Respect Excellence
Integrity Leadership

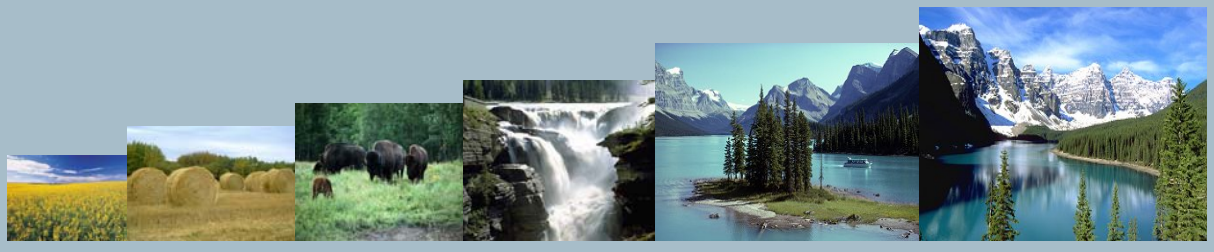
GENERAL PROCEDURES & STANDARDS

PWGSC
Western Region

For Professional & Design Services

Public Works and Government Services Canada
Real Property Services
Western Region

March 2010



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

Canada

General Procedures & Standards
For
Professional and Design Services

Table of Contents:

1 INTRODUCTION

1.1 GENERAL PROCEDURES AND STANDARDS

1.1.1 GENERAL

.1 These PWGSC *General Procedures and Standards* (P&S) have been developed to:

.1 Facilitate the development of a rational, well-documented design process and

.2 Ensure compliance with federal government standards, PWGSC Policies and Treasury Board directives

1.1.2 HARMONIZATION WITH THE TERMS OF REFERENCE (TOR)

.1 The P&S document must be used in conjunction with the TOR, as the two documents are complimentary

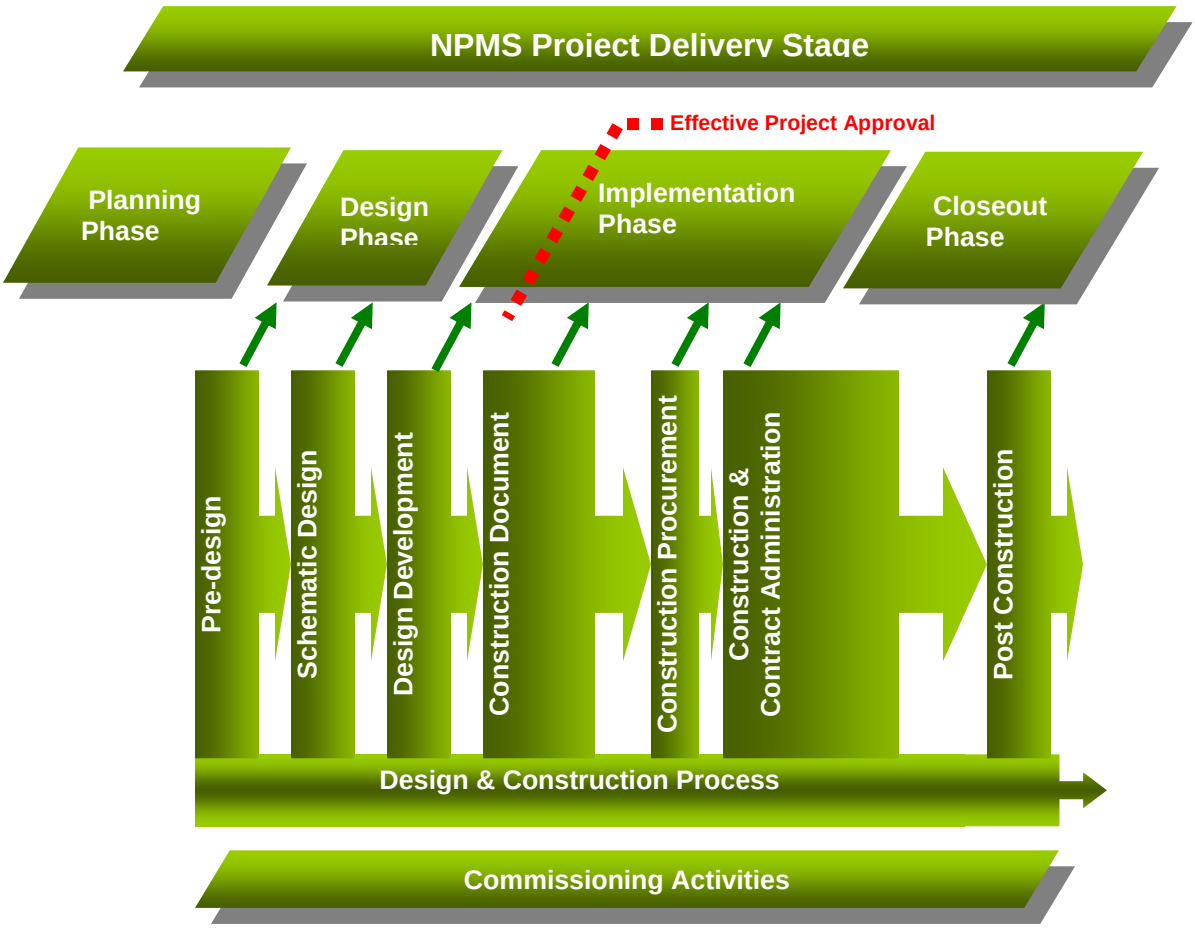
.2 The TOR describes project-specific requirements, services and deliverables while the P&S document outlines with minimum standards and procedures common to all projects.

.3 In the case of a conflict between the two documents, the requirements of the TOR override this document.

1.2 PROJECT MANAGEMENT (BUILDINGS)

1.2.1 NATIONAL PROJECT MANAGEMENT SYSTEM

.1 PWGSC uses the National Project Management System (NPMS) for management of its building projects. Refer to the PWGSC NPMS web site for more details.



1.2.2 DESIGN STAGE

.1 Pre-design Process
- .1 The purpose of this phase is to analyze all project requirements including codes, regulations, programming, sustainability, cost, time management and risk to demonstrate a full understanding of the project
- .2 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.

.2 Schematic Design Process
- .1 The purpose of this phase is to explore three distinctly different design options and to analyze them against the project requirements.
- .2 The Schematic Design will be in sufficient detail to illustrate and communicate the project characteristics.
  - .1 Provide a detailed review and analysis of the project requirements including all updates and amendments to ensure all requirements are fully integrated into the Schematic Design.
  - .2 Out of this process the Schematic Design will be accepted and authorization to proceed to Design Development will be based on the accepted Schematic Design.
- .3 The *Departmental Representative*, in concert with others shall choose one option to be further developed.
  - .1 Although the *Consultant* is required to identify a preferred option, the *Departmental Representative* may select another option.
- .4 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.

1.2.3 IMPLEMENTATION STAGE

.1 Design Development Process
- .1 The purpose of this phase is to further develop the design option selected for refinement at the Schematic Design stage.
- .2 The Design Development documents consist of drawings and other documents to describe the scope, quality and cost of the project in sufficient detail to facilitate design approval, confirmation of code compliance, detailed planning of construction and project approval.
- .3 This design will be used as the basis for preparation of construction documents.
- .4 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.

.2 Construction Document Process
- .1 The purpose of this phase is to translate design development documents into construction drawings and specifications, for use by the contractor to determine a cost for the work and to construct the building.

.3 Contract Procurement Process
- .1 The purpose of this phase is to obtain and evaluate bids/proposals from qualified contractors to construct the project, as per the Construction Contract Documents and to award the construction contract according to government regulations.

.4 Construction Contract Administration Process
- .1 The purpose of this phase is to implement the project in compliance with the Construction Contract Documents and to direct and monitor all necessary or requested changes to the scope of work during construction, commissioning and closeout.

1.2.4 COMMISSIONING STAGE

.1 Commissioning Process “Commissioning” is a quality assurance process, in which the functional requirements of the Owner/occupant and the operational requirements of facility management are tested, verified and proven to function as intended.

.1 Commissioning deliverables occur at various phases throughout the project as detailed in section 2.8.

.2 Commissioning shall be in accordance with the PWGSC Commissioning Manual CP.1 (2003).

1.2.5 CLOSEOUT STAGE

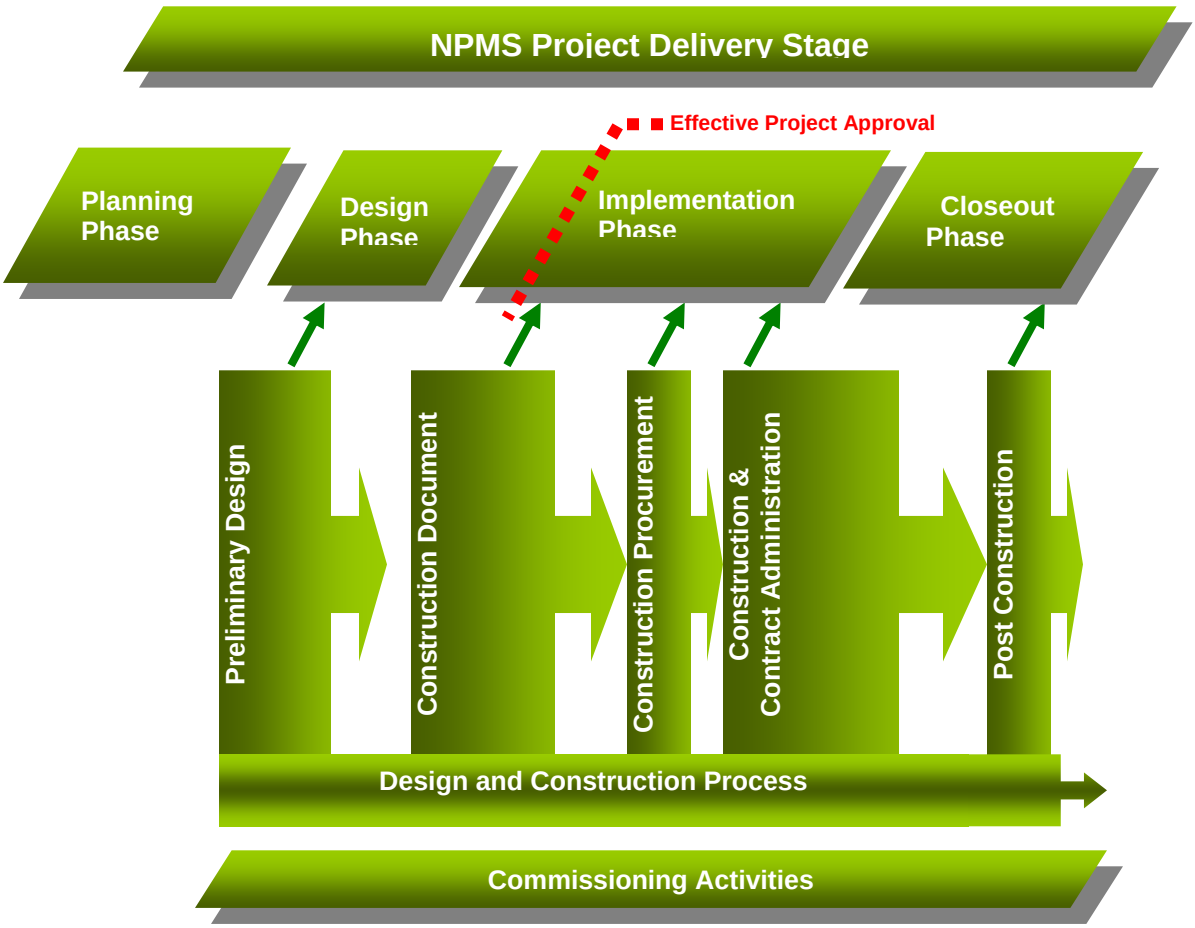
.1 Post Construction Process

.1 The purpose of this phase is to ensure the orderly completion and recording of all aspects of the work during the construction and liaise with the Public Works And Government Services Canada and other agencies as appropriate to close out the project.

1.3 PROJECT MANAGEMENT (ENGINEERING)

1.3.1 NATIONAL PROJECT MANAGEMENT SYSTEM

.1 PWGSC uses the National Project Management System (NPMS) for management of its engineering projects. Refer to the PWGSC NPMS web site for more details.



1.3.2 DESIGN STAGE

.1 Preliminary Design Process

.1 The purpose of this phase is to:

.1 Analyze all project requirements including:

.1 Codes, regulations, programming, sustainability, cost, time management and risk to demonstrate a full understanding of the project

.2 Prepare a preliminary design that addresses the project objectives and resolves the issues outlined in the scope of work.

.2 The approved deliverable will become the formal project work plan and will be utilized throughout the project to guide the delivery.

1.3.3 IMPLEMENTATION STAGE

.1 Construction Document Process

.1 The purpose of this phase is to translate design development documents into construction drawings and specifications, for use by the contractor to determine a cost and to complete the engineering work.

.2 Contract Procurement Process

.3 The purpose of this phase is to obtain and evaluate bids/proposals from qualified contractors to construct the project, as per the Construction Contract Documents and to award the construction contract according to government regulations.

.2 Construction Contract Administration Process

.1 The purpose of this phase is to implement the project in compliance with the Construction Contract Documents and to direct and monitor all necessary or requested changes to the scope of work during construction, commissioning and closeout.

.1 Resident site services may be required for the purpose of ensuring the presence of the Consultant's representative on-site to inspect, co-ordinate and monitor the work; and to provide liaison with the Contractor, Departmental Representative and other agencies involved in the work.

1.3.4 COMMISSIONING STAGE

.1 Commissioning Process

.1 "Commissioning" is a quality assurance process, in which the functional requirements of the Owner/occupant and the operational requirements of facility management are tested, verified and proven to function as intended.

.2 Commissioning deliverables occur at various phases throughout the project as detailed in section 2.8.

.3 Commissioning shall be in accordance with the PWGSC Commissioning Manual CP.1 (2003).

1.3.5 CLOSEOUT STAGE

.1 Post Construction Process

.1 The purpose of this phase is to ensure the orderly completion and recording of all aspects of the work during the construction and liaise with the Public Works And Government Services Canada and other agencies as appropriate to close out the project.

2 PROCEDURES

2.1 PROJECT ADMINISTRATION

2.1.1 GENERAL REQUIREMENTS FOR ALL PROJECTS

.1 The administration requirements outlined in this section are applicable to all PWGSC projects in Western Region, unless otherwise indicated in the TOR.

.2 "Project Team" refers to key representatives involved in this project.

.3 All team members must maintain a professional, cordial and collaborative relationship.

2.1.2 LANGUAGE

.1 Construction documents must be prepared in English.

2.1.3 MEDIA

.1 The Consultant shall not respond to any media inquiry.

.2 Direct all media requests to the Departmental Representative.

2.1.4 PROJECT MANAGEMENT

.1 Public Works and Government Services Canada administers the project on behalf of Canada and exercises continuing control over the project during all phases of development.

.2 This project is to be organized, managed and implemented in a collaborative manner.

.3 The PWGSC project management team, the Consultant, the Contractor and the User Department teams are to work cooperatively at every stage of the design and construction process in order to assure the creation of a successful and meaningful work of architecture.

.4 Under the leadership of the PWGSC Departmental Representative, all team members are responsible for establishing and maintaining a professional and cordial relationship.

2.1.5 LINES OF COMMUNICATION

.1 In general, communications will be through the Departmental Representative, unless directed otherwise.

.1 This includes formal contact between the Consultant, the Contractor, the PWGSC Project Team and the User Department.

.2 Direct communication between members of the PWGSC Project Team on routine matters may be required for resolution of technical issues.

.1 However, this shall not alter project scope, budget or schedules, unless confirmed in writing by the Departmental Representative.

.3 During construction tender call, PWGSC will conduct all correspondence with bidders and award the contract.

2.1.6 MEETINGS

.1 The Departmental Representative will arrange meetings throughout the project, with representatives from:

.1 The User Department;

.2 PWGSC

.3 The Consultant team; and

.4 The Contractor (during the construction phase)

.2 Standing agenda items shall include:

.1 Project Schedule,

.2 Cost,

.3 Risk,

.4 Quality,

.5 Health and safety

2.1.7 CONSULTANT RESPONSIBILITIES

.1 The "Consultant Team" includes the Consultant's staff, sub-consultants and specialists.

.1 This team must maintain its expertise for the duration of the project.
.2 The team must include qualified registered architectural and engineering professionals, with extensive relevant experience, capable of providing all required services.
.3 Team members may be qualified to provide services in more than one discipline.
.4 The Consultant may expand the team to include additional disciplines.

.2 The Consultant is responsible for:
.1 Obtaining Departmental Representative acceptance for each project phase before proceeding to the next phase.
.2 Accurately communicating design, budget, and scheduling issues to staff, sub-consultants and specialists.
.3 Co-ordinating input for the Departmental Representative's Risk Management Plan
.4 Co-ordinating the quality assurance process and ensuring that submissions of sub-consultants are complete and signed-off by reviewers;

2.1.8 PWGSC RESPONSIBILITIES

.1 Administration
.1 PWGSC administers the project and exercises continuing control over the project during all phases of development.
.2 The following administrative requirements apply during all phases of the project delivery.

.2 Reviews
.1 PWGSC will review the work at various stages and reserves the right to reject unsatisfactory work at any stage.
.2 If later reviews show that earlier acceptances must be withdrawn, the Consultant shall re-design and re-submit at no extra cost.

.3 Acceptance
.1 PWGSC acceptance of submissions from the Consultant simply indicates that, based on a general review, the material complies with governmental objectives and practices, and meets overall project objectives
.2 Acceptance does not relieve the Consultant of professional responsibility for the work and for compliance with the contract.

.4 PWGSC Project Management
.1 The Project Manager assigned to the project is the Departmental Representative.
.2 The Departmental Representative is directly responsible for:
.1 The progress and administration of the project, on behalf of PWGSC
.2 Day-to-day project management and is the Consultant's single point of contact for project direction.
.3 Providing authorizations to the Consultant on various tasks throughout the project.
.4 The liaison amongst and between the Consultant, PWGSC and the User Department and manages the internal federal government stakeholders.
.3 Unless directed otherwise by the Departmental Representative, the Consultant obtains all Federal approvals necessary for the work.

.5 PWGSC Professional & Technical Resources Team
.1 Provides professional advice and quality assurance reviews of consultant deliverables by Architectural and Engineering professional disciplines.
.2 Offers expert technical advice on related project issues, such as functional programming, options analysis, risk management, cost planning, scheduling, contract interpretation, specifications, terms of reference, commissioning, claims management, project delivery approach and project compliance.
.3 Participates regularly in design phases and may attend (during construction), contractor meetings and conduct field reviews on behalf of the Departmental Representative.

.4 Provides a Design Manager for the project, who will coordinate the services of the Professional & Technical Resources Team through the Departmental Representative;
.1 The Design Manager is the assembler and coordinator of the Resources Team of Architects, Engineers, Interior Designers, Project Planners, Cost Planners and Commissioning Specialists, all with specific areas of expertise.

.6 PWGSC Commissioning Specialist represents the Departmental Representative's interests in the commissioning process for buildings by:
.1 Providing technical advice on O&M matters, operational criteria and quality assurance on the commissioning process throughout the project life cycle;
.2 Coordinating and overseeing internal PWGSC commissioning activities during all project phases to ensure that O&M concerns are addressed;
.3 Working closely with the Consultant, the Consultant's Commissioning Manager, the Contractor, and the Departmental Representative for Commissioning activities and,
.4 Reviews all documentation and reported results relative to commissioning throughout the project delivery.

2.1.9 REVIEW AND APPROVAL BY PROVINCIAL AND MUNICIPAL AUTHORITIES

.1 The federal government generally defers to provincial and municipal authorities for specific regulations, standards and inspections but in areas of conflict, the more stringent authority prevails.
.2 Municipal authority review
.1 The purpose of this review is information and awareness;
.2 Submissions will be reviewed at the completion of specific phases as outlined in the Required Services Section of the TOR.

2.1.10 BUILDING PERMITS AND OCCUPANCY PERMITS

.1 The Consultant will support the Contractor in applying for building permits by providing the required documentation.
.1 These documents will be submitted at phases as requested by the municipal authorities.
.2 The Consultant will negotiate and resolve building permit related issues.
.2 The Consultant shall support the Contractor in its application for an occupancy permit and coordinate the resolution of all outstanding issues relating to the permit.
.3 The Contractor shall pay for the permits on behalf of PWGSC.

2.1.11 TECHNICAL AND FUNCTIONAL REVIEWS

.1 This includes both COE reviews and User Department reviews.
.1 The Purpose of these reviews is technical and functional quality assurance;
.2 Submissions will be reviewed at the completion of specific phases as outlined in the Required Services Section of the TOR.
.2 HRSDC Reviews of building projects
.1 The purpose of these reviews is for fire protection, health and life safety;
.2 Submissions will be reviewed at the completion of specific phases as outlined in the Required Services Section of the TOR.

2.2 PROJECT DELIVERY

2.2.1 GENERAL REQUIREMENTS

.1 The project delivery requirements outlined in this section are applicable to the design and construction of all PWGSC projects in Western Region, unless otherwise indicated in the TOR.
.2 Under the direction of the Consultant, the Consultant team shall provide fully integrated and coordinated professional and design services for the delivery of a project, in accordance with the requirements in the TOR and as contained herein
.3 The Consultant must:

.1 Obtain written authorization from the Departmental Representative before proceeding from one phase of work to the next phase of a project.
.2 Coordinate all services with the Departmental Representative.
.3 Deliver each project utilizing best practices in support of User Department needs, respecting the approved financial budget, schedule, scope, quality energy budget.
.4 Establish a cohesive functional partnership and open communication between all members of the project delivery team and stakeholders throughout all phases of the project life,
.5 Ensure that the Consultant team has an in-depth understanding and collective 'buy-in' of the project requirements, scope, budget and scheduling objectives, working constructively to build a collaborative and cooperative team approach with knowledgeable and timely input and contribution by all project team members, including representatives from PWGSC and the User Department.
.6 Conduct rigorous quality assurance reviews during the design and construction phases, including the application of value engineering principles during the design of all complex systems,
.7 Provide a written response to all PWGSC comments included in Quality Assurance reviews conducted throughout the design of the project.
.8 Develop a rigorous quality management plan in order to respond to and correct, in a timely and effective manner, all issues as they occur,
.9 If any alterations are required during the development of the design, analyse the impact on all project components and resubmit for approval before proceeding further,
.10 Establish and maintain a change control procedure for scope changes;
.11 Ensure that an experienced Project Architect or Project Engineer is assigned to each project, who shall be responsible for the production, coordination and delivery of all design and construction documents for all project disciplines,
.12 Prepare a continuous risk identification and management program employing effective methodologies to ensure construction safety as well as claims avoidance,
.13 Provide continuous and comprehensive documentation of the project at all stages of the project implementation,
.14 Ensure continuity of key personnel and maintain a dedicated working team for the life of the project.

2.2.2 SERVICE DELIVERY FOR ALL PROJECTS

.1 For all projects, the Consultant shall:
  .1 Deliver the project to be within:
    .1 The established construction budget;
    .2 The key milestones, according to the established project schedule
  .2 Ensure that each Consultant team member:
    .1 Understands the project requirements, for seamless delivery of the required services;
    .2 Functions as a cohesive partnership with open communication between all members of the project delivery team and stakeholders throughout all phases of the project life,
    .3 Function as an integrated and focused team with an in-depth understanding and collective 'buy-in' of the project requirements, scope, budget and scheduling objectives,
  .3 Provide
    .1 Full co-ordination of services with other consultants engaged by PWGSC;
    .2 A quality management plan that includes rigorous quality reviews during the design and construction phases, which responds to and corrects all issues as they occur, in a timely and effective manner;

.3 A continuous risk management program to address the risks associated specifically with this project, including construction safety and claims avoidance issues;

.4 Deliver the work in a professional manner during all phases of the project, employing best practices for budget, schedule, quality, and scope management.

.5 Maintain continuity of key personnel and maintain a dedicated working team for the life of the project.

2.2.3 SERVICE DELIVERY (BUILDINGS)

.1 For Building projects, where an Architectural firm is the Prime *Consultants*, the *Consultant* team shall, as a minimum, adhere to the standards of services outlined in the "Canadian Handbook of Practice for Architects - Volume 2 Management" (latest edition) distributed by the Royal Architectural Institute of Canada (RAIC).

2.2.4 SERVICE DELIVERY (ENGINEERING)

.1 For Engineering projects, where an Engineering firm is the Prime *Consultants*, the *Consultant* team shall adhere to the standards of services established by the Professional Engineering Association in the Province or Territories where the project is located

2.3 COST MANAGEMENT

2.3.1 CONSTRUCTION COST ESTIMATES

.1 The following provides a general indication of the information needed by the Consultant's cost estimator to prepare specific classifications of estimates.

.2 These are the minimum requirements only and should be supplemented where additional information exists or is warranted.

.3 Construction cost estimates are to be prepared and submitted to PWGSC at various stages during the design process.

.4 In addition to the Consultants' estimate, PWGSC may have independent estimates performed to compare with the Consultant estimate.

2.3.2 TREASURY BOARD (TB) SUBMISSIONS

.1 Projects that are subject to TB approval are normally submitted twice:

.1 The first submission is for Preliminary Project Approval (PPA) at Pre-Design or Schematic Design stage of a project and must include an Indicative Estimate for the cost of the work.

.2 The second submission is for Effective Project Approval (EPA) at the completion of Design Development or Pre-Tender stage of a project and must include a Substantive Estimate for the cost of the work.

.2 The Treasury Board estimate definitions are:

.1 Indicative Estimate:

.1 A low quality, order of magnitude estimate that is not sufficiently accurate to warrant TB approval as a Cost Objective.

.2 Substantive Estimate:

.1 An estimate which is of sufficiently high quality and reliability as to warrant TB approval as a Cost Objective for the project phase under consideration.

.2 It is based on detailed systems and component design, taking into account all project objectives and deliverables.

.3 TB Terminology

.1 Constant dollar estimate

.1 This is an estimate expressed in terms of the dollars of a particular base fiscal year.

.1 It includes no provision for inflation.

.2 Cash flows over a number of fiscal years may also be expressed in constant dollars of the base year including no allowance for inflation in the calculation of costs.

.2 Budget-year (BY) dollar estimate
.1 ***Budget year*** dollars is also be referred to as ***Nominal*** dollars or ***Current*** dollars
.1 This is an estimate based on costs arising in each FY of the project schedule.
.2 It is escalated to account for inflation and other economic factors affecting the period covered by the estimate.
.2 The costs and benefits across all periods should initially be tabulated in budget year dollars for thee following reasons:
.1 First, this is the form in which financial data are usually available.
.2 Second, adjustments, such as tax adjustments, are accurately and easily made in budget year dollars.
.3 Finally, working in budget-year dollar enables the analyst to construct a realistic picture over time, taking into account changes in relative prices.

2.3.3 CLASSES OF ESTIMATES

.1 PWGSC applies a detailed, four level, classification using the terms Class A, B, C and D (outlined below).
.2 Apply these estimate classifications at the project stages as defined in the TOR included in the RFP.
.3 For projects required to be submitted to TB for approval:
.1 An Indicative Estimate shall be at least a class ‘D’.
.2 A Substantive Estimate shall be at least a class ‘B’.

2.3.4 CLASS 'D' (INDICATIVE) ESTIMATE

.1 Based upon a comprehensive statement of requirements and an outline of potential solutions, this estimate is to provide an indication of the final project cost, and allow for ranking of all the options being considered.
.2 Submit Class ‘D’ cost estimates in elemental analysis format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors, with cost per M^2 for current industry statistical data for the appropriate building type and location.
.3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.
.4 The level of accuracy of a class D cost estimate shall be such that no more than a 20% design contingency allowance is required.

2.3.5 CLASS 'C' ESTIMATE

.1 Based on a comprehensive list of requirements and assumptions, including a full description of the preferred Schematic Design option, construction experience, design experience and market conditions, this estimate must be sufficient for making the correct investment decision.
.2 Submit Class ‘C’ cost estimates in elemental analysis format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors, with cost per M^2 for current industry statistical data for the appropriate building type and location.
.3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.
.4 The level of accuracy of a class C cost estimate shall be such that no more than a 15% design contingency allowance is required.

2.3.6 CLASS 'B' (SUBSTANTIVE) ESTIMATE

.1 Based on design development drawings and outline specifications, which include the preliminary design of all major systems and subsystems, as well as the results of all site/installation investigations, this estimate must provide for the establishment of realistic cost objectives and be sufficient to obtain effective project approval.
.2 Submit Class ‘B’ cost estimates in both elemental analysis format and trade divisional format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors.

.3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

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

2.3.7 CLASS 'A' (PRE-TENDER) ESTIMATE

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

.2 Submit Class 'A' cost estimates in both elemental analysis format and trade divisional format, in accordance with the latest edition issued by the Canadian Institute of Quantity Surveyors.

.3 Include a summary in the cost estimate, plus full back up, showing items of work, quantities, unit prices, allowances and assumptions.

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

2.4 SCHEDULE MANAGEMENT

2.4.1 CONTROL SPECIALIST (SCHEDULER)

.1 The Scheduler shall provide a Project Planning and Control Schedule for the project, for the purpose of Planning, Scheduling, Progress Monitoring (Time Management), during all the design phases up to the construction procurement phase.

.2 A qualified Scheduler, with experience commensurate with the complexity of the project, is required to develop and monitor the project schedule during the design process.

.3 The Scheduler shall adhere to good industry practices for schedule development and maintenance, as recognized by the Project Management Institute (PMI).

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

2.4.2 PROJECT SCHEDULE

.1 A Detailed Project Schedule is a schedule developed in reasonable detail to ensure adequate Time Management planning and control of the project.

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

.3 When building a Project Schedule, the Consultant must consider:

.1 The level of detail required for control and reporting;

.2 The reporting cycle shall be monthly, unless otherwise identified in the Terms of Reference

.3 What is required for reporting in the Project Teams Communications Plan and

.4 The nomenclature and coding structure for naming of scheduled activities, which must be submitted to the Project Manager for acceptance.

2.4.3 MILESTONES

.1 The Major Milestones are standard Deliverables and Control Points within NPMS and are required in all schedule development.

.2 These Milestones will be used in Time Management Reporting within PWGSC as well as used for monitoring project progress using Variance Analysis.

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

2.4.4 ACTIVITIES

.1 All activities will need to be developed based on:

.1 Project Objectives,
.2 Project Scope,
.3 Milestones,
.4 Meetings with the project team and
.5 The scheduler's full understanding of the project and it's processes.

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

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

.4 These elements will become activities, interdependently linked in the Project Schedule.

2.4.5 SCHEDULE REVIEW AND APPROVAL

.1 Once the scheduler has identified and properly coded all the activities to the acceptance of the Project Manager, the activities are then sorted into a logical order and appropriate duration are applied to complete the schedule.

.2 The scheduler, together with the Project Team, can then analyze the schedule to see if the milestone dates meet the project timelines and then adjust the schedule accordingly by modifying durations or changing logic.

.3 When the schedule has been satisfactorily prepared, the scheduler can present the detailed schedule back to the Project Team for acceptance and application as the project baseline.
.1 There may be several iterations before the schedule meets with the Project Teams agreement and the critical project timelines.

.4 The final agreed version must be copied and saved as the baseline to monitor variances during the design process.

2.4.6 SCHEDULE MONITORING AND CONTROL

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

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

.3 There will be several schedules generated from the analysis of the baseline schedule as outlined in the Required Services Sections of the TOR

.4 Each updated schedule reflects the progress of each activity to date, any logic changes, both historic and planned, projections of progress and completion indicating the actual start and finish dates of all activities being monitored.

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

.6 If unforeseen or critical issues arise, the Scheduler will advise the Project Manager and submit proposed alternative solutions in the form of an Exception Report.
.1 An Exception Report will include sufficient description and detail to clearly identify:
.1 Scope Change: Identifying the nature, reason and total impact of all identified and potential project scope changes affecting the project.
.2 Delays and accelerations: Identifying the nature, the reason and the total impact of all identified and potential duration variations.
.3 Options Enabling a Return to the project baseline: Identifying the nature and potential effects of all identified options proposed to return the project within baselined duration.

.7 At each submission or deliverable stage, provide an updated schedule and exception report.

2.5 RISK MANAGEMENT

2.5.1 RISK FACTORS

.1 Probability, impact, overall risk, risk response and risk allowance are to be determined for each item listed below:

2.5.2 RESOURCES EXTERNAL TO PROJECT MANAGEMENT TEAM

.1 Planning Resources and Performance
- .1 Errors and omissions
- .2 Low accuracy of estimates (allowances)
- .3 Data inadequacies
- .4 Level of liability insurance
- .5 Potential for misinterpretation / misunderstanding of documents
- .6 Planning inexperience

.2 Construction Resources Required and Performance
- .1 Level of liability insurance
- .2 Design versus execution methods
- .3 Suitability of execution methods to design
- .4 Commissioning issues (start up/turnover difficulties)
- .5 Contractor construction strategy
- .6 Reputation of contractor
- .7 Contractor financial stability
- .8 Contractor inexperience
- .9 Resources obtained less qualified than desired
- .10 Availability/suitability/performance of resource

2.5.3 PROJECT SCOPE DELIVERY

.1 Delivery of Specified Requirement
- .1 Accuracy of client requirements in terms of cost/schedule/performance/quality and ability to interface with existing environment
- .2 Conflicting client priorities
- .3 Low level of client knowledge

.2 Unstated Client Requirements
- .1 Completeness of client requirements in terms of cost/ schedule / performance / quality and ability to interface with existing environment
- .2 Restricted working conditions
- .3 Opportunities for changes / positive impact

.3 Stakeholder Requirements, Stated and Unstated
- .1 Low involvement of user groups in scope of definition
- .2 Interface with existing systems
- .3 Restricted working conditions
- .4 Operational needs

2.5.4 SITE/ASSET/BUILDING ACTUAL CONDITIONS

.1 Actual Physical Environment
- .1 Availability/accuracy of as built documentation and existing condition reports
- .2 High variability/low stability of soils
- .3 Potential for soil contamination
- .4 Presence of hazardous materials
- .5 Availability/access to site
- .6 Presence of other contractors on site
- .7 Climate (winter conditions, rain, wind, water levels)

2.5.5 GOVERNMENT/PWGSC/CLIENT/CONTEXT

.1 Impact on Adjacent Areas Actual
  .1 Impact on adjacent areas (land/tenants/traffic/operations)
.2 Impact from External Sources
  .1 Legal lawsuits, patent rights, licensing, etc
  .2 Political impacts including visibility of project
  .3 Social sensibilities
  .4 Potential strikes
  .5 Market risks
  .6 Bad press (media coverage)
.3 Impact from Unanticipated Regulatory Change
  .1 Environmental legislation and environmental screening
  .2 Potential changes to Acts, Codes and Regulations
  .3 Municipal building/occupancy permit issues
.4 Procedures Known
  .1 Suitability of tender documents
  .2 Suitability of contracting method
  .3 Delays in tendering process
  .4 Client internal coordination
  .5 Change order process
.5 Plan Approval/Design Reviews
  .1 Approvals may be required from Client, PWGSC, Treasury Board, FHBRO, HRSDC, Police, Emergency Services, Municipalities, Service Authorities (City of Ottawa, Hydro Ottawa, etc.), etc.
  .2 Absence of Investment Analysis
  .3 Unstable/changing client organization
  .4 Heritage building issues
  .5 Health and safety issues
  .6 Potential for “hold orders”
  .7 Design review delays (client/PWGSC/TBS/other)
  .8 Approval delays (client/PWGSC/TBS/other)

2.6 WASTE MANAGEMENT

2.6.1 PROTOCOL

.1 The Construction, Renovation, and Demolition (CRD) Non-hazardous Solid Waste Management Protocol to which PWGSC is bound, provides direction on the undertaking of non-hazardous solid waste management actions on projects.
  .1 The protocol is designed to meet the federal requirements, provincial/territorial policies and the objectives of the PWGSC Sustainable Development Strategy (SDS).
.2 The contractor must implement a solid waste management program.
.3 Contractors must be instructed to plan for extra project time when implementing CRD waste diversion initiatives.
  .1 Added labour costs can be recuperated and waste management costs savings can be achieved through reduced tipping fees, avoided haulage costs, and the sale of reusable and recyclable materials.

2.6.2 CONSULTANT RESPONSIBILITIES

.1 Research and investigate hazardous waste disposal strategies in context of the project and make recommendations.
.2 Include in the contract documents, a requirement for the contractor to develop a waste reduction and management plan during the construction of this project.

.3 Identify, on the site plan where large (garbage) bins shall be stored, as well as easy disposal truck access/exit to/from same, to assist the Contractor in reducing waste or re-cycling of materials on and off site.

2.7 COMMISSIONING

2.7.1 GENERAL

.1 This section defines the PWGSC commissioning process, the requirements and associated roles and responsibilities as they relate to the various phases in the delivery of a project

.2 It is to be used as a guide in further developing the commissioning plan and the specification requirements for a project.

.3 Commissioning is not a replacement for good design and construction practices.

.1 It requires coordinated efforts on the part of all parties involved in the Project.

.4 The “commissioning phase” is the transition stage between the implementation and operation phases of the PWGSC NPMS referred to in Section 2.1.

.5 The PWGSC Commissioning Manual CP.1 will be provided to the consultant.

.6 Sample check sheets for various types of system will be made available to the consultant for his own customization.

2.7.2 COMMISSIONING PROCESS

.1 “Commissioning” is a quality assurance process, in which the functional requirements of the Owner/occupant and the operational requirements of facility management are proven to function as intended.

.2 The “commissioning process” is a planned program of quality management and information transfer that extends through all phases of a project’s development and delivery, up to and including the warranty period.

.3 The process consists of a series of checks and balances to ensure that the work is designed, installed and proven to operate as intended.

.4 This process, as described herein, is for a typical new major project.

.1 For smaller projects, renovation work and for complex projects such as laboratories, the commissioning process must be tailored to the specific requirements of the project.

.2 For renovation work and fit-up projects where the work interfaces with existing base building systems, re-verification of integrated systems is required to confirm the functional performance of the affected systems.

2.7.3 MAIN COMPONENTS

.1 Commissioning has two main components, functional and operational.

.1 The functional component deals with:

.1 Security, Health (indoor air quality) and occupant safety;

.2 Comfort (temperature, relative humidity, ventilation, air flow patterns, air purity and well being);

.3 Cost-effectiveness of design and

.4 Systems and equipment supporting Owner’s functional requirements

.2 The operational component deals with:

.1 Operation and Maintenance (O&M) issues; e.g., design review with a particular concern for the operation and maintenance of the systems today and in the future, when repairs are required;

.2 Performance evaluation of systems and equipment;

.3 Accessibility to O&M Documentation and

.4 Review of the training plan against the current needs now and in the future.

2.7.4 COMPONENT VERIFICATION

.1 Component verification sheets (CV) sheets are developed by the *Consultant* and incorporated in the contract documents to ensure the facility is an operating entity and meets the requirements as described in the Agreement.

.2 The CV sheets are intended to monitor and track the supply and shop drawing requirements associated with each component. The *Consultant* must verify that the components being installed in the built works are acceptable to their design and the approved shop drawings.

.3 The commissioning process requires the documentation of all the components installed as part of a system that will have performance verification testing conducted.

2.7.5 SYSTEM & INTEGRATED SYSTEM TESTING

.1 The systems and integrated systems tests are known as “performance verification tests (PVTs)”. These are intended to demonstrate the functional performance of the systems & integrated system during the various modes of operation, against the design intent. Each test shall be uniquely identified and reflected in the contractor's commissioning schedule.

.2 Once the contract has been awarded the *Consultant* shall monitor the contractor’s process to help ensure the timely completion of these tests. The *Consultant* shall witness each test. The *Consultant* shall provide final certification of the test results. After an acceptable review of the test document, the PWGSC Commissioning Specialist will recommend to the *Departmental Representative* the acceptance or rejection of the test results.

2.7.6 TEST REQUIREMENTS

.1 Each CV or PVT shall be uniquely named, numbered and categorized by discipline.

.2 Tests shall define:

- .1 Test Purpose
- .2 System design narrative.
- .3 Test Prerequisites
- .4 Testing Procedures
- .5 Test Comments
- .6 Test Sign-off Block

2.7.7 SCHEDULING AND SEQUENCING

.1 System Performance Verifications Tests

- .1 These tests have prerequisites that are to be completed and approved prior to conducting the tests, which, may include but are not limited to:
  - .1 CV and PVT sheets developed and accepted,
  - .2 Contractor proving start-up and tests,
  - .3 Manufacturers start-ups,
  - .4 Consultant has certified testing, adjusting & balancing (TAB) results, per TAB specification.
    - .1 TAB work must be completed and approved prior to the control system Pts.
  - .5 Associated control device calibrations and physical point verifications are completed and approved.
    - .1 Note, control system end to end checks to be completed and approved prior to the control system PVTs.
  - .6 Other specified deliverables, i.e. factory test reports, O&M submissions, etc.
  - .7 Integrated System Performance Verifications
- .2 These tests have prerequisites that are to be completed and approved prior to conducting the tests which, may include but are not limited to:
  - .1 System performance tests associated with the integrated systems under test,
  - .2 Consultant certified fire alarm verifications,
  - .3 Other specified deliverables.
- .3 Prerequisites to Interim Acceptance

.1 The following commissioning related activities are prerequisites to interim acceptance and are to be reflected in the construction specification contract acceptance procedures:
  .1 Completed and approved component verification sheets
  .2 Completed and approved system performance tests
  .3 Completed and approved integrated system performance tests

2.7.8 OVERVIEW OF ROLES AND RESPONSIBILITIES

.1 The following provides a general overview of the roles, responsibilities and implementation of the commissioning process. The commissioning process is a logical sequence of verifications from component verifications through to system & integrated system, performance verification testing.

.2 At completion of the commissioning process all results are documented and audited for acceptance.

2.7.9 MAJOR TASKS AND RESPONSIBILITIES

Phase	Major Tasks and Responsibilities
Pre-Design	
PWGSC Commissioning Specialist	• Review and edit commissioning requirements in the Consultant Agreement
Schematic Design and Design Development	
Consultant	• Develop commissioning strategy • Develop preliminary commissioning plan,
Construction Documentation	
Consultant	• Complete the final commissioning plan • Develop commissioning specifications, • Develop component verification sheets for the specification, and • Develop project specific sample system test • Develop project specific integrated tests for the specification
Construction	
Consultant	• Monitor and report on contract commissioning activities, • Finalize development of job specific system and integrated systems tests, • Review and certify component verification sheets as they are completed by the contractor, and • Review commissioning schedule
Contractor	• Comply with the requirements in the specifications, • Complete the component verification, • Conduct the equipment system start-up and proving, and • Develop the commissioning schedule, reflecting the PVTs.
Commissioning Phase	
Consultant	• Witness all system and integrated systems tests, • Review and certify commissioning test results,

	• Track and compile all commissioning documentation submitted by the contractor and confirm that all commissioning tasks are completed, • Incorporate all commissioning documentation into a preliminary commissioning report and recommend interim acceptance. • Identify "deferred" commissioning tests due to seasonal constraints, etc.
Contractor	• Comply with the requirements in the specifications, • Conduct the system testing, and • Conduct the integrated system testing.
Operating Phase	
Consultant	• Provide advice and recommendations for fine tuning, if required, • Witness "deferred" commissioning tests, • Review and certify "deferred" systems test results, • Incorporate deferred system test results and all other commissioning documentation into a final commissioning report with an executive summary recommending final acceptance.
Contractor	• Address warranty issues,
Evaluation	
Consultant	• Provide advice and recommendations during the final evaluation.

2.8 SURVEYS

2.8.1 SITE SURVEY

.1 Site surveys are generally prepared for PWGSC projects involving site work

.1 The survey may be contracted separately by PWGSC or may be included in the scope of the *Consultant* for the project. The guidelines given here apply in either case. In cases where PWGSC contracts for the survey directly, the *Consultant* may be requested to review the scope of work for the survey and recommend modifications to the technical requirements to suit the specific project site.

.2 The criteria listed here are not absolute; they should be modified by the *Consultant* to suit the particular conditions of the project. All surveys should be prepared and sealed by a surveyor licensed in the province where the project is located.

2.8.2 GENERAL REQUIREMENTS

.1 Surveys should generally contain the following information:

.1 Locations of all permanent features within limits of work, such as buildings, structures, fences, walls, concrete slabs and foundations, above-ground tanks, cooling towers, transformers, sidewalks, steps, power and light poles, traffic control devices, manholes, fire hydrants, valves, culverts, headwalls, catch basins or inlets, property corner markers, benchmarks, etc.

.2 Conduct digital topographical control survey using Total Station as follows.

.1 Control to be produced using the 6-degree UTM grid system and geodetic mean sea level datum for all survey positioning. The horizontal datum is to be NAD 83. Tie in total station survey with a minimum of three (3) geodetic monuments and clearly indicate them on survey drawings. Provide ASCII format file containing information in the following order for each survey point: Point number, Northing, Easting, Elevation, and description (as required to identify specific items, abbreviations are acceptable if code table for abbreviations is provided).

.2 Indicate and define Grid North UTM, and True North relative angles.
.3 Process horizontal control data using rigorous least squares adjustment program.

.3 Survey pavements, PCC, HMAC, and gravel surfaces, as follows.
.1 Survey all pavement areas using a maximum 20 m stations spacing including all edges and corners. No point further than 20 meters from its nearest neighbouring point. Survey points are to be taken on the concrete, not in the sealant reservoir.
.2 For 60 m wide Runways, take shots at Centerline (CL), 7.5mL.7.5R. 15.0mL, 15.0mR, 23.5mL,23.5mR,30.0mL, 30.0mR offsets.
.3 For 45 m wide Runways, take shots at Centerline (CL), 7.5mL.7.5mR. 15.0mL, 15.0mR, 22.5mL,22.5mR, offsets.
.4 For 30 m wide Runways, take shots at Centerline (CL), 7.5Lm,7.5mR. 15.0mL, 15.0mR offsets.
.5 For 30 m wide Taxiways, take shots at Centerline (CL), 7.5mL.7.5mR. 15.0mL, 15.0mR, offsets.
.6 For 23.0 m wide Taxiways, take shots at Centerline (CL), 5.75mL,5.75mR. 11.5mL, 11.5mR, offsets.
.7 For roads, take shots at CL, pavement edges. For Hrizontal and vertical alignment curves use maximum 10.0 m station intervals.
.8 Runway/taxi intersections and runway/runway intersections to be shot on a 10 meters spacing. Shots to go at least 60 meters down the intersecting structure and pick up the fillet corners and mid points of fillets.
.9 .Spot elevations on concrete pavements are to be coincident with panel joint line intersections and edges and taken with no point further than 20 meters from its nearest neighbouring point.
.10 Follow surveying convention to clearly indicate all topographical features.
.11 Each instrument set up is to pick up minimum of two spot elevations in the previous instrument set up.
.12 Where necessary, use tighter grid spacing to ensure all important features, including survey boundaries, feature break lines such as edge of ditch, centerline of ditch, pavement crown, and edge of pavement, and change in pavement surface type etc, are obtained. Take additional survey points wherever there is change in horizontal alignment of features and wherever there is change in slope.

.4 Location of all adjacent and abounding roads or streets and street curbs including any signage within limits of work, including driveways and entrances. Type of surfacing and limits should be shown. For public streets, right-of-way widths and centerlines should also be shown.

.5 Locate drainage features, natural and manmade, including catch basins, manholes, trenches, swales, ditches, culverts, flow control structures, and surface elevation of any freestanding water. For each catch basin, manhole, and similar structures, take shot on center of grating, measure depth of sump, all pipe inverts and elevation difference between their top and surrounding grades.

.6 Locate fencing, airfield instruments and windsocks, Airfield lighting, (tops of edge lighting units need not be measured – measure at the base), Airfield signage. Indicate on the drawing what message is posted on each sign respectively. Survey each sign at its base, Electronic navigation aids including antennae and radar reflectors, Electrical distribution equipment including transformers and Arrestor gear systems.

.7 Location of all trees, shrubs, and other plants within limits of work
.1 For trees, calliper size should be shown; dead trees should be indicated.

.8 Location of all overhead telephone and power lines within the limits of work and their related easements

.9 Based on existing records, location of underground utilities, such as gas, water, steam, chilled water, electric power, sanitary, storm, combined sewers, telephone, etc. should be shown. Sizes of pipes (I.D.), invert elevations, inlet or manhole rim elevations should be indicated. Where appropriate, information should be verified in the field.

.10 Based on existing records, location of underground storage tanks or other subsurface structures.

.11 Topography field criteria should include such items as 300 millimetre or 600 millimetre contour intervals plotted on a grid system appropriate to the scale of the survey; elevations at top and bottom of ditches and at any abrupt changes in grade; periodic top-of-curb and gutter elevations, as well as street centerline elevations; elevations at all permanent features within the limits of work; ground floor elevations for all existing buildings.

.12 Bearings and distances for all property lines within the limits of work.

.13 Official datum upon which elevations are based and the benchmark oil or adjacent to the site to be used as a starting point

.14 Official datum upon which horizontal control points are based

.15 If there are not already two benchmarks on the site, establish two permanent benchmarks.

.16 Elevations of key datum points of all building structures and improvements directly adjacent and across the street from the project site during both wet and dry season

.17 Delineate location of any wetlands or floodplains, underground streams or water sources.

.18 Prepare a 1:1000 scale AutoCAD drawing of all survey points including the following.

.1 . Each point to have appropriate survey data attached (i.e. northing, easting, elevation, description).

.2 .Join like features (e.g. edge of pavement, building sides, pavement crown, ditch or swale edge, ditch or swale centreline, etc.) with lines and Indicating break lines for features.

.3 Logically assemble and label like features/object data Annotate by colour, and group by layer in the CAD file. Ensure each data point has its associated Point number annotated. Topographical data points and benchmarks are to be placed on exclusive drawing layers. Provide legend describing each point type Description code.

.4 Provide contour lines at maximum 0.20 m intervals to indicate topographical features on the 1:1000 scale drawings based on the grid elevation data.

.5 Surveyed area is to be mapped into a single CAD file only. The CAD file is not to be broken down into separate sub-files joined by match lines. Use ‘ground’ coordinates to create the file.

.6 Provide drawing in UTM Ground Coordinates; indicate BMs and scale factor used to calculate Ground Coordinates.

.7 Do not use drawing level 0 (zero).

.8 Clearly indicate geodetic monuments on the drawing

.19 Provide ASCII format files containing information in the following order for each survey point: Point number, Northing, Easting, Elevation, and Description (as required to identify specific items, abbreviations are acceptable provided a legend of the abbreviations is also submitted). Files are to be comma delimited.

.1 Submittals – Submit the following.

.1 One ASCII survey point file in each of the following formats:

.2 UTM ‘ground’ coordinates

.3 UTM ‘grid’ coordinates

.20 Survey Precision

.1 Vertical Precision- the vertical precision is to be 5 mm for asphalt PCC surfaces and 15mm for gravel and grass surfaces.

.2 Horizontal Precision- the Horizontal control points to be 1 in 25000.

2.9 GEOTECHNICAL INVESTIGATION AND ENGINEERING

2.9.1 STAGES

.1 PWGSC projects geotechnical investigations may take place at three separate stages:
- .1 During site selection,
- .2 During building design, and
- .3 During construction

.2 The requirements for geotechnical work for the building design are defined herein.
- .1 They apply whether PWGSC contracts for geotechnical work separately or includes the geotechnical investigation in the scope of the *Consultant* services.

.3 The requirements for geotechnical work during site selection and during construction may vary.

2.9.2 PURPOSE

.1 The purpose of the geotechnical investigation during building design or for other infrastructures is to determine the character and physical properties of soil deposits and evaluate their potential as foundations for the structure or as material for earthwork construction.
- .1 The type of structure to be built and anticipated geologic and field conditions have a significant bearing on the type of investigation to be conducted.
- .2 The investigation must therefore be planned with knowledge of the intended project size and anticipated loads, land utilization and a broad knowledge of the geological history of the area.

.2 The guidelines given here are not to be considered as rigid.
- .1 Planning of the exploration, sampling and testing programs and close supervision must be vested in a competent geotechnical engineer and/or engineering geologist with experience in this type of work and licensed to practice engineering in the province where the project is located.

2.9.3 ANALYSIS OF EXISTING CONDITIONS

.1 The report should address the following:
- .1 Description of terrain
- .2 Brief geological history
- .3 Brief seismic history
- .4 Surface drainage conditions.
- .5 Groundwater conditions and associated design or construction problems
- .6 Description of exploration and sampling methods and outline of testing methods
- .7 Narrative of soil identification and classification, by stratum
- .8 Narrative of difficulties and/or obstructions encountered during previous explorations of existing construction on or adjacent to the site.
- .9 Description of laboratory test borings and results
- .10 Plot plan, drawn to scale, showing test borings or pits.
- .11 Radon tests in areas of building location.
- .12 Soils resistively test, identifying resistively of soil for corrosion protection of underground metals and electrical grounding design
- .13 Boring logs, which identify:
  - .1 Sample number and sampling method
  - .2 Other pertinent data deemed necessary by the geotechnical engineer for design recommendations, such as:
    - .1 Unconfined compressive strength
    - .2 Standard penetration test values

.3 Sub-grade modulus.
.4 Location of water table
.5 Water tests for condition of groundwater.
.6 Location and classification of rock
.7 Location of obstructions
.8 Atterberg tests.
.9 Compaction tests.
.10 Consolidation tests.
.11 Triaxial compression test
.12 Chemical test (pH) of the soil
.13 Contamination.

2.9.4 ENGINEERING RECOMMENDATIONS

.1 Engineering recommendations based on borings and laboratory testing should be provided for the following:
  .1 Recommendations for building and other infrastructure foundation design and pavement structure design, with discussion of alternate solutions, if applicable, including:
    .1 Allowable soil bearing values
    .2 Feasible deep foundation types and allowable capacities, where applicable, including allowable tension (pull-out) and lateral sub grade modulus.
    .3 Feasibility of slab on grade versus structurally supported floor construction, including recommended bearing capacities and recommended sub grade modulus (k).
    .4 Discussion of evidence of expansive soils and recommended solutions
    .5 Lateral earth design pressures on retaining walls or basement walls, including dynamic pressures.
    .6 Design frost depth, if applicable
    .7 Removal or treatment of contaminated soil
    .8 Discussion of potential for consolidation and/or differential settlements of substrata, with design recommendations for total settlement and maximum angular distortion
    .9 Use and treatment of in-situ materials for use as engineered fill.
    .10 Recommendations for future sampling and testing
    .11 Recommendations for pavement designs, including base and sub-base thickness and sub drains
    .12 Recommendations for foundation and sub drainage, including appropriate details
    .13 Recommendation for bedding, surround, backfill material for any buried pipes including any filter fabricfrench drainage, etc.
    .14 Recommendation for any slope stability requirements and for any side supports required for deep trench excavations.
    .15 Recommendation for any potential Quick sand condition construction, and any water pumping requirements.
    .16 Discussion of soil resistivity values
    .17 Discussion of radon values and recommendation for mitigating measures, if required.

2.9.5 GEOLOGIC HAZARD REPORT

.1 A geologic hazard report shall be prepared for all new building construction in Regions of Low, Moderate and High seismicity, except for structures located in regions of Low seismicity designed to the Life Safety Performance Level.
.2 Geologic hazard reports are not required for minor or relatively unimportant facilities for which earthquake damage would not pose a significant risk to either life or property.
.3 Required Investigation

.1 When required by the project scope, a geologic hazard investigation, which addresses the hazards indicated below, must be performed.
.2 Whenever possible, a preliminary investigation should be performed in the planning stage of siting a facility, to provide reasonable assurance that geologic hazards do not preclude construction at a site.
.3 During a later stage of geotechnical investigations for a facility at a selected site, supplemental investigations may be conducted as needed to define the geologic hazards in more detail and/or develop mitigating measures.
.4 The scope and complexity of a geologic hazard investigation depends on the economics of the project and the level of acceptable risk.
.5 In general, major new building complexes, high-rise buildings, and other high value or critical facilities shall have thorough geologic hazard investigations.
.6 Small, isolated buildings need not have elaborate investigations.

.4 Surface Fault Rupture
.1 For purposes of new building construction, a fault is considered to be an active fault and a potential location of surface rupture if the fault exhibits any of the following characteristics:
.1 Has had documented historical macro seismic events or is associated with a well-defined pattern of micro seismicity.
.2 Is associated with well-defined geomorphic features suggestive of recent faulting.
.3 Has experienced surface rupture (including fault creep) during approximately the past 10,000 years (Holocene time).
.2 Fault investigations shall be directed at locating any existing faults traversing the site and determining the extent of their recent activity. If an active fault is found to exist at a site and the construction cannot reasonably be located elsewhere, investigations shall be conducted to evaluate the appropriate set-back distance from the fault and/or design values for displacements associated with surface fault rupture.

.5 Soil Liquefaction
.1 Recently deposited (geologically) and relatively unconsolidated soils and artificial fills without significant cohesion, which are located below the water table, are susceptible to liquefaction.
.1 Sands and silty sands are particularly susceptible.
.2 Potential consequences of liquefaction include foundation bearing capacity failure, differential settlement, lateral spreading and flow sliding, flotation of lightweight embedded structures, and increased lateral pressures on retaining walls.
.3 The investigation shall consider these consequences in determining the size of the area and the depth below the surface to be studied.
.2 An investigation for liquefaction may take many forms.
.1 One acceptable method is to use blow count data from the standard penetration test conducted in soil borings.
.2 This method is described in publications by H. B. Seed and M. ldriss, (1982), Ground Motions and Soil Liquefaction During Earthquakes: Earthquake Engineering Research Institute, Oakland, CA, Monograph Series, 134 p. and H.B. Seed et al, (1985) "The Influence of SPT Procedures in Soil Liquefaction Resistance Evaluations": Journal of Geotechnical Engineering, ASCE 111 (12): pp. 425-1445.

.6 Landsliding
.1 New construction shall not be sited where it may be within a zone of seismically induced slope failure or located below a slope whose failure may send soil and debris into the structure.
.2 Factors, which affect slope stability, include slope angle, soil type, bedding, ground water conditions, and evidence of past instability.

.3 The geologic hazard investigation shall address the potential for seismically induced slope deformations large enough to adversely affect the structure.

.7 Differential Settlement

.1 Loosely compacted soils either above or below the water table can consolidate during earthquake shaking, producing surface settlement. The potential for total and differential settlements beneath a structure shall be assessed. If liquefaction is not expected to occur, then in most cases, differential settlement would not pose a significant problem to construction.

.8 Flooding

.1 Earthquake-inducing flooding can be caused by tsunamis, seiches, and dam and levee failures, The possibility of flooding shall be addressed for new construction located near bodies of water.

.9 Duration of Strong Ground Shaking

.1 Estimates of the duration of strong ground Shaking at a site are defined by earthquake magnitude and shall be used to assess geologic hazards such as liquefaction and slope failure. Strong motion duration is strongly dependent on earthquake magnitude.

.2 Estimates of the duration of strong ground shaking shall be based on the assumption of the occurrence of a maximum considered earthquake generally accepted by the engineering and geologic community as appropriate to the region and to the subsurface conditions at the site.

.10 Mitigative Measures

.1 A site found to have one or more geologic hazards may be used, provided the hazards are removed, abated, or otherwise mitigated in the design, or if the risk is judged to be acceptable. Examples of mitigative measures include: removal and re-compaction of poorly compacted soils; use of special foundations; stabilizing slopes; and draining, compaction, or chemical treatment of liquefiable soils. The geological hazard report shall identify feasible mitigative measures.

.11 Required Documentation

.1 Investigations of geologic hazards shall be documented.

.2 As noted in the paragraph entitled "Required Investigation" above, a preliminary geologic hazard investigation shall be conducted and a report issued during the siting phase for a facility, however, unless the geologic hazard investigations have been documented in a stand-alone report, they shall be addressed in a section of the geotechnical engineering report prepared during the design phase of a project.

.3 The geologic hazard report, whether it is a separate report or a section of the geotechnical engineering report, shall as a minimum contain the following:

.1 List of hazards investigated, which must include the five described earlier in this section.

.2 Description of the methods used to evaluate the site for each hazard.

.3 Results of any investigations, borings, etc

.4 Summary of findings

.5 Recommendations for hazard mitigation, if required

.6 In some cases, estimates of site ground motions may be needed for assessment of geologic hazards such as liquefaction and slope failure.

3 STANDARDS

3.1 TECHNICAL REPORTS

3.1.1 PURPOSE

.1 This section provides direction and standards for the preparation of reports delivered to PWGSC during all the various stages of project delivery and for specific services such as investigations, studies, analysis, strategies, audits, surveys, programs, plans, etc.

.2 Technical Reports are official government documents, which are typically used to support an application for approval or to obtain authorization or acceptance and as such they must:

- .1 Be complete, clear and professional in appearance and organization, with proper reference to related parts and contents in the report
- .2 Clearly outline the intent, objectives, process, results and recommendations,
- .3 Present the flow of information and conclusions in a logical, easy to follow sequence
- .4 Be in written narrative, graphic, model (traditional and / or computer generated), and photographic format, which can be web enabled.
- .5 Ensure that all pages are numbered in sequence
- .6 Be printed double-sided, if hard copies are produced

3.1.2 STANDARDS FOR PWGSC TECHNICAL REPORTS

.1 Standard practice for the organization of technical reports requires:

- .1 A cover page, clearly indicating the nature of the report, the date, the PWGSC reference number and who prepared the report
- .2 A Table of Contents
- .3 An Executive Summary
- .4 The body of the report is to be structured such that the reader can easily review the document and locate, respond to and /or reference related information contained elsewhere in the report.
- .5 Appendices to be used for lengthy segments of the report, supplementary and supporting information and / or separate related documents

.2 The report content must:

- .1 Ensure that the executive summary is a true condensed version of the report following the identical structure, including only key points and results / recommendations requiring review and / or approval.
- .2 Use a proper numbering system (preferably legal numbering), for ease of reference and cross-reference.
  - .1 The use of ‘bullets’ is to be avoided.
- .3 Use proper grammar, including using complete sentences, in order to ensure clarity, avoid ambiguity and facilitate easy translation into French, if required.
  - .1 The use of undefined technical terms, industry jargon and cryptic phrases are to be avoided.
- .4 Be written as efficiently as possible, with only essential information included in the body of the report and supporting information in an appendix if needed.

3.2 CONSTRUCTION DOCUMENTS

3.2.1 PURPOSE

.1 This section provides direction in the preparation of construction contract documents (namely specifications, drawings and addenda) for PWGSC.

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

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

3.2.2 PRINCIPLES FOR PWGSC CONTRACT DOCUMENTS

.1 PWGSC's contract documents are based on common public procurement principles.
.2 PWGSC does not use Canadian Construction Document Committee (CCDC) documents.
.3 The construction contract and the terms and conditions are prepared and issued by PWGSC, along with all other related bidding and contractual documents.
  .1 For more detailed information, the clauses are available on the following web site:
    .1 http://sacc.pwgsc.gc.ca/sacc/query-e.jsp.
  .2 Any questions should be directed through the PWGSC Project Manager.

3.2.3 QUALITY ASSURANCE

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

3.2.4 SPECIFICATIONS

.1 In preparing project specifications, the Consultant must use the current edition of the National Master Specification (NMS) in accordance with the "NMS User's Guide".

3.2.5 DRAWINGS

.1 Computer Aided Design & Drafting (CADD)
  .1 Drawings shall be in accordance with PWGSC Western CADD Standards and CSA B78.3.
  .2 Refer to:
    .1 http://www.tpsgc-pwgsc.gc.ca/cdao-cadd/ouest-western/tdm-toc-eng.html
    .2 The above link is subject to change
    .3 The Consultant shall check with the Project Manager to ensure that the link is current.
  .3 Download and use the Toolkit which includes drawing border templates, layer utility and drawing standards checker.

3.2.6 ADDENDA

.1 Format
  .1 Prepare addenda using the format shown in Appendix 'C'.
  .2 No signature type information is to appear.
  .3 Every page of the addendum (including attachments) must be numbered consecutively.
  .4 All pages must have the PWGSC project number and the appropriate addendum number.
  .5 Sketches shall appear in the PWGSC format, stamped and signed.
  .6 No Consultant information (name, address, phone #, consultant project # etc.) may appear in the addendum or its attachments (except on sketches).
.2 Content
  .1 Each item should refer to an existing paragraph of the specification or note/detail on the drawings. The clarification style is not acceptable.

3.2.7 SUBMISSIONS

.1 For each construction document submission, the Consultant shall provide:
  .1 A completed and signed Checklist for the Submission of Construction Documents (See Appendix 'B')
  .2 Original specification; printed one side on 216 mm x 280 mm white bond paper.

.3 Index, as per Appendix 'C'
.4 Reproducible original drawings; sealed and signed by the design authority.
.5 Addenda (if required), as per Appendix 'D;' (to be issued by PWGSC)

.2 Tender information:
.1 Include a description of all units and estimated quantities to be included in unit price table.
.2 Include a list of significant trades including costs.
.1 PWGSC will then determine which trades, if any, will be tendered through the Bid Depository.

.3 Government Electronic Tendering System (MERX):
.1 Consultants shall provide an electronic true copy of the final documents (specifications and drawings) on one or multiple CD-ROM in Portable Document Format (PDF) without password protection and printing restrictions.
.2 The electronic copy of drawings and specifications is for bidding purposes only and do not require to be signed and sealed.
.1 See Appendix 'E' and Appendix 'F' ????

3.2.8 PWGSC ROLE

.1 PWGSC shall provide:
.1 General and Special Instructions to Bidders
.2 Bid and Acceptance Form
.3 Standard Construction Contract Documents

3.3 SPECIFICATIONS

3.3.1 NATIONAL MASTER SPECIFICATION (NMS)

.1 In preparing project specifications, the Consultant must use the current edition of the National Master Specification (NMS) in accordance with the "NMS User's Guide".
.2 The NMS is a master construction specification available in both official languages, which is divided into 48 Divisions (Masterformat 2004) and is used for a wide range of construction and/or renovation projects.
.3 The Consultant retains overriding responsibility for content and shall edit, amend and supplement the NMS as deemed necessary to produce an appropriate project specification, free of conflict and ambiguity.

3.3.2 SPECIFICATION ORGANIZATION

.1 Narrow scope sections describing single units of work are preferred for more complex work; however, broad scope sections may be more suitable for less complex work.
.2 Use either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full-page format.
.3 For specifications not included in the NMS, but required for the project, follow the number and title recommendations of Masterformat 2004
.4 Number each page and start each Section on a new page
.5 Bind specifications
.6 Include Division 1, edited to PWGSC requirements.
.7 Note: Consultant's name is not to be indicated in the specifications..

3.3.3 TERMINOLOGY

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

.3 Notations such as: "verify on site", "as instructed", “to match existing”, “example”, “equal to” or “equivalent to”, "to be determined on site by “Departmental Representative", should not be indicated in the specifications as this promotes inaccurate and inflated bids.

.4 Specifications must permit bidders to calculate all quantities and bid accurately.

.1 If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices).

.5 Ensure that the terminology used throughout the specifications is consistent and does not contradict the applicable standard construction contract documents.

3.3.4 DIMENSIONS

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

3.3.5 STANDARDS

.1 As references in the NMS may not be up to date, it is the responsibility of the consultant to ensure that the project specification uses the latest applicable edition of all references quoted.

.2 Canadian standards should be used wherever possible.

3.3.6 SPECIFYING MATERIALS

.1 The practice of specifying actual brand names, model numbers, etc., is against departmental policy except for special circumstances.

.2 The method of specifying materials shall be by using industry recognized standards.

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

.4 In exceptional or justifiable circumstances, or if no standards exist and when a suitable non-restrictive, non-trade name “prescription” or “performance” specification cannot be developed; specify by trade name

.5 Include all known materials acceptable for the purpose intended, and in the case of equipment, identify by type and model number.

3.3.7 ACCEPTABLE PRODUCTS AND MATERIALS

.1 The term “Acceptable Manufacturers” must not be used, as this restricts competition and does not ensure the actual material or product will be acceptable.

.1 A list of words and phrases that should be avoided is included in the NMS User's Guide.

.2 Listing of acceptable products or materials is to be an exception, due to a unique specification or for the purpose of assisting bidders in identifying lesser known potential products or materials.

.3 For exceptions, provide justifiable reasons for listing products and materials and submit to the *Departmental Representative* for acceptance.

.4 When authorized to list acceptable products or materials, list all, with a minimum of three (3), trade names of products and materials acceptable for the intended purpose.

3.3.8 ALTERNATE PRODUCTS AND MATERIALS

.1 Alternates must be approved by addendum issued by the *Departmental Representative* in accordance with Instructions to bidders.

.2 Review applications for approval of alternate products and materials and provide recommendations to the *Departmental Representative.*

.3 Compare products/materials to specifications. Do not compare product-to-product or material-to-material.

3.3.9 SEPARATE AND ALTERNATE PRICES

.1 Do not include Separate or Alternate Pricing unless authorized to do so by the *Departmental Representative*.

.2 Conditions regarding Separate and Alternate Pricing require that an evaluation criteria be published and at the time of tender closing, all bidders be evaluated with a full matrix of values, based on the evaluation criteria.

3.3.10 SOLE SOURCING

.1 Sole sourcing for materials and work may be used for proprietary systems (i.e. fire alarm systems, EMCS systems).

.2 Substantiation and/or justification will be required.

.3 Prior to including sole source materials and/or work, the Consultant must contact the Departmental Representative to obtain the approval for the sole sourcing.

3.3.11 UNIT PRICES

.1 Unit prices are used where the quantity can only be estimated (e.g. earth work) and the approval of the Project Manager must be sought in advance of their use.

3.3.12 CASH ALLOWANCES

.1 Construction contract documents should be complete and contain all of the requirements for the contractual work.

.2 Cash allowances are to be used only under exceptional circumstances (i.e. utility companies, municipalities), where no other method of specifying is appropriate.

.3 Obtain approval from the Project Manager in advance to include cash allowances and then use "Section 01 21 00 - Allowances" of the NMS to specify the criteria.

3.3.13 WARRANTIES

.1 It is the practice of PWGSC to have a 12-month warranty and to avoid extending warranties for more than 24 months.

.2 When it is deemed necessary to extend a warranty beyond the 12 month period provided for in the General Conditions of the contract, obtain approval from the Project Manager.

.3 Delete all references to manufacturers' guarantees.

3.3.14 SCOPE OF WORK

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

3.3.15 SUMMARY AND SECTION INCLUDES

.1 In Part -1 All Sections; do not use (delete):

.1 "Summary" and

.2 "Section Includes."

3.3.16 RELATED SECTIONS

.1 In Part 1 All Sections; do not use (delete)

3.3.17 INDEX

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

3.3.18 HEALTH AND SAFETY

.1 Confirm with the Project Manager to determine if there are any instructions to meet regional requirements.

3.3.19 EXPERIENCE AND QUALIFICATIONS

.1 Remove experience and qualification requirements from specification sections.

3.3.20 PREQUALIFICATION

.1 Do not include in the specification any mandatory contractor and/or subcontractor prequalification requirements that could become a contract award condition.

.2 If a prequalification process is required, contact the Project Manager.

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

3.3.21 CONTRACTING ISSUES

.1 Specifications describe the workmanship and quality of the work.

.1 Contracting issues should not appear in the specifications.

.2 Division 00 of the NMS is not used for PWGSC projects.

.3 Remove all references within the specifications, to the following:
- .1 General Instructions to Bidders
- .2 General Conditions
- .3 CCDC documents
- .4 Priority of documents
- .5 Security clauses
- .6 Terms of payment or holdback
- .7 Tendering process
- .8 Bonding requirements
- .9 Insurance requirements
- .10 Alternative and separate pricing
- .11 Site visit (Mandatory or Optional)
- .12 Release of Lien and deficiency holdbacks

3.4 DRAWINGS

3.4.1 TITLE BLOCKS

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

3.4.2 DIMENSIONS

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

3.4.3 TRADE NAMES

.1 Trade names on drawings are not acceptable.

.2 Refer to SECTON 2.3, SPECIFICATIONS; 2.3.6 Specifying Materials for specifying materials by trade name.

3.4.4 SPECIFICATION NOTES

.1 No specification type notes are to appear on any drawing.

3.4.5 TERMINOLOGY

.1 Use the term "Departmental Representative" instead of Engineer, PWGSC, Owner, Consultant or Architect.

.2 "Departmental Representative" means the person designated in the Contract, or by written notice to the Contractor, to act as the Departmental Representative for the purposes of the Contract, and includes a person, designated and authorized in writing by the Departmental Representative to the Contractor.

.3 Notations such as: "verify on site", "as instructed", “to match existing”, “example”, “equal to” or “equivalent to”, "to be determined on site by “Departmental Representative", may not be indicated on the drawings or in the specifications as this promotes inaccurate and inflated bids.

.4 Specifications & drawings must permit bidders to calculate all quantities and bid accurately.

.5 If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices).

.6 Ensure that the terminology used throughout the drawings & specifications is consistent and does not contradict the applicable standard construction contract documents.

3.4.6 INFORMATION TO BE INCLUDED

.1 Drawings must show the quantity and configuration of the project, the dimensions and details of how it is constructed.

.2 There should be no references to future work and no any information that will be changed by future addenda.

.3 The scope of work should be clearly detailed and elements not in contract should be eliminated or kept to an absolute minimum.

3.4.7 DRAWING NUMBERS

.1 Number drawings in sets according to the type of drawing and the discipline involved as follows:

.1 The requirements of SECTION 2 PWGSC NATIONAL CADD STANDARD will supersede these requirements, where warranted.

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

Discipline	Drawing
Demolition	D1, D2, etc.
Architectural	A1, A2, etc.
Civil	C1, C2, etc.
Landscaping	L1, L2, etc.
Mechanical	M1, M2, etc.
Electrical	E1, E2, etc.
Structural	S1, S2, etc.
Interior Design	ID1, ID2, etc.

3.4.8 PRINTS

.1 Print with black lines on white paper.

.2 Blue prints are acceptable for document submissions at 33%, 66% and 99% stages.

.3 Confirm with Project Manager the size of prints to be provided for review purposes.

3.4.9 BINDING

.1 Staple or otherwise bind prints into sets.

.2 Where presentations exceed 20 sheets, the drawings for each discipline may be bound separately for convenience and ease of handling.

3.4.10 LEGENDS

.1 Provide a legend of symbols, abbreviations, references, etc., on the front sheet of each set of drawings or, in large sets of drawings, immediately after the title sheet and index sheets.

3.4.11 SCHEDULES

.1 Where schedules occupy entire sheets, locate them next to the plan sheets or at the back of each set of drawings for convenient reference.

.1 See CGSB 33-GP-7 Architectural Drawing Practices for schedule arrangements.

3.4.12 NORTH POINTS

.1 On all plans include a north point.

.2 Orient all plans in the same direction for easy cross-referencing.

.3 Wherever possible, lay out plans so that the north point is at the top of the sheet.

3.4.13 DRAWING SYMBOLS

.1 Follow generally accepted drawing conventions, understandable by the construction trades, and in accordance with PWGSC publications.

APPENDIX A CHECKLISTS

A.1 CHECKLIST FOR THE SUBMISSION OF CONSTRUCTION DOCUMENTS

A1.1 TITLE BLOCK

Project Title:	Date:
Project Location:	**Project Number:**
Consultant's Name:	**Contract Number:**

PWGSC PM:	Review Stage:		
	66%	99%	100%

A1.2 STANDARDS & GUIDELINES

ITEM		Checked by:	Comments:
1. General The design meets the requirements of;			
.1	National Building Code - 2005		
.2	National Fire Code - 2005		
.3	National Plumbing Code - 2005		
.4	Canada Labour Code		
.5	NFPA 10 - Standard for Portable Fire Extinguishers - 2002		
.6	NFPA 13 - Standard for the Installation of Sprinkler Systems - 2007		
.7	NFPA 14 – Standard for the Installation of Standpipe and Hose Systems - 2003		
2. Treasury Board The design meets the requirements of;			
.1	Chapter 3-6: Fire Protection Standard for Correctional Institutions. http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13580		
.2	Chapter 3-2: Fire Protection Standard for Design & Construction. http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13581		
.3	Fire Protection Standard for Electronic Data Processing Equipment. http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13582		
3. HRSDC Fire Protection Engineer Standards The design meets the requirements of;			
.1	Federal Fire Protection Standards. http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/index.shtml		
.2	FC-403 Standard for Sprinkler Systems. http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/403/page00.shtml		
.3	FC-311-M Standard for Record Storage.		

http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/commissioner/311/page00.shtml		
4. Labour Canada Standards The design meets the requirements of;		
.1 Canada Labour Code. http://laws.justice.gc.ca/en/L-2/		
.2 Canada Occupational Health and Safety Regulations. http://laws.justice.gc.ca/eng/SOR-86-304/index.html		
.3 Movable Storage Units Standard. http://www.hrsdc.gc.ca/eng/labour/fire_protection/policies_standards/guidelines/mobile.shtml		
5. ASHRAE Standards The design meets the requirements of;		
.1 ANSI/ASHRAE 55 – 2004 Thermal Environmental Conditions for Human Occupancy		
.2 ASHRAE 62.1 – 2007 – Ventilation for Acceptable Indoor Air Quality		
.3 ASHRAE Applications Handbook		
.4 ASHRAE Fundamentals Handbook		
6. PWGSC MD Standards The design meets the requirements of;		
.1 MD 15116 – Computer Room Air Conditioning Systems - 2006		
.2 MD 15128 – Minimum Guidelines for Laboratory Fume Hoods – March 2004		
.3 MD 15129 – Perchloric Acid Fume Hoods - 2006		
.4 MD 15161 – Guidelines for the control of Legionalla in mechanical systems		
.5 MD 250005 – Energy Monitoring and Control Systems Design Guidelines - 2009		

A1.3 SPECIFICATIONS – ALL DISCIPLINES

ITEM	Checked by:	Comments:
1. General The Specifications meet the requirements of;		
.1 The NMS Users Guide. .		
.2 Masterformat 2004		
.3 The current edition of the NMS database		
.4 Deletion of "Related Sections" and "Section Includes" throughout.		
.5 PWGSC GCs for projects tendered through PWGSC		
.6 Consistent use of CCDC or other for privately tendered projects.		
.7 Non-proprietary Specifications.		
.8 Being completely edited with removal of all square choice brackets and Spec Notes.		

.9	Including all relevant Sections as evident by the by the scope of work indicated by the drawings.		
.10	Not referring to the Tender Submission (Contract B)		
.11	Use of command imperative style of language.		
.12	Formatting in either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full page format.		
.13	Each Section starting on a new page and the Project Number, Section Title, Section Number and Page Number show on the header of each page only.		
.14	Specification headers not including date or consultant's name.		
.15	Departmental Representative being used throughout instead of Engineer, PWGSC, Owner, Consultant or Architect. (That is; the contractual entity)		
.16	Non use of notations such as: "verify on site", "as instructed", "to match existing", "example", "equal to", "equivalent to" and "to be determined on site by".		
.17	Dimensions being provided in metric only.		
.18	Indicating the latest edition of all references noted in Part 1 of each Section and that un-used reference Standards are deleted.		
.19	No bolding of text.		
.20	Use of Western Regions standard payments procedures clause.		

A1.4 DRAWINGS GENERAL – ALL DISCIPLINES

ITEM		Checked by:	Comments:
1. General The Drawings meet the requirements of;			
.1	PWGSC Western Region AutoCAD drafting standards.		
.2	Using the "toolkit" and the "drawing checker".		
.3	All dimensions in SI. No dual dimensioning has been used.		
.4	Providing a north arrow.		
.5	Providing a legend on all relevant sheets.		
.6	Indicating grid lines on all sheets.		
.7	Using standard scales. (1:50, 1:100 etc.)		
.8	Cross referencing and detailing is consistent.		
.9	No Specifications on drawings.		
.10	All notes being written in the command imperative style of speech.		
.11	Not naming the "Contractor" or "sub trades" in the notes.		
.12	Numbering all rooms on all floor plans.		
.13	Using appropriate line weights to differentiate new versus existing versus demolition.		

.14	Using font sizes and types following PWGSC drafting standards.		
.15	Providing separate drawings for demolition and new work.		
.16	Drawing acceptance by the FPE of HRSDC.		

A1.5 DRAWINGS - DISCIPLINE SPECIFIC (TOP 10 FOR EACH)

ITEM		Checked by:	Comments:
1. Architectural The Drawings meet the requirements of;			
.1	Providing a Building Code Analysis.		
.2	Indicating fire separations and firewalls and rating.		
.3	Providing a complete site plan with all related details.		
.4	Providing a fully detailed reflected ceiling plan showing lighting, diffusers, sprinkler heads, etc.		
.5	Wall sections being coordinated with the structural and other disciplines drawings.		
.6	Building elevations showing all mechanical and electrical ancillaries.		
.7	Sub surface drainage being shown on the foundation plans and coordinated with all other disciplines.		
.8	Accessibility conforming to CAN/CSA 651-04.		
.9	Coordination of door, finish, hardware schedules in conjunction with fire separations and other disciplines.		
.10	All conflict points identified by BIM have been resolved.		
2. Structural The Drawings meet the requirements of;			
.1	Ensuring that General Notes provide additional information that is NOT covered in Specifications.		
.2	Remove all information that is or should be covered by the Specifications.		
.3	Note loads used for design.		
.4	PWGSC policy of using general product descriptions, not proprietary product names followed.		
.5	Table of Abbreviations used provided.		
.6	Section bubbles properly cross referenced.		
.7	Coordination with all other disciplines.		
3. Mechanical The Drawings meet the requirements of;			
.1	Separate drawings for Plumbing, HVAC, Fire Suppression, etc.		
.2	Provision for humidification with a clean source of water and no standing water		
.3	Provision of separate HVAC zoning for each unique thermal zone.		

.4	Providing Ventilation to ASHRAE 62.1.		
.5	The building and systems and equipment meeting all requirements of Section 5 of ASHRAE 62.1.		
.6	Conformance to ASHRAE 55 for; .1 Operative temperature .2 Air motion .3 Radiant Temperature Asymmetry .4 Draft .5 Vertical Temperature Difference .6 Floor Surface Temperature .7 Temperature Variations with Time .8 Cyclic Variations .9 Drifts and Ramps		
.7	Providing building cross-sections at all key locations showing clearances for the mechanical installation and access for maintenance.		
.8	Providing sufficient access to mechanical equipment for maintenance.		
.9	Providing mechanical schematics showing design pressure and temperatures as well as all instrumentation and control points labels.		
.10	Coordination with all other disciplines.		
4. Electrical The Drawings meet the requirements of;			
.1	Separate drawings for Lighting, Power, Fire Alarm System, Communication and Data, Security & CCTV etc.		
.2	Verification and acceptance of the Grounding condition for this project.		
.3	The Overcurrent and Short Circuit Study and confirming all components are fully coordinated.		
.4	The Arch-Flash Study and confirming all components are fully coordinated.		
.5	Providing Arch protection warning signs and labeling.		
.6	Providing lighting Levels in accordance with the National Building Code and IESNA recommendations.		
.7	Not using Armored Cable. Using Armored Cable will be allowed only for jumping from one light fixture to the other in a distance up to 3m.		
.8	Providing identification for each circuit including: .1 Name .2 Voltage, .3 Phase, .4 Amps, .5 Circuit-s .6 Fed from Panel, Destination.		
.9	The Voltage Drop Calculation for each circuit and conformance to CEC requirements.		
.10	Providing phase load and total load for each panel and ensuring proper balance of the Electrical System.		
.11	Coordination with all other disciplines.		

5. Civil The Drawings meet the requirements of;			
.1	The design criteria. (e.g. deign vehicle for surface structures, design period and other data for WM.WW, SW and other systems including data and calculations showing design requirements and provided capacities)		
.2	The reference standards. (e.g. minimum service connection pipe or minimum WM size, etc have been used for municipal works, name the local authority whose standards are used.)		
.3	Indicating existing sub-grade soil properties and strength that has been used for the design is indicated on drawings or in a report.		
.4	Indicating Bench Marks used for the Topographic Survey are shown with Northing, Easting and elevation data.		
.5	Indicating the Final Geometric layout for existing and new infrastructures and facilities including centerline of all access roads and pipes. The data provided includes Northing and Easting of all points including start and end point and for all other points wherever there is change in direction, and all horizontal curve data		
.6	Providing typical X-sections for all structures, including type, thickness of various materials for pavement structures, and pipe diameter, material types and thickness and SDR values.		
.7	Providing design grades and slopes.		
.8	Providing details for all infrastructures and facilities indicating all works and type of materials and all geometrics and dimensions..		
.9	Coordination with all other disciplines.		

A1.6 CONSULTANT'S DECLARATION

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

Consultant's Representative:	
Firm name:	
Signature:	
Date:	

APPENDIX B SAMPLE OF INDEX

B.1 SAMPLE OF INDEX FOR DRAWINGS & SPECIFICATIONS

B1.1 DRAWINGS

.1 List all Drawings by number and title.

B1.2 SPECIFICATIONS

.1 List all Divisions, Sections (by number and title) and number of pages.

Project No: _____ **Index**
Page 1 of xx

DRAWINGS AND SPECIFICATIONS

DRAWINGS:

C-1	Civil
L-1	Landscaping
A-1	Architectural
S-1	Structural
M-1	Mechanical
E-1	Electrical

SPECIFICATIONS:

DIVISION	SECTION	NO. OF PAGES
DIVISION 01	01 00 10 - General Instructions.....	xx
	01 14 25 - Designated Substances Report.....	xx
	01 35 30 - Health and Safety.....	xx
DIVISION 23	23 xx xx	xx
DIVISION 26	26 xx xx	xx

APPENDIX C SAMPLE OF ADDENDUM

C.1 SAMPLE OF ADDENDUM FORMAT

C1.1 DRAWINGS

.1 Indicate drawing number and title, then list changes or indicate revision number and date, and re-issue drawing with addendum.

C1.2 SPECIFICATIONS

.1 Indicate section number and title.

.2 List all changes (i.e. delete, add or change) by article or paragraph

Project Title:	**Addendum No:**
Project Location:	**Project Number:**
Consultant's Name:	**Date:**

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

Drawings

1 A1 Architectural

Specifications

1 Section 01 00 10 - General Instructions

.1 Delete article (xx) entirely.

.2 Refer to paragraph (xx) and change ...

2 Section 23 05 00 - Common Work Results - Mechanical

.1 Add new article (x) as follows:

APPENDIX D TENDER DOCUMENTS STANDARDS

D.1 CONVENTION STANDARDS FOR TENDER DOCUMENTS

D1.1 USER MANUAL

.1 Refer to the User manual on directory structure and naming convention standards for construction tender documents on CD ROM

.1 Issued by: Real Property Contracting Directorate, PWGSC,

.2 Version 1.0, May 2005

D1.2 PREFACE

.1 The Government of Canada (GoC) has committed to move towards an electronic environment for the majority of the services it offers.

.2 This covers the advertisement and distribution of contract opportunities, including construction solicitations.

.3 As a result, it is now necessary to obtain a copy of construction drawings and specifications (in PDF format *without* password protection) on one or multiple CD-ROM to facilitate for the GoC the transfer of the construction drawings and specifications electronically to the Government Electronic Tendering System (GETS).

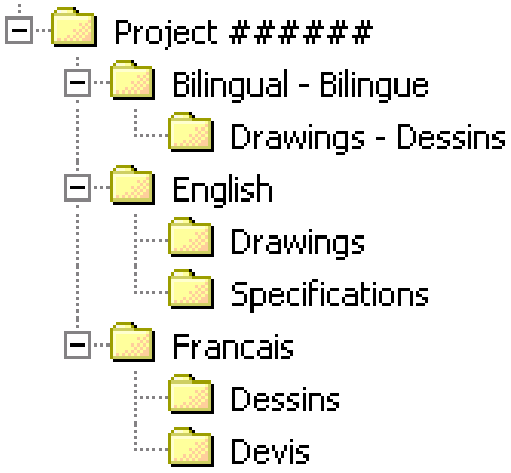
.4 There is therefore a need to adopt a common directory structure and file-naming convention to ensure that the information made available to contractors electronically and in hard (printed) copy is in accordance with the sequence adopted in the real property industries, both for design and construction.

.5 This manual defines the standard to be followed by both consultants and print shops at time of formatting and organizing the information, whether drawings and specifications are created by scanning print documents or saved as PDF files from the native software (AutoCAD, NMS Edit, MS-Word, etc…) in which these were created.

.6 It is important to note that the procedure described in this manual is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications.

.7 The sole purpose of this manual is to provide a standard for the organization and naming of the electronic files that will be recorded on CD-ROM.

D1.3 DIRECTORY STRUCTURE



D1.4 1ST, 2ND AND 3RD TIER SUB-FOLDERS

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

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

.1 The "*Project* ######" folder is considered the 1st Tier of the Directory Structure where ###### represents each digit of the Project Number.

.2 The Project Number must always be used to name the 1st Tier folder and it is always required.

.3 Free text can be added following the Project Number, to include such things as a brief description or the project title;

.3 The "*Bilingual - Bilingue*", "*English*" and "*Français*" folders are considered the 2nd Tier of the Directory Structure. The folders of the 2nd Tier **cannot** be given any other names since GETS uses these names for validation purposes. At least one of the "*Bilingual - Bilingue*", "*English*" and "*Français*" folders is always required, and these must always have one of the applicable sub-folders of the 3rd Tier;

.4 The "*Drawings - Dessins*", "*Drawings*", "*Specifications*", "*Dessins*" and "*Devis*" folders are considered the 3rd Tier of the Directory Structure. The folders of the 3rd Tier **cannot** be given any other names since GETS also uses these names for validation purposes. There must be always at least one of the applicable 3rd Tier folder in each document.

.5 **IMPORTANT NOTE**:

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

D1.5 4TH TIER SUB-FOLDERS FOR DRAWINGS

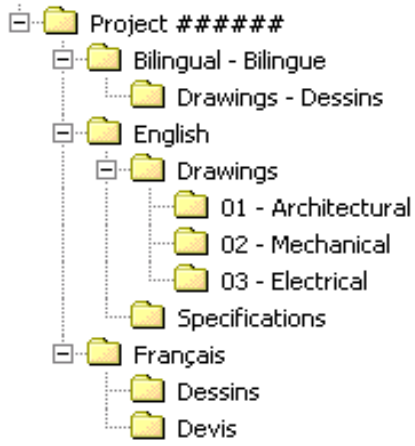
.1 The "*Drawings – Dessins*", "*Drawings*" and "*Dessins*" folders must have 4th Tier sub-folders created to reflect the various disciplines of the set of drawings.

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

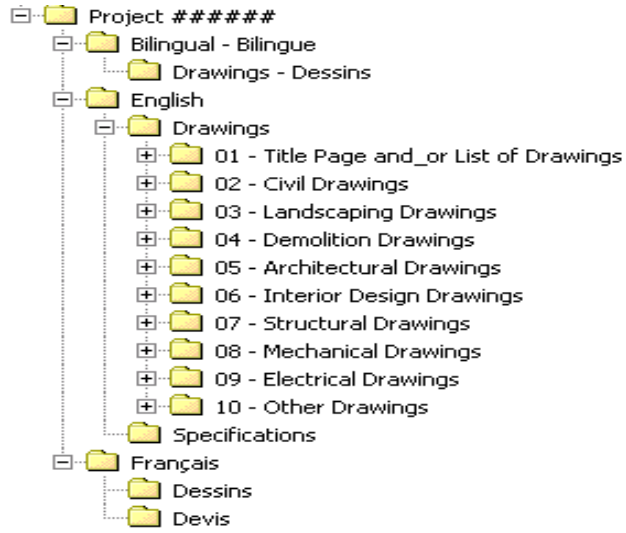
.3 Note:

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

.4 Examples of 4th Tier sub-folders for drawings:



or



D1.6 NAMING CONVENTION - 4TH TIER DRAWINGS

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

.1 For the "*Drawings*" and "*Dessins*" folders:

1 ## - Y, Where:
   1 ## = A two digit number ranging from 01 to 99 (leading zeros must be included)
   2 Y = The title of the folder
2 Example: 03 – Mechanical

.2 For the "*Drawings - Dessins*" folder:

1 ## - Y – Z, Where:
   1 ## = A two digit number ranging from 01 to 99 (leading zeros must be included)
   2 Y = The English title of the folder
   3 Z = The French title of the folder
2 Example: 04 - Electrical – Électricité

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

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

.1 The alphanumerical sorting is done on an ascending order;

.2 The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the drawing PDF files in the 01 sub-folder will be printed in alphanumerical order before the drawings in the 02 sub-folder etc…);

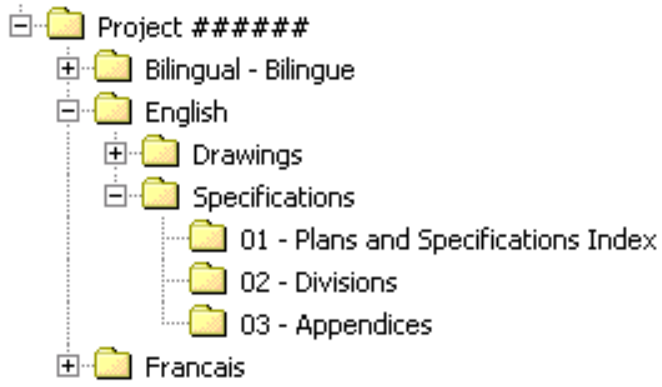
.3 Each drawing PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing (i.e. Drawing A001 will be printed before Drawing A002, Drawing M02 before Drawing M03, etc…).

D1.7 4TH TIER SUB-FOLDERS FOR SPECIFICATIONS

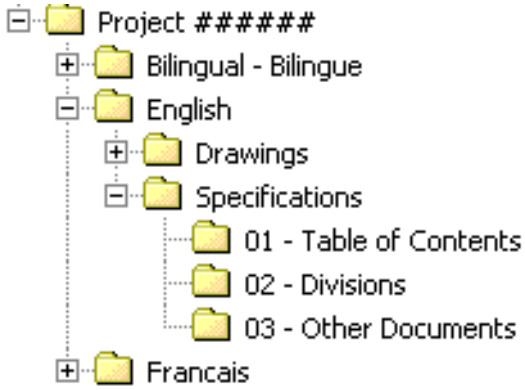
.1 The "*Specifications*" and "*Devis*" folders must have 4th Tier sub-folders created to reflect the various elements of the specifications.

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

.3 Examples of 4th Tier sub-folders for specifications:



or



D1.8 NAMING CONVENTION - 4TH TIER SPECIFICATIONS

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

.1 For the "*Specifications*" and "*Devis*" folders:

1 ## - Y, Where:

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

2 Y = The title of the folder

2 Example: 02 – Divisions

.2 It should be noted that the numbering of the 4th Tier sub-folders is for sorting purposes only and is not tied to an element of the specifications.

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

.4 The alphanumerical sorting is done on an ascending order;

.1 The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an

example: all the specifications PDF files in the 01 sub-folder will be printed, in alphanumerical order before the PDF files in the 02 sub-folder, etc…);

.2 Each specifications PDF file within each sub-folder will also be sorted alphanumerically.

1 This will determine the order of appearance on the screen as well as the order of printing (i.e. Division 01 will be printed before Division 02, 01 - Appendix A before 02 - Appendix B, etc…).

D1.9 NAMING CONVENTION FOR PDF FILES

.1 Each drawing, specifications division or other document that are part of the tender documents must be converted in PDF format (without password protection) in accordance with the following standard naming convention and each PDF file must be located in the appropriate sub-folder of the Directory Structure.

D1.10 DRAWINGS

.1 Each drawing must be a separate single page PDF file.

.2 The naming convention of each drawing must be:

.1 X### - Y, Where:

1 X = The letter or letters from the drawing title block ("*A*" for Architectural or "*ID*" for Interior Design for example) associated with the discipline

2 ### = The drawing number from the drawing title block (one to three digits)

3 Y = The drawing name from the drawing title block (for bilingual drawings, the name in both English and French is to appear)

.2 Example: A001 - First Floor Details

.3 Each drawing that will be located in the appropriate discipline 4th Tier sub-folders must be named with the same letter ("*A*" for Architectural Drawings for example) and be numbered.

.4 The drawing number used to name the PDF file must match as much as possible the drawing number of the actual drawing (the exception being when leading zeros are required).

.5 The following important points about drawings are to be noted:

.1 The drawing PDF files within each sub-folder are sorted alphanumerically for both displaying and printing. If there are more than 9 drawings in a particular discipline the numbering must use at least two numerical digits (i.e. A01 instead of A1) in order to avoid displaying drawing A10 between A1 and A2.

1 The same rule applies when there are more than 99 drawings per discipline i.e. three digits instead of two must be used for the numbering (for example M003 instead of M03);

.2 If drawing PDF files are included in the "*Bilingual - Bilingue*" folder, these cannot be included as well in the "*English*" and/or "*Français*" folders;

.3 If drawings not associated with a particular discipline are not numbered (Title Page or List of Drawings for example), these will be sorted alphabetically.

1 While this does not represent a problem if there is only one drawing in the sub-folder, it could disrupt the order when there are two or more drawings. If the alphabetical order of the drawings name does not represent the order on the hard copy set, the drawings are to be named as per the following standard convention when converted in PDF format to ensure proper display and printing order.

1 ## - Y, Where:

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

2 Y = The name of the drawing

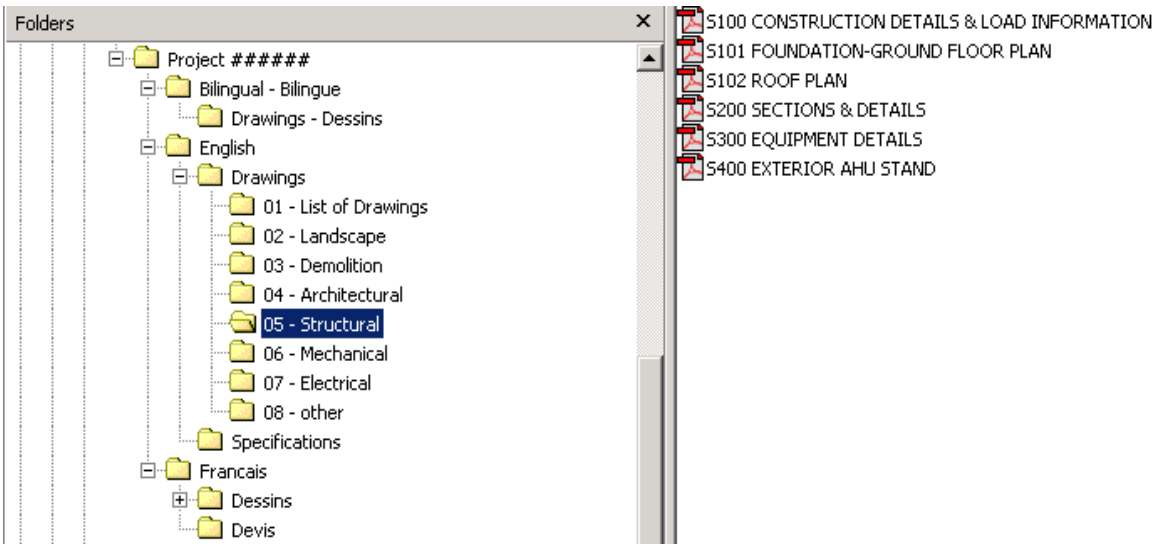
2 Example:

1 01 - Title Page

2 02 - List of Drawings

.4 If numbers are not used in the PDF files name, "*List of Drawings*" will be displayed before "*Title Page*" because "L" comes before "T" in the alphabet.

D1.11 EXAMPLE OF A 4TH TIER DRAWINGS SUBFOLDER'S CONTENT:



D1.12 SPECIFICATIONS

.1 Each Specifications Division must be a separate PDF file and all pages contained in each PDF file must have the same physical size (height, width).

.2 The Plans and Specifications Index must also be a separate PDF file.

.3 If there are other documents that are part of the Specifications (e.g. Appendix or other) these are to be separate PDF files as well.

D1.13 DOCUMENTS OTHER THAN SPECIFICATIONS DIVISIONS

.1 Because PDF files within the Specifications sub-folders are sorted alphanumerically (in ascending order) for both on screen display and printing order, all files that appear in folders other than the "*Divisions*" sub-folder must be named using a number:

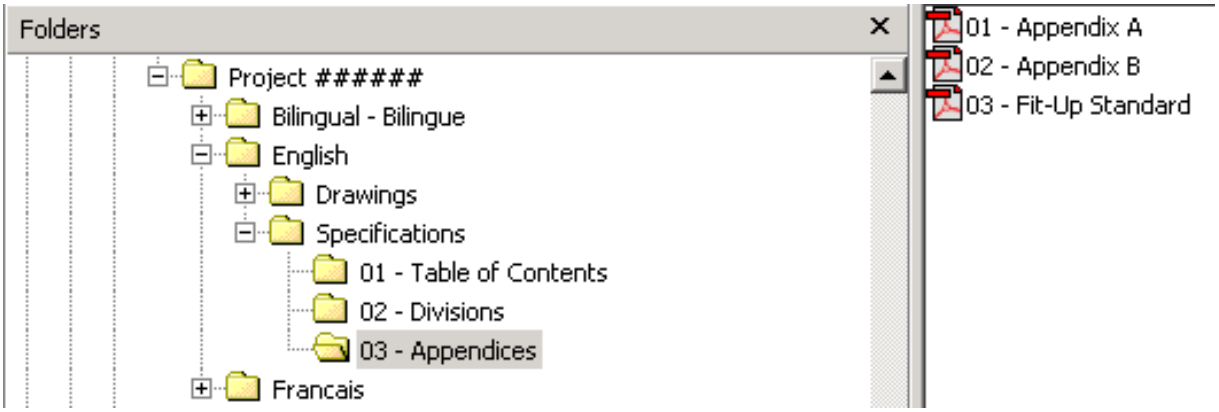
.1 ## - Y, Where:

1 ## = Two digit number ranging from 01 to 99 with leading zeros required

2 Y = Name of the document

.2 Example: 01 - Plans and Specifications Index

D1.14 EXAMPLE OF A SUB-FOLDER CONTENT (SUB-FOLDER OTHER THAN "*DIVISIONS*"):



D1.15 SPECIFICATIONS DIVISIONS

.1 The Specifications Divisions must be named as follows:

.1 Division ## - Y, Where:

1 Division ## = The actual word "*Division*" followed by a space and a two digit number ranging from 01 to 99 (with leading zeros required)

2 Y = Name of the Specifications Division as per **CSC/CSI MasterFormat™**

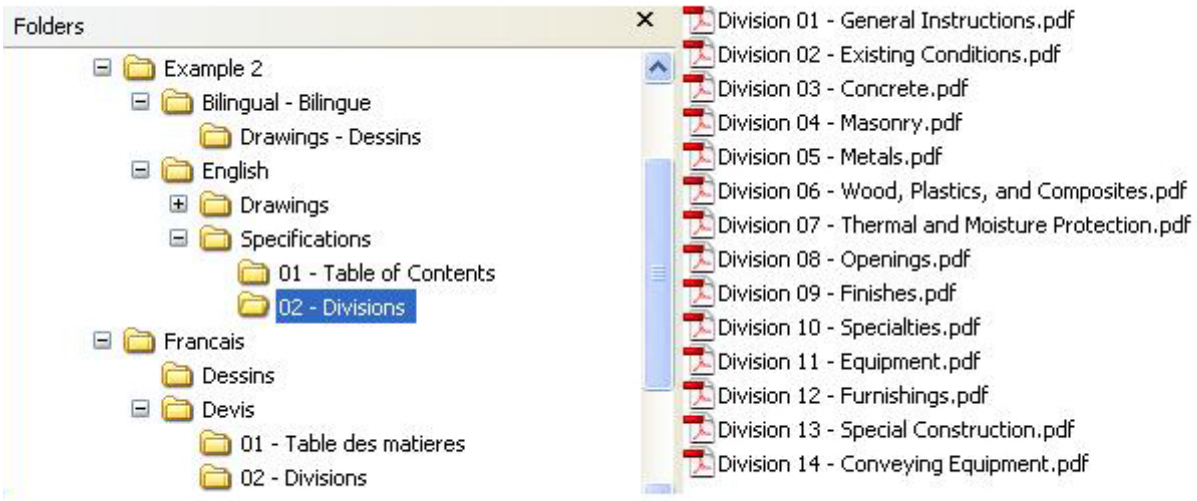
.2 Example: Division 05 – Metals

.2 The following important point about specifications is to be noted:

.1 The Numbering of the Divisions **cannot** be altered from **CSC/CSI MasterFormat™** even if some Divisions are not used in a given project.

1 For example, Division 05 will always remain Division 05 even if Division 04 is not used for a given project.

D1.16 EXAMPLE OF A "*DIVISIONS*" SUB-FOLDER CONTENT:



D1.17 CD-ROM LABEL

.1 Each CD-ROM is to be labelled with the following information:

.1 Project Number / Numéro de projet
.2 Project Title / Titre du projet
.3 Documents for Tender / Documents pour appel d'offres
.4 CD *X* of/de *X*

.2 Example:

.1 Project 123456 / Projet 123456
.2 Repair Alexandra Bridge / Réparation du pont Alexandra
.3 Documents for Tender / Documents pour appel d'offres
.4 CD 1 of/de 1

APPENDIX E PORTABLE DOCUMENT FORMAT

E.1 CONVERTING CONSTRUCTION DRAWINGS INTO PDF

E1.1 REFERENCE GUIDE

.1 Refer to the basic reference guide on converting construction drawings into portable document format (PDF)

.1 Issued by:

1 Real Property Contracting Directorate. PWGSC, Version 1.0, May 2005

E1.2 PREFACE

.1 Portable Document Format (PDF) is the standard format for documents that are posted on the Government Electronic Tendering System (GETS).

.2 There is therefore a need to obtain from architectural and engineering consultants an electronic copy of drawings and specifications in PDF for tendering Government of Canada (GoC) construction projects.

.3 In order to have the highest quality in term of resolution and printing, consultants should to the greatest extent possible have the PDF drawing and specification files derived from the native software in which they were created. Scanning is permissible but only in special circumstances, for example when there is no electronic version of a drawing being included in a construction tender package.

.4 The purpose of this document is to provide basic information on the conversion of Computer Aided Design and Drafting (CADD) drawings in PDF. Creating a PDF file from a CADD drawing is a relatively simple process once all the necessary configurations and settings are in place.

.1 It actually should not take any longer than it would take to create a plot file or to send a drawing to a printer.

.2 The information in this guide is not intended to cover all technical aspects of the conversion, which can be done using various methods, but rather to highlight important points about the process and file settings.

.3 The conversion of specifications is not covered in this basic reference guide since it does not require any special configuration or setting.

.5 The information provided in this basic reference guide is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications.

.1 The sole purpose of this guide is to provide basic information on the PDF conversion process bearing in mind that additional detailed technical information is available from the various software manufacturers.

E1.3 PRINTER DRIVERS

.1 Adobe Acrobat provides two different printer drivers that are able to convert CADD drawing into PDF format, Acrobat PDF Writer and Acrobat Distiller.

.2 Before creating a PDF file from a CADD drawing, a choice must be made as to which one will be used.

.3 Acrobat PDF Writer is a non-PostScript printer driver that works best with documents that don’t contain complex graphics

.4 Acrobat Distiller is a PostScript printer driver that works best with documents that contain PostScript fills, Encapsulated PostScript (EPS) graphics, or other complex elements.

.5 It is recommended that Acrobat Distiller be used to create PDF file of architectural and engineering drawings due to their size and complex graphical nature.

E1.4 PRINTER CONFIGURATION

.1 Before converting a CADD drawing to PDF, an Acrobat printer configuration file for the PDF paper size needs to be created.

.2 This function can be done in the CADD software rather than using a custom paper size defined for the Acrobat distiller feature.

.3 The recommended method is to add a PostScript Adobe plotter in the CADD software and making the necessary setting in terms of media source and size, scale and orientation.

.4 The configuration can then be re-used to simplify the conversion process for future files that use the same page size.

.5 As an alternative, although not recommended, a custom-defined size can be created in Acrobat Distiller in the *properties* menu.

E1.5 CREATING PDF FILES

.1 Once the printer configuration has been done in the CADD software, open up Acrobat Distiller and make the necessary settings in the *preferences* and *job options* sub-menu.

.1 Ensure that the page size match the sheet size selected in the CADD software to create the file.

.2 Particular settings can be saved under different names for future use.

.2 With the Acrobat Distiller application open, ensure the required sheet size is displayed in the *job options* window.

.1 Then it is simply a matter of bringing the CADD file into the Acrobat Distiller creation box.

.3 A progress bar will show during the conversion and the newly converted PDF file should open up and be displayed for verification.

E1.6 PDF FILES SETTINGS

.1 Security

.1 Adobe Acrobat contains security features that can de used to secure the files by restricting any changes to the files.

.2 However, since the files will be posted on GETS and will be used for printing copies, the files **must not** be password protected and **must** allow printing.

E1.7 DRAWING ORIENTATION

.1 The final PDF drawing files must be displayed on the screen in the same direction that the users are intended to view them. This can be achieved by adjusting the setup of the plotter. If the drawing is not oriented properly after the conversion, it can be rotated manually within Adobe Acrobat.

E1.8 FONT TYPE

.1 In order to avoid any problems during the conversion and to minimize the potential for font display errors, the fonts used for the production of construction drawings must be *PostScript or True Type fonts.*

E1.9 RESOLUTION

.1 Since the PDF files will be used for printing, it is important that a proper resolution be selected. It is recommended to select 600 dots per inch (dpi).

E1.10 SCALE

.1 When choosing the Plot scale in Adobe, it is important to choose the 1:1 scale to ensure the integrity of the scale from which the drawings were created in the CADD software.

E1.11 SCANNING

.1 Scanning is not recommended and should be done only when the drawing is not available electronically.

.2 When scanning a drawing, it is important that it be done in real size (scale 1:1) to ensure that the scale remains intact in subsequent printing.

.3 It is recommended that each scanned drawing be opened and verified to ensure that the resolution, scale and border are of an acceptable quality.

E1.12 FINAL CHECKLIST

.1 When the drawing file has gone trough the PDF conversion, it is recommended to open it and verify the following:

- .1 That the sheet size displayed is what was intended to be created (the size is viewable in the lower left corner of the drawing).
- .2 That the orientation of the sheet is correct.
- .3 That the line types, line weights and fonts match the CADD drawing.
- .4 That the PDF file is in black and white.
- .5 That each drawing is a single PDF file.
- .6 That the PDF file is not password protected and printable.

.2 If all the items are verified, the PDF file is useable

E1.13 ADDITIONAL INFORMATION

.1 For more information about the creation of PostScript and EPS files please refer to the User's Guide of the CADD software being used to produce the drawings. For more information about creating PDF file please refer to the Acrobat Distiller User's Guide and/or visit the Adobe Web site at www.adobe.com.

APPENDIX F DEFINITIONS

F.1 TERMINOLOGY

TERMS	DESCRIPTION
As-builts/Record Drawings	See Record Drawings
Base Building	Refers to the building shell, as opposed to the tenant fit-up. It includes finished floors, exterior walls, interior core, finished ceilings with lighting, and other building systems for the planned general use of the building. Generally, the work for the base building is separate from the work for tenant-fit-ups
Circulation	Space used, primarily by people, to move from one area to another. It includes major as well as secondary aisles.
Client	A term that refers to the client, the client department or user department
Co-location	Placing items together for better organization
Consultant	The word refers both to an individual consultant, or a consultant team. The consultant is generally selected by PWGSC using a Request for Proposal.
Contractor	The company, organization or firm who is responsible for the construction of the project
Consolidation	Reducing the number of co-located items by placing them in a common floor facility to eliminate duplication of space.
Constant dollar estimate	This is an estimate expressed in terms of the dollars of a particular base fiscal year.
Cost Specialist	Refers to the cost estimating, planning and control team or an individual performing these functions.
Current dollar estimate	Refer to: *budget year dollars*
Budget-year dollars	This is an estimate based on costs arising in each FY of the project schedule, which is escalated to account for inflation and other economic factors affecting the period covered by the estimate ***Budget year*** dollars is also be referred to as ***Nominal*** dollars or ***Current*** dollars
Departmental Representative	The person designated in the contract, or by written notice to the Consultant or Contractor, to act for PWGSC for the purposes of the contract. It can also be a person designated in writing by the Departmental Representative to act on his/her behalf. In most cases, the PWGSC Project Manager is the Departmental Representative
EMV	Expected monetary value of risk event (i.e. cost or saving to the project if risk event occurs)
Final Certificate of Completion	A document issued by the Project Manager after the final inspection by the Project Acceptance Board. The final payment to the Contractor by PWGSC is based on the final certificate of completion
Final Inspection	The inspection performed by the Project Acceptance Board after project completion and after correction of deficiencies identified during Interim Inspection
Fit-up for initial occupancy	The preparation of accommodation for initial occupancy, in accordance with the federal Fit-up Standards. This fit-up may include alternations to the base building and its building systems.

Fit-up of existing space for reuse, Refit	Work required to alter space previously occupied by one organization to meet the requirements of a different organization.
Fit-Up Cost Limits	The funding limits for the fit-up of office accommodation. The limits are based on the average cost per useable square meter, for fit-up elements in specific urban centres across Canada, and are updated from time to time. The limits do not include soft costs or items funded by clients or under base building costs.
Fit-Up Items	Components that are installed removed or relocated to prepare the space for occupancy. They include partition walls, doors, frames, hardware, counters and cabinetry, modifications to base building systems, etc. as detailed in the Fit-up standards. Some base building components are included in consultant scope of work, such as the flooring and the ceiling finishes or telecommunications spaces and related environmental controls.
Focus Group	Group sessions held to establish qualitative requirements. They are most effective at the strategic planning level. They are used primarily to translate the Client Department's mission statement into organizational requirements and to assess planning alternatives
Full-time equivalent.	It measures of labour utilization in the federal government which approximates the actual number of persons "employed" by the government for carrying out the unit of work
Functional space equation	Identifies space requirements (in usable m^2) by group along with summary of the total space required for all groups.
Gross Space	The total floor space
High risk	A project (or element of a project) may be assessed as high risk if one or more hazards exist in a significant way and, unless mitigated, would result in probable failure to achieve project objectives
Impact	The result of the occurrence of an event on the project either positive or negative (i.e. a schedule delay as a result of late delivery of a piece of equipment may have a high negative impact on a project; increased access to a construction site due to early departure of occupants in an office space may have positive impact on a project). The Impact of individual Risk Events can be qualified as low, medium, high or quantified in terms of time, cost (immediate cost or in-service cost (O&M)) or performance.
Interim Certificate of Completion	The certificates issued by Project manager following the Interim Inspection. Interim payment to the Contractor by PWGSC is based on the interim certificates. This payment takes place of a regular progress claim.
Interim Inspection	The inspection performed by the Project Acceptance Board after substantial completion of the project. A list of deficiencies is prepared, and subject to the Contractor's agreement to correct these, the Project Manager accepts the work and prepares the interim certificates
LEED®	Leadership in Energy & Environmental Design; an environmental rating system
Low risk	A project (or element of a project) should be assessed as low risk if hazards do not exist or have been reduced to the point where routine project management control should be capable of preventing any negative effect on the attainment of project objectives

Medium risk	A project (or element of a project) may be assessed as medium risk if some hazards exist but have been mitigated to the point that allocated resources and focused risk management planning should prevent significant negative effect on the attainment of project objectives
National Project Management System	The system used by PWGSC for management of its projects. It replaces the earlier Project Delivery System (PDS).
PI Forms	Product Information forms; used in commissioning documentation
Probability	The likelihood that an event will occur (i.e. Low, Medium, High)
Project Acceptance Board	A team assembled by the Project Manager to perform interim and final inspections of the Client Department's improvements.
PV Forms	Performance Verification forms; used in commissioning documentation
Record drawings	Drawings used to record field deviations, dimensional data, and changes or deviations from the 'Construction Document-Issued for Construction'. They indicate the work as 'actually' installed. They are also called as-builts
Rentable Space	Usable space plus space occupied by columns, convectors, elevator lobbies and washrooms. It also includes some common base building areas such as telephone and janitorial closets.
Request for Proposal	The document used for requesting consultant services. It includes the Terms of Reference as well as other contracting documents
Risk management	The art and science of identifying, analysing, and responding to risk factors throughout the life of a project and in the best interests of its objectives
Risk Event	A discrete occurrence that may affect the project for better or worse (i.e. late delivery of a piece of equipment is a "risk event" that may cause a schedule delay)
Scheduler	Refers to the Time Scheduler; also referred to as Time Specialist
Space Equation	A spreadsheet that reflects the Client's organizational structure, functional requirements, and proposed planning alternatives. It is used to determine the total usable area required to accommodate the following: .1 Open and enclosed workstations/worksettings; .2 Support space; .3 Special purpose space circulation factor; .4 Building loss factor; .5 Total population; and .6 Total space required; and .7 Summary by group
Space Optimization	Maximizing the utilization of space.
Special Purpose Spaces	Non-standard spaces required to accommodate activities that are essential to departmental programs. This space is often not suitable for conversion to office accommodation because of its special requirements. Examples include: laboratories, health units or clinics, meeting or training complexes which serve outside groups, processing space, departmental libraries, gymnasiums, warehouses, file or storage areas not allowed by the PWGSC Fit-Up Standards, trade shops, mailrooms, computer training rooms, cash offices and similar spaces requiring special service and security features and hearing rooms.

Support Space	Space for typical office support functions not included in workstation or circulation space but necessary for office operation. The Fit-Up Standards identify specific sizes and ratios for kitchenette / recycling centre / lunchroom / resource areas, shared equipment spaces, meeting rooms, quiet / touch down rooms, printer stations, reception / mail drop / waiting / display areas and coat / storage closets. Limited allowances for "Other" support spaces including non-dedicated workstations, storage rooms, LAN rooms, breakout rooms, interview rooms, training rooms, reading rooms etc. are also identified in the Fit-Up Standards.
Terms of Reference	A document prepared by PWGSC when requesting Consultant services, which forms part of the RFP and is also included in the Consultant Agreement with PWGSC.
Universal Footprint	One standard module which can be multiplied to accommodate all office functions including workstations, support space and special purpose space
Usable space, "Walk-on" Space	The space, in M^2, that is actually usable by the occupant. Measurement calculations do not include columns and convectors, building service areas and accessory areas.
Worksettings	Common work areas that support both collaboration and privacy. They include: teaming areas, non-dedicated workstations, privacy nooks, resource areas and multipurpose areas.
Workstations	An enclosed or open area dedicated for the use of individual employees.

F.2 ACRONYMS

ACRONYM	DESCRIPTION
A&E	Architecture & Engineering
AHJ	Authorities Having Jurisdiction
AMP	Asset Management Report
ASAE	American Society of Agricultural Engineers
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASPE	American Society of Plumbing Engineers
BCC	Building components and connectivity
BCR	Building Condition Report
BMM	Building Maintenance Manual
CAD	Computer aided drawing
CCDC	Canadian Construction Document Committee
CBIP	Commercial building incentive program
COE	PWGSC Centre of Expertise
EMCS	Energy Monitoring & Control System
EPA	Effective Project Approval
FHBRO	Federal Heritage Building Restoration Office
FOBS	Federal Office Building Standards (PWGSC)
FTE	Full-time equivalent
HCP	Heritage Conservation Program
HRSDC	Human Resources and Skills Development Canada
IT/MM	Information Technology/Multi-media
MMS	Maintenance management system
NBC	National Building Code
NCA	National Capital Area;
NCR	National Capital Region;
NFBC	National Farm Building Code
NGMA	National Greenhouse Manufacturers' Association
NMS	The National Master Specification used by PWGSC
NPMS	National Project Management System
OAA	Ontario Association of Architects
O&M	Operation and Maintenance
P&S	General Procedures and Standards
PA	Project administration
PI	Product Information
PD	Project Description
PM	Project Manager
PV	Performance verification
PWGSC	Public Works and Government Services Canada
RAIC	Royal Architectural Institute of Canada
RAS	Requirements and Standards
RS	Required Services

RSR	Resident site services
RPCD	Real Property Contracting Directorate
TOR	Terms of Reference