Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Bid Receiving - PWGSC / Réception des soumissions - TPSGC
11 Laurier St. / 11 rue Laurier
Place du Portage, Phase III
Core 0A1/Noyau 0A1
Gatineau, Québec K1A 0S5
Bid Fax: (819) 997-9776

SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires
THIS PROCUREMENT CONTAINS A SECURITY REQUIREMENT

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

Issuing Office - Bureau de distribution
Consultant Services Division/Division des services d'experts-conseils
11 Laurier St./11 Rue Laurier
3C2, Place du Portage
Phase III
Gatineau, Québec K1A 0S5

Title - Sujet Animal Wing to Wet Lab Conversion	
Solicitation No. - N° de l'invitation EP008-121856/A	**Amendment No. - N° modif.** 002
Client Reference No. - N° de référence du client R.044033.002	**Date** 2012-03-30
GETS Reference No. - N° de référence de SEAG PW-$$FE-112-59430	
File No. - N° de dossier fe112.EP008-121856	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2012-04-25	**Time Zone** **Fuseau horaire** Eastern Daylight Saving Time EDT
F.O.B. - F.A.B. **Plant-Usine:** ☐ **Destination:** ☑ **Other-Autre:** ☐	
Address Enquiries to: - Adresser toutes questions à: El-Zarka, Edward	**Buyer Id - Id de l'acheteur** fe112
Telephone No. - N° de téléphone (819) 956-6097 ( )	**FAX No. - N° de FAX** (819) 956-3160
Destination - of Goods, Services, and Construction: **Destination - des biens, services et construction:** Sir Frederick Banting Research Centre, 251 Sir Frederick Banting Way, Ottawa, ON	

Instructions: See Herein

Instructions: Voir aux présentes

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

Canada

This amendment will form part of the contract documents.

1. The following is in response to inquiries received in relation to this solicitation.

Question 10:
RS 11 is referenced in the document, but not included in the rest of the package. Please confirm this section of the RFP.

Answer 10:
Reference to section PD 6 Project Objectives, section 6.7 Waste Management:

- **DELETE** "The Departmental Representative shall provide details of waste management delivery strategies.Details for specifying deliverables are provided in "Required Services" RS 11 - Waste Management." and

- **REPLACE** with "The Departmental Representative shall provide details of waste management delivery strategies."

Question 11:
In RS7 Commissioning section in the RFP (pages 43 to 48) we are not clear what is a consultant responsibility because the first sentence states “as a member of the PWGSC team, the Commissioning Manager…” which seems to imply that PWGSC is providing the commissioning manager. The section sometimes notes “the Commissioning manager” and sometimes notes “the consultant shall” and many other times is not entirely clear who is responsible for what is described. Please clarify for the bidders. Some portions of the work noted in the Commissioning section are called up in the other detailed RS sections. Which takes precedence, the other RS section commissioning descriptions or the or RS7 Commissioning section.

Answer 11:
The Commissioning Manager is a PWGSC employee and will be charged with overseeing commissioning activities, thus RS7 is an outline of how the successful proponent will be required to assist and provide information to the Commissioning Manager. Portions of commissioning work outside of RS 7 are to be completed by the successful proponent in order to provide information, reports, minutes, memoranda, etc, to the Commissioning Manager. In reference to other sections of the RFP where Commissioning is identified, they are shown in timelines of the project and as such compliment the RS7 section, which this section provides a greater detail of the specific Commissioning services to be provided.

Question 12:
In RS7 Commissioning section in the RFP (pages 43 to 48), there are references to other documents CP3, CP4, CP5, MC5, and MC6, and the TOR seems to imply that they are included in appendices. We could not locate these documents in the RFP. Are they important for the bid?

Answer 12:
i) **DELETE** all references to MC5, and **REPLACE** with CP8 "Commissioning Reports"

ii) **DELETE** all references to MC6, and **REPLACE** with CP10 " Report forms and Schematics"

iii) Reference to section RS 2 Design Concept, section 2.2 General, 8th bullet:
- **DELETE** "Prepare a preliminary Commissioning Plan;", and
- **REPLACE** with "Prepare a preliminary Commissioning Plan in accordance with CP.3: 'Guide to the development of the Commissioning Plan';"

iv) Reference to section RS 3 Design Development, section 3.4 Deliverables, last bullet:
- **DELETE** "Commissioning Plan;" and
- **REPLACE** with "Commissioning Plan in accordance with CP.3: 'Guide to the development of the Commissioning Plan'"

v) Refer to attached Appendix F for the Commissioning Guidelines and Manuals, CP3, CP4, CP5, CP8 and CP10.

Question 13:
Page 23 of the RFP, item 2.3.2, does not clearly identify the structural scope of work in support of the options. Please clarify the expected structural scope of work for the project.

Answer 13:
Should any of the successful proponent's design options call for changes to the structural infrastructure of the deconstructed Banting Building 3rd and 4th floor layout, a Structural Engineer will be required to review, design changes, and implement works required by same. Any and all changes proposed by the successful proponent which may impact the structure must be supported by a suitably qualified Structural Engineer.

Question 14:
Please confirm that the seismic rehabilitation for floors 3&4 and penthouse are being done as part of the Demolition project currently underway. Please confirm that once this is done, that no additional seismic upgrades are required and cross-brace/friction dampers are to remain in the locations installed.

Answer 14:
Seismic rehabilitation of the structure will be completed through the current Deconstruction project. Provided there are no layout changes proposed by options put forward by the successful proponent, no additional seismic changes will be necessary.

Question 15:
Page 27 of the RFP, 6th bullet, notes "provide furniture and equipment plans and schedules". Are we to assume furniture is a reference to built-in furniture such as lab cupboards, lab benching, countertops etc and not office furniture workstation systems?

Answer 15:
Reference to pages 62 & 63 of pages 146 of the RFP, RS 3.3.1 Architectural Drawings, 6th bullet:

Identifies "Furniture and Equipment Plans and Schedules" meaning the furniture and equipment plans and schedules are as determined in the Functional Program Process. Anticipated are the following components:

1) Millwork, built-in laboratory casework and other fixed furniture.

2) Fixed Laboratory Equipment

APPENDIX F

COMMISSIONING GUIDELINES AND MANUALS

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

PWGSC Commissioning Guidelines

CP.3

Guide to the development of the

Commissioning Plan

3rd edition
November 2003

Prepared by

National Commissioning Committee

Issued by

Real Property Branch

CP.3: Guide to the development of the Commissioning Plan

Table of Contents

CP.3: Guide to the development of the Commissioning Plan

1. Introduction

An operational facility can be regarded as a number of integrated systems delivering a functional environment through a "systems hierarchy" of components, equipment, subsystems, systems and integrated systems. After commissioning, these provide a fully operational quality facility, meeting all of the Owner/Investor's functional and operational requirements, on time and within budget.

Commissioning involves many activities and requires the active co-operation of many participants. For this reason, it is essential that everyone involved clearly understands what is to be done, why, by whom, when and for how much. This is the purpose of the Commissioning Plan.

2. Importance of the Commissioning Plan

The Commissioning Plain is the master planning document for commissioning the project and is addressed to all members of the Commissioning Team. It provides an overview of commissioning, defines roles and responsibilities, gives a general description of all elements that make up the Commissioning Plan and sets out the process and the methodology for successful commissioning.

3. Purpose of the Commissioning Plan

The Commissioning Plan is a **communications** tool, informing each member of the Commissioning Team, in general terms, of their roles and responsibilities.

The Commissioning Plan is also a **managemen**t tool, setting out the scope, standards of commissioning and deliverables.

4. Definition

The Commissioning Plan is the document that:

.1 outlines the organization, scheduling, allocation of resources, documentation, etc. pertaining to the implementation of the commissioning process,

.2 includes the requirements that each party involved in the commissioning process will have to accomplish, including sequencing, scheduling, documentation requirements, verification procedures, staffing requirements, etc.,

.3 sets out the deliverables relating to O&M issues, the commissioning process and the administration of the commissioning process that are to be produced,

.4 describes the process as proposed by the Designer (in consultation with the Commissioning Manager) for verifying that all built works meet the Owner/Investor's requirements,

.5 is designed so as to produce a complete functional system prior to issuance of the Certificate of Occupancy

5. Preparation

The Commissioning Plan is generally prepared after approval of the conceptual design. It will be revised and refined as necessary as design and development of working documents proceeds.

Prime responsibility for its preparation rests with the Designer. However, its production is a coordinated effort between the Project Manager, the Designer and the Commissioning Manager. Other parties involved may include, but not necessarily be limited to, the Owner/Investor, the User/Occupant, O&M personnel (or Property Manager), and the authority having jurisdiction. The Commissioning Plan is essentially complete to 95% at the completion of the working documents and will be further refined by the Contractor based upon his schedule and method of resourcing the project.

The Contractor will refine the Commissioning Plan to include all changes resulting from the Client Program modifications, approved design and construction changes. It will incorporate the planning of resources and timeline established by the project schedule, thus bringing the Commissioning Plan to 100% completion at the same time as the construction schedule.

6. Contents of the Commissioning Plan

.1 The Commissioning Plan **identifies all parties forming the Commissioning Team**. These may include, but not necessarily be limited to, the Client, the User/Occupant, Project Manager, PWGSC Design Quality Review Team, Property Manager, Commissioning Manager, the Property Manager, O&M personnel, Designer, Contractor, commissioning agency, the authority having jurisdiction and others as may be required from time to time.

.2 The Commissioning Plan **establishes communications and reporting protocols** between all members of the Commissioning Team.

.3 The Commissioning Plan identifies **all systems that are to be commissioned** together with all related components, equipment and sub-systems, as well as certification and documentation required for each. To do this, a full risk assessment must be carried out. Risk assessment may be considered as completing the following sentence: "IF ..... happens, THEN .....will (or may) occur". This is discussed in detail in Appendix A.

.4 The Commissioning Plan outlines the **objectives of commissioning**. In general, these may be described as a fully functional facility:

- .1 whose systems have been proven to meet the User's functional requirements, on time and within budgeted costs,
- .2 whose O&M personnel have been fully trained,
- .3 in which all systems have been fully documented in an easily retrievable manner

.5 The Commissioning Plan identifies the **roles and responsibilities of each member of the Commissioning Team**.

.6 The Commissioning Plan identifies **all deliverables relating to commissioning ,** including but not necessarily limited to:

.1 Deliverables relating to operation and maintenance (O&M) perspectives, including, but not necessarily limited to:

.1 Building Management Manual,
.2 Operation and maintenance budget,
.3 Design energy budget,
.4 Warranties,
.5 "As-Built" documentation,
.6 Inventory of spare parts, special tools and maintenance materials,
.7 Implementation of the PWGSC MMS identification system.

.2 Deliverables relating to the commissioning process including, but not necessarily limited to:

.1 Performance Verification Tests and Inspections,
.2 Contractor's startup, pre-commissioning activities and related documentation
.3 Contractor's startup, pre-commissioning activities for all disciplines, EMCS, life safety systems.
.4 Commissioning activities and related documentation
.5 Commissioning of integrated systems and related documentation
.6 Commissioning Specifications.
.7 Installation checklists (ICL).
.8 Product Information (PI) Report Forms.
.9 Performance Verification (PV) Report Forms.
.10 Commissioning Reports
.11 Activities During the Warranty Period.
.12 Tests to be Performed by the Owner/User.
.13. Training Plans

.3. Deliverables relating to the administration of commissioning including, but not necessarily limited to:

.1 Commissioning Schedules for each discipline.
.2 Method of payments for commissioning

END OF CP.3
GUIDE TO THE DEVELOPMENT OF THE COMMISSIONING PLAN

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

PWGSC Commissioning Guidelines

CP.4

Guide to development of

BUILDING MANAGEMENT MANUALS

3rd edition
November 2003

Prepared by

National Commissioning Committee

Issued by

Real Property Branch

CP.4 - Guide to the development of

Building Management Manuals (BMM)

Table of Contents

CP.4 - Guide to the development of
Building Management Manuals (BMM)

Chapter 1. General requirements

1.1 Description

The Building Management Manual (BMM) is addressed to the Owner/Investor and/or Asset and Facility Management and the disciplinary operating and maintenance personnel. It may be considered as the project's "Owners Manual".

The Building Management Manual **for SMALLER PROJECTS** is intended to supplement existing Building Management Manuals, unless the project is so extensive that the existing Building Management Manual is manifestly redundant,

.1 The Building Management Manual explains:
- .1 **"what'** systems, equipment and/or components were incorporated into the building,
- .2 **"why "** the system, equipment and components were selected, and
- .3 **"how"** the design and operating concepts of the sub-systems, systems and integrated systems are accomplished.

.2 The Building Management Manual describes, not necessarily in this order:
- .1 **the design intent** of the project, explains the purpose of the facilities from the consultant's point of view,
- .2 **how the design meets the Client's functional and operational requirements** as well as Corporate and Project Objectives.
- .3 **the design philosophy**, the conceptual framework of the project and provides a record of, and rationale for, decisions made throughout the development of the design, including the rationale for system selection based on life cycle cost analysis.
- .4 **information required for the successful operation and maintenance** of the building, its equipment, components and systems.
- .5 **the tools to facilitate informed decisions in the future** by the Building Management.

1.2 Application

The requirements of the Building Management Manual applies to new projects, renovations and fit-ups.

.1 Application to existing buildings:

Existing buildings which have undergone extensive renovations generally require a completely new Building Management Manual. The task of updating an existing O&M Manual is not normally worth the effort.

.2 **Existing buildings undergoing minor-medium-sized renovations, fit-ups, etc:** The existing O&M Manual(s) can generally be readily updated to reflect the new work, by removing all redundant data and replacing it with new data.

.3 **SMALLER PROJECTS new projects up to about $1M:** Generally require a Building Management Manual that may not need to be as extensive in scope as would be required for larger projects over $1M. This Manual will provide guidance in this regard.

1.3 Criteria for development

The Building Management Manual supports the management and operation of the building throughout its entire life cycle. It is therefore important that the manual~~s~~ be

.1 **professionally developed,**

.2 **well organized in terms of text and graphics to** facilitate its use as a building reference document,

.3 **simple to prepare**,

.4 **easy to update**, with information located in one place only with cross-referencing as necessary and without any duplication,

.5 **delivered in a timely manner** because much of it is needed during training,

.6 **assembled in a well-organized manner**, making it easy to use,

.7 **completely accurate and contain only information that is relevant to this building** so as to provide for safe, reliable and efficient operation Collections of catalogue pages, cuts and manufacturers' brochures should not be accepted.

1.4 Indexing

All data in all manuals shall be separated using hard paper separators having large, strong indexing tabs protected by clear plastic covers with descriptors matching the approved identification nomenclature

1.5 Use of the Building Management Manual

CP.4 - Guide to the preparation of Building Management Manuals should be attached to, and form part of, the Project Brief.

1.6 Production

The Project Design Team shall be responsible for the production of the BMM. However, the Project Construction Team, the Project Commissioning Team and the Facility Management Team shall cooperate fully.

For LARGER PROJECTS the Building Management Manual shall be prepared on current electronic word-processing equipment using software approved by the Department.. The main emphasis must be on ease of accessibility at all times, maintenance in up-to-date state and comparability with User's requirements.

1.7 Deliverables

Two (2) copies of each manual shall be provided on CD-ROM-RW diskette and four (4) hard copies shall also be provided.

1.8 Language

Separate manuals are to be provided for each official language as required by the Project Brief..

1.9 Units of measurement

All measurements shall be reported in SI units

1.10 Text

All text shall be clear, concise, arranged in logical sequence, preferably written in the imperative voice using vocabulary and expressions clearly understood by Building Management personnel.

Text should be 1.5 line spacing with 0.75" margin on left-hand side for binding and 0.5" margin on right-hand side. Text is to be on 210 x 297 mm 10M/20# white bond paper with text on one or two sides. Text referring to drawings, schematics and diagrams shall be on the facing page to facilitate cross- referencing.

For details of requirements for drawings, diagrams, schematics, charts and tables, refer to *CP.10: "Report Forms and Schematics"*.

1.11 Development and submission of BMM

It is essential that the Project Manager's approval be obtained before starting work.

.1 **At the Conceptual Design Report stage (or Schematic Design phase) it will represent the Designer's point of view** and will be produced in draft form, and two copies, meeting the language requirements of the Project Brief shall be submitted with the Conceptual Design Report (or Schematic Design Report) in a 3-ring, D-ring binder.

.2 **During detailed design Development** it will be revised, updated and submitted at the end of each required project delivery phase specified in the Project Brief with a view to becoming a complete project record. At each submission, its format, structure and organization shall be such that subsequent submissions need only the addition of missing information.

.3 **When the construction documents are tender ready,** the BMM shall be 90% complete from the design perspective.

.4 **Updating during construction and commissioning** shall include:

- .1 confirmation of adherence to established design criteria,
- .2 updating project archives,
- .3 recording changes in control and operating philosophy, methods of integrating control systems with central control systems,

.4 Updating descriptions of architectural and engineering systems, design intents, design assumptions.

.5 **Semi-final submission requirements:** The 99% complete Building Management Manual shall be submitted for review within twelve (12) weeks prior to commencement of training. Incorporate all comments so as to reflect the final as-built works including all changes, modifications, revisions and adjustments.

.6 **Use during commissioning and training:** The Building Management Manual must be available during the actual Commissioning of the installations and training of Facility Operations Staff.

.7 **Final submission requirements:** Prior to the issuance of the Final Certificate of Completion, provide The BMM as described under 1.7 - Deliverables, above - all meeting the language requirements of the Project Brief.

1.12 Binders for LARGER PROJECTS

Use 50-mm three-ring D-ring binders having clear vinyl pockets on front and spine. Identify each binder with the name of the building, manual name, part number and volume number. Each binder shall be prefaced with a complete Table of Contents. Binders shall not be more than two-thirds full. Cross-reference binders and sections as necessary

Separate binders shall be used for English and French versions of the BMM.

1.13 Binders for SMALLER PROJECTS

If the new data is not incorporated into existing BMM or O&M Manuals, replace existing binders with new 50-mm three-ring D-ring binders having clear vinyl pockets on front and spine to enable proper identification. Each binder shall be prefaced with a complete Table of Contents. Binders shall not be more than two-thirds full. Cross-reference binders and sections as necessary.

Separate binders shall be used for English and French versions of the BMM.

1.14 Use of BMM during training sessions

The BMM will be available for use during the Commissioning phase in the training of O&M Personnel and the Property Management personnel. Refer also to *CP.5 Guide to the preparation of Training Plans.*

1.15 Storage facilities for LARGER PROJECTS

The size of the project may indicate that the Building Management Manual may be too large for three-ring binders. In this case, filing cabinets or other approved storage facilities must be organized.

1.16 Conflicts with NMS Section 01730 - Operating and Maintenance Manuals

Since it has been observed that there may be conflicts with NMS Section 01730, it is recommended that the entire contents of Section 01730 be deleted and a single sentence inserted therein, referring the reader to Section 01814 - Commissioning: Manuals.

1.17 BMM for Parliamentary Precinct Directorate (PPD) projects

.1 **Fire Protection Manual** is normally produced by the Property Manager. It contains information relevant to emergency evacuation plans, fire drills, fire suppression systems, emergency electrical supply, battery-powered emergency lighting, fire pumps, portable extinguishers, fire alarm systems, voice communications systems, standpipe and hose systems, doors in fire separations, exit lights, hydrants, etc. This manual is to be based on existing PWGSC Fire Protection Manuals, but enhanced to be made facility-specific. The manual is to be architectural CAD-based and in full colour, matching format and graphical appearance for devices and systems in other facilities. Verify with the Commissioning Manager as to the requirements relating to this manual including requirements for completion.

.1 For requirements relating to schematics, refer to *CP.10: "Report Forms and Schematics"*.

.2 **Electrical Panel Inventory:** indicating detailed inventory of electrical circuitry, per panel board, installed or modified as part of the project. Manual is to be in conformity to details outlined in Appendix G of the PWGSC Electrical Panel Work Authorization (PEPWA). Manual format to be approved by the Commissioning Manager. Samples of existing electrical panel inventories for PPD buildings is available from the Commissioning Manager.

Chapter 2 Organization of the Building Management Manual

2.1 Introduction

The Building Management Manual is well organized, text and graphics that facilitate its use as a building reference document, with a detailed index and section dividers.

The format should use a combination of paragraphs, point form, sketches, photographs and schematics, and reduced size line diagrams (in folded arrangement, if necessary).

The following organization is suggested, but is not to be considered as complete or mandatory.

2.2 Contents

The BMM shall contain a design description of each system, including architectural, structural, mechanical, electrical, civil, fire protection, acoustical and other systems as well as all site systems.

2.3 Overall organization of the BMM

The BMM shall normally be divided into 5 **"Parts",** each of which shall be sub-divided into **"Sections".** These shall be as follows:

PART 1: GENERAL PROJECT DESCRIPTION

Section 1.1:	Index and List of contents.
Section 1.2:	Complete list of names, addresses, telephone & FAX nos.
Section 1.3:	Client's functional and operational requirements.
Section 1.4:	General description of building and systems
Section 1.5:	Accessibility requirements - ie. methods used to comply with code requirements.
Section 1.6:	FHBRO Heritage Character Statement (HCS)

PART 2: DESIGN CRITERIA, DESIGN INTENT, DESIGN PHILOSOPHY. APPLICABLE CODES AND STANDARDS

Section 2.1:	Design criteria, design intent (ie. how the design criteria have been met), design philosophy, how Client's requirements have been met.
Section 2.2:	Design information, design decisions, design assumptions, design compromises, client concessions:
Section 2.3:	Applicable Statutory and Regulatory Codes, Standards and Guidelines

PART 3: SYSTEMS OPERATION AND MAINTENANCE

Section 3.1	Standard operating procedures (SOP) manual
Section 3.2	Operating and maintenance (O&M) manual

PART 4: BUILDING MANAGEMENT

Section 4.1: Building documentation
Section 4.2: Maintenance and service contracts
Section 4.3: Life Safety Compliance (LSC) Manual:

PART 5: SUPPORTING APPENDICES

Section 5.1: Architectural appendices
Section 5.2: Structural appendices
Section 5.3: Fire protection and fire prevention appendices
Section 5.4: Mechanical appendices
Section 5.5: Electrical appendices
Section 5.6: WHMIS information manual
Section 5.7: Operation and maintenance (O&M) budget
Section 5.8: "As-built" construction documents.

BUILDING MANAGEMENT MANUAL - Check List			
	Larger Projects	**Smaller Projects**	**Comments**
PART 1: GENERAL PROJECT DESCRIPTION			
1.1: Index and List of contents.	YES	YES	
1.2: Complete list of names, addresses, telephone & FAX numbers	YES	YES	
1.3: Client's functional and operational requirements.	YES	YES	
1.4: General description of building and systems - including:	YES		
.1 Energy conservation strategy	YES	Only as	
.2 Design life span of the building	YES	approp-	
.3 Office planning strategy	YES	riate to	
.4 Alternative layouts for function rooms	YES	Project	
.5 Special concerns	YES		
.6 Provisions for anticipated future changes	YES		
.7 Special maintenance issues	YES	Maybe	May have to include CHANGES to special maintenance issues
.8 Project archives	YES	Maybe	May have to include CHANGES to project archives
.9 Summary of systems:	YES		
1.5: Accessibility requirements - i.e. methods used to comply with code requirements	YES		
1.6: FHBRO Heritage Character Statement (HCS)	YES	Maybe	
PAR 2: DESIGN CRITERIA, DESIGN INTENT, DESIGN PHILOSOPHY, APPLICABLE CODES AND STANDARDS			
2.1: Design criteria, design intent	YES	YES	
2.2: Design information, design decisions, design assumptions, design compromises, client concessions	YES	YES	
2.3: Applicable Statutory and Regulatory Codes, Standards and Guidelines	YES	YES	
.1: fire and life safety evaluation	YES	YES	
.2: accessibility report	YES	YES	

BUILDING MANAGEMENT MANUAL - Check List			
	Larger Projects	**Smaller Projects**	**Comments**
.3: Special tests or reports on component issues	YES	YES	
.4: report outlining requirements for occupancy	YES	NO	For SMALLER projects whether the need applies will depend upon the size and complexity of the project and whether these items were applied to the project
.5: All code analyses	YES	NO	
.6: fire and life safety evaluation	YES	NO	
.7: accessibility report	YES	NO	
.8: Special concerns such as fire truck weight, height	YES	NO	
.9: Facility operation under heightened security conditions	YES	NO	
.10: Special tests or reports on component issues	YES	NO	
PART 3 - SYSTEMS OPERATION and MAINTENANCE			
3.1: Standard operating procedures (SOP) manual	YES	YES	
.1: Information directory	YES	YES	
.2: Drawings, schematics, diagrams, areas served, system description	YES	YES	
.3: Operating standards, operating logs, operating routines, procedures, EMCS data	YES	YES	
.4: EMCS controls information	YES	YES	
.5: Troubleshooting information	YES	YES	
3.2: Operating and maintenance (O&M) manual	YES	YES	Generally, there should be one O&M manual for each discipline and for each system within that discipline.
.1: Information directory	YES	YES	
.2: Approved shop drawings, product data and associated maintenance data	YES	YES	
.3: Information supporting the maintenance program	YES	YES	
.4: MMS equipment inventory	YES	YES	
PART 4 - BUILDING MANAGEMENT			
4.1: Building documentation	YES	Maybe	May not be necessary for SMALLER projects
.1: Index of all manuals	YES		
4.2: Maintenance and service contracts	YES	Maybe	

BUILDING MANAGEMENT MANUAL - Check List			
	Larger Projects	**Smaller Projects**	**Comments**
.1: Index of contracts	YES		May not be necessary for SMALLER projects
4.3: Life Safety Compliance (LSC) Manual	YES	Maybe	
.1: Emergency information relating to all possible emergencies	YES		May already exist or not be necessary, or may already exist, for SMALLER PROJECTS.
.2: Emergency provisions	YES		
.3: Emergency control procedures	YES		
.4: Emergency evacuation procedures	YES		
PART 5 - SUPPORTING APPENDICES			
5.1: Architectural appendices	YES	YES	
.1: Door schedules doors	YES	YES	
.2: Finishing schedules	YES	YES	
.3: Inspection certificates, construction permits	YES	YES	
.4: Area measurement/ space usage report	YES	Maybe	May not be necessary for SMALLER projects
5.2: Structural appendices:	YES	YES	
.1: Roof anchor log book	YES	YES	
.2: Floor loading plans	YES	YES	
5.3: Fire protection and fire prevention appendices:	YES	YES	
.1: Fire protection system test reports	YES	YES	
.2: Smoke test reports	YES	YES	
.3: Commissioning reports for fire protection and fire prevention systems	YES	YES	
5.4: Mechanical appendices	YES	YES	
.1: Inspection certificates, installation permits	YES	YES	
.2: All engineering calculations	YES	YES	
.3: Piping and ducting pressure test certificates	YES	YES	
.4: Charts - valve, steam traps, etc	YES	YES	
.5: Copies of posted instructions	YES	YES	
5.5: Electrical appendices:	YES	YES	

BUILDING MANAGEMENT MANUAL - Check List			
	Larger Projects	Smaller Projects	Comments
.1: Inspection certificates, installation permits	YES	YES	
.2: Electrical work log book	YES	YES	
.3: Charts and schedules	YES	YES	
.4: Locations of cables and components	YES	YES	
.5: Copies of posted instructions	YES	YES	
5.6: WHMIS information manual	YES	YES	
5.7: Operation and maintenance (O&M) budget	YES	YES	
5.8: "As-built" construction documents:	YES	YES	
.1: "As-built" drawings and specifications	YES	YES	
.2: All approved change orders	YES	YES	
.3: Copies of identification charts and posted instructions	YES	YES	

PART 1: GENERAL PROJECT DESCRIPTION

Section 1.1: Index and list of contents. The index includes a complete detailed reference (sub-index) to describe where other related operations and maintenance information is located

Section 1.2: Complete list of names, addresses, telephone and facsimile numbers of all firms, designers, consultants, sub-consultants, specialist consultants and agents who participated in the design and delivery of the facility.

Section 1.3: Client's functional and operational requirements.

Section 1.4 for LARGER PROJECTS: to include general description of building and systems - including:

- **.1** **Energy conservation strategy** for the building,
- **.2** **Design life span of the building,**
- **.3** **Office planning strategy** with floor protocol, related information, and simplified plans illustrating client group configurations or zones,
- **.4** **Alternative layouts for function rooms**,
- **.5** **Special concerns such** as fire truck weight or height provisions for access to the building (e.g. small bridges)**,**
- **.6** **Provisions for anticipated future changes** as identified,
- **.7** **Special maintenance issues**, such as exterior bronze work, decorative hardware, floors, marble, etc.**,**
- **.8** **Project archives** - to include how these archives are to be managed, updated and delivered at the end of the project,
- **.9** **Summary of systems:**
  - **.1** **Architectural systems -** including acoustical systems**,**
  - **.2** **Structural engineering systems -** such as raised floor systems**,**
  - **.3** **Civil engineering systems -** such as site services**,** landscape design intent, including location of hose bibs, coverage of irrigation systems, Christmas lighting on trees, shrubs, snow removal/dumping arrangements, grounds maintenance arrangements, other special requirements,
  - **.4** **Mechanical engineering systems** - including central heating and cooling plant, steam and hydronic systems, HVAC systems, plumbing systems, laboratory systems, storm water, regular and laboratory waste systems, EMCS., refrigeration systems,
  - **.5** **Electrical engineering systems -** including high, medium and low voltage systems, alternative power systems, low voltage lighting control and communications systems.

Section 1.4 for SMALLER PROJECTS: General description of new systems and changes to existing systems within the existing building and additions. To include:

- **.1** **ONLY the appropriate items listed above for larger projects,** PLUS.
- **.2** **Changes to special maintenance issues**, such as exterior bronze work, decorative hardware, floors, marble, etc.**,**
- **.3** **Changes to existing project archives** - including how these archives are to be managed

Section 1.5: **Accessibility requirements - being methods used to comply with code requirements. (**for code requirements, refer to PART 2, Section 2.3). To include:

- **.1** **Way-finding and other similar signage information**.

Section 1.6: **FHBRO Heritage Character Statement (HCS)** Commemorative Integrity Statement (CIS), Conservation Strategy Report, etc.

END OF PART 1

PART 2 - DESIGN CRITERIA, DESIGN INTENT, DESIGN PHILOSOPHY APPLICABLE CODES AND STANDARDS

General description of systems to be included in the SOP Manual

.1 **Descriptive information** relating to the installed systems would include:

- .1 sequence of operation,
- .2 building operation under heightened security conditions (e.g. facility required to silence fire alarm signally during important meetings and uses fire watch process) emergency procedures,
- .3 equipment data, MMS system, equipment, and component identification.

.2 **Architectural systems -** would include information on operation and maintenance on all installed systems including, as appropriate:

- .1 building envelope (eg. curtain walls, roofs),
- .2 dock levellers,
- .3 swing cages,
- .4 vertical transportation,
- .5 furnishings and finishes (eg. doors and windows and related hardware**,**
- .6 door and window hardware (cross-reference to PART 5 - Supporting Appendices),
- .7 finishing schedules (cross-reference to PART 5 - Supporting Appendices),
- .8 window washing/cleaning and roof anchor information,
- .9 landscaping,
- .10 maintenance requirement for special surfaces, (cross-reference to PART 5 - Supporting Appendices).

.3 **Fire protection systems:** (Cross-reference to PART 4 - Building Management). Would include information on operation and maintenance on all fire protection and life safety systems installed, including, as appropriate:

- .1 fire pumps,
- .2 standpipe and hose systems,
- .3 wet and dry pipe sprinkler systems (provide single line diagram), including any special features (eg. sprinklers at windows),
- .4 smoke control and smoke management systems (including diagrams of fire and smoke control zones, rated separations) and lists of type and locations of fire dampers - cross-reference to Section 3.3 - Mechanical),
- .5 fire detection, fire protection and suppression systems**,**
- .6 Fire protection requirements for mechanical and electrical systems to include, but are not necessarily limited to:
  - .1 general control strategies, sequences, and reset schedules;
  - .2 seasonal switch-over procedures,
  - .3 emergency procedures during a fire condition, power or equipment failure,
  - .4 Reduced simplified plans illustrating system configurations, including single line and plan drawings of zoning of each system.

.5 fire, smoke, carbon dioxide and carbon monoxide detectors and alarm systems

.4 **Mechanical:** Would include information on operation and maintenance on all mechanical systems installed, including, as appropriate:

.1 central heating and cooling plant,
.2 steam and hydronic distribution systems (provide single line diagrams or schematics),
.3 refrigeration systems (provide single line diagrams or schematics),
.4 HVAC, heat recovery and exhaust systems,
.5 plumbing systems, sanitary systems, storm water systems,
.6 laboratory waste treatment systems,
.7 EMCS (including general control strategies, sequences, and reset schedules, seasonal switch-over procedures).

.5 **Electrical:** Would include information on operation and maintenance on all electrical systems installed, including, as appropriate:

.1 normal Power (provide single line diagrams),
.2 emergency power (provide single line diagrams),
.3 lighting systems and low voltage lighting control systems,
.4 data communication systems (provide single line diagrams),
.5 high and medium voltage distribution systems.

Section 2.1: **Design criteria, design intent (ie. how design criteria have been met), design philosophy, how Client's requirements have been met (ie.** WHY the components and the systems were chosen.

Section 2.2: **Design information, design decisions, design assumptions, design compromises, client concessions:** This section:

.1 identifies agreements with respect to regulatory / statutory requirements,
.2 should be organized by discipline: eg. Architectural, Structural, Fire protection and prevention, Mechanical and Electrical, with all the design information and decisions clearly outlined,
.3 cross-references to codes and standards used and specifies appropriate sections
.3 identifies conformity to statutory requirements such as fire and life safety, code compliance, accessibility, heritage buildings, This section is organized by discipline, with all the design information and decisions clearly outlined and cross-referenced to codes and standards used, and specify appropriate sections

.1 **Architectural:** aesthetics (materials and colours, lighting, floor layouts and details as required,
.2 **Structural:** Floor load capacity, roof load capacity, special design elements,

.3 **Fire protection and prevention:** Type of building (eg., high rise), fire ratings, type of systems selected with rationale for selection, Plans with fire separations, and egress routes indicated,

.4 **Mechanical:** Indoor environmental criteria for each space (eg. temperature, RH, noise criteria, humidity, air changes/hour, inter-space pressurization, air flow patterns and velocities, indoor air quality), space requirements, system selection with rationale for selection,

.5 **Electrical:** Space requirements (lighting, fire alarm, normal/emergency power, data communication, systems selection with rational for selection, single line diagrams for power and fire alarm systems

.4 provides general description of systems relating to the installed systems would include:

.1 location of equipment,

.2 area served,

.3 narrative description of how each system operates, why it was selected, how the system will achieve its designed purpose, based on the functional and operational requirements as well as the Design Criteria,

.4 options and analyses that were considered,

.5 any special features,

.6 interfaces with existing systems,

Section 2.3: Applicable statutory and regulatory codes, standards and guidelines and where they were applied.

For SMALLER PROJECTS, this would include:

.1 **A fire and life safety evaluation** and a record of any special negotiated agreements with municipal and federal authorities having jurisdiction.

.2 **An accessibility report** recording agreements, special exceptions, proof of approvals, noting the enhanced requirements of the CAN CSA 651 Barrier Free Design Standard, current edition,

.3 **Special tests or reports on component issues** (e.g. fire load from boxed files, heritage door fire test results, etc.)

For LARGE PROJECTS, this would include all of the above PLUS:

.4 **A report outlining requirements for occupancy,** existing related issues, classification of spaces considering the NBCC, Treasury Board Standards, and related codes and standards.

.5 **All code analyses** (all relevant reports/letters/etc.) in an AutoCAD file and to form part of the "As-Built" Record Drawings so that these issues can be read in conjunction with the drawings,

.6 **A fire and life safety evaluation** and a record of any special negotiated agreements with municipal and federal authorities having jurisdiction,

.7 **An accessibility report** recording agreements, special exceptions, proof of approvals, noting the enhanced requirements of the CAN CSA 651 Barrier Free Design Standard, current edition,

.8 **Special concerns such as fire truck weight or height** provisions for access to the facility (e.g. on small bridges),

.9 **Facility operation under heightened security conditions** (e.g. facility required to silence fire alarm signally during important meetings and uses fire watch process),

.10 **Special tests or reports on component issues** (e.g. fire load from boxed files, heritage door fire test results, etc.)

END OF PART 2

PART 3 - SYSTEMS OPERATION and MAINTENANCE

Section 3.1 Standard operating procedures (SOP) Manual

.1 **Generally, there should be one binder for each discipline and for each system within that discipline,** containing information:

.1 relating to the detailed description of each system,
.2 relating to day-to-day operation of the system,
.3 permitting operating personnel to make decisions which are in complete agreement with the Client's requirements within the limits of the installed system..

.2 **Development:** The SOP Manual is produced **by the Designer** using the format established by the generic SOP document. The Project Manager will review and approve its format at the outset.

During all stages of development, the Contractor cooperates with the Designer by providing all required data and information, identifying changes in set points of operating, limit and safety controls during start-up, verification, commissioning, adjustments in operating procedures, etc.

.1 **By the end of PDS Stage 3 - Implementation - Preliminary Design** the SOP Manual will include:

.1 the area and its function served by the system and all connected or related loads,
.2 floor plans indicating zoning of systems,
.3 drawings, schematics and descriptions of the system, subsystems, equipment, components, functions and input/output parameters of each controller, start-up and shut-down procedures.
.4 brief narrative description of the sequence of operations and its components.

For SMALLER PROJECTS the above stage in the -production of the SOP Manual may not be necessary.

.2 **By the end of PDS Stage 3 - Implementation - Working Documents,** to be 90% complete & include:

.1 detailed narrative descriptions of the sequence of operations.
.2 all necessary emergency procedures or requirements.
.3 details of its relationship to all other system.

.3 **During PDS Stage 3 - Implementation - Construction,** the Designer will bring the SOP Manual to 99% completion prior to pre-start-up inspections.

.4 **During PDS Stage 3 - Implementation - Construction and PDS Phase 4 - Commissioning,** the SOP Manual is brought to 100% completion at least [6] weeks prior to issuance of the Interim Certificate of Completion, using data obtained during start-up, verification and commissioning. This will include:

.1 documenting control systems as finally set,
.2 instructions for operation under all conditions and under all loads.
.3 details of response to emergency situations.

.5 **During PDS Phase 5 - Operation,** it may be necessary to make further changes to reflect operation under varying conditions of occupancy.

.3 **Organization of the SOP Manual:** In general, the contents should be arranged as follows:

Division 1: Information directory: To provide easy access to all information, it should include:

.1 table of contents listing all systems in the building,
.2 list of equipment for each system, cross-referenced to the Operating and Maintenance Manual
.3 identity of binder providing information,
.4 table of contents of each binder.

Division 2: Drawings, schematics, diagrams, areas served, system description. To include, but not necessarily limited to:

.1 drawings, schematics, diagrams, charts identifying all systems and the area(s) served by each system.
.2 For each system:
  .1 drawings, schematics, diagrams, and narrative description
  .2 operational tolerances of systems, equipment and components,
  .3 manufacturers' recommendations for operation under all normal and emergency conditions,
  .4 cross-references to the approved TAB and PV reports for each system - located in the appropriate section of PART 5 - SUPPORTING APPENDICES.

Division 3: Operating standards, operating logs, operating routines, procedures, EMCS data: To be clearly understandable to building operators and the Property Manager and to include, but not necessarily limited to:

.1 required standards of performance,
.2 operating logs to monitor performance,

.3 reporting requirements for all licensing and inspections as applicable,
.4 identity of all activities associated with normal and abnormal operation,
.5 details of load-shedding procedures,
.6 operating checklists,
.7 seasonal start-up and shutdown procedures,
.8 electrical safety single line diagrams for electrical systems,
.9 EMCS data to include system schematics, input/output summaries, complete with alarm limits for each device, copy of the actual program language**.**
.10 All special or codified (eg. Labour Canada regulations and amendments) procedures relating to environmental control, health and safety, and productive work environment.

Division 4: EMCS controls information: To include:
.1 system schematics, graphical and electrical drawings, and devices,
.2 narrative description of the control programming, point names, safety features, reset schedules,
.3 input/output summaries, complete with alarm limits for each device,
.4 copy of the actual program language

Division 5: Troubleshooting information: This may include:
.1 elementary questionnaires,
.2 simple walk-through inspections,
.3 sophisticated diagnostic or expert analysis (depending upon the complexity of the system and the technical expertise of the O&M personnel). The intent is to allow Users of this manual to isolate probable causes in an orderly and efficient manner.

End of Section 3.1 - Standard operating procedures (SOP) manual

Section 3.2 Operating and maintenance (O&M) manual

Generally, there should be one operating and maintenance manual for each discipline and for each system within that discipline.

.1 **Development:** Normally the operating & maintenance (O&M) manual) is produced by the Contractor under the guidance and supervision of the Designer and the Project Manager. The O&M Manual is prepared using the Product Information (PI) Report forms, data provided by the Contractor and information from other sources as required.

During all stages of development**,** the Contractor cooperates with the Designer and the Project Manager in the development of the O&M manual.

.1 **Assembly is started at the commencement of PDS 3 - Implementation - Construction** and is 90% complete prior to pre-start-up inspections.

.2 **During PDS Phase 4 - Commissioning,** this manual is amended so as to become 100% complete at least [6] weeks prior to the issuance of the interim certificate of completion. The O&M manual must be available at all times during commissioning and the training of the O&M personnel.

.3 **During PDS Phase 5 - Operation:** The Contractor must cooperate with the Designer and Commissioning Manager to supplement it, modify it, provide additional requested information, identifying all changes in maintenance procedures and schedules, etc.

.2 **Approvals:** The format and organization of the O&M manual must be reviewed by the Commissioning Manager within 12 weeks of the award of Construction Contract. This must be identified as an item in the Construction and Completion Schedule and the Commissioning Schedule.

.3 Contents:

.1 It is not merely a collection of catalogue pages, cuts and manufacturers' brochures.

.2 It must be complete in every respect and include information relating to ONLY what is installed on this project.

.3 It is most important that maintenance personnel gain easy access to all information contained in the O&M manual when preparing work procedures, servicing or repairing the equipment, ordering parts, etc.

.4 Depending upon the size of the project, the O&M manual should include:

Division 1: Information directory: providing information relating to system equipment and component inventory

Division 2: Approved shop drawings, product data and associated maintenance data. With today's technology, there should be no difficulty in making these completely project-specific. They shall include the following data:

.1 **Shop drawings and product data,** containing:

- .1 capacity, operating parameters,
- .2 operating, safety and limit devices,
- .3 physical sizes, O&M clearances, mountings,
- .4 performance standards, characteristics, curves and graphs showing point of actual operation and efficiencies,
- .5 details of all accessories, drives, safety guards and adjustment limits,
- .6 details of motors, starters, controls and all electrical data,

.2 **Manufacturers' construction, installation, mounting, commissioning, O&M recommendations and instructions,** warranties, start-up and shutdown procedures, and training material,

.3 **Completed product information (PI) report forms containing** original purchase order number, date of purchase, name, address and telephone number of vendor,

.4 **Inventory of spare parts, special tools, maintenance materials,** together with source and availability information, instructions for use and/or installation, details of packaging, identification and location of storage,

.5 **Warranty information** and installation information: To include:

- .1 lists of extraordinary warranties.

.6 **Inventory of all inspection certificates** complete with summary of expiry dates so as to facilitate updating, renewal and periodic ongoing inspections.

Division 3: Information supporting the maintenance program: This should include:

- .1 Recommended project-specific maintenance procedures and frequencies,
- .2 Everything necessary for the preparation of predictive, preventive, breakdown and all other project-specific

maintenance programs including location of the equipment, frequency, task time allotted, tools, spare parts and other consumables required, skill level, frequency, task time, etc.,

.3 Information relating to removal and replacement of major equipment including, as a minimum, details of methods, lifting equipment required, route of egress and entry.

Division 4: MMS equipment inventory. Where there is an existing identification system which can be retained, the manual should be organized to match this inventory.

End of Section 3.2 - Operating and maintenance (O&M) manual

END OF PART 3

PART 4 - BUILDING MANAGEMENT

4.1 General

This Part would include information required to manage the building under normal and emergency situations.

IMPORTANT NOTE: Do not duplicate information contained in other Parts of this Building Management Manual. Cross-reference where required between the various Parts of this Building Management Manual and to other manuals.

Section 4.1: Building documentation:

This section may not be necessary for SMALLER PROJECTS.

.1 **Index of all manuals** outlining : i) purpose ii) information contained, and iii) location where documents are archived.

Section 4.2: Maintenance and service contracts:

This section may not be necessary for SMALLER PROJECTS.

.1 **Provide index of contracts** with brief outline of (i) extent of contract; (ii) contract period and cost; (iii) service provider; (iv) monitoring agent.

Section 4.3: Life Safety Compliance (LSC) Manual:

This manual may not be necessary, or may already exist, for SMALLER PROJECTS.

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 Commissioning Manager for reference purposes. It should include:

.1 **Emergency information relating to all possible emergencies** such as:

- .1 the presence of smoke, fire (cross-reference to PART 3 - Section 3.2), or floods,
- .2 the presence of gas,
- .3 electrical power failure,
- .4 failure of water supply, heating, cooling, elevators, escalators,
- .5 refrigerant release, chemical spills,
- .6 heating and cooling generation plant emergencies, failure of fuel supplies,
- .7 intrusion and breach of security.

Include list of emergency contacts with phone numbers. Information is to be immediately available and comprehensible to technical and non-technical users.

.2 **Emergency provisions:** in the event of flood design features, earthquake calculations (where applicable), dedicated emergency generators for high security, medical facilities, high tech systems, emergency control procedures, etc,

.3 **Emergency control procedures** during a fire condition, power or equipment failure,

.4 **Emergency evacuation procedures.**

END OF PART 4

PART 5 - SUPPORTING APPENDICES

The purpose of this Part is to capture all design and other information that does not naturally belong in any other Part of the Building Management manual.

Section 5.1: **Architectural appendices:** Including:

- **.1** **Door schedules doors** (numbered as occupancy) **and hardware**,
- **.2** **Finishing schedules**,
- **.3** **Inspection certificates and all necessary construction permits,**
- **.4** **PV reports for all architectural systems and equipment.**

The following items may not be required for SMALLER PROJECTS:

- **.5** **Area measurement/ space usage report -** to include a complete summary of types of surfaces and finishes, special or unusual surfaces, features or unique products or sources.

Section 5.2: **Structural appendices:** Including:

- **.1** **Roof anchor log book** outlining all roof anchor points, code requirements and procedures to be employed when washing windows and using roof anchors,
- **.2** **Floor loading plans** with load assumptions and method of structural calculation, include for point and distributed loads.
- **.3** **PV reports for all structural systems.**

Section 5.3: **Fire protection and fire prevention appendices:** Including:

- **.1** **Fire protection system test reports.**
- **.2** **Smoke test reports,**
- **.3** **PV reports for fire protection and fire prevention systems.**.

Section 5.4: **Mechanical appendices:** Including:

- **.1** **Inspection certificates and all necessary installation permits,**
- **.2** **All engineering calculations**, including heating and cooling load calculations. 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,
- **.3** **TAB and PV reports for all mechanical systems and equipment.**
- **.4** **Piping and ducting pressure test certificates,**
- **.5** **Charts - valve, steam traps, etc.,**
- **.6** **Copies of posted instructions**

Section 5.5: **Electrical appendices:** Including:

- **.1** **Inspection certificates and all necessary installation permits,**
- **.2** **TAB and PV reports for all electrical systems and equipment.**
- **.3** **Electrical work log book** for recording all future electrical work, as required by authority having jurisdiction,
- **.4** **Charts and schedules,**

.5 Locations of cables and components,
.6 Copies of posted instructions

Section 5.6: WHMIS information manual:
Including data sheets relating to controlled substances in use within the operation of the building. This manual is to be subdivided by supplier, then product. A detailed index is to appear at the beginning of the manual.

Section 5.7: Operation and maintenance (O&M) budget:
Containing a detailed breakdown of various items with the assessment of the systems selection, estimated electrical, mechanical, or specialty equipment annual energy consumption and systems maintenance, operation and/or service contract costs.

Section 5.8: "As-built" construction documents.
These are the accurate record of construction and include:
.1 "As-built" drawings and specifications,
.2 all approved change orders supplemented by schematics and diagrammatic layouts as necessary,
.3 copies of identification charts and posted instructions

Section 5.9: Final commissioning reports
.1 Final commissioning report,
.2 Final evaluation report.

END OF PART 5

Chapter 3 Schematics and Diagrams for Manuals

3.1 Requirements

Refer to *CP.10: "Report Forms and Schematics"*.

END OF CP.4

Guide to the preparation of

BUILDING MANAGEMENT MANUALS

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

PWGSC Commissioning Guidelines

CP.5

Guide to preparation of

Training Plans

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CP.5: Guide to preparation of Training Plans

Table of Contents

CP.5: Guide to preparation of Training Plans

1. Definition of O&M personnel

The term "O&M personnel" as used here includes the Property Manager, building operators, maintenance staff, security staff (as required) and technical specialists.

O&M personnel may be employed by PWGSC, other government departments (OGDs) or by private sector specialist contractors.

2. Objectives of training plans

Training plans must give full consideration to all aspects of training.

Properly trained O&M personnel are critical to the successful operation of any project. The aim of initial and ongoing training is to enhance monitoring and diagnostic capabilities and result in more efficient, cost-effective operation of the facility. A well-trained O&M Team is able to identify repair and maintenance needs that would otherwise go undetected for long periods with possibly serious consequences.

For training of O&M personnel to be effective, they should be available during the later stages of construction, to allow for familiarization with the facility and the installed systems.

Initial training shall be in sufficient detail and of sufficient duration to meet the following objectives:

.1 Safe, reliable and energy-efficient operation of all systems in all normal and all emergency modes and under all conditions.
2 Effective ongoing inspection and measurement of system performance.
3 Proper preventive maintenance, diagnosis and troubleshooting.
4. Service and repair of all systems, equipment and components .
5 Ability to update documentation and input on future building modifications.
6. Ability to operate equipment and systems under emergency conditions without assistance or until appropriate qualified assistance arrives

3. Long term ongoing training

"Long-term" ongoing training is not included in commissioning activities. However, training courses and training materials must be designed to permit long-term ongoing training well into the future.

4. Coordination and monitoring

.1 The Commissioning Manager shall:

.1 review and comment on the Training Plan and training schedule,
.2 coordinate all participants for training,
.3 shall monitor all training.

.2 **The Contractor** shall co-ordinate and implement all training to be provided by his subcontractors, suppliers, fabricators and vendors etc.,

5. Responsibilities

.1 **The Designer** shall:

.1 direct all training,

.2 include in the Working Documents all specifications for training material, training and classroom time, Contractor personnel (or professional trainers where required) and resources to be provided by equipment/systems manufacturers and installers for training purposes, including Design Intent.

.2 **The Commissioning Manager shall :**

.1 ensure that all designated O&M personnel will be available for training during later stages of construction for purposes of familiarization with the facility and all installed systems,

.2 ensure that the quality of the Contractor's training and training materials meets all requirements of the project.

.2 **The Contractor** shall ensure provision of training materials, training and classroom times, Contractor's personnel, professional trainers (where deemed appropriate), manufacturers' resources for training purposes and be responsible for:

.1 implementation of all training activities,

.2 coordination among instructors,

.3 quality of training and training materials

6 Trainees

Shall include O&M personnel selected for operating and maintaining the project, the Property (Facility) Manager, building operators, maintenance staff, security staff, technical specialists (as applicable).

7. Level of training

The level of training required for O&M personnel on a project depends on many factors, including:

1. **Complexity and size of the project:** Training must address not only the individual systems but interaction among all systems during integrated operation. A simple HVAC installation with one Programmable Controller obviously has a far different training requirement than a complete Building Automation System containing integrated systems for fire alarm, smoke control, security and intrusion monitoring, window blind operation, lighting controls, emergency power, clock, communications, and so on.

2 **Location**: Projects in remote areas must be self-sufficient for longer periods than those within or close to urban centres. Training for O&M personnel responsible for projects in remote locations must provide in-depth coverage so that educated

judgements can be made on the spot without the assistance of the Manufacturer or Designer.

3 **Trainee prerequisites**: Basic skills and knowledge that are considered essential prerequisites for staffing the O&M personnel positions must be defined.

4 **Service contracts**: The nature and extent of Service Contract provisions can influence the level of training required for in-house O&M personnel. The work required, the proximity of the Service Contractor to the site, and accessibility to the site can all have a bearing on training needs.

8. Instructors

Instructors shall include:

.1 **Designer:** To provide instruction on the design philosophy, design criteria, design intents, and general description of all systems.

.2 **Contractor**: To provide instruction on the operation of specific systems, equipment or components, including start-up, operation, shut-down, features of controls, such as reasons for, results of, implications on associated systems of, adjustment of setpoints of control and limit safety devices

..3 **Factory-trained and certified manufacturer's maintenance specialist personnel:** to provide instruction on start-up, operation, care, maintenance, shut-down of equipment for which they have certified installation, started up and carried out PV tests.

.4 **Professional trainers:** Where the Contractor is not deemed to be able to deliver the quality or level of training required.

9. Training requirements

.1 **Organization:** Training of O&M personnel shall consist of three main parts:

.1 **Familiarization**: This will be in two parts:

Part 1 Within [4] months of award of Contract, the Designer will familiarize all parties to the Contract in all matters relating to occupancy profile, functional requirements, design solutions, systems philosophies, system layouts, operating sequences, etc., requirements for the completion of the Building Management Manual including the development of the Maintenance Manual.

Part 2: Familiarization sessions organized for all systems during Phase 3d - Implementation (construction and installation stage) and Phase 4 - Commissioning (activation and performance verification activities).

.2 **Hands-on training**: shall be provided on all systems, components and equipment and explanations of all commissioning procedures shall be given during the commissioning phase.

.3 **Classroom sessions:** shall be provided during PDS Phase 4 - Commissioning, with instruction regarding functional requirements, system philosophy, system operation and use of the Building Management Manual and all other commissioning documentation.

.2 Content

Training requirements are included in table format in the commissioning specifications - Section 01815 - Commissioning: Training of O&M Personnel. The tables provided in this section of the specification are to be considered as illustrative ONLY and must be modified to meet actual project requirements.

Training shall include:

.1 Review of the facility, including occupancy profile
.2 Functional requirements
.3 System philosophy – design criteria, design intents, why the system was designed in this way, why certain settings are important and should not be changed without proper authority, limitations of each system, including emergency procedures
.4 Review of system layout and equipment, components and controls
.5 System operating sequences, including interaction between systems forming part of integrated systems, step-by-step directions for starting up and shutting down all systems, closing and opening valves, dampers and switches, adjusting control settings, turning motors on and off, emergency procedures
.6 Maintenance and servicing of systems, equipment and components
.7 Troubleshooting diagnosis – symptoms, signs, causes and corrective measures. For some equipment, this need only be a general knowledge, but should be enough to allow the operator to describe the problem adequately and to take emergency measures until qualified help arrives.
.8 Review of the Building Management Manual.

.3 Instructional materials

.1 General: All instructional material shall be produced in a form that will permit future training for replacement O&M personnel to the same degree of detail and depth as supplied by initial training.

.2 Training materials shall include at least the following:

.1 "As-built" Contract Documents
.2 Building Management Manual. Copies of the Building Management Manual shall be made available to O&M personnel

prior to the familiarization sessions for retention throughout the training period for purposes of self-study.

.3 TAB, PV Reports

.3 **Instructional material** shall be supplemented as necessary by:

.1 transparencies for overhead projectors

.2 35-mm slide presentations

.3 manufacturer's training videos. These should be screened and approved by the Engineer at least six months prior to pre-start-up inspections before being included as part of the training material.

.4 equipment models

.4 **Instructors** shall be responsible for the content and quality of training materials for all training sessions under their jurisdiction.

.4 Training plan

.1 A training Plan should be developed for each discipline based upon project requirements within 12 weeks of award of Contract.

.2 Submit the training Plan to the Project Manager for review and comment at least two weeks prior to the proposed training dates. Update and resubmit as required.

.3 Include an agenda and a course outline summarizing the content and duration of training.

.4 Co-ordinate the date(s) of the training session(s) with the Project Manager. Project Manager to organize the location and provide the lists of participants.

.5 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 Project Manager.

.6 Record the time, date and subject matter of training sessions as they occur. Indicate all those who are present at each training session.

10 Delivery of training

.1 Training shall normally be provided during regular working hours prior to take-over of the project.

.2 Adequate time for training is to be included in Construction and Completion Schedule.

.3 Each training session should not be longer than three hours and provided between the hours of 0830 – 1130 and 1300 – 1600.

.4 Training is to be hands-on, classroom, oral, written and audio/visual.

11 Timing of training

.1 Training sessions and videotaping shall take place only after all performance verification (PV) tests of components, equipment, sub-systems, systems and integrated systems have been completed.

.2 Training is to be completed prior to acceptance of facility.

12 Demonstrations

.1 Training should include demonstrations by the trained O&M personnel so as to show confidence in, and depth of understanding of, all systems and equipment, and to demonstrate completeness of training.

.2 Upon completion of these demonstrations, a written report, signed by Instructors and witnessed by Engineer, should be deposited with the Commissioning Manager.

13 Videotaping/recording on to CD-ROM's of training sessions

The Project Manager should reserve the right to videotape all training sessions for use during future retraining.

On-site training videos can be an excellent training tool, ensuring consistent quality and convenient scheduling. They provide a convenient means of offering demonstrations as well as simulating real-life situations and emergencies. However, they do not provide rapport with instructors and should be used only in tandem with traditional classroom and hands-on sessions. Use the following as guidelines in their production and use:

.1 Consider the need for and possibilities of videotaping all or certain key segments of the O&M training for future reference, retraining and training of new or replacement O&M personnel.

.2 The decision to use videotape should be made as early as possible and details of videotaping requirements should be worked out several months before static completion.

.3 Videotaping of training sessions shall be performed only after all systems have been fully commissioned.

.4 Production methods shall be of professional quality. The assistance of PWGSC Corporate Communications should be enlisted as required.

.5 Video-based training should be organized in short modules so that any changes necessary (the result of changes to the facility, occupancy or equipment) can be incorporated into specific modules.

.6 The training session(s) can be recorded to CD ROM for future reference and training of operations staff due to change of personnel in the facility.

14 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 with the Commissioning Manager 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 (eg. some special laboratories) may recommend qualifications..
3b Working Documents	Develop a comprehensive training package to be provided by Contractor and Designer. Include: - Course outline - Scope, extent, nature, location of training - Standards to be achieved - Approximate number of O&M personnel to be trained - Length of time required Identify O&M personnel requirements Incorporate all requirements for Contractor implementation into Contract Documents.
3d Construction/ Installation	1. Training Plan approved. 2. Confirm availability, presence of assigned O&M personnel for observation as system installations proceed. 3. Provide site familiarization sessions.
4 Commissioning	1. Verify quality of training provided to O&M personnel. 2. Monitor quality of training sessions. 3. Assess depth of understanding of training received. 4. Organize, supervise and conduct training. 5. Demonstrate to Owner/User and Project Manager all normal and emergency procedures of all systems under all conditions, using trained O&M personnel. (Use of O&M personnel for this work demonstrates their knowledge of, and confidence in, all systems.)
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.
6 Evaluation	Include in Evaluation Report a summary of the effectiveness of training and recommendations for changes, improvements, necessity for ongoing training, etc.

END OF CP.5
CP.5: GUIDE TO PREPARATION OF TRAINING PLANS

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

PWGSC Commissioning Guidelines

CP.8

Guide to the preparation of

Commissioning Reports

3rd edition
November 2003

Prepared by

National Commissioning Committee

Issued by

Real Property Branch

CP.8: Guide to the preparation of Commissioning Reports

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CP.8: Guide to the preparation of Commissioning Reports

Chapter 1. Introduction

SPECIAL NOTE:
Although this Guideline makes many references to and takes examples from, the Mechanical discipline, it must be recognized that this Guideline applies to all disciplines and all types of building systems in which important commissioning activities and reports are required.

1.1 Scope

This manual covers requirements for all types of commissioning reports, including:

.1 TAB and PV reports,
.2 Commissioning reports,
.3 Final evaluation report

1.2 Basic principles for preparation and presentation

All reports shall:

.1 be easily followed,
.2 be simple to update as changes occur,
.3 be readily incorporated into the Building Management Manuals,
.4 provide the necessary documentation to permit repeat verifications,
.5 complement the "As-built" drawings prepared by the Designer

1.3 Language requirements

.1 Commissioning Reports shall be produced in English and/or French as required by the RFP..
.2 Reports in different languages should be in separate binders.

1.4 Measurements

All measurements reported in all Commissioning Reports shall be in Systeme Internationale (SI).

1.5 Quality of production

Draft and final reports to be keyboarded (i.e. typewritten).

1.6 Prior approval of report format

.1 One copy of a type of report complete with corresponding schematics – in effect, a report without project-specific data – must be developed and submitted by the developer to the Commissioning Manager for approval of format and layout within 12 weeks of award of Contract.

.2 Being "shelf-ready" at the front end of the construction process, the reports will provide the Design, Construction and Commissioning Teams with a clear understanding of the level of documentation, appearance, etc. that is expected.

.3 Requirements for delivery must also be built into the construction and completion schedule.

.4 The approved samples will become the standard of quality for all reports.

1.7 Binders

In general, each report should be put together in a separate three-ring, D-ring binder for 8.5" x 11.0" paper having clear vinyl pockets on face and spine. Thickness will depend upon the size of the report. Each binder to be no more than three-quarters full.

Chapter 2. Reports

2.1 General

The following table shows very briefly the salient differences between the various reports:

Action	TAB reports PV reports	Commissioning report	Final evaluation report
Written by:	Contractor and Commissioning agent	Commissioning Manager	Project Manager
With input from	Contractor and Designer	Designer and Contractor	Designer
Addressed to	Commissioning Manager	Project Manager	Project Leader
Time of writing	During commissioning phase	Throughout Warranty Period	After termination of Warranty Period
Contents	Details of TAB & PV of sub-systems, systems, integrated systems	Evaluation of commissioning process	Evaluation of facility
Show conformity to	Working Documents	Design Criteria, Functional & Operational requirements	User's requirements & Investment Analysis Report
Relationship to other documents	Forms part of Building Management Manual	Forms part of Building Management Manual	Forms part of Building Management Manual

2.2 Testing, adjusting, balancing (TAB) and performance verification (PV) reports

.1 Function: TAB and PV Reports are required to:

.1 verify Design Criteria and Design Intent,

.2 prove conformity of the installation and performance to the Contract Documents,

.3 record all settings of control devices,

.4 record all other data obtained during the entire project including commissioning,

.5 serve as a long-term operation, maintenance and management instrument (e.g. when fundamental changes to the use of the space are proposed 5 to 10 years down the road, long after the Project Manager, Consultants, Contractor, etc. have gone).

.2 Extent of each report: Separate TAB and PV reports are to be prepared for each sub-system, system and integrated system.

.3 **Preparation:** TAB and PV Reports are to be prepared by the Contractor and the Testing Agency working in close cooperation with the Designer.

.4 **Submissions and approvals:**

.1 Completed TAB and PV Reports are to be submitted to the Designer for review and approval by the Commissioning Manager and Project Manager. All review comments shall be incorporated into the TAB and PV Reports and the requisite number of copies as required by the Commissioning Brief shall be provided.

.2 Approved TAB and PV reports will reside in PART 5 - SUPPORTING APPENDICES of the Building Management Manual.

.5 **Contents:** to include, as applicable:

Section 1: General information, including: names of all participants in TAB and PV process: eg. Contractor, sub-contractors, controls systems contractor, TAB agency, PV agency.

Section 2: Information for each system, including, as appropriate:

.1 drawings, schematic drawings, diagrams identifying the areas served by the system

.2 design criteria, design intents, and performance targets, for the system involved in the report, for purposes of comparison with results obtained from TAB and PV

.3 brief narrative description of system, its equipment and components,

.4 brief description of interlocks with other systems,

.5 schematics, single line diagrams,

.6 "As-commissioned" narrative-type sequence of operations for all operating modes (including interlocks with all other equipment and systems),

.7 list of control equipment and components, points lists used in conjunction with EMCS or DDC systems.

Section 3: TAB and PV information: including, as appropriate:

.1 description of tests in each mode of operation,

.2 procedures used in TAB and PV, including points where measurements were taken

.3 Instruments used, including serial numbers, calibration certificates, locations of readings,

.4 Completed TAB and PV Report forms showing results obtained, signed by measuring technician, the technician's supervisor and witnessed by the Designer, recording conformity of installation and performance to contract documents,

.5 reasons for variances between Design and Measured values or performance, together with suggested remedial measures (if required)
.6 a record of all settings of control devices as set upon completion,
.7 equipment performance curves showing design point of operation, actual point of operation as set upon completion,
.8 a record of all other data obtained during commissioning,
.9 performance curves for fans, pumps, etc. To include a family of performance curves over the manufacturer's entire operating range for use during future modifications, etc.

Section 4: Certificates, other test reports: including, as appropriate:
.1 Pressure and leakage test certificates for the applicable systems,
.2 Equipment part load performance curves

2.3 Supplements to TAB and PV reports

These shall include:
.1 faults and conditions beyond the Contractor's responsibility but which prevent full and complete TAB or PV,
.2 recommended remedial measures complete with related costs,
.3 summary of possible changes to effect further economies in energy consumption, to improve environmental conditions, to improve O&M costs, etc.

2.4 Commissioning report

.1 Description: The Commissioning Report is in essence a commissioning debriefing report.

,2 Purpose: Its purpose is to evaluate the commissioning processes used during the project delivery cycle.

.3 Preparation:
.1 The commissioning report is prepared during, and finalized at the end of, the Warranty Period (PDS phase 5), submitted to and approved by the Project Manager before the start of the Operation Phase (PDS phase 5).
.2 The commissioning report will reside in PART 5 - SUPPORTING APPENDICES of the Building Management Manual.

.4 Contents: It includes, but is not necessarily limited to, the following, as appropriate:
Section 1: Background information: as may be appropriate:

Section 2: **Procedural information:** to include as appropriate:

.1 detailed report of all commissioning activities, including time taken for various activities,
.2 costs,
.3 effectiveness,
.4 observation of commissioning procedures used,
.5 problems encountered during PV and commissioning,
.6 minutes of all meetings held during the Warranty Period,
.7 Occupants'/User's comments/complaints audit system.

Section 3: **Results, etc:** to include, as appropriate:

.1 comparison with Designer's criteria (specified in Working Documents),
.2 confirmation of achievement of all objectives of commissioning as described in the Commissioning Brief,
.3 details of all variances from Design Criteria and results actually achieved,
.6 Summary of results of evaluation or debriefing meetings held at the termination of the Warranty Period,
.7 Summary of operational problems encountered and details of actions taken to resolve these problems,
.8 Identification and recommendations for modification of conditions which differ from requirements in the Project Brief.

Section 4: **Emergency and similar information:** to include, as appropriate:

.1 Precautionary information,
.2 other issues such as lessons learned,
.3 ongoing problems and the actions taken, or recommendations for actions to be taken, to resolve these problems. This could be in tabular form as follows:

Item	Description	Comments	Action takem / Recommrndation

2.5 Final evaluation report

.1 Preparation:

.1 The final evaluation report is prepared after the termination of the Warranty Period and at the commencement of the Operation Phase (PDS-6) by the Project Manager with input from the Designer, and submitted to the Project Leader.

.2 The final evaluation report will reside in PART 5 - SUPPORTING APPENDICES of the Building Management Manual.

.2 **Function:** The final evaluation report provides an assessment of the project for compliance with the User's functional requirements (e.g. comfort, safety, well-being, health) and operational requirements (e.g. performance, accessibility, documentation, training) all as described in the Investment Analysis Report (IAR) and the Project Brief..

.3 **Contents:** It includes, but is not necessarily limited to, the following, as appropriate:

.1 summary of variances between planned and actual performance as identified in detail in the final commissioning report,

.2 Summary of the Occupants' Comments/Complaints Audit System and details of the actions taken,

.3 Summary of possible improvements in systems installation, controls, O&M procedures, etc. so as to effect further economies in operation and/or maintenance, or to improve environmental conditions,

.4 evaluation of commissioning process and commissioning phase

END OF CP.8

CP.8: GUIDE TO THE PREPARATION OF COMMISSIONING REPORTS

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

PWGSC Commissioning Guidelines

CP.10

Guide to the development and use of

Report forms and schematics

3rd edition
November 2003

Prepared by

National Commissioning Committee

Issued by

Real Property Branch

CP.10: Guide to the development and use of Report forms and schematics

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CP.10: Guide to the development and use of Report forms and schematics

Chapter 1. Introduction

1.1 General

1. Although there are many Performance Verification (PV) and Commissioning Report forms available, they are scattered over many organizations. Some tend to have a lot of extraneous material while others are deemed too insufficiently detailed for PWGSC commissioning purposes. For these reasons, PWGSC has developed many of its own generic Product Information (PI) and Performance Verification (PV) Report forms.

.2 One important exception are the performance verification forms developed by NFPA and ULC. These shall be used in preference to forms developed by or for PWGSC.

1.2 Scope

This manual covers requirements for:

.1 The preparation and use of Product Information (PI) and Performance Verification (PV) Report forms.

.2 Development of Schematics forming part of commissioning reports.

1.3 Basic principles for preparation and presentation

All PI and PV report forms shall:

.1 be easy to follow

.2 be simple to update as changes occur

.3 provide the necessary documentation to permit repeat verifications

.4 complement the "As-built" drawings prepared by the Designer

1.4 Language

.1 Language used in Commissioning Reports shall be English and/or French as required by the Project Brief.

1.5 Measurements

All measurements reported shall be in Systeme Internationale (SI).

Chapter 2. Report forms

2.1 Modifications of PWGSC generic PI and PV report forms and production of new forms

.1 The absence of PI and PV forms will not relieve the Contractor of responsibility for performance verification of all equipment and systems on the project.

.2 Many PWGSC generic PI and PV report forms are available from the Commissioning Manager in electronic and hard copy format. An index of these forms is given in the Appendix.

.3 The Designer shall modify any PWGSC generic PI and PV report forms to suit project requirements, and develop new PI and PV report forms as may be required, using manufacturer's data. The Designer will ensure the technical relevance of all information contained in the forms to the satisfaction of the Commissioning Manager since the Designer is intimately familiar with the Design Criteria, design assumptions, the design intent and the overall design of the facility. They shall follow the same general format as the PWGSC Generic PI and PV report forms.

.4 Modified and new PI and PV report forms must be approved by the Commissioning Manager and be “shelf-ready” by the time that the Working documents are complete.

.5 **PI report forms:** Being "shelf-ready" at the front end of the construction process, they will provide the Design, Construction and Commissioning teams with a clear understanding of all purchasing, product and all other technical information to be provided.

.6 **PV report forms:** Being "shelf-ready" at the front end of the construction process, they will provide the Design, Construction and Commissioning Teams with a clear understanding of:

.1 the Design Criteria and the type, number and complexity of tests, and the level of documentation that is expected, and

.2 the time required for these tests, which of course will have a bearing on the development of the construction and completion schedule for the project.

.7 PI and PV report forms are to be in electronic and subject to the acceptance of the Commissioning Manager.

.8 The approved samples will become the standard of quality for all work.

.9 Until such time as the PI and PV forms that have been developed to date are reproduced in a more suitable format, INFORMATION MAY HAVE TO BE ABBREVIATED IN ORDER TO PREVENT WRAP-AROUND, which may

result in bottom portions of each sheet overflowing on to next sheet, thus creating serious problems.

2.2 Product information (PI) report forms

.1 Purpose: PI Report forms are intended to record full details of purchasing information as well as manufacturer's product information, construction, nameplate data, appurtenances, components, controls and all other purchasing data.

.2 Procedure for use

.1 The Contractor shall:

- .1 complete all purchasing information, at the time that orders are placed.
- .2 complete the remainder of the form, including start-up and warranty data, immediately upon delivery to site.
- .3 insert additional sheets for equipment or components for which no space has been provided.
- .4 insert "N/A" if not applicable. If any complete table is not to be used, it must be clearly crossed out.

.2 The Designer will add all MMS numbering sequences.

.3 The completed form shall then be signed off by the recording technician and the technician's supervisor, then immediately witnessed by the Designer.

.4 Approvals: Each PI form shall be verified by the Commissioning Manager.

.5 The completed PI report form is to form part of and be submitted with the relevant TAB or PV report.

.6 A second copy should be maintained on site until all commissioning is complete.

.7 The PV and PI form shall include the Maintenance Management System (MMS) coding.

2.3 Performance verification (PV) report forms

.1 General

It is strongly suggested that PV forms be printed on YELLOW paper to make the distinction between PI forms clearly evident. With BLACK printing, the wording will still stand out clearly.

.2 Purpose

PV Report forms shall be designed

.1 to record all design criteria, design intents, testing, adjusting, balancing (TAB) and performance verification (PV) test results and all other data relating to components, equipment, sub-systems, systems and integrated systems,

.2 to permit repetition of tests and re-commissioning at any future time,

.3 for verification and testing protocols relating to design criteria, design intent and operational requirements, and include provisions for:

.1 confirming operation as per design criteria and design intents,
.2 identifying variances between design and operation and reasons for these variances,
.3 verifying operation in all specified normal and emergency modes (including simulated instantaneous abnormal system disturbances) and under all specified load conditions,
.4 inclusion of analytical and other substantiating data,
.5 verifying all reported results,
.6 inclusion of additional data not previously specified but required by the Commissioning Manager for further sub-system, system and integrated system tests,
.7 verifying redundancy and standby factors.

.3 Procedures for use

The normal procedures for using PV Report forms shall be as follows:

.1 The Designer shall complete all design criteria and design intents before Tender Call,
.2 The Contractor shall add data to "Shop Drawings" column immediately upon approval of the shop drawings or product data.
.3 The Contractor shall complete the "As measured" portion of the PV Report form upon completion of commissioning.
.4 The column for "Comments" may be used to note reasons for deviations, discrepancies, etc.
.5 Each box must be completed. If not applicable, insert "N/A".
.6 Insert additional sheet(s) for equipment or components for which nothing has been provided.
.7 The completed form shall then be signed off by the measuring technician and the technician's supervisor, then witnessed by the Designer.
.8 Each completed PV form is thereafter subject to verification by the Designer and the Commissioning Manager.
.9 The PV report form is to be included in the PV Report.
.10 A second copy should be maintained on site until commissioning is complete.

2.4 Instrumentation report forms

.1 Use supplementary sheets to describe instrumentation and procedures used, if different from those prescribed in the commissioning specifications.

.2 These descriptions shall permit repetition of tests as may be required from time to time.

2.5. On-going use for O&M

Once completed, PI and PV forms will be used to implement the Preventive Maintenance System (MMS). The time spent in completing these forms will be more than saved during implementation of the management related elements of the project,

Chapter 3. Schematics used in manuals, commissioning reports

3.1 PWGSC CADD policy

Comply with the requirements as described in the RFP or Project Brief.

3.2 Graphics

Comply with the following standards and requirements:

.1 Federal Identify Program Manual Standards,
.2 CSA Z321 Standards on Shape and Colour,
.3 Standards on type style, size and colour, line weights and colour palette, special symbols,
.4 All colour palettes will be CMYK (Cyan, Magenta, Yellow & Black),
.5 CAN/CGS13 - 21 series,
.6 Government of Canada Graphic Standards on Colour and Typography

3.3 Required information

Development of schematics, diagrams and graphics shall be based on review of all equipment as actually supplied and installed.

The following illustrates the type of information required in the applicable section of the manuals:

.1 Architectural/structural:

.1 site drawings in reduced scale,
.2 all building floor plans in reduced scale showing systems and sub-systems,
.3 finish schedules,
.4 door and window schedules (doors numbered as per occupancy),
.5 door and window hardware schedules

.2 Mechanical

.1 site drawings in reduced scale,
.2 all building floor plans in reduced scale showing systems, sub-systems, room identifiers, maintained environmental conditions,
.3 systems, sub-systems drawings, schematics and diagrams as required,
.4 charts – eg. valve (shut-off, control, balancing), steam trap, etc.,
.5 schedules – eg. equipment, dampers, etc.,
.6 schematics – eg. system, sub-system, flow, control, etc., with final settings, ranges, etc. of all operating, limit and safety devices,
.7 copies of posted instructions (reduced in size if necessary) including consolidated and simplified diagrams of equipment, controls, power, etc.,
.8 concise instructions on start-up and shut-down, details of final settings and conditions to be observed and logged.

.3 Electrical

.1 site drawings in reduced scale,
.2 all building floor plans in reduced scale showing systems, sub-systems, room identifiers, maintained lighting levels,
.3 systems and sub-systems drawings,
.4 charts and schedules as required,
.5 schedules – eg. lighting, equipment, etc.,
.6 single line riser diagrams indicating ratings, final settings, ranges, etc. of all operating, limit and safety devices,
.7 locations of cables and components,
.8 copies of posted instructions (reduced in size if necessary) including consolidated and simplified diagrams of equipment, controls, power, etc.,
.9 concise instructions on start-up and shut-down, details of final settings and conditions to be observed and logged.
.10 Life Safety System; fire alarm system, ULC Certificates, complete with verification reports.

3.4 Basic principles for preparation

.1 Schematics, diagrams, charts, etc. illustrate and describe O&M requirements.

.2 They shall be prepared by the Designer, who should:

.1 Identify all equipment, components, etc., using the same nomenclature used in the Contract Documents,
.2 Identify every location where measurements are required (this is to ensure that readings are meaningful), what instruments are to be used, what data are to be presented and in what form. (For example, grilles, registers, diffusers: use either flow hoods and manufacturer's "k" factors or duct traverse in run-out duct.),
.3 Show design values and leave space for measured values,
.4 Describe how the systems are to be TAB'd, the instruments to be used and the methodology to be employed.

.3 These will be prepared by skilled draftspersons.

.4 Development of schematics shall be based on design and review of all equipment actually supplied and installed.

3.5 Use of EMCS graphics

Many projects use EMCS in which graphics play a large role. It may be possible to incorporate these graphics into the Operating Manual (part of the Building Management manual). However, approval must be obtained before implementing this recommendation.

3.6 Requirements for schematics for Fire Protection Manual - projects <u>within the Parliamentary Precinct Directorate (PPD)</u>

.1 General

Produce individual Fire Protection Manuals in an identical format to those which exist in other Parliamentary Buildings for each new or renovated facility. Hard copies shall be printed and supplied only after approval of the final drafts.

.2 Description of requirements

.1 Shall be in English and French, oriented to non-technical readers, with all measurements in SI (Systeme International).

.2 Include all floor plans, mezzanines and any other area forming part of the built works.

.3 Development of the manuals shall be based on design and review of all equipment actually supplied and installed.

.3 Scope

.1 Produce simplified computer file floor plans (see sample manuals for existing bldgs).

.2 Assemble, coordinate, organize and present the required data.

.3 Manual to include, but not be limited to, the following:

- .1 description of the manual's sections and instructions on use,
- .2 fire alarm panels- description,
- .3 device locations,
- .4 device legends,
- .5 zone indices and location drawings of all fire, sprinkler, smoke and other fire suppression zones, along with information describing systems, signals, locations, symbols, panels, elevations, levels, details and zones, air maintenance devices, dry valves, emergency telephones, emergency exits, emergency lighting end-of-line resistors, fire panels, fire hose cabinets, fire hoses and/or indicating devices, flow switches, gate valves, heat detectors, magnetic open devices, OS&Y valves, pumper connections, siamese connections, smoke detectors, emergency voice communication systems and devices, strobes, supervised valves, water motor gongs, and any other fire-related devices and zones,
- .6 a sprinkler riser diagram and icon description sheet,
- .7 all other pertinent fire protection information.

.4 Standards

.1 Printed 4-colour process one side.

.2 Xerox docu-colour 40 printing system. Equal systems will be accepted only upon pre-approval from the Commissioning Manager. Submit full range of samples for any proposed alternative.

.3 Front and back cover pages 45.3 kg white stock.

.4 Divider pages printed one side, with tabs 279 x 445 mm.
.5 Binding: Post Binder complete with locking mechanism

.5 Graphics

.1 See sample manuals for reference.
.2 See also requirements stated above.

3.7 Requirements for all other projects

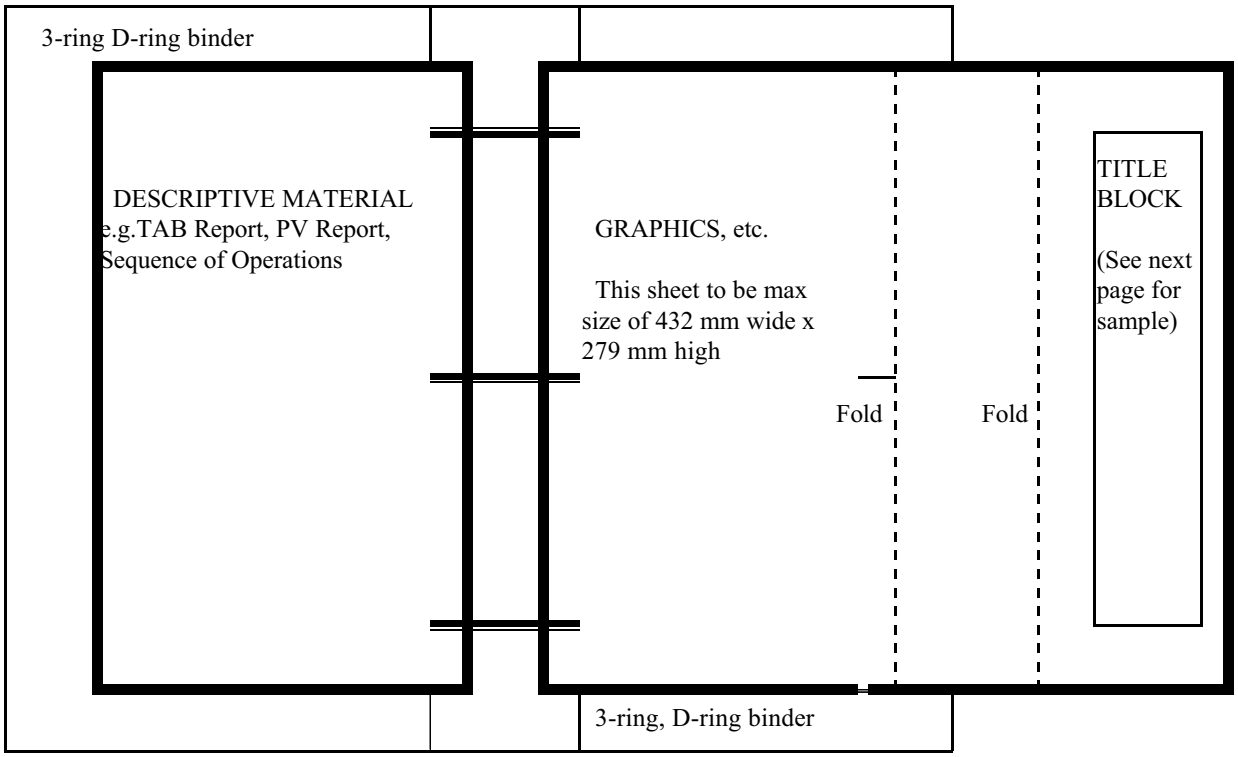
.1 The following requirements shall apply:

.1 Sheet size to be either 216 x 279 mm or 279 x 432 mm.
.2 Schematics to be in the same format as the pre-approved schematics.
.3 Paper to be 36.24 kg white paper stock with maximum of two folds arranged so that title blocks are always visible.
.4 If schematics require more than a single sheet, show match lines and reference notes.
.5 Each sheet to have title block on right-hand side arranged so that no matter how sheets are folded the title block remains visible. The sketch below shows one possible arrangement. Title block to be similar to the Contract Drawings but including at least the data shown in the attached sheet. (Legend is only an example. Every item listed will obviously not be necessary on every sheet.)
.6 Each system, sub-system to be on a separate sheet.
.7 Schematics, diagrams shall be easily identified, in workable segments, readily followed and, if necessary, prefaced by an index. They shall include:

.1 complete layout of each system as actually installed,
.2 identity and locations of all provisions for TAB,
.3 flow measuring and regulating devices,
.4 all interfacings with, and points of interconnections into, existing systems,
.5 valves, dampers, PRV, air terminal units, heat transfer equipment,
.6 duct and pipe sizes,
.7 room numbers, floor numbers, system numbers, equipment identifiers,
.8 match lines, cross-references to other sheets (if schematic requires more than one sheet),
.9 measured values, locations of measurements, instruments used, procedures followed,
.10 cross-reference to Contract documents, PI and PV Report forms, TAB data, calculation sheets.

.2 Disks to form part of Commissioning Reports.

.3 One sample schematic must be submitted for approval. This will then become the standard of quality for all drawings included in the O&M Manual.



3.8 Sample title block for schematics

.1 See following page.

.2 Use only those portions of legend that apply to specific schematic.

Public Works and Government Services Canada
National Capital Operations
B. McDonald
Regional Director
Architectural & Engineering Services

LEGEND:

AFMS	Air Flow Measuring Station
CBV	Calibrated balancing Valve
CD	Ceiling diffuser
CV	Constant volume
D	Design value
DBT	Dry bulb temperature
DP	Differential pressure
DPT	Dewpoint temperature
EA	Exhaust air
EAD	Exhaust air damper
EAT	Exhaust air temperature
EF	Exhaust fan
EWT	Entering water temperature
FD	Fire damper
FSD	Fire/smoke damper
G	Grille
LD	Linear diffuser
LAT	Leaving air temperature
LWT	Leaving water temperature
M	Measured value
MA	Mixed air
MAT	Mixed air temperature
OA	Outside air
OAD	Outside air damper
OAT	Outside air temperature
PD	Pressure drop
R	Register
RA	Return air
RAD	Return air damper
RAT	Return air temperature
RD	Rectangular diffuser
RED	Relief damper
RF	Return fan
SA	Supply air
SAT	Supply air temperature
SD	Smoke damper
SP	Static pressure
T	Traverse point
TAB	Testing, adjusting, balancing
TR	Troffer
TRH	Terminal reheat
VAV	Variable air volume
VCD	Volume control damper
WBT	Wet bulb temperature

Project:	Project no:	
Floor or Area:		
System:		
Engineer's Drg no:		
Designer		
Contractor:		
TAB Agency:		
Measuring Technician:		Date
Supervisor:	Date	
Witness:	Title:	Date
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CP.10: GUIDE TO THE DEVELOPMENT OR REPORT FORMS & SCHEMATICS

APPENDIX

Product information (PI) report forms
Performance verification (PV) report forms
MECHANICAL

January 1997 (Re-affirmed October 19/1999)
(NOTE: All PI and PV Forms are undergoing extensive reviews)

TITLE	LIST		PI FORMS		PV FORMS	
	Eng	Fr	Eng	Fr	Eng	Fr
Access to Concealed Equipment	YES	YES				
Air Compressor			YES	YES	YES	YES
Air-Cooled Condenser			YES		YES	
Air-Cooled Condensing Unit			YES		YES	
Air-Cooled Fluid Cooler			YES		YES	
Air Duct Flow Report see *TAB Report, Air Ducts*						
Air Flow Measuring Station - Rectangular					YES	
Air Flow Measuring Station - Round					YES	
Air Flow measuring Station			YES			
Air Handling Unit - Factory Packaged			YES		YES	
Blowdown Tank			YES			
Boiler-High Pressure Packaged			YES	YES	YES	YES
Cabinet Unit Heater			YES	YES	YES	YES
Cathodic Protection Systems			YES		YES	
Centrifugal Fan			YES		YES	
Chiller - absorption			NO		NO	
Chiller - Centrifugal			YES	YES	YES	YES
Chiller - reciprocating			NO		NO	
Chiller - screw			NO		NO	
Circulating Pumps - See *Hydronic System Circulating Pumps*						
Coil - Heating / Cooling			YES	YES		

TITLE	LIST		PI FORMS		PV FORMS	
	Eng	Fr	Eng	Fr	Eng	Fr
Coil - Hydronic					YES	YES
Coil - Steam					YES	YES
Control Valve			YES	YES	YES	YES
Cooling Tower			YES		YES	
Dampers - fire and smoke, List of - see *Fire and Smoke Dampers - list of*						
Dampers - Operating - see *Operating Dampers*						
De-aerator-Feedwater Heater			YES		YES	
Deficiency List	YES	YES				
Dehumidifier - Desiccant Type			YES		YES	
Dehumidifier - Refrigerant Type			NO		NO	
Diffusers - see *Grilles, Registers, Diffusers*						
Domestic Water Booster Heater			YES	YES		
Domestic Water Heater			YES			
Drilled Well - see *Well - Drilled*						
Duct (Air) Flow Report					YES	
Duct (Air) Leakage Test Report					YES	
Duct - Rectangular - Pitot-tube Traverse					YES	
Duct - Round - Pitot-tube Traverse					YES	
EMCS					YES	
Expansion Tank - see *Hydronic System Expansion Tank*						
Exhaust Fan - for Lab Fume Hood					YES	
Fan - Centrifugal - see *Centrifugal Fan*						
Fan - Exhaust - for Lab Fume Hood - see *Exhaust Fan for Lab Fume Hood*						
Fan Coil Units			YES		YES	
Filters - Final			YES	YES	YES	YES
Filters - Pre			YES	YES	YES	YES
Filter Gauges			YES	YES		

TITLE	LIST		PI FORMS		PV FORMS	
	Eng	Fr	Eng	Fr	Eng	Fr
Fire and Smoke Dampers - list of	YES	YES				
Fire Extinguishers - list of	YES	YES				
Fire Pump & Jockey Pump			YES		Use NFPA 20	
Fire Pumps, (2) Operating in Parallel					YES	
Fire Pumps, Sprinkler & Standpipe & Hose Systems			NO - Use NFPA 20			
Fire - Sprinkler System Alarm Valves - see *Sprinkler System Alarm Valves - Wet/Dry*						
Gas Pressure Regulator			YES			
Glycol Fill & Mixing Tank			YES			
Grilles, Registers, Diffusers					YES	
Heat Exchangers			YES		YES	
Heat Exchanger - Safety & Relief Valves			YES			
Heat Pumps			YES			
Heat Pumps - Water Source					YES	
Heat Pumps - Hydronic Distribution System					YES	
Heat Pump System - Water Source - TAB Report					YES	
Humidifiers - Direct Steam Injection type			YES		YES	
Humidifiers - Evaporative type			NO	NO	NO	NO
Hydronic system circulating pump			YES		YES	
Hydronic System Circulating Pump - Duplex - Single Pump Operation			NO		YES	
Hydronic System Circulating Pumps - Duplex - Operating in Parallel			NO		YES	
Hydronic System Circulating Pumps - Duplex - Operating in seriesl			NO		NO	
Hydronic System Expansion Tank			YES		YES	
Instrument Calibration Data Report			YES			
Laboratory Pressurization					YES	
Laboratory Pressurization (Integrated System)					YES	

TITLE	LIST		PI FORMS		PV FORMS	
	Eng	Fr	Eng	Fr	Eng	Fr
Laboratory Fume Hood					YES	
Lab Fume Hood Scrubber System			YES		YES	
Lab Fume Hood Exhaust Fan - see *Exhaust Fan for Lab Fume Hood*						
Laboratory Services					YES	
Lubrication Schedule - List of	YES					
Maintenance Materials Required by Contract Documents, List of	YES					
Mixing Chamber (Plenum)					YES	
Oil Storage Tanks			YES			
Operating Dampers			YES		YES	
Plumbing Specialties			YES			
Potable Water Distribution System					YES	
Pressure Booster System					YES	
Pumps - see *Hydronic System Circulating Pumps*						
Pure Water Systems (Preliminary only)			YES		YES	
Refrigeration Compressors			YES		YES	
Relief Valves - see *Safety & Relief Valves*						
Safety & Relief Valves			YES			
[Sanitary] [Storm Water] Lift Station			NO		YES	
Service Contracts, List of	YES					
Sewage Pump - see *[Sanitary] [Storm Water] Lift Station*						
Site Test Requirements, Summary of	YES					
Smoke Dampers - see *Fire and Smoke Dampers*						
Snow Melting System - Glycol					YES	
Spare Parts List	YES	YES				
Special Tools Req'd by Contract Doc'ts, List of	YES					

TITLE	LIST		PI FORMS		PV FORMS	
	Eng	Fr	Eng	Fr	Eng	Fr
Sprinkler System Alarm Valve - Dry Pipe			YES	YES	use NFPA 13	
Sprinkler System Alarm Valve - Wet Pipe			YES	YES	use NFPA 13	
Stairwell Pressurization System (SPS)					YES	
Steam Traps, List of	YES	YES				
Strainers, List of	YES					
Sump Pump - see *[Sanitary] [Storm Water] Lift Station*						
TAB Reports - Air Ducts					YES	
TAB Report - Water-source Heat Pump System					YES	
TAB of Hydronic Coil, Control Valve, CBV			YES		YES	
Tests & Warranties, List of	YES					
Unit Heaters			YES		YES	
Variable Air Volume (VAV) Boxes	NO	NO			YES	YES
VAV System - Diversity Test					YES	
Water Treatment Systems			YES		YES	
Well - Drilled					YES	
Well pumps			NO		NO	

END OF MECHANICAL INDEX

Product information (PI) report forms
Performance verification (PV) report forms
ELECTRICAL

January 1997 (Re-affirmed October 19/1999)
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TITLE		LIST		PI FORMS		PV FORMS	
		Eng	Fr	Eng	Fr	Eng	Fr
Air Circuit Breaker	476	NO		NO		YES	
Capacitors for Power Factor Correction	410	NO		NO		YES	
Clock Systems	730	NO		NO		YES	
Diesel Generators	622	NO		NO		YES	
Disconnect Switch - Fused and Un-fused	440	NO		NO		YES	
Distribution Panelboard (includes Lighting or Receptacle Panelboard)	471	NO		NO		YES	
Distribution Transformer	461	NO		NO		YES	
Emergency Handset Communication System	762	NO		NO		YES	
Feeder Cables	122	NO		NO		YES	
Fire Alarm Systems	720	NO		NO		YES	
Generator Switchboard	625	NO		NO		YES	
Ground Fault Relay	495	NO		NO		YES	
Hands-Free Intercom Systems	771	NO		NO		YES	
Main Switchboard Enclosure	426	NO		NO		YES	
Motor Starter	811	NO		NO		YES	
Motor Control Centre Enclosure	820	NO		NO		YES	
Potential Transformers & Current Transformers (includes Switchboard Digital Metering Unit)	431	NO		NO		YES	

TITLE		LIST		PI FORMS		PV FORMS	
		Eng	Fr	Eng	Fr	Eng	Fr
Programmable Lighting Control System	591	NO		NO		YES	
Public Address Communication System	770	NO		NO		YES	
Security Radio Communication Systems	764	NO		NO		YES	
Switchboard and/or Panelboard - Moulded Case Circuit Breaker	477	NO		NO		YES	
Telecommunications Systems	763	NO		NO		YES	
Uninterruptible Power Systems	610	NO		NO		YES	
Very Early Warning Detection System	721	NO		NO		YES	
Voltage Regulators	611	NO		NO		YES	

END OF ELECTICAL INDEX

END
CP.10 REPORT FORMS AND SCHEMATICS