs.

OPERATION/CONTROL - NORMAL OPERATING MODE

The following safety interlocks are an integral part of the units operation and control. Safety interlocks listed in **Tables 1 and 3** and, highlighted with an asterisk (*), will prevent the unit from functioning if their operating parameters are not satisfied. All safety interlocks listed in **Table 1** are to be maintained within the set point parameters outlined in the table.

TABLE 1. CONTROLS / SET POINTS / INTERLOCKS

	SETPOINT	CUT-IN	CUT-OUT	RESET (MANUAL/AUTO)
* FREEZE LIMIT (FREEZE-STAT)	5 °C	4.5°C	5.5°C	MANUAL
*LOW OUTSIDE AIR TEMPERATURE LIMIT	-	-	-	-
**HEATING LOOP FLOW SWITCH	-	-	-	-
**OUTSIDE AIR TEMPERATURE	-	-	-	-
* BLOWER FAN INTERLOCK (STARTER)	N/A	-	-	MANUAL
* DAMPER ENDSWITCH (INTERLOCK)	-	-	-	-
* HEATING PUMP FLOW SWITCH	-	-	-	-
* HIGH/LOW PRESSURE GAS CUT-OUT SWITCH	-	-	-	-

IMPORTANT → ** If outside air temperature is below **°C/**°F, a heating loop failure (flow switch) will cause the unit to shut down)

TABLE 2: THE FOLLOWING NORMAL OPERATING CONDITIONS SHOULD BE OBSERVED

SPACE (ROOM) AIR TEMPERATURE	21.0° - 23.0°C
SPA RETURN AIR HUMIDITY	35% RH
SUPPLY AIR HUMIDITY	< 80% RH
RETURN AIR TEMPERATURE	21.0° - 23.0°C
MIXED AIR TEMPERATURE	10.0° - 17.0°C
SUPPLY AIR TEMPERATURE	12.0° - 18.0°C
SUPPLY STATIC PRESSURE	199 PASCAL

TABLE 3: FIRE SAFETY INTERLOCKS

FIRE ALARM	RESET (MANUAL/AUTO)
SPA * FIRE ALARM SYSTEM INTERLOCK	MANUAL
* SUPPLY AND RETURN AIR SMOKE DETECTORS	AUTO

CONTROL DESCRIPTION - NORMAL OPERATING MODE

AIR HANDLING UNIT 1 is a variable air volume system normally operated and controlled automatically by the Energy Management Control System (EMCS). This system runs based on the following time schedule:

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Off	4:30am On	5:00am On	5:00am On	5:00am On	5:00am On	Off
	6:00pm Off	6:00pm Off	6:00pm Off	6:00pm Off	6:00pm Off	

The unit may also be started by an optimization sequence calculated by the EMCS based on outdoor air temperature and the reference room space temperature. In this mode of operation, the dampers remain in full recirculation position.

The discharge air temperature is maintained between 13° and 17°C based on the following reset schedule:

Outdoor Air Temperature	Discharge Air Temperature Setpoint
-20°C	18°C
13°C	12°C

When the outdoor air temperature is below 8°C, the discharge air temperature is maintained by modulating the electric heating coil. A minimum fresh air of 27% at minimum supply air flow and 11% at maximum airflow is calculated by using the outdoor air temperature and return air temperature. The mixing damper modulate to maintain a mixed air temperature setpoint resulting from the previous fresh air calculation.

When the outdoor air temperature is above 8°C but below 12 °C, the discharge air temperature is maintained by modulating the mixing dampers and enabling two (2) of the four (4) stages of cooling in sequence. A delay of six minutes is set between each cooling stage.

When the outdoor air temperature is above 12°C, the discharge air temperature is maintained by sequencing the four (4) stages of cooling. The mixing dampers are locked to an operator adjustable minimum position of 15%. The two last stages of cooling are not permitted to start until the outdoor air temperature is greater than 18°C.

A constant static pressure is maintained in the ducts to ensure an adequate quantity of air is available in all areas at all times. On startup, the supply fan variable speed drive modulates to maintain a static pressure setpoint of 0.8" W.C. in the duct. and the return fan drive tracks the supply fan volume (total of VAV primary flow readings) and is set to deliver at a flow rate of 1400 l/s less than the supply fan.

The return air humidity is maintained at 35%rh by modulating the humidifier in the supply duct. A supply air humidity high limit has been incorporated to override the humidifier control if the supply air humidity exceeds 80%. The humidifier is only permitted to start after a proof of supply fan operation and a ten (10) minute delay.

The return fan is interlocked with the supply fan. A freeze detector will alarm and shut down the fan units. Software acknowledgment of a failed unit is required before they may restart via the EMCS control.

OPERATIONAL PROCEDURES - START-UP

Following a system shutdown, the following procedures must be taken prior to starting the air handling system. In fact, these procedures must be observed and followed at all times to maintain normal building operations. These procedures are applicable when the system is started automatically.

PREPARATION

1. Ensure all air filters are properly installed and acceptably clean. Check for damage to filters (i.e. rips, tears or holes in filter media - replace as required).
2. Verify all cabinet access and clean-out doors are fully closed and secured.
3. Verify fan belt drives are properly tensioned and not obstructed by any debris.
4. Verify water supply valve to the humidifier is *fully open* and power supply is on.
5. Verify power to supply and return fan variable frequency drives are on. Depress reset buttons on each of the respective starters to ensure clearance of any control interlocks.

THE UNIT MAY NOW BE STARTED

1. Start the unit by placing the Hand-Automatic selector switch on the variable frequency drives for the supply and return fans in the "Auto" position.
2. When the system gets a start command from the EMCS, the unit will start.
3. Should the fan fail to start, verify that controls interlocks are satisfied as outlined in the "Operation Criteria" - Table 1 (on page M-5) for this system and that all procedures previously outlined have been taken.
4. After unit operation has stabilized, verify normal operating conditions for this system as outlined in Table 2 (on page M-5). Ensure all system components are operational and check for any unusual vibration or noise.



CONTROL DESCRIPTION - EMERGENCY OPERATING MODE

In the event of damage to the controller or the loss of power to the controller, following procedures should be used. Power must be available to fans, and cooling system (during cooling season).

Note: If the unit must be run in an emergency situation, it should not be left unsupervised for an extended amount of time.

OPERATIONAL PROCEDURES - START-UP

Following a system shutdown, the following procedures must be taken prior to starting the air handling system. These procedures are applicable when the system is started manually.

PREPARATION

The following equipment should be available before starting the following procedure:

- 1- Portable temperature probe. (electronic or mechanical thermometer)
- 2- Magnehelic pressure gauge or incline manometer. (minimum range or 0 to 1.5"W.C.)
- 3- Portable relative humidity probe.
- 4- Variable DC Voltage power source. (Loop Calibrator with a minimum range of 0 to 10 Vdc)
- 5- Variable frequency drive **Operator's Manual** for supply and return fan.

Note: Item 3 and 4 may be optional if humidifiers are not required to operate.

1. Ensure all air filters are properly installed and acceptably clean. Check for damage to filters (i.e. rips, tears or holes in filter media - replace as required).
2. Verify all cabinet access and clean-out doors are fully closed and secured.
3. Verify fan belt drives are properly tensioned and not obstructed by any debris.
4. Verify water supply valve to the humidifier is *fully open* and power supply is on.
5. Verify power to supply and return fan variable frequency drives are on. Depress reset buttons on each of the respective starters to ensure clearance of any control interlocks.
6. Remove power to all damper actuator needed to be operated manually.
7. Remove static pressure sensor tubing from duct and replace with portable pressure gauge (magnehelic or incline manometer) tubing.
8. Remove the supply air temperature sensor from the supply duct and insert the portable temperature probe.
9. Remove return air temperature sensor from the return duct.
10. Remove the humidifier control wire from the controllers terminals 35 (-) and 36 (+) and attach the lead of the variable DC Voltage power source to these wires ensuring proper polarity.
11. Read carefully the instructions for manually operating the fans variable frequency drive.

THE UNIT MAY NOW BE STARTED

1. Start the supply and return fan using the keypad on the variable frequency drives. Ramp the speed of the supply fan gradually while monitoring the supply duct static pressure until desire value outline in Table 2 (on page M-5) is reached. Ramp return fan speed equally with supply fan speed. When static pressure has stabilized, verify that building pressure is adequate (exterior doors operate normally). If doors tend to stay open, increase return fan speed. If doors tend to be difficult to open decrease return fan speed.
2. Should the fan fail to start, verify that controls interlocks are satisfied as outlined in the "Operation Criteria" - Table 3 (on page M-5) for this system.
3. Open fresh air and exhaust air damper between 15 and 20% and open mixed air damper between 85 and 80% using the crank provide with the actuator motors. This will allow minimal fresh air into the building. Monitor supply air temperature and adjust dampers to maintain temperature outlined in Table 2 (on page M-5).

Warning! Actuators may be damaged if power is not removed before manually positioning the actuator with the crank.

4. During the heating season, the heating coil will not be used to maintain supply air temperature. The heating coil circuit requires a 24 Vac modulated timed pulse to modulate the power to the heating coil. It would require constant attention from the operator just to maintain the supply air temperature.
5. During the cooling season, monitor the return air temperature using the thermometer and cycle the cooling stage on and off to maintain the return air temperature within the limits outlined in Table 2 (on page M-5). The cooling stages may be energized by placing a jumper across the normally open contacts of the omron relay located in the condenser unit control panel. Do not start the second compressor if the outdoor air temperature is below 18°C.
6. If humidification is required, set the output of the variable DC Voltage power source to 5 volts. Monitor the return and supply air humidity periodically using the portable relative humidity probe. Make voltage adjustments to maintain the readings at values listed Table 2 (on page M-5).
7. After unit operation has stabilized, continuously verify normal operating conditions for this system. Ensure all system components are operational and check for any unusual vibration or noise.
8. When the problem has been rectified, restore the unit to it's original state.



CONTROL DESCRIPTION - MANUAL OPERATING MODE

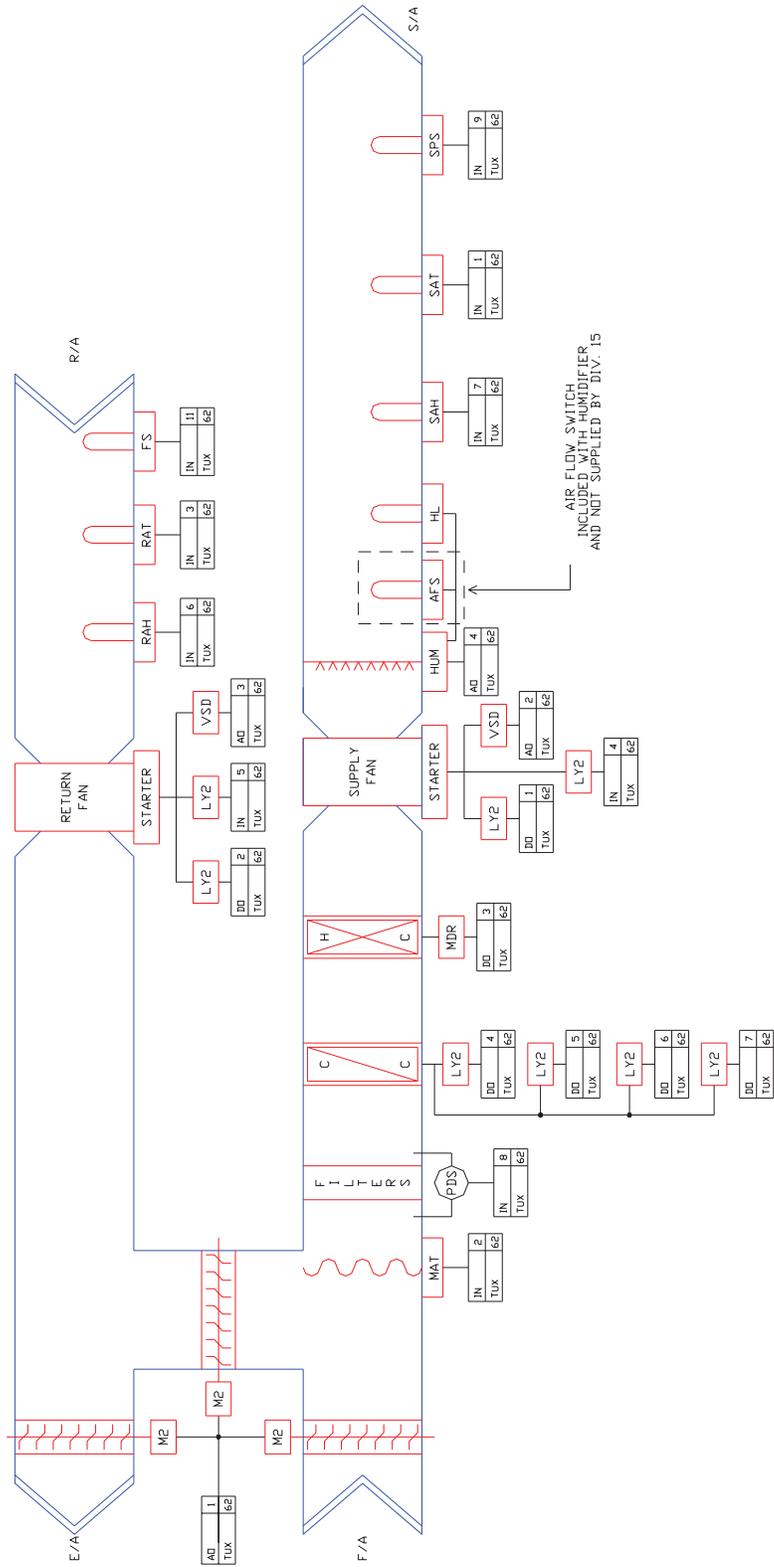
See Emergency Operating Mode.

OPERATIONAL PROCEDURES - START-UP

PREPARATION

THE UNIT MAY NOW BE STARTED

HVAC SYSTEMS CHECKLIST	FREQUENCY
<ul style="list-style-type: none"> ▪ CHECK AND RECORD TEMPERATURE OF SUPPLY AIR, RETURN AIR, MIXED AIR AND SPACE(S) SERVED AS APPLICABLE 	DAILY
<ul style="list-style-type: none"> ▪ VISUALLY CHECK CONDITION OF PRE-FILTER/MAIN FILTER AND REPLACE AS REQUIRED ▪ CHECK AND RECORD STATIC PRESSURE DIFFERENTIAL ACROSS FILTER ▪ VISUALLY CHECK DAMPER POSITIONS AND LINKAGES ▪ CHECK OPERATION OF FANS FOR VIBRATION AND PROPER BELT TENSION 	WEEKLY
<ul style="list-style-type: none"> ▪ CHECK VARIMARK OR INLET VANES FOR PROPER OPERATION ▪ IMPORTANT → VISUALLY CHECK HEATING, COOLING AND PREHEAT COIL AND ASSOCIATED PIPING AND VALVES FOR WATER LEAKS ▪ CHECK AND RECORD HEATING, COOLING AND PREHEAT COILS, SUPPLY AND RETURN TEMPERATURE AND PRESSURE ▪ IMPORTANT → CHECK FOR NORMAL OPERATION OF DEHUMIDIFICATION AND/OR STEAM HUMIDIFICATION SYSTEM ▪ CHECK FIRE DAMPER LINKAGE AND DAMPER POSITION ▪ ENSURE ALL COMPARTMENT DOORS ARE CLOSED AND LATCHED ▪ IMPORTANT → VERIFY ALL NATURAL GAS ISOLATION VALVES ARE FULLY OPENED TO GAS-FIRED HEAT EXCHANGERS (IF APPLICABLE) 	DAILY



End of Sample Standard Operating Procedures Manual

Sample of Training Plan

NOTE: *This is a sample (only) of the type of Training Plan which might be used with a project for upgrading, extending, and replacing existing laboratory facilities.*

1. General

The following is the Preliminary Training Plan and will be developed in greater detail as design progresses and as the Working Documents are developed.

The commissioning schedule prepared by the Contractor will indicate in detail how training will be implemented, the duration of each training session, the trainers, trainees, etc.

2. Development of Training Plan

The Training Plan shall be complete [within 3 months after award of Contract] [before construction contract is 50% complete].

3. Responsibilities

The Designer will be responsible for training and will monitor all training activities including:

1. Preparation of agenda and outlines
2. Videotaping of all sessions

The Contractor will be responsible for implementation of training activities, quality of instruction and training materials and for coordination among the instructors.

4. Instructors

Instructors and trainers will include the Designer, Contractor, factory-trained and certified equipment suppliers and manufacturers, factory-trained and certified maintenance specialist personnel and the service contractors holding service contracts for the following:

- EMCS
- fire alarm systems
- security systems
- lighting control systems
- elevators

and any service contracts that may be implemented during this project.

5. Trainees

These will include the Facility (Property) Manager, building operators, maintenance staff, security staff, technical specialists as necessary and facility occupants as necessary.

The following is a list of O&M personnel, property management staff and others requiring requisite training: the Commissioning Manager will coordinate their attendance at agreed-upon times (typical for Parliamentary Precinct projects):

	Number
Facility Property Manager (already in place)	1
Operating staff: Building operators (already in place)	7-8
Maintenance staff: Plouffe Park shops	??
Building Maintenance (already in place)	7-8
Service contractors (e.g. cleaning)	not known
Security staff (already in place)	

6. Prerequisite Skills and Qualifications of trainees

[to be specified _____].

7. Scheduling of training

Training sessions relating to the design philosophy:

1. These are to be given by the Designer and shall be presented within three months after award of contract. This will permit all involved in the construction and future operation of this facility to become familiar with all aspects of the design philosophy.
2. If the O&M personnel have not been identified or are not available at this time, these sessions will be repeated during the Contractor-led training sessions.

All training will be completed prior to issuance of the Interim Certificate.

8. Details of training

Training will meet all identified qualification requirements of installed equipment and systems.

Training will include:

1. All aspects of operation under all normal, emergency and "what-if" modes, over the full range of operating ranges.
2. Detailed maintenance, troubleshooting, regular, preventive and emergency maintenance. Training will consist of the following elements, to be completed, with demonstration of completeness, before date of acceptance:
 1. Random on-site familiarization and observations during construction, installation, layout of equipment, systems and components, start-up and testing of the work, access to approved shop drawings, equipment operating and maintenance data. On-site observations will include still-photo records as deemed necessary by the O&M personnel – particularly of concealed elements.
 2. Hands-on instruction relating to start-up; shut-down; emergency procedures; features of controls; monitoring; servicing; maintenance; performance verification and commissioning; reasons for, results of and implications on associated systems of adjustment of set points of control, limit and safety devices; interaction among systems during integrated operation; and troubleshooting diagnostics. Other elements will include system operating sequences, step-by-step directions for operation of valves, dampers, switches, adjustment of control settings and other specialized training relating to installed systems. Duration will be as specified in the commissioning specifications.
 3. Formal classroom sessions relating to functional and operational requirements, system philosophy, limitations of each system, and operation and use of Building Management Manual. Duration of these sessions will be as specified in the commissioning specifications, using space to be identified.
 4. Location of training to be determined.
 5. Training sessions on design philosophy will include:
 1. overview of how each system is intended to operate
 2. description of design parameters and operating requirements
 3. description of operating strategies
 4. information to assist in troubleshooting system operating problems

9. Training materials

Training materials will be in a form permitting future training procedures to be in the same degree of detail and will include at least the following:

1. "As-built" contract documents
2. Building Management Manual
3. TAB and PV Reports
4. Transparencies for overhead projectors and 35 mm slides
5. Manufacturers' training videos (after prior screening for suitability)
6. Equipment models

10. Videotaping

Hands-on and classroom sessions will be videotaped for future reference and retraining but will be held only after all systems have been fully commissioned. Production will be of professional quality and organized into several short modules to permit incorporation of changes.

(Note any requirements for training Owner, Investor or User.)

11. Standard of training

Training will be in sufficient detail and of sufficient duration to ensure:

1. Safe, reliable, cost-effective, energy-efficient operation of all systems in normal and emergency modes and under all conditions
2. Effective ongoing inspection, measurements of system performance
3. Proper preventive maintenance diagnosis, troubleshooting
4. Ability to update documentation
5. Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives

12. Limitations

Long-term ongoing training will not be included. However, the training courses and training materials will permit further ongoing training as well as training of new personnel.

13. Demonstrations

Training will include demonstrations by the trained personnel to show their confidence in, and depth of understanding of, all installed systems and equipment and to demonstrate completeness of their training.

14. Manufacturers' video-based training

Video will be used as training tool after Engineer's review of videos and written approval at least three months prior to static completion. To be included in Construction and Completion Schedule.

TABLE 1: SUMMARY OF TRAINING ACTIVITIES

PDS Phase	Training Activity
2 Definition	Training requirements are defined in the Commissioning Brief. To include: - extent, nature and location of training - standards to be achieved
3a Design	Designer identifies training that will be required and obtains from PWGSC a list of O&M personnel to be trained, prerequisites, qualifications, etc. Designer of specialized projects (e.g.. Some special laboratories) may recommend qualifications..
3b Working Documents	1. Training Plan approved.
3d Construction/ Installation	1. Confirm availability, presence of assigned O&M personnel for observation as system installations proceed. 2. Provide site familiarization sessions.
4 Commissioning	2. Provide site familiarization sessions.
5 Operation	1. Evaluate training provided to O&M personnel using, as basis, ability of O&M personnel to: a. adjust systems, in response to complaints, thus rectifying identified faults b. minimize energy consumption by intelligent adjustments and at the same time maximize system efficiency c. investigate and troubleshoot systems to determine source of, and reasons for, faults or failures; take corrective actions. 2. Observe and assess quality of training. 3. Recommend additional training as necessary.

Sample of Training Activities - Architectural

ARCHITECTURAL (THIS IS BROAD OUTLINE ONLY)				
This Training Plan forms Part of Section 01815				
Systems and Goals	Instructors	Content (approximately 30% Theory, 70% practical)	Approx. duration	Instruction Materials and Tools
Elevators	Installing Contractor, Manufacturer	Operation and control features, Emergency power, emergency response Interconnection with FA systems (i.e. Fire fighters' features)		
Escalators	Installing Contractor, Equipment Manufacturer			
Waste Management (e.g. garbage collectors, chutes, compactors, shredders, destructors)	Installing Contractor, Authority having jurisdiction	Operation and control features, emergency power, emergency response		Licensing by authority having jurisdiction
Incinerators [with heat recovery]	Installing Contractor, Authority having jurisdiction			
Building Envelope Air/water penetration rate serving building in event of failure of mains analyses Water shedding systems Thermal performance Light transmittance	Installing Contractor, Special Testing Agency			

Sample of Training Activities - Mechanical

MECHANICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815			
Systems and Goals	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration
<p>Design Philosophy</p> <ol style="list-style-type: none"> General overview of design concepts Awareness of interaction of mechanical systems 	Engineer	<ol style="list-style-type: none"> Explanation of mechanical and related electrical systems, their interaction Site visit in early stages of project Classroom sessions during commissioning stage 	<ol style="list-style-type: none"> 1. Schematics of layouts & controls 2. Installed systems, equipment 3. Design Criteria, Design Intents
<p>HVAC Systems</p> <p>Central ducted supply and return systems</p> <p>Exh. systems: kitchen, LFH, BSC, washrms.</p> <p>Smoke control systems: zone isolation, connections to FA systems</p> <p>Stand-alone HVAC systems</p> <ol style="list-style-type: none"> To learn details of all systems installed To develop in-depth knowledge of the operation of each system 	Installing Contractor, Equipment Manufacturer, EMCS trade	<ol style="list-style-type: none"> Explanation of operational concepts of systems and components including air handling units, fans, filters, coils, VAV boxes, humidification systems, use of economizer cycles and controls Equipment operation and adjustment Review of O&M Manuals Equipment troubleshooting Observation during construction Site visits, classroom sessions 	<ol style="list-style-type: none"> 1. "As-built" HVAC drawings 2. TAB & PV Reports 3. Systems Operations Manual 4. Maintenance Manual 5. Installed systems, equipment 6. Controls Schematics and Reports 7. Demonstrations
<p>Steam or Hydronic Heating Systems</p> <ol style="list-style-type: none"> Training in equipment start-up, operation, shut-down, prevention of, and re-start after emergency shutdown, operation at optimum efficiencies To prevent breakdowns, limit service calls 	Contractor, Equipment Manufacturer	<ol style="list-style-type: none"> Start-up, testing and operation of systems, steam generators for humidifiers, circulating pumps, controls (operating, limit, safety). Annual maintenance, restart after emergency shut-down. Review of O&M Manuals Equipment troubleshooting Site visit, then classroom period for Q&A 	<ol style="list-style-type: none"> 1. Installed equipment 2. Demonstrations 3. "As-built" piping drawings 4. Systems Operations Manual 5. Equipment O&M Manual 6. TAB and PV Reports 7. Controls Schematics, Report

MECHANICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815			
Systems and Goals	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration
<p>BAS, EMCS Control systems for mechanical systems Compressed air systems for EMCS. Building control components. System programming. Project-specific controls: (e.g. humidification of special areas, dehumidification of swimming pools, diversified controls: "smart panels" for central and local HVAC systems Debugging software</p>	System Installing Contractor, EMCS sub-trade.	<ol style="list-style-type: none"> 1. Explanation of operational concepts of systems and components 2. Use of various cycles and controls 2. Equipment operation and adjustment 3. Review of O&M Manuals 4. Equipment and system troubleshooting 5. Observation during construction 6. Site visits, classroom sessions 	5 days
<p>Water Analysis and Treatment 1. Training in O&M of water treatment equipment 2. To learn how to maintain specified water quality</p>	Installing Contractor, Water Treatment Manufacturer	<ol style="list-style-type: none"> 1. Description of equipment, systems, chemicals, justification for specified standards, sampling collection and testing techniques, analysis of raw water, treated water 2. Review of O&M Manuals. 3. Equipment troubleshooting 4. Observation during construction 5. Classroom sessions 	½ day
<p>Refrigeration Systems Kitchen, servery, laboratory 1. Training in equipment start-up, operation, shut-down, prevention of, and restart after emergency shut-down 2. To learn to operate equipment safely and at optimum efficiencies 3. To prevent breakdowns, limit service calls</p>	Installing Contractor	<ol style="list-style-type: none"> 1. Start-up, testing of O&M of required conditions, controls (operating, limit, safety). Annual maintenance, re-start after emergency shut-down 2. Review of O&M Manuals 5. Equipment troubleshooting 6. Observation during installation 7. Classroom sessions 	2 days
		<ol style="list-style-type: none"> 1. "As-built" HVAC and control drawings 2. Systems Operations Manual 3. Maintenance Manual 5. Installed systems, equipment 6. Controls Schematics and Reports 7. Demonstrations 	
		<ol style="list-style-type: none"> 1. Demonstrations 2. Laboratory facilities 3. Chemical and bacteriological analyses 4. Water treatment O&M Manuals 	
		<ol style="list-style-type: none"> 1. Demonstrations 2. "As-built" piping drawings 3. Systems Operations Manual 4. Equipment O&M Manual 5. Controls Schematics & Reports 6. Commissioning Reports 	

MECHANICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815			
Systems and Goals	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration
<p>Fire Protection and Suppression Systems Sprinkler systems, standpipe and hose systems Fire pumps, controller, transfer switch. Total flooding systems Local application systems 1. Training in start-up, shut-down, emergency requirements 2. Training in interconnection with HVAC, smoke control systems, Fire Dept. 3. To learn use of voice communications systems, emergency evacuation protocols</p>	Contractor, local Fire Dept.	<ol style="list-style-type: none"> 1. Periodic testing 2. Annual maintenance 3. Review of O&M Manuals 4. Equipment, system troubleshooting 5. Observation during installation 6. Classroom sessions 	½ day
<p>Dom. H&CWS Systems 1. Training in O&M 2. Training in Legionella control</p>	Contractor, Equipment Manufacturer	<ol style="list-style-type: none"> 1. Annual maintenance 2. Review of O&M Manuals 3. Equipment, system troubleshooting 4. Observation during installation 5. Classroom sessions 	½ day
		<ol style="list-style-type: none"> 1. Demonstrations 2. "As-built" piping drawings 3. Systems Operations Manual 4. Equipment O&M Manual 5. Controls Schematics & Reports 6. Commissioning Reports 	
		<ol style="list-style-type: none"> 1. Demonstrations 2. "As-built" piping drawings 3. Systems Operations Manual 4. Equipment Mtce. Manual 5. TAB / PV Reports 6. Controls Schematics, Reports 	

MECHANICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815			
Systems and Goals	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration
Storm Water Management Systems Roof drains, catch basins, flow controls, site storage ponds 1. Training in storm water management	Contractor, Equipment Manufacturer	1. Annual maintenance 2. Review of O&M Manuals 3. Equipment, system troubleshooting 4. Observation during installation 5. Classroom sessions	½ day
Laboratory/Medical Services 1. Training in O&M of each system 2. Training in identification of different services, verification of additional connections, outlets, etc. 3. Training in lab. waste treatment systems	Installing Contractor, Equipment Manufacturer, Servicing Contractor	1. O&M 2. Review of O&M Manuals 3. Equipment, system troubleshooting 4. Observation during installation 5. Classroom sessions	2 days (1 day if only few services)
			Instruction Materials and Tools 1. Demonstrations 2. "As-built" piping drawings 3. Systems Operations Manual 4. Equipment Mtce. Manual 5. Commissioning Reports 6. Controls Schematics, Reports 1. Demonstrations 2. Systems Operations Manual 4. Equipment Maintenance Manual 5. Commissioning Reports 6. Controls Schematics, Reports

Sample of Training Activities - Electrical

ELECTRICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815				
Goal	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration	Instruction Materials and Tools
General Overview 1. Overall review of design concepts 2. Awareness of interaction of electrical systems	Engineer	1. Explanation of electrical systems 2. Their interaction with other systems 3. Site visit in early stages of project 4. Classroom sessions during commissioning stage	½ day	1. Schematics of power, 120 volt, low voltage layouts, controls 2. Installed systems, equipment 3. Design Criteria, Design Intents
Incoming Service and High Voltage Distribution 1. To learn details of all systems installed throughout complex and to develop in-depth knowledge of its operation	Engineer, Contractor, Equipment Manufacturer	1. Explanation of operational concepts including transformers, HV switching equipment, controls 2. Equipment operation and adjustment 3. Review of O&M Manuals 4. Equipment troubleshooting 5. Observation during construction 6. Site visits, classroom sessions	1 day	1. "As-built" distribution drawings, schematics, test reports 2. Systems Operations Manual 3. Maintenance Manual 4. Installed systems & equipment 5. Controls Schematics 6. Demonstrations
Low Voltage Systems (including low voltage lighting controls, clocks, fire alarm) 1. Training in equipment start-up, operation, shut-down, transfer to emergency power, re-transfer to normal power, operation at optimum efficiencies 2. To understand system designed to prevent failure, limit service calls	Contractor, Equipment Manufacturer	1. Start-up, testing and operation of all systems and controls (operating, limit, safety) 2. Annual maintenance, restart after emergency failure 3. Review of O&M Manuals. Equipment troubleshooting 4. Observation during construction 5. Site visits, classroom sessions	1 day	1. Installed equipment 2. Demonstrations 3. "As-built" drawings 4. Systems Operations Manual 5. Equip't Maintenance Manuals 6. Controls Schematics, Reports
Telephones, Communications, Signaling Systems 1. To learn telephone link-up with utility				

ELECTRICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815				
Goal	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration	Instruction Materials and Tools
Security Systems: CCTV, card control, door position switches 1.				
PA Systems, Intercom. Entertainment, background music, white noise 1.				
Special Systems: (e.g. pocket paging, central dictation, nurse call, division bells, simultaneous translation) 1..				
Lighting Systems: Normal interior, exterior, economy measures 1.				
Emergency Lighting Systems: Exit lighting, battery-powered emergency systems 1.				
Emergency Power Systems 1. Training in O&M of fuel system, diesel engine, generator 2. To be able to maintain specified quality of service	Engineer, Contractor, Equipment Manufacturer, Supplier	1. Description of emergency generating equipment, fuel storage and supply system, special ventilation systems, switch gear, distribution systems 2. Review of O&M Manuals 3. Equipment troubleshooting 4. Observation during construction 5. Site visits, classroom sessions	½ day	1. Demonstrations 2. Systems Operations Manual 3. Maintenance Manual 3. Commissioning Reports
Uninterruptible power systems 1.				
Isolated Power Systems (as for hospital operating rooms) 1.				

ELECTRICAL (THIS IS BROAD OUTLINE ONLY) This Training Plan forms Part of Section 01815			
Goal	Instructor	Content (approximately 30% Theory, 70% practical)	Approx duration
<p>Special/Dedicated Electrical Services to Special Areas</p> <ol style="list-style-type: none"> 1. Training in equipment start-up, operation, shut-down, prevention of, and restart after emergency failures 2. To be able to operate equipment safely, efficiently, with very high operation level without failure, limit service calls 	Engineer, Contractor, Equipment Manufacturer	<ol style="list-style-type: none"> 1. Start-up, testing, operation of equipment, controls (operating, limit, safety) 2. Annual maintenance, restart after emergency failure 3. Review of O&M Manuals 4. Equipment troubleshooting 5. Observation during construction 6. Site visits, classroom sessions 	1 day
			<p>Instruction Materials and Tools</p> <ol style="list-style-type: none"> 1. Demonstrations 2. "As-built" drawings 3. Systems Operations Manual 4. Equipment O&M Manual 4. Controls Schematics, Reports 5. Commissioning Reports

END OF SAMPLE TRAINING PLAN

Sample of Installation / Start-up Check List

(Installation / Check Lists are at present being reviewed and revised)

Project: PNE#	Project no/No de projet: P#	Page 105
Projet:	Date	
No. on Contract Drawings/French:	MMS Identifier/French	
FILTERS - PRE / FILTRES - PRE		
INSTALLATION CHECKLISTS/LISTES DE VERIFICATION DE L'INSTALLATION		
General: <input type="checkbox"/> "General" sheets, portions as appropriate plus the following:	Général: <input type="checkbox"/> Pages "Général", parties appropriées, plus ce qui suit:	
Construction: <input type="checkbox"/> Media - correct type	Construction: <input type="checkbox"/> Matériel filtrant - de type approprié	
Installation: <input type="checkbox"/> Media in place, clean condition <input type="checkbox"/> Zero leakage around media <input type="checkbox"/> Blank-off plates <input type="checkbox"/> Even velocity profile across filter bank	Installation: <input type="checkbox"/> Matériel filtrant en place, propre <input type="checkbox"/> Aucune fuite autour de matériel filtrant <input type="checkbox"/> Plaques d'obturation <input type="checkbox"/> Profile dvélocité traversant le groupe-filtre	
Casing: <input type="checkbox"/> Accessibility for inspection, replacement <input type="checkbox"/> Access doors or panels (opening out) <input type="checkbox"/> Illumination of interior	Boîtiers: <input type="checkbox"/> Portes ou panneaux d'accès (ouvrant vers l'extérieur) <input type="checkbox"/> Éclairage de l'intérieur	
Appurtenances: <input type="checkbox"/> Filter Gauge - red pointer at point of replacement <input type="checkbox"/> Spare filters for installation prior to acceptance <input type="checkbox"/> Temporary filters for Start-up. Media in place	Dépendances: <input type="checkbox"/> Jauge à filtres <input type="checkbox"/> Filtres de rechange pour installation avant l'acceptation <input type="checkbox"/> Filtres temporaires pour la mise en marche. Matériel filtrant en place	

END OF SAMPLE INSTALLATION / START-UP CHECK LIST

Sample of MMS input into working documents

VARIABLE VOLUME DUAL DUCT BOXES									
Box Identifier	MMS identifier	Size	Air flow rate		Reheat (watts)	No of rows	Heating coil		Notes
			Max	Min			(US GPM)	Elec (kW)	
VVDD-02-0	30-466-01	5	94	100%					
VVDD-04-0	30-466-02	5	90	100%					
VVDD-05-0	20-466-03	5	70	100%					
VVDD-13-0	30-466-04	6	125	100%					
VVDD-01-1	30-466-05	5	85	100%					
VVDD-02-1	30-466-06	5	105	100%					
VVDD-04-1	30-466-07	6	140	100%					
VVDD-05-1	30-466-08	5	104	100%					
VVDD-06-1	30-466-09	5	104	100%					
VVDD-11-1	30-466-10	8	219	40%					
etc.									

STEAM HUMIDIFIERS						
Unit Identifier	MMS Identifier	Air flow rate			Steam	
		Flow (L/s)	Temp (°C)	% RH	Flow (kg/h)	Press (kPa)
HUM-1	30-350-01	1,269	12.8	46 to 58	65	90
HUM-2	30-350-02	2,360	12.8	49 to 55	11	90
HUM-3	30-350-03	2,546	12.8	56 to 63	13	90
HUM-4	30-359-04	8,541	12.8	39 to 56	65	90

END OF SAMPLE MMS INPUT INTO WORKING DOCUMENTS

Sample of Product Information (PI) report form

(This form is at present being reviewed and re-formatted)

Project:		Project number:		Date:	
Projet:		Numero de projet:		Page:	

PRODUCT INFORMATION (PI) INFORMATION SUR LE PRODUIT

Performance Verification (PV) report form accompanies this PI report form: YES

FILTERS / FILTRES - [FINAL / FINALS] [PRE / PRE]	
No. on Contract Drgs/Numero sur le dessin	MMS Identifier/Identification du SSEP:
Description of system/french:	
No. on Contract Drgs/Numero sur le dessin:	MMS Identifier/Identification du SSEP:

PURCHASING INFORMATION/French			
Vendor/Agent Vendeur/Agent::		Address: Adresse:	
Purchase order no/No. d'ordre d'achat:		Date:	
Ordered by/ Commande par:			
Date of manufacture/Date du manufacture:		Date of start-up/Date du mise en marche:	
Details of Warranty: Details de garantie:		Commencement Debut:	Expiration: n:

PRODUCT INFORMATION / INFORMATION SUR LE PRODUIT			
Man'fr/Manufacturie			
Model/Modele:	Size/Dimension:	Type:	
Serial no/No. de serie:		Rated capacity/french	

Efficiency: [Dust spot] [DOP]	Number & sizes Numéro & Dim		Face Area Façade Air	
Efficacité [Trace de poussière] []				
Other data Autre données:				

Technician Technicien	Supervisor Superviseur	Date:
Witnessed by Temoin:	Title: Titre:	Date:

Sample of Performance Verification (PV) Report Form

(This form is at present being reviewed and re-formatted)

Project:		Project number:		Date:	
Projet:		Numero de projet:		Page:	

PERFORMANCE VERIFICATION (PV) REPORT / RAPPORT DE VERIFICATION DE RENDEMENT

FILTERS - FINAL / FILTRES - FINALS	
No. on Contract Drgs/No. sur le dessin:	MMS Identifier/Identification du SSEP:
Description of system/french:	
No. on Contract Drgs/No. sur le dessin:	MMS Identifier/Identification du SSEP:

FILTERS - FINAL	Designed	Shop Drawings	Measured	Comments
FILTRES - FINALS	Conception	Dessins d'atelier	Mesuré	Commentaires
TEMPORARY FILTERS:				
FILTRES TEMPORAIRES:				
Flow rate:/débit:				
Face velocity:/Vélocité d'entrée				
PRESSURE DROP:/BAISSE DE PRESSION				
1. Clean:/Propre				
2. Dirty/Sale				
ACTUAL FILTERS:				
FILTRES ACTUELS:				
Flow rate:/Débit				
Face velocity:/Vélocité d'entrée				

PRESSURE DROP:/BAISSE DE PRESSION				
1. Clean/Propre				
2. Dirty/Sale				

FILTERS - PRE	Designed	Measured/	Comments/Commentaire
FILTRES - PRE	Conception	Mesuré	
Flow rate/Débit			
Face velocity/Vélocité d'entrée			
Pressure Drop/Baisse de pression			
1. Clean/Propre			
2. Dirty/Sale			

Technician	Supervisor	Date:
Technicien	Superviseur	
Witnessed by	Title:	Date:
Temoin:	Titre:	

END OF SAMPLE PI AND PV REPORT FORMS

Samples of requirements for schematics

Schematics used in manuals, commissioning reports

PWGSC A&ES CADD Policy is set out in the A&ES Policy and Procedures Manual, Sections 4110 through 4114. This policy requires: (1) that drawings, schematics, diagrams, etc. are provided in an electronic format compatible with the CADD systems in current use by PWGSC A&ES; (2) conformity to guideline documents (available in both official languages) from the Documentation Centre at the Tupper Building, Riverside Drive, Ottawa, Ontario K1A 0M2.

Graphics: will conform to all Federal standards

Required information: Development of schematics, diagrams and graphics shall be based on review of all equipment as actually supplied and installed.

Basic principles for preparation: Schematics, diagrams, charts, etc. illustrate and describe O&M requirements. They are prepared by the Designer, who: (1) identifies all equipment, components, etc.: (2) identifies measurement locations, (3) instruments used: (4) data to be presented; (5) shows design values and measured values: (6) describes how the systems will be tested, used and the methodology employed.

Graphics will be prepared by skilled draftspersons.

Requirements: will include: (1) Sheet size - either 216 x 279 mm or 279 x 432 mm.: (2) Schematics will be in pre-approved format using 36.24 kg white paper stock with maximum of two folds arranged so that title blocks are always visible, with match lines and reference notes is schematics extend to more than a single sheet; (3) Title blocks similar to the Contract Drawings on right-hand side and permanently visible and include legend : (4) Each system, sub-system to be on a separate sheet: (5) Schematics, diagrams will be easily identified, in workable segments, readily followed and, if necessary, prefaced by an index: (6) They will include complete layout of each system as actually installed, identity and locations of all provisions for TAB, flow measuring and regulating devices, all interfacing with, and points of interconnections into, existing systems, valves, dampers, PRV, air terminal units, heat transfer equipment, duct and pipe sizes, room numbers, floor numbers, system numbers, equipment identifiers, cross-reference to Contract documents, PI and PV Report forms, TAB data, calculation sheets.

EMCS graphics:

Many projects now use EMCS in which graphics play a large role. It may be possible, after approval, to incorporate these graphics into the Systems Operations Manual.

END OF SAMPLE REQUIREMENTS FOR SCHEMATICS

SAMPLE COMMISSIONING SCHEDULE

No	Task	Duration	Start	Finish	Dates
	Elevator #1				This area of the table would be used to indicate, in graphic form, dates of start and completion of the activities listed. These would include:: 1. Progress of construction / installation (extracted from the Contractor's Construction / Completion Schedule 2. Milestones 3. Factory tests 4. Testing, performance verification and commissioning
44	Mechanical installation				
45	Electrical installation				
46	Controls				
47	Commissioning & testing				
	HVAC System #1				
88	HVAC unit installation				
89	Piping installation to HVAC unit				
90	Electrical installation				
91	HVAC unit Controls				
92	Point-to-point & other tests				
93	Start-up of HVAC unit				
94	Commissioning & Testing				
95	Ductwork installation				
96	Pressure testing of duct systems				
97	Grilles, registers, diffusers installation				
98	Environmental controls installation				
99	Point-to-point verification				
100	TAB				
101	Pressure testing between laboratories				
102	Environmental testing				
	Heating boiler plant:				
132	Factory pres & performance tests				
133	Boiler installation				
134	Electrical installation				
135	Boiler Controls tests				

No	Task	Duration	Start	Finish	Dates
136	Chimney stack installation				
137	Natural gas installation to boilers				
138	Natural gas system testing				
139	Boiler start-up				
140	Boiler feed water piping installation				
141	Boiler feed pump installation				
142	Boiler feed pump start-up				
143	Boiler FW piping pressure testing				
144	Chemical treatment - installation				
143	Boiler room piping installation				
144	Boiler room piping - pressure testing				
145	Flushing and cleaning				
146	Boiler room integrated equipment and system - Start-up and commissioning				
A similar schedule would be developed for chilled water and condenser water systems					
151	Distribution Piping installation				
152	Distribution piping pressure testing				
153	Flushing and cleaning				
154	Permission granted for Contractor to use distribution system for temporary heat				
Boiler room H&V system					
173	H&V unit installation				
174	Piping installation				
175	Electrical installation				
176	Controls				
177	Testing and PV				
178	Boiler room air pressure tests				

No	Task	Duration	Start	Finish	Dates
	Plumbing systems				
211	Acid resisting waste piping install'n below grade				
212	Pressure testing of below grade acid waste piping				
213	Acid waste treatment systems				
214	Acid waste treatment system testing, commissioning				
215	Acid resisting waste piping installation above ground				
215	Pressure testing of entire system				
217	Regular waste and storm water piping installation below ground				
218	Pressure testing of below grade regular waste and storm water piping systems				
219	Regular waste and storm water piping installation system above grade				
220	Pressure testing of entire regular waste and storm water systems				
	HWS systems				
223	HWS Heater and circulating pumps - installation				
231	HWS heater and pumping installation testing and commissioning				
232	Water conditioning system installation				
233	Water conditioning system commissioning				
	Hot and cold water systems				
246	H&CWS piping systems installations				
247	H&CWS piping systems pressure testing				
248	TAB of HWC systems				

No	Task	Duration	Start	Finish	Dates
249	Plumbing fixtures installation				
250	PV & adjustment of plumbing fixtures				
	Laboratory gas piping systems				
270	Piping installations				
271	Bulk oxygen station installation				
272	Testing and commissioning				
273	Medical compressed air station installation				
274	Testing and commissioning				
275	Vacuum station installation				
276	Testing and commissioning				
277	Gas Cylinder station installation				
278	Testing and commissioning				
279	Pressure testing of each system				
280	Lab outlets installation				
281	Testing of piping systems and outlets				
	Electrical				
290	Transformer vault installation				
291	Energization and testing				
292	Metered for use by Contractor				
301	Conduit installation				
302	Electrical wiring installation				
303	Megger testing				
	Low voltage systems				
311	Conduit systems installation				
312	Wiring installations				

No	Task	Duration	Start	Finish	Dates
313	Testing and commissioning				
	Communications system				
333	Conduit installation				
334	Wiring installations				
335	Speakers installation				
336	Controls console installation				
337	Testing and commissioning				
340	Lightning protection installation				
341	testing				
	Emergency power installation				
351	Generator #1 installation				
352	Transfer switch installation				
353	Transfer switch testing				
354	Generator fuel installation				
355	Generator exhaust installation				
356	Ventilation system installation				
357	Ventilation system testing & Cx				
358	Integrated system testing & Cx				
	Lab Fume Hoods & BSC's				
411	LFH and BSC installation				
412	Exhaust ducting installation				
413	Controls				
414	Electrical installation				
415	Lab services installation				
416	Exhaust fan and ducting installation				

No	Task	Duration	Start	Finish	Dates
317	LFH & BSC testing and Cx				
418	Integrated testing with HVAC systems				

END OF SAMPLE COMMISSIONING SCHEDULE

Sample specification for Performance Verification of equipment NMS Section 13920 - Fire Pump

1. General
 - .1 In accordance with ANSI/NFPA 20, supplemented as specified herein.
 - .2 In accordance with Section 01810 - Commissioning: General Requirements, supplemented as specified herein.
- .2 Field test each fire pump, driver and controllers in accordance with ANSI/NFPA 20.
- .3 Testing to be witnessed by [Fire Commissioner of Canada] [Canadian Forces Fire Marshal] [authority having jurisdiction.]
- .4 Develop, with [Engineer] [Consultant] [Owner] assistance, detailed instructions for O&M of this installation.
- .5 Disposal of water
 - .1 Discuss appropriate measures for provision and disposal of water used in testing with Engineer.
- .6 Co-ordination
 - .1 Co-ordinate tests with performance verification of sprinkler systems specified section [] - [], [wet] [dry] pipe sprinkler systems specified Section [] - [] and standpipe and hose systems specified Section [] - [].
- .7 Testing to be witnessed by Fire Commissioner of Canada and authority having jurisdiction.
- .8 Allow operating conditions to stabilize at test conditions before taking measurements.
 - .1 Tests for at least 10 minutes under each of minimum, rated, peak load conditions to verify:

- .1 No overheating of any component.
 - .2 No excessive vibration of unit.
 - .3 No vibration transmitted to structure.
 - .2 During each test, measure inlet and outlet pump pressures, rates of flow, electrical power draw, pump speed and plot these points on pump characteristic curves.
 - .3 Test controllers and transfer switches using manufacturer's recommended procedures. Perform at least ten (10) automatic and ten (10) manual operations during this test.
- .9 Timing:
- .1 Perform tests when there is no risk of freezing conditions.
- .10 Identification:
- .1 Verify that all devices are properly labelled, identifying area served, etc.
- .11 Reports:
- .1 In accordance with requirements of Section 01818 Commissioning Reports supplemented as specified herein.
 - .2 In addition to reports required by NFPA 20, include at least following:
 - .1 Purchasing information and product information for all equipment. Refer to Section 01817 Commissioning: Report Forms and Schematics.
 - .2 Manufacturer's characteristic curves (family of curves) for fire pump.
 - .3 Drawings or schematics showing locations and types of controls and components.
- .12 Training:
- .1 Refer to Section 01815 Commissioning: Training of O&M Personnel.

END OF SAMPLE SPECIFICATION FOR PERFORMANCE VERIFICATION OF
EQUIPMENT

Sample of specification for integrated systems test for laboratory

1 General

- 1 In accordance with Section 01810 - Commissioning: General Requirements, supplemented as specified herein.

2 Purpose

- 1 To determine:
 - .1 Operation of all systems working in unison.
 - .2 Response to normal, emergency and "what if" conditions which may occur during laboratory operations.
 - .3 the ability of the EMCS to perform as designed under change-over conditions from normal power to emergency power.
 - .4 that performance of integrated system is as designed and with proper interaction between related systems, equipment and components.

3 Commissioning agency:

- .1 To be [independent Commissioning Agency] [_____]
- .2 Responsibilities to include:
 - .1 Coordinate and conduct tests and fine-tuning of integrated systems.
 - .2 Correct deficiencies identified during integrated systems testing and fine-tuning.
 - .3 Diagnose problems.
 - .4 Modify operating parameters as necessary to satisfy fine-tuning requirements required by Engineer so as to satisfy proper system operation, including adjustments which may become apparent as testing proceeds, modifications to suit changes in system operation as equipment settles down during the "running-in" period.

4 Acronyms:

BSC:	Biological Safety Cabinet
DBT	Dry bulb temperature
DP	Differential pressure
EA	Exhaust air
EMCS:	Energy Management & Control Systems

FA	Fire alarm
HEPA	High Efficiency Particulate air
HVAC:	Heating, Ventilation, Air Conditioning.
LFH:	Laboratory Fume Hood
NC	Noise criteria
PD	Pressure drop (pressure difference)
PV:	Performance Verification
SA	Supply air
SP:	Static pressure
TAB:	Testing, Adjusting and balancing
WBT.	Wet bulb temperature

5 Design criteria, design intents

- .1 DBT, WBT, noise levels, space differential pressure to be maintained in each laboratory at all times within specified tolerances: Refer to Design Criteria and relevant PV Report Forms
- .2 Laboratory DP must not be permitted to go to zero or into opposite pressure values.

6 Application tolerances:

- A. For negatively pressurized laboratories:
 1. SA systems: Plus [0] %; minus [10]%
 2. EA systems: Plus [10]%; minus [0] %.
- .2 For positively pressurized laboratories:
 1. SA systems: Plus [10] %; minus [0]%
 2. EA systems: Plus [0]%; minus [10] %.

7 Timing:

- A. Perform tests only after:

1. Architectural finishes completed.
 2. TAB of HVAC systems successfully completed.
 3. TAB of smoke control systems successfully completed.
 4. Commissioning of FA systems successfully completed.
 5. Commissioning of emergency electrical power systems successfully completed.
 6. Commissioning of all BSC's, LFH, snorkels, other laboratory exhaust systems successfully completed.
 7. EMCS is completed and commissioned to point where it may be used for recording system data and dynamic step response data.
- .2 If necessary, occupancy to be coordinated so as to avoid interference with, or interruption of, any integrated systems tests.

8 Seasonal constraints

- .1 Notwithstanding all-inclusive requirements specified herein, additional separate cycles of Integrated Systems Testing may be necessary during opposite seasons for equipment and systems whose full operation is dependent on seasonal conditions.
- .2 This may necessitate carrying out one of these tests after occupancy and during the Warranty Period.

9 Engineer's responsibilities

- .1 To include:
 - .1 Witness tests and certify results.
 - .2 Provide instruction at the same time as the integrated system performance tests.
 - .3 Provide direction and instruct Commissioning Agency so as to satisfy operating requirements.
 - .4 Fully document results, details of adjustments, changes in system operation as systems settle down.
 - .5 During Warranty Period:
 - .1 Take environmental measurements as necessary to identify existing and potential problems.

- .2 Conduct User surveys to determine degree of satisfaction.

10 Systems to be tested

- .1 These tests shall be applied to all Laboratory HVAC and exhaust systems and related systems.

11 Commissioning procedures - EMCS

- .1 With the EMCS in full operation, change over to emergency power and
 - .1 change from normal operation to operation in fire alarm mode.
 - .2 change from normal operation to smoke exhaust mode.
- .2 Return to normal power and simulate failure of EMCS to test operation of smoke exhaust system without EMCS.
- .3 Perform following during integrated system tests:
 - .1 Perform diagnosis of problems which become apparent during testing.
 - .2 Make adjustments which become apparent as testing proceeds.
 - .3 Make modifications to suit changes as equipment settles down during the "running-in" period.
- .4 Carry out fine-tuning and adjustment of systems as needed.

12 Commissioning procedures - Integrated VAV HVAC and exhaust systems:

- .1 Commissioning Agency to become fully cognizant of all Design Criteria and Design Intents. These may include:
 - .1 Assumed diversity of LFH, BSC, snorkel, other exhaust system usage.
 - .2 LFH operating parameters such as types, face velocity, normal operating and maximum sash heights, minimum flow rate through hood with sash fully closed, etc.
 - .3 Need for redundancy of exhaust systems.
 - .4 Type of LFH exhaust system.- manifolded or dedicated.
 - .5 If manifolded, is the general laboratory exhaust on same system.

- .6 If room exhaust system is separate from LFH exhaust system and if LFH exhaust fan goes down or LFH exhaust air valve fails, possibility for air to be drawn from the LFH into the room.
- .2 The following commissioning procedures are basic only. They may have to be modified for each laboratory, type of LFH, BSC, other exhaust system, supply system, controls, type of supply and exhaust tracking systems used.
- .3 Commissioning to include
 - 1. verification of the integrity of the laboratory envelope,
 - 2. performance verification of maintenance of design DBT, %RH and noise levels in each laboratory at all times while at the same time maintaining design offset between supply air and exhaust air:
 - .1 at maximum and minimum supply and exhaust air flow rates,
 - .2 at various part load conditions of heating and cooling,
 - .3 in "occupied" and "unoccupied" modes,
 - .4 with LFH's at varying sash positions,
 - .5 with BSC's in various modes of operation,
 - .6 with other laboratory exhausts in various modes of operation, and
 - .7 at various combinations thereof.
 - 3. Verify tracking of LFH VAV EA flow rate with SA flow rate from maximum to minimum and record pressure conditions at all exhaust system air valves.
 - 4. Track laboratory supply system from maximum to minimum flow rates and record pressure conditions at all supply system air valves and outlets.
 - 5. Verify integrity of control system and response to within $\pm 5\%$. including:
 - .1 Verify stability of zero drift, span shifts, laboratory DP.
 - .2 Investigate all possible control scenarios to determine if there is any one sequence of operations which will cause lab DP to go to zero or into opposite pressure values.
 - .3 Using repeated cycling of controls, determine if the control loops will require periodic re-calibration.
 - 6. Using recording instruments, challenge LFH face velocity by:
 - i. raising and lowering the sash quickly implementing emergency purge procedures.

- ii. simulating EA failure through LFH by exhaust fan or air valve failure.
 - iii. simulating SA failure by supply fan or VAV box failure.
- .7 Track laboratory DP under all possible combinations of operating conditions, such as:
 - i. All LFH sashes fully open or fully closed.
 - ii. Maximum heating and cooling, minimum heating and cooling.
 - iii. LFH sashes randomly in partially closed and open positions.
- .8 Identify the position of the sash below which the face velocity rises above the maximum design face velocity or fall below the minimum design face velocity.
- .9 Verification of direction of air flow through doors into the space. This can be by propping the door open about 100 mm, and measuring velocity and direction of air flow through the opening every 150 mm from top to bottom.
- .10 Measure all LFH exhaust duct flow rates and velocities and ensure that each stack discharge is in excess of required velocities.
- .11 Performance verification and demonstration of speed of response (in seconds) in the event of:
 - .1 failure of LFH or BSC air valve to minimum and to maximum,
 - .2 failure of laboratory supply air valve, exhaust air valve to minimum and to maximum,
 - .3 failure of supply fan, exhaust fan,
 - .4 failure of normal electrical power and transfer to emergency power,
 - .5 partial and total failure of EMCS,
 - .6 major chemical spills, where the operation of an emergency pull station maximizes exhaust from the laboratory, increases the negative pressure in the laboratory and informs the central control facility,
 - .7 fire or smoke emergency conditions, in which the FA system stops supply fans serving the fire zone, maximizes general exhaust systems so as to increase the negative pressure in the fire zone relative to surrounding fire or smoke control zones.
- .12 Verification that all exhaust fan discharge ducts in Mechanical Room are fully welded and have been pressure tested and that shaft seals of exhaust fans are tight.

- .13 Verification that indirect connections between BSC's and the manifolded exhaust system will never permit any spillage.
- .14 PV of all snorkels and other exhausts for design exhaust flow rates at all times.
- .15 Survey of supply air to ensure that air velocity and air flow patterns in vicinity of LFH and BSC are within parameters of The Standard.
- .16 Examination of very low leakage dampers on inlet to each exhaust fan for leakage when closed, to permit removal of exhaust fan from the system and to permit O&M personnel to service same without exposure to exhaust air.
- .17 Examination of manifold exhaust ducting for condensation under low flow conditions.
- .18 Verification that exhaust stack discharge exceeds 15 m/s (3000 FPM) at all times.
- .19 PV of lead-lag arrangements for exhaust fans, including automatic change-over.
- .4 Measurement of DP: Either directly or indirectly depending upon design requirements:
 - .1 Direct measurement of DP between laboratory and reference point.
 - .2 Indirect measurement by maintenance of differential between SA and EA flow rates using air flow measuring stations in all ducts.
- .5 Multi-point data loggers may be used to:
 - .1 log each exhaust, laboratory supply, response time,
 - .2 track exhaust system from design maximum flow rate to design minimum flow rate by monitoring conditions at the most remote LFH or BSC,
 - .3 track supply system from design maximum flow rate to design minimum flow rate by monitoring conditions at the most remote supply air valve,
 - .4 record DBT, %RH and total offset between supply air and exhaust air.

13 Commissioning manifolded laboratory exhaust systems:

- .1 Exhaust systems to include general laboratory exhaust, LFH, BSC, snorkels, (elephant trunks), other special exhausts.
- .2 Establish SA and EA flow rates at design conditions. Set LFH sashes to design position. Measure DP or SA-EA flow rate offset. Make necessary repairs and/or seal leaks until design values are achieved.
- .3 Measure DP or SA-EA flow rate offset for all other possible operating conditions such as:

- .1 sashes on all LFH CLOSED, cooling load at MAX.
- .2 sashes on all LFH OPEN, cooling load at MIN.
- .3 sashes on all LFH CLOSED, cooling load at MIN.
- .4 Determine response time (in seconds) while:
 - .1 raising and lowering LFH sash quickly,
 - .2 implementing emergency purge conditions,
 - .3 simulating LFH EA failure,
 - .4 simulating general EA failure,
 - .5 simulating SA flow rate failure.
- .5 Using multi-pen data-logger to record:
 - .1 SA, LFH EA, general EA flow rates,
 - .2 differential pressure,
 - .3 response time (in seconds).
- .6 Track entire exhaust system from design maximum flow rate to minimum flow rate by monitoring SP at most remote EA valve and face velocity at most remote LFH.
- .7 Track entire supply system from design maximum flow rate to minimum flow rate by monitoring SP at most remote SA valve and face velocity at most remote LFH.
- .8 Record DBT, WBT and DP on 7-day strip chart recorder.

14 Laboratory airlocks:

- .1 Purposes: To demonstrate directions of air flow towards space of highest contamination when entering or leaving laboratory.
- .2 Applicable air lock systems: [refer to PV Report Forms] [_____].
- .3 Timing: After integrated systems tests for stable operation and laboratory operations have been successfully completed.
- .4 Conditions at time of tests:
 - .1 Supply and exhaust air systems functional, airlock entry controls operational.
 - .2 Laboratory operational, functioning normally, including monitoring.

- .3 Adjacent areas operating normally.
- .5 Design intents:
 - .1 Entry/Exit process to be bi-directional.
 - .2 In either entry or exit, it must be possible to turn around and return to starting point.
 - .3 If access is denied, it must be possible to turn around and return to starting point.
 - .4 In event of fire conditions, door controls to be released, access to be available in either direction.
- .6 Procedures:
 - .1 Start air systems, allow to stabilize, continue to operate for [60] minutes, then shut down.
 - .2 Execute entry and exit sequences according to established operational protocols.
 - .3 Using instrumentation and smoke tests, monitor and record flow and pressure variables and response time for laboratory and associated air locks throughout +entry and exit protocols.
- .7 Acceptance requires that:
 - .1 Directional air flow in laboratory to be maintained throughout tests.
 - .2 Pressure in all laboratories associated with air system serving this laboratory remain as designed.
 - .3 Safe egress to be maintained at all times. Force on doors to conform to requirements defined in PV Report Forms.

15 Pressure decay tests of welded ducts

- .1 Apply this test only to those portions of laboratory ducted air systems required to be welded for contaminant containment purposes.
- .2 Perform pressure decay test as described in ANSI/ASME N510-1989, section 6.5.3 "Duct and Housing Leak Rate Test (Pressure Decay Method).
- .3 Ductwork to be closed off and sealed between HEPA filter housing and room by closing airtight dampers or, in absence of dampers, by sealing openings to ductwork.
- .4 Application tolerances: Not more than 0.2% of the flow rate at 500 Pa.

16 Other laboratory exhaust systems

- .1 Application tolerances: Plus [10]%; minus [0]%.
 - .2 Standard: As for HVAC systems
 - .3 TAB procedures:
 - .1 TAB as per standard.
 - .2 Plugs for test openings: To match duct materials specifications.
 - .3 Upon completion of TAB, perform activities specified this section.

17 Records of tests

- .1 Use EMCS to record systems data and dynamic step response data.
- .2 Where EMCS points not available, use manually recorded parameters.
- .3 Monitor, record effects, note response times of various operational and failure conditions on systems.
- .4 Measure variable on real-time basis. Utilizing this data, make fine-tuning adjustments as necessary.
- .5 Present test data and results in data file and graphic format.
- .6 Engineer to develop project-specific PV forms.

18 Air systems - Stable operation:

- .1 Purpose:
 - .1 To demonstrate operation and accuracy of air systems.
 - .2 Applicable air systems: All systems in the new facility.
- .2 Conditions at time of tests: All equipment and systems to be operational in automatic mode.
- .3 Procedures: Start air systems run for [60] minutes to stabilize conditions.
- .4 Conditions for Acceptance: Requires:
 - .1 Control of variables associated with test.

- .2 Stable and dynamic system response to laboratory disturbances to permit performance of remaining tests.
- .3 Maintenance of standard steady state conditions listed in PV Report Forms.

19 Normal laboratory operation

- .1 Purpose: To demonstrate that laboratory and associated BSC's, LFH's and snorkels are maintained in safe condition during normal laboratory operation.
- .2 Applicable laboratories: All laboratories in this facility.
- .3 Timing: Perform these tests after tests for stable operation (specified this section) successfully completed.
- .4 Required steady state conditions: Refer to Performance Verification (PV) Report Forms.
- .5 Conditions at time of tests: Laboratory supply and exhaust systems to be operational.
- .6 Procedures:
 - .1 Assume PD across HEPA filters = 250 Pa
 - .2 Start air systems, allow to stabilize, run for [60] minutes, then shut down.
 - .3 Monitor, record flow and pressure variables, response times for lab to reach steady state conditions.
 - .4 Using instrumentation, smoke tests, demonstrate directional air flow.
- .7 Acceptance: requires that:
 - .1 Directional air flow to be maintained.
 - .2 Pressure in all laboratories associated with air system serving this lab remain as designed.
 - .3 Safe egress to be maintained. Force on doors to conform to requirements defined in PV Report forms.

20 BSC and LFH failure

21 Supply fan failure

- 22 Laboratory supply air failure**
- 23 Maximum supply air to laboratory**
- 24 Exhaust fan failure**
- 25 Laboratory exhaust air failure.**
- 26 Maximum exhaust from laboratory**
- 27 Electrical power failure to laboratory**
- 28 Building power failure**
- 29 Activities upon completion of commissioning**
- 30 Commissioning Reports**
- 31 Training**
- 32 Commissioning activities during Warranty Period**
- 33 Laboratory training upon occupancy and during Warranty Period**

END

SAMPLE OF SPECIFICATION FOR INTEGRATED SYSTEMS TEST FOR LABORATORY

**CP.1: PROJECT COMMISSIONING MANUAL
END OF APPENDIX A**

Appendix B

Commissioning Glossary (CP.2)

Acceptance

The acceptance by the Owner/Investor of responsibility or ownership of the facility/service/product delivered under the Contract and which, in the opinion of the Owner/Investor, conforms to all terms and conditions of the Contract.

Adjusting

Regulation of the built works as necessary to meet required flow rates, modes of operation, and so on.

Amended Commissioning Plan

The Commissioning Plan as amended in the light of components, equipment, sub-systems, systems approved for installation, suppliers' delivery schedules, the contractor's construction and completion schedule, the user's occupancy schedule, and consideration of all other conditions pertaining to commissioning.

"As-built" drawings and specifications

Drawings prepared from the Project Record Drawings, and providing an accurate record of the project as built and operating. They may be supplemented by schematics and diagrammatic layouts. "As-built set point" drawings also include:

- .1 amendments to show all measured and approved results of performance verification procedures, settings of all controls, systems and equipment as finally set upon completion of commissioning. It also includes project specifications amended by insertion of addenda, change notices, etc.
- .2 flow diagrams and piping schematics as installed at each major item of equipment complete with valves controllers, etc. identified with numbered tags.

Average effectiveness level

The capability of all parts of the built works to meet specified requirements and to maintain this level of operation without interruption for a specified test period.

Balancing

The proportioning of flow rates within a distribution system to meet requirements.

Breakdown maintenance

The prompt correction of unpredicted or unpredictable breakdowns or failures and the making good and restoration to the original level of durability, reliability, efficiency and safety.

Building management manual (BMM)

The manual provided to the Propert Manager, considered as the project's "Owners Manual", which explains what systems, equipment and/or components were incorporated into the building, why they were selected, how the design and operating concepts of the sub-systems, systems and integrated systems are accomplished, and includes the design criteria, design intent, design philosophy, how the design meets the Client's functional and operational requirements, standard operating procedures (SOP) manual and operating and maintenance (O&M) manual. Refer to CP.3 for details.

Built works

Includes all static and dynamic systems and installations, all components, equipment, sub-systems, systems, integrated systems, controls constructed and installed as part of the project.

Certificate of completion

See *General Conditions*. There are two types: "Interim" and "Final".

Client

Usually, but not invariably, the Owner/Investor.

Commissioning (Cx)

A planned program of activities that advances the built works from the earliest Phase to a condition of full operation, meeting all objectives of commissioning as defined in the Commissioning Brief.

Commissioning activities

See "*Commissioning Procedures*".

Commissioning agency

See "*Commissioning Agent*".

Commissioning Agency

The person(s) or company qualified and approved to carry out commissioning activities and procedures. The Commissioning Agency may change, depending upon the equipment, system, integrated system being commissioned. It may be the installing contractor, a qualified Testing, Adjusting and Balancing (TAB) Agency, a special Commissioning Agency, etc. (except in cases where the TAB contractor is already under contract on the same project)

Commissioning agent

The General Contractor's delegated person with established reputation in commissioning to oversee all commissioning activities by all commissioning agencies and to be the single point of contact for the Designer, Engineer and PWGSC Commissioning Manager in all matters relating to commissioning. Qualifications are described in *PWGSC Commissioning Manual (CP.1)*".

Commissioning authority

See "*Commissioning Manager*".

Commissioning Brief

The section of the Project Brief which defines the deliverables describes the objectives and scope of commissioning, defines commissioning requirements based upon a detailed study of the User's requirements, and establishes roles and responsibilities for commissioning activities.

Commissioning documentation

A complete set of data and information fully describing the project as a built, finished, functional and operational facility. It includes the "As-built" plans and specifications, working documents, systems design documents, all approved shop drawings and product data, inspection certificates, operating and maintenance manuals, and Building Management Manuals.

Commissioning Engineer

The Designer (Architect, Engineer or other professional producing the design solution meeting the User's requirements) responsible for observing, witnessing and certifying results of commissioning activities performed by the Commissioning Agency. See also "*Designer*".

Commissioning Manager

The person responsible for the management of all commissioning activities and for providing technical advice to the Project Manager regarding commissioning concerns. Refer to *PWGSC Commissioning Manual (CP.1)*". Depending on the size of the project, the Commissioning Manager may be assisted by a team of qualified representatives of the disciplines involved.

Commissioning manual

The overall document dealing with commissioning as carried out in PWGSC. This manual consists of the "*PWGSC Commissioning Manual (CP.1)*" and a number of "*PWGSC Commissioning Guidelines*", all of which are listed in the Table of Contents of the "*PWGSC Commissioning Manual (CP.1)*". .

Commissioning Plan

The document which describes the organization, scheduling, allocation of resources, documentation, dates, roles and responsibilities for verification that the built works meet Contract Document requirements.

Commissioning procedures

Includes TAB, PV (Performance Verification) and all other activities described in the various Commissioning Procedures Manuals or specified in the Contract Documents.

Commissioning Procedures Manual

A document that describes all the procedures used during the Commissioning process.

Commissioning process:

See "*Commissioning*".

Commissioning Report

A debriefing report on commissioning to evaluate the commissioning processes used during the project delivery cycle. This report is prepared by the Designer during, and finalized at the end of the Warranty Period and included in the Building Management Manual.

Commissioning Schedule

A schedule, cross referenced to the Construction Schedule, which highlights dates and times when key commissioning activities are to be implemented and completed and deliverables provided. This schedule is used to track the progress of the commissioning process throughout the project.

Commissioning Team

The Commissioning Team is usually represented by the Commissioning Manager during the NPMS *Project Delivery Stage*. For roles and responsibilities and team definition, refer to "*PWGSC Commissioning Manual (CP.1)*".

Completion

The point at which all terms of the Contract have been fulfilled to the satisfaction of the Project Manager. See "*General Conditions*".

Components

Individual devices, forming part of equipment, sub-system or system.

Concept drawings

Drawings prepared by the Designer to show the design concept.

Conceptual design

See "*Design Concept*".

Construction schedule

The detailed schedule prepared by the Contractor which establishes the scope and approach to project construction operations and incorporating the Amended Commissioning Plan. See also "*Commissioning Schedule*".

Construction Team

The Construction Team is usually engaged following successful bidding on the project and being awarded the construction contract. This team completes its work at the end of NPMS *Project Delivery Stage, Implementation Phase.*, when the management of the completed facility passes to the Property Management Team for operation. The services of the Construction Team may be required during the NPMS *Project Delivery Stage, Delivery Close Out Phase* if construction difficulties become apparent.

Consultant

See "*Designer*".

Contract documents

The Working Documents upon which the contract with the Contractor to deliver the project is based. Usually includes drawings and specifications.

Contractor

Includes sub-contractors, manufacturers, suppliers, vendors, fabricators and sub-trades.

De-commissioning

Facilities which are taken out of service, mothballed, shut down or otherwise made non-operative.

Defect

Any variation in form, fit or function from the Design Intent, Design Criteria or Contract Documents.

Demonstrations

Operation of the built works in the presence of the Project Manager, Commissioning Manager, Client/Investor and/or User to confirm installation and operation in conformity to Commissioning Documentation.

Design-Builder

See both "*Designer*" and "*Construction Team*".

Design concept

The design solution as developed by the Designer and meeting all requirements of the Project Brief. It is the result of analysis of the problem or opportunity, and investigation of the various options. For detailed description of contents, refer to the "*Project Management Manual. (CP.1)*".

Design criteria

All those factors included in the design of a facility prescribed by the Project Brief or determined by the Designer as necessary in order to meet all requirements of the Owner/Investor.

Designer

The Architect, Engineer or other professional producing the design solution meeting the User's requirements. In the context of the Project Brief, the term used is "Consultant".

Design intent

The methodology employed by the Designer which is intended to meet the Design Criteria.

Design Team

The Design Team is usually assembled at the end of NPMS project delivery stage, planning phase and continues to work as a team until the end of NPMS project delivery stage, implementation phase.. The services of the Design Team may be required during NPMS project delivery stage, close-out phase, in the event of design difficulties.

Durability

The average expected service life before failure, based upon the manufacturer's estimate of the hours of operation and also based upon a specific preventive maintenance program.

EMCS

Acronym for Energy Monitoring and Control System. A computerized system with field devices located on building system components to permit monitoring and control of a component, system or integrated system through a central command post or a designated remote station location.

Environment

The output of all related integrated systems. Conditions established within the environment affect, or are affected by, the set points of the components, which in turn adjust, or are adjusted by, the output of the sub-systems, systems and integrated systems.

EPVT

Acronym for Equipment Performance Verification Tests.

Equipment

Devices, components, etc. forming part of a sub-system or system.

Evaluation Report

This report provides an assessment of the project for compliance with the User's functional and operational requirements as describes in the Investment Analysis Report (IAR) and the Project Brief. This report is prepared by the Project Manager with input from the Designer and submitted to the Project Leader after the termination of the Warranty Period and at the end of the Operation Phase.

Extended warranty

A warranty made relating to certain specific items of equipment which is of greater duration than the Warranty Period stipulated in the Contract.

Extent of commissioning

The degree to which components, equipment, sub-systems, systems and integrated systems are commissioned, based upon studies of the User's requirements, effects of such omissions on operating efficiencies, security, health, welfare, comfort, safety, professional and regulatory obligations and liabilities.

Facility

See "*Project*".

Facility Management Team

See "*Property Management Team*".

Facility Manager

Usually called the Property Manager in PWGSC. The person responsible for operation and maintenance of the completed facility.

Fine tuning

The additional adjustments made after commissioning so as to optimize performance and to maximize the benefits of a system, sub-system and equipment.

Function

Includes all modes and sequences of control operation, interlocks and conditional control responses, all specified responses to emergency conditions, etc.

Functional performance testing

See "*Performance Verification*".

General conditions

See PWGSC front-end contract documents.

Implementation phase

A distinct phase within the NPMS Project Delivery Stage during which the built works are checked for static completion, started, tested, adjusted and balanced, operational and functional performance is verified, documentation is verified for completeness, all training is carried out, all facility management plans implemented. At the end of the Project Delivery Stage, the facility is handed over to the Owner/Investor and User.

Inspection certificates

Certificates signed and certified by the authority having jurisdiction which apply to installation, performance verification, commissioning or operation of special systems or equipment.

Installation/start-up Check Lists

A compilation of items that should be examined during pre-start-up inspections. It includes all items specified in the Contract Documents, and items not so specified but considered as essential to good installation engineering practice or necessary for proper operation of the facility.

Integrated systems

Multiple systems driven by the operating parameters of the architectural, structural, mechanical and electrical systems and operating as a coordinated and integrated entity in order to satisfy User's requirements.

Interim commissioning

That portion of commissioning that verifies that the built works are in satisfactory operating condition for initial occupancy.

Life cycle costs

Include capital construction costs, labour, materials, costs of utility connections, utilities such as potable water, thermal energy (heating and cooling), electrical costs, costs of maintenance, repairs and servicing, to operate and maintain the system (or the facility). Depending upon the context, Life Cycle Cost (LCC) may be calculated per annum or over the service life of the facility

Maintainability

A measure of the time required to fully restore the works to perform their intended function after failure with specified procedures and resources. Maintainability of that characteristic of the works which indicates the ease and rapidity with which it can be restored to a specific level of performance.

Maintenance management system (MMS)

A code base system, which is sub divided into a series of numbers/ codes for building devices, components for each base building system such as mechanical (heating/cooling), fire protection, electrical, emergency power systems, fire alarm system. The data base is totally inputted into a computer to permit the effective and timely maintenance / replacement of the building installations, and is used for estimating the life cycle planning.

National Project Management System

The basic framework within which all PWGSC projects are developed, implemented and delivered.

Non-acceptance

The refusal to accept the responsibility/ownership of the facility/service/product delivered under the Contract which, in the opinion of the Owner/Investor, does not conform to the terms or conditions of the Contract.

Operating and maintenance budget

See *"Life Cycle Costs"*.

Operating manual

A project-specific manual prepared by the Designer using schematic and diagrammatic layout drawings to fully describe each system, all Design Criteria, Design Intents, its operation (using narrative-type sequence of operation). During the design phase, it is "generic" in the sense that it generally contains no reference to manufacturer's equipment. During construction and commissioning, it is amended to contain all "As-built" information and forms the Operating Manual for the facility.

Operation

The normal day-to-day manipulation of the works as designed in order to fulfill the intent of the design.

Operating and maintenance (O&M) manuals

An organized compilation of all documentation relating to the facility as a built, finished, functional and operational entity. It consists of two separate manuals – the Operating Manual and the Maintenance Manual.

Performance verification (PV)

The checks and tests carried out to determine if the built works function in accordance with the Design Intent.

Performance verification report

Record of all measured data resulting from testing, adjusting, balancing and performance verification for the built works. It includes all product information. See also "*Product Information*".

Post-occupancy commissioning

Commissioning activities carried out after full occupancy and under normal operating conditions, and may include system optimization, commissioning of seasonal-, occupancy- and weather-sensitive systems.

Preliminary design

The development of the Design Concept in more detail and establishment of technical, operational, cost and scheduling requirements in sufficient detail to ensure that subsequent development of Working Documents continue to meet requirements of the Project Brief.

Preventive maintenance

Pre-planned activities designed to ensure the continuance of durability, reliability, operation at peak efficiency, safety of the works, minimize down-time and to prevent unplanned, unscheduled or unpredictable failures by doing work at scheduled intervals. Preventive maintenance includes servicing and corrective maintenance functions. Preventive maintenance anticipates wear and tear during operation, takes corrective actions so as to minimize deterioration.

Product data

Manufacturers' product data sheets provided by the Contractor for factory-fabricated components, equipment, systems, etc., specified in the Working Documents and required for the project. These are approved before purchase by the Contractor. See also "*Shop Drawings*".

Product information (PI)

A compilation of data gathered from all components and equipment installed on the project, including manufacturer's nameplate data and all other information that is necessary for full and complete commissioning documentation. Product information forms part of the Performance Verification Reports.

Project

A package of activities specifically dedicated to fulfilling a program requirement within a prescribed time period, having defined objectives (including scope, performance, quality, cost).

Project Brief

The document which defines all requirements of the project and services to be provided. It includes general project information, scope of the work, time plan, design data and the Commissioning Brief. It contains design instructions to the Design Team and Commissioning Team and is the basis for Consultant's Agreements. Refer also to "*Request for Proposal (RFP)*".

Project Leader

The person representing the Owner/Investor and accountable for the overall project development.

Project Manager

The person responsible for the implementation of a project, including management, administration and coordination of activities.

Project record drawings

The Contract Documents amended by the Contractor on site to show the actual location of all features and materials and all other deviations from those called for in the Contract Documents as made during construction. These amendments are made as the work progresses.

Property Management Team

The Property Management Team receives the facility at time of commissioning and operates it throughout its useful life. The team consists of the Facility Manager, Building Operations Manager, in-house maintenance staff, and service contractors. Members of the Design Team, Commissioning Team and Construction Team may also be included.

PV

See "*Performance Verification*".

PWGSC Commissioning Manager

The person responsible for the management of all commissioning activities and for providing technical advice to the Project Manager regarding commissioning concerns. Qualifications are described in the "*PWGSC Commissioning Manual (CP.1)*". Depending on the size of the project, the Commissioning Manager may be assisted by a team of qualified representatives of the disciplines involved. The Commissioning Manager represents the Owner / Investor for all PWGSC projects.

PWGSC Commissioning Manual

The document which describes commissioning as carried out in PWGSC.

PWGSC Design Quality Review Team

For definitions, roles and responsibilities, refer to "*PWGSC Commissioning Manual (CP.1)*".

QA

Acronym for Quality Assurance.

Quality assurance

The process by which the Project Manager ensures that the Designer meets all defined objectives. It includes review of the calibre of Designer and installers, adequacy of quality control by the Contractor.

Quality control

The process by which the Project Manager verifies that all levels of quality described in the Project Brief, set out in the Working Documents and installed in the built works, are attained. It includes a process of review and monitoring through all stages of the project, corrective action where appropriate and documentation in the Commissioning Documentation.

Quality management

The process adopted by which the quality of the product delivered is controlled. It includes quality assurance and quality control, reviews for conformity to applicable codes, standards, regulations, generally accepted professional standards and principles.

Re-commissioning

Commissioning activities carried out on an existing system. These systems may, for example, have been changed by additions or deletions, repeated adjustments in settings or operating parameters, etc.

Redundancy

The replacement equipment immediately available for operation in the event of the failure of the equipment presently on-line.

Redundancy factor

The ratio of the excess number of units installed to the number of units required to meet design demand.

Reliability

The length of time that the system will perform its intended function before failure under stated conditions of application and use and with a specific preventive maintenance program. It is the failure rate per unit of time. There are two types of reliability:

- .1 **Inherent reliability:** that which is built into the design (i.e. the reliability which would be possible if each and every component performed throughout its life precisely as the designer planned).
- .2 **Achieved reliability:** that which is actually experienced. It varies with the manufacturing processes, shipping, storage, application, installation and operator's capabilities.

Repair

Making good restoration to full operating condition without necessarily restoration to original level of durability, reliability, efficiency or safety. See also "*Maintenance*".

Request for Proposal (RFP)

A statement, addressed to interested Designers, of needs defining those elements, services and systems that must be provided and the products that must be delivered in order that the facility will meet the User's program needs. Based upon a detailed study of the User's requirements. Refer also to "*Project Brief*".

Servicing

The routine work required to be performed by virtue of owning the facility. The work to be performed to keep the facility in optimum condition and operating safely and at peak efficiency at all times.

Shop drawings

Drawings prepared by the Contractor illustrating in detail their interpretation of the requirements of the Contract Documents for shop or on-site fabrication of various components, equipment, etc. required for the project. These are approved before construction or installation. See also *Product Data*.

Start-up Check Lists

See "*Installation/Start-up Check Lists*".

Substantial completion

For a definition, refer to "*General Conditions*".

Sub-systems

Components and equipment operating (with distribution network if required) in an integrated manner.

Systems

Consist of multiple sub-systems operating in conjunction with one another to provide an operational entity.

TAB

Acronym for testing, adjusting and balancing.

Testing

Includes pressure, leakage, flow rate and performance verification.

User

The end user of the product of the project or the occupant of the facility. It may include the Client.

Verification

The process by which reported results of TAB, PV and commissioning are checked for completeness, accuracy and validity.

Warranty

The promise made by the Contractor to rectify and make good any defect or fault that appears in the work or that comes to the attention of the Minister within the period stipulated in the Contract commencing normally on the date of the Interim Certificate of Completion.

Warranty inspections

Refer to "*General Conditions of the Contract Documents*".

Working documents

The drawings and specifications developed by the Designer showing the approved design and describing all quality control and quality assurance requirements for the project in sufficient detail for the Contractor to deliver the project.

END OF APPENDIX B