

DOING BUSINESS WITH A&ES

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SECTION 1

SPECIFICATION BRIEF

1 SPECIFICATION BRIEF

Specification Briefs and Quality Assurance Checklists

This document provides reference information to assist in developing project specifications and includes a Plans and Specifications Index and a Sample Addendum. These documents are used to enhance the quality of project specifications and must be used in conjunction with all components of the contract including General Conditions, Instructions to Bidders, Terms of Payment etc.

It is imperative that consultants become familiar with the **PWGSC “Specification Brief” & Pacific Region Specification Guide**” referenced information and processes related to specifications and drawings.

Consultants will incorporate the PWGSC reviews of proposed specifications provided by the Regional Specification Writer / NMS Coordinator and the managers of the respective disciplines prior to the solicitation of tenders.

1 Purpose

This document states specification policy and provides the framework, format and reference information, to assist the specification writer in developing the project specifications.

2 National Master Specification

The Canadian National Master Construction Specification (NMS) is a bilingual system of master construction specification sections, which are divided into 50 Divisions and used for a wide range of construction and/or renovation projects. In preparing project specifications, the consultant shall use **the most current edition of the new NMS six digit Master Format System in accordance with the “NMS User’s Guide”**. The consultant retains overriding responsibility for content and shall edit, amend and supplement the NMS as deemed necessary to produce an appropriate project specification free from conflict and ambiguity.

3 Regional Specifications

Some regions maintain abridged or replacement versions of the NMS Division 1 specification sections which includes requirements peculiar to the federal, provincial or regional authorities having jurisdiction. Project Manager to provide the index of the Pacific Region Sections.

4 Specification Organization

Since its inception, the NMS structure has been based on "Masterformat", a List of Section titles and numbers which is jointly produced by the Construction Specifications Institution of the United States and Construction Specifications Canada. 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. The consultant should consult with the Project Manager and Regional Specification Writer to determine the scope of NMS and if either the NMS 1/3 - 2/3 page format or the Construction Specifications Canada full page format will be utilized.

5 Specifying Materials

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

The method of specifying materials shall be in the following order of preference:

- .1 Specify by prescriptive method.

- .2 Specify by using recognized standards such as those produced by Canadian Gas Association (CGA), Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), and Underwriters Laboratories of Canada (ULC), or by trade associations such as Canadian Roofing Contractors' Association (CRCA) and Terrazzo, Tile, Marble Association of Canada (TTMAC). Canadian standards should be used wherever possible.
- .3 Where no standards exist, specify by a non-restrictive, non-trade name performance specification.
- .4 Where no standards exist and where a suitable non-restrictive, non-trade name prescription" or "performance" specification cannot be developed because of complexity, specify by Acceptable Product: trade name type and model number.
- .5 Specify products to meet particular design requirements or to match existing materials: use only material specified a "Approved Product".

List all trade names of materials acceptable for the purpose as follows:

Acceptable Materials:

1. ABC Co. Model [_____].
2. DEF Co. Model [_____].
3. GHI Co. Model [_____].

The reference to the Instructions to Tenderers in the above examples is necessary to remove any suggestion of partiality and to ensure that all suppliers are aware of the provision for alternative proposals during the tendering period. The onus will be on the consultant to review and evaluate all requests for approval of alternative materials.

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

Use of trade names on drawings is unacceptable, as are phrases such as "or equal" or "equivalent to" when providing for alternative materials. The term "Acceptable Manufacturers" should not be used, as this restricts competition and does not ensure the actual material or product will be acceptable. A list of words and phrases that should be avoided is included in the NMS User's Guide.

6 Standards

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

- CSA standards: <http://www.csa.ca>
- CGSB standards: <http://www.pwgsb.gc.ca/cgsb>
- ANSI standards: <http://www.ansi.org>
- ASTM Standards: <http://www.astm.org>
- ULC standards: <http://www.ulc.ca>
- General reference of standards: <http://www.cssinfo.com>
- For the website addresses of other standards organizations and manufacturers associations, refer to "Section 01 42 00 - References" in the NMS. The NMS website (www.pwgsb.gc.ca/nms) also links to other documents references in the NMS under its "Links" feature.

7 Canadian Materials

Specify Canadian materials to the fullest extent practicable and consistent with implementing the work in an economical and expeditious manner.

8 Cash Allowances

Specifications and drawings should be complete and contain all of the requirements for the contractual work. Do not use this section, cash allowances will be used only under exceptional circumstances, where no other method of specifying is appropriate subject to approval.

9 Extended Warranties

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

- **Major Work (over \$100,000)**
"For the work of this Section [_____], the 12 month warranty period prescribed in Subsection GC 32.1 of General Conditions "C" is extended to 24 months
- **Minor Works (under \$100,000)**
"For work of this Section [_____], the 12 month warranty period prescribed in Section 24 of the General Conditions is extended to 24 months."

Based on past performance, extended warranties may be required for defects which are likely to occur after the twelve month warranty period provided for in the General Conditions (i.e. roofing and waterproofing, exterior wood doors, caulking, etc.).

10 Terminology

Use the term "Departmental Representative" instead of PWGSC, owner, consultant, architect or engineer. Departmental Representative is defined in the contract documents and means the officer or employee of Her Majesty who is designated pursuant to the contract and includes a person specially authorized by the Departmental Representative to perform, on the Departmental Representative's behalf, any of the Departmental Representative's functions under the contract and is so designated in writing to the contractor.

The drawings and specifications are complementary and numeric values are to be in metric only. The consultant should not rely solely on a mandatory site visit to complete the information. Notations such as: "verify on site", "as instructed", "to be determined on site by engineer", should not be indicated in the specifications and/or drawings as this promotes inaccurate bids and inflated tenders. Drawings and specifications must permit tenderers to calculate all quantities and bid accurately. If quantities are impossible to identify (i.e. cracks to be repaired) give an estimated quantity for bid purposes (unit prices). Ensure that the terminology used throughout the drawings and specifications is consistent and does not contradict the applicable standard construction contract documents.

11 Documentation

Consultant shall provide:

- Specification:
 - Start with Sections of Division 1.
 - provide originals printed one side on 216 mm x 280 mm white bond paper.
 - start each Section on a new page and show Project Number, Section Title, six digit Section Number and Page Number and specification date on each page. Do not indicate Consultant's name.
- Index: as per Appendix 'A'
- Addenda (if required): as per Appendix 'B' (prepared by consultant, reviewed and issued by PWGSC).
- Drawings: reproducible originals, sealed and signed by the design authority.

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

PWGSC shall provide:

- Front and Back Cover
- Special Addenda
- Instructions to Tenderers
- Tender Form
- Standard Construction Contract Documents:
 - for Major Works (over \$100,000.00) :
 - General Instructions to Tenderers.
 - Articles of Agreement
 - Terms of Payment “B”
 - General Conditions “C”
 - Labour Conditions “D”
 - Insurance Conditions “E”
 - Contract Security Conditions “F”

for Minor Works (under \$100,000.00):

- General Conditions - Minor Works
- Labour Conditions

12 Attachments

- Sample Index for Plans and Specifications
- Sample Addendum Format

Sample Index for Plans and Specifications

Project No: _____

Index
Page 1 of ____

PLANS AND SPECIFICATIONS

PLANS:

SPEC NOTE: List all Drawings by number and title.

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

SPECIFICATIONS:

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

<u>DIVISION</u>	<u>SECTION</u>	<u>NO. OF PAGES</u>
DIVISION 01	01 11 20 - Summary.....XX
	01 14 25 - Designated Substances Report.....XX
	01 35 33 - Health and Safety.....XX
DIVISION 23	23 xx xx	
DIVISION 26	26 xx xx	

Sample Addendum Format

**PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA
REAL PROPERTY CONTRACTING
GATINEAU, QUEBEC**

**ADDENDUM No. _____
PAGE 1 of _____**

Project Name: _____

Project Number: _____

Date: _____

SPEC NOTE: Add the following sentences at the beginning of each addendum.

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

PLANS

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

- 1 A1 Architectural
 .1

AMEND/REVISE SPECIFICATIONS AS FOLLOWS:

SPEC NOTE: indicate section number and title.

- 1 Section 01 11 20 - Summary

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

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

**TENDER DOCUMENT CHECKLIST
(for Specifications*)**

GENERAL

- | | |
|---|-------------------------------------|
| Latest version of the National Master Specification (NMS) has been used | <input checked="" type="checkbox"/> |
| Reference standards utilized are the most recent standards (including dates/titles) | <input checked="" type="checkbox"/> |
| Dimensions/sizes are given in metric (no dual dimensioning is permitted) | <input checked="" type="checkbox"/> |
| All references are to the “ Departmental Representative ” (Owner, Consultants, Architect, Engineer are not acceptable). | <input checked="" type="checkbox"/> |
| Cross references from section to section have been coordinated | <input checked="" type="checkbox"/> |
| Sections have been included for all work identified on drawings | <input checked="" type="checkbox"/> |

INDEX

- | | |
|--|-------------------------------------|
| Index is included and follows the correct format (see Specification Brief) | <input checked="" type="checkbox"/> |
| Index lists all the specification sections (A/M/E) and correct number of pages per section | <input checked="" type="checkbox"/> |
| All drawings are listed in the index with the same titles as those on the drawings | <input checked="" type="checkbox"/> |

DIVISION 1

- | | |
|--|-------------------------------------|
| Division 1 sections have been used and the “Specification Notes’ were followed | <input checked="" type="checkbox"/> |
| Section 01 35 33 have been included | <input checked="" type="checkbox"/> |
| The Designated Substance Report has been included (mandatory in Ontario and recommended in Quebec) | <input checked="" type="checkbox"/> |

SPECIFYING MATERIALS

- | | |
|---|-------------------------------------|
| Materials are specified using standards and performance criteria (if not, the correct form of acceptable materials has been used. References to “or equivalent” is not acceptable | <input checked="" type="checkbox"/> |
| Correct wording has been used and a justification provided to RPCS when sole sourcing a product | <input checked="" type="checkbox"/> |

***This checklist is not intended to eliminate the need for a technical review. This checklist is provided to help identify and address common issues that arise during Real Property Contracting reviews and which ultimately delay the release of documents to tender.**

**TENDER DOCUMENT CHECKLIST
(for Drawings and Addenda*)**

DRAWINGS

- All dimensions/sizes are provided in metric (no dual dimensioning is permitted).
- PWGSC standard title block has been used

- Architectural and engineering drawings have been stamped and signed

- Trade names do not appear on the drawings (confirm)

- Specifications type notes appear in the specification and not on the drawings (confirm)

ADDENDA

- Addenda is in the correct PWGSC format (see Specifications Brief)
- Items refer to an existing specification paragraph or drawing note (confirm)
- All pages have been numbered and bidders can determine if they have a completed document
- All dimensions/sizes are provided in metric (no dual dimensioning is permitted).
- Signature block is not included (confirm)

***This checklist is not intended to eliminate the need for a technical review. This checklist is provided to help identify and address common issues that arise during Real Property Contracting reviews and which ultimately delay the release of documents to tender.**

SECTION 2

COST ESTIMATES BRIEF

2 CLASSES OF CONSTRUCTION COST ESTIMATES USED BY PWGSC

2.1 PWGSC AND TREASURY BOARD

In its dealings with Treasury Board on matters of project approvals, PWGSC uses two classes of estimates: *indicative* and *substantive*. The indicative estimate is the first one that is used (chronology-wise) and serves as the basis of Preliminary Project Approval by the Treasury Board. This estimate is also referred, within PWGSC, as a Class “D” estimate. The substantive estimate is the second one that is used (again, chronology-wise) and serves as the basis of Effective Project Approval by the Treasury Board. This estimate is also referred, within PWGSC, as a Class “B” estimate.

2.2 PWGSC AND CONSULTANT AGREEMENTS (for architects and engineers)

In its dealings with architects and engineers, PWGSC uses four classes of estimates: Classes “D”, “C”, “B” and “A”.

- The Class “D” estimate is the first one that is used (chronology wise) and serves as the basis of the Construction Cost Estimate upon which an agreement between PWGSC and an architectural/engineering (A&E) consulting firm is entered into. The Class “D” estimate is prepared by PWGSC and is used by the A&E firm during its performance of the “Analysis of the Project Brief”. (This estimate compares to the *indicative* estimate).
- The Class “C” estimate is prepared by the firm as part of the “Design Concept”.
- The Class “B” estimate is prepared by the firm as part of the “Design Development”. (This estimate compares to the *substantive* estimate).
- The Class “A” estimate is prepared by the firm as part of the “Construction Documents, Pre-Tender Construction Cost Estimate and Project Schedule”.

Definitions of Classes “D”, “C”, “B” and “A” are as follows.

Description of the Classes of Estimates Used by PWGSC for Construction Costing of Buildings Projects

Class “D” Estimate

This estimate provides an indication of the total cost of the project, based on the user’s functional requirements to the degree known at the time. It is based on historical cost data for similar work, suitably adjusted for such factors as: effect of inflation, location, risk, quality, size, and time. All related factors affecting cost are considered to the extent possible.

Such an estimate is strictly an indication (rough order of magnitude) of the project total cost and completion date. This estimate is used to establish the *indicative* estimate required by the Treasury Board for Preliminary Project Approval. Expected degree of accuracy: 20%.

Class “C” Estimate

This estimate is prepared at the end of the Design Concept stage and is based on updated user requirements, general description of the end built works, preliminary site information and existing conditions, production, and takes into consideration construction experience and market conditions as well as basic implementation logistics. It includes costs for design, documentation, and construction supervision. Expected degree of accuracy: 15%.

Class “B” Estimate

This estimate is prepared at the end of Preliminary Design and is based upon data (on cost, time and construction) of a level of precision as is typically available when the design of the major systems and sub-systems of the facility (including outline specifications, preliminary drawings and models), as well as when the results of all site or installation investigations are completed. This estimates also makes allowance for all costs resulting from the anticipated schedule, expected market conditions and suitable level of contingencies.

This estimate is used to establish the *substantive* estimate required by Treasury Board for Effective Project Approval. Expected degree of accuracy: 10%.

Class “A” Estimate

This estimate is based on the “B” estimate which has been updated concurrently with the development of construction documents, and is submitted as a final pre-tender estimate. It requires that project systems be designed and specified to near completion, and is based on a realistic construction schedule and accurate labour and material costs.

This is the final estimate before tender call or construction start. Typically, the total forecast is presented in elemental format and includes all actual associated fees and costs. Expected degree of accuracy: 5%.

SECTION 3

RISK MANAGMENT BRIEF

3 RISK MANAGEMENT

3.1 Definitions

3.1.1 Procurement Plan

Formal submission for approval to enter into a contract and composed of:

- .1 a cost estimate of the requirement (including cash allowances, and design, estimating and inflation allowances);
- .2 a contingency; and
- .3 an anticipated amendment amount.

3.1.2 Allowances

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

- .1 Cash Allowances: a specific amount to be used for specific work item or service.
 - Cash Allowance Construction: additional resources included in an estimate to cover the cost of known but undefined requirements whose probability of occurrence is high. This allowance is specifically identified in a cost estimate.
 - Cash Allowance Consultant: additional services included in an estimate to cover the cost of known but undefined requirements whose probability of occurrence is high. This allowance is specifically identified in a cost estimate.
- .2 Risk Allowance: a nticipated monetary value of risk events, due to the complexity of the project, market conditions, competitiveness, and timing of project, contingencies are likely to happen and do not form part of cost estimates.

3.1.3 Anticipated Amendments

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

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

3.1.4 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. (PMBOK)

- .1 Risk Event: a discrete occurrence that may effect the project for better or worse (i.e.

late delivery of a piece of equipment is a “risk event” that may cause a schedule delay).

- .2 Probability: the likelihood that an event will occur (i.e. Low, Medium, High).
- .3 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.

- High risk*: a project (or element of a project) may be assessed as high risk if one or more hazards exist in a significant way and, unless mitigated, would result in probable failure to achieve project objectives.
- Medium risk*: a project (or element of a project) may be assessed as medium risk if some hazards exist but have been mitigated to the point that allocated resources and focussed risk management planning should prevent significant negative effect on the attainment of project objectives.
- Low risk*: a project (or element of a project) should be assessed as low risk if hazards do not exist or have been reduced to the point where routine project management control should be capable of preventing any negative effect on the attainment of project objectives.

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

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

3.2 Risk Management

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

3.2.1 Resources External to Project Management Team

- .1 Planning Resources and Performance
 - errors and omissions
 - low accuracy of estimates (allowances)
 - data inadequacies
 - level of liability insurance
 - potential for misinterpretation / misunderstanding of documents
 - planning inexperience
- .2 Construction Resources Required and Performance

- level of liability insurance
- design versus execution methods
- suitability of execution methods to design
- commissioning issues (start up/turnover difficulties)
- contractor construction strategy
- reputation of contractor
- contractor financial stability
- contractor inexperience
- resources obtained less qualified than desired
- availability/suitability/performance of resource

3.2.2 Project Scope Delivery

- .1 Delivery of Specified Requirement
 - accuracy of client requirements in terms of cost/schedule/performance/quality and ability to interface with existing environment
 - conflicting client priorities
 - low level of client knowledge
 - Y2K compliance
- .2 Unstated Client Requirements
 - completeness of client requirements in terms of cost/ schedule / performance / quality and ability to interface with existing environment
 - restricted working conditions
 - opportunities for changes / positive impact
- .3 Stakeholder Requirements, Stated and Unstated
 - low involvement of user groups in scope of definition
 - interface with existing systems
 - restricted working conditions
 - operational needs

3.2.3 Site/Asset/Building Actual Conditions

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

3.2.4 Government/PWGSC/Client/Context

- .1 Impact on Adjacent Areas Actual
 - impact on adjacent areas (land/tenants/traffic/operations)
- .2 Impact from External Sources
 - legal lawsuits, patent rights, licensing, etc.

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

SECTION 4

PWGSC NATIONAL CADD STANDARD



PWGSC

National CADD Standard

Computer-Aided Design and Drafting



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1.0 Introduction

Computer-Aided Design and Drafting (CADD) is an integral component of information management for Public Works and Government Services Canada (PWGSC). The production of digital files by CADD is an important corporate asset. The greatest payback for CADD and related technology is in the reuse of the digital data for facilities management and as a foundation for future projects. If CADD files are to be an effective source of information, they must adhere to a standardized set of criteria that all CADD users will understand.

As an ongoing effort to keep up with changing technology, we are pleased to introduce the third edition of the PWGSC National CADD Standard. A concerted effort has been made not only to simplify the standard, but also to reinforce the requirements in areas we feel are critical to our goals.

PWGSC is aware of the emerging technology and processes related to building information modelling (BIM). As BIM represents a significant change, a new BIM standard, by necessity, will be created, facilitating the transition in the architecture, engineering, and construction (AEC) industry.

In addition, some of the regions have developed a regional CADD standard, which is to be used as a complement to this national standard.

For questions or further information regarding this document, please contact the National CADD Coordinator at the following e-mail address:

CADD-CDAO@pwgsc-tpsgc.gc.ca

For a list of regional contacts, please visit the PWGSC National CADD Standard Web site and regional pages at:

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

1.1 Scope

This standard applies to all services that generate CADD data files for PWGSC, including both internal PWGSC CADD service(s), and external consultant(s).

All CADD data files submitted to PWGSC must meet this standard.

2.0 Project Delivery

2.1 Drawing File Format

PWGSC requires all files to be compatible with Microsoft® Operating Systems. The CADD drawing format required for drawings is the AutoCAD® native format DWG file, i.e., they may not be submitted in Adobe® PDF, Autodesk® DWF, or any other simplified format unless specified in the contract. PWGSC will not supply or accept formats that are no longer supported by Autodesk®.

2.2 Project Start-up

All project drawings must be created using the PWGSC National CADD Standard. To ensure this requirement is met, PWGSC will undertake drawing coordination and quality assurance.

Where CADD services will be provided externally, the PWGSC project manager or technical authority will convey its requirements to the consultant or CADD service. PWGSC will provide the pertinent CADD drawings for the related facility or property, the drawing templates, the regional supplement to this standard and the symbol library if applicable. . All new work must meet this standard irrespective of the condition of any existing files provided at the outset of work.

The PWGSC National CADD Standard is available on the PWGSC Web site at <http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-eng.html>.

2.2.1 Regional supplement and symbol library

Some of the regions have developed regional supplement and/or a symbol library, which is to be used as a complement to this national standard. The regional supplements are available on the PWGSC Web site at: <http://www.tpsgc-pwgsc.gc.ca/cdao-cadd/index-eng.html>

2.2.2 CADD Base Plans

The CADD base plans maintained by PWGSC have been drawn from building and property surveys. The intent is to use the files for project drawings, and then the PWGSC regional CADD RA will be in charge of updating the base plans once the project is completed and measurements of the affected area(s) are verified.

Existing digital information, when available, is used to form the foundation for new project drawings. Any areas critical to the project should be verified by field checking.

New digital drawing files created must be modified to include the most up-to-date information contained in the National CADD Standard. Older legacy CADD data that is used in new drawing files must be updated to the current standard.

The project start-up meeting with the project manager or technical authority and CADD Coordinator should address the extent to which the existing digital files require verification and updating. All new work must meet this standard irrespective of the condition of any existing files provided at the outset of the work.

2.2.3 Template Drawing

Drawing templates set the default metric units, text styles, and dimension styles. Recognizing the differences between engineering drawings and architectural drawings, the templates are provided with dimension styles and lettering for multiple disciplines. PWGSC templates must be used to start a new project. Please visit the PWGSC National CADD Standard Web site or contact the PWGSC project manager regarding the use of drawing templates.

2.3 Quality Assurance of CADD Data

PWGSC will carry out quality assurance of delivered CADD data files to ensure adherence with the PWGSC National CADD Standard and regional supplements.

2.3.1 Digital File Review

- **Colour Assignment**

PWGSC colour/line weight assignment must be used. ([See 3.2.5 Colour Assignment Standard](#))

- **Layer Management**

The PWGSC Layering Standard must be used. ([See 3.2 Layering Standard](#))

Standard layer names must be used.

Entities must be in the correct layers.

- **Text Style Management**

Only standard AutoCAD® SHX fonts or TTF fonts can be used. ([See 3.4 Text Style Standard](#))

- **Dimension Style Management**

The PWGSC naming convention must be used. ([See 3.5 Dimension Style Standard](#))

Associative dimensions must be used.

- **Linetype and Hatch Pattern Management**

Only standard AutoCAD® and/or PWGSC linetypes and hatch patterns can be used. ([See 3.6 Linetype and Hatch Standard](#))

Linetype display variables must be used correctly.

- **External Referencing**

The use of external references is authorized only if certain conditions are met. ([See 1.2.1 External References \(XREF\)](#))

- **PWGSC Title Blocks and Graphic Scales**

PWGSC title blocks must be used. Please visit the PWGSC National CADD Standard Web site or contact the PWGSC project manager.

Title blocks must contain the minimum information ([See 3.7 Title Blocks and Graphic Scales](#)).

Graphic scales or written scales must accompany all plans, sections, details, and elevations, etc.

- **1:1 Metric Model**

Drawings must be modelled at full size using the International System of Units (S.I.)

- **Real-World Coordinate System**

Maintain coordinate systems integrity for 2D drawings.

2.3.2 Drawing file approval

PWGSC has jurisdiction over all drafting-related aspects of the final drawing, including but not limited to drawing content, title block layout, symbols, and font usage continuity throughout a drawing set. All drawings must be completed to the satisfaction of PWGSC.

In the absence of a drawing submission schedule, PWGSC reserves the right to request CADD data files at the midpoint (50%) of the scheduled work to conduct a CADD drafting review.

Note that the content of the digital CADD data file is just as important as the printed content, and no drawing will be accepted as final until all issues are resolved.

Delivered work that fails to meet any requirement in any of these areas will result in the work being deemed unacceptable. The consultant/CADD service will be required to correct the problem(s) at their cost. Furthermore, PWGSC will exercise its option to withhold payment of the contracted work as set out in the contract terms until the work is made right.

Alternatively, PWGSC may, if the consultant/CADD service refuses to correct the problem, make the corrections to the CADD data files and printed drawing plans and deduct the cost thereof from the consultant's/CADD service's fee. The consultant/CADD service grants to PWGSC an irrevocable licence to make such corrections and use the corrected CADD data files and printed drawing plans as it sees fit. Furthermore, PWGSC reserves the right to use the printed drawing plans resulting from the CADD data files with no payment obligation until the CADD data files are corrected.

2.3.3 External References (XREF)

The use of external references will be conditionally authorized if the regional supplement of the CADD standard where the work is being performed permits the use of xrefs.

When this condition is met, xrefs may only be used in conjunction with the "Sheet Set Manager" to support the transmission of drawing files in a compressed format.

In all the other cases, external references must be converted into blocks. (Do not BIND XREFs, instead use BIND INSERT.) **Under no circumstances should a drawing contain referenced symbols; they must be inserted as blocks.**

2.3.4 Raster Images

When separate raster images are included in a drawing, all related files containing images and information on coordinates, rotation angles, scaling, etc. are to be provided. As these files are essential for their geo-referencing, they must be delivered intact. Raster images should be used as a reference only and cannot replace the vector data normally required in drawing files.

2.3.5 Digital Signature

Drawing files containing digital signatures are not accepted and can not legally replace printed copies signed and stamped as original.

2.4 Work Completed

When work is complete and the drawing files are delivered to PWGSC, they must be reviewed for compliance with the National CADD Standard. The CADD service shall maintain the drawings in a suitable manner until all drawings for the project are verified and accepted by PWGSC. Once completed, a PWGSC will archive the file(s) in an electronic document and record management system.

2.4.1 File Delivery

File transfer will be stipulated by PWGSC on a per project basis by one of the methods listed below:

- Submission and upload of drawing files to a project collaboration tool (PCT) designated by the contact person.
- Submission and upload of drawing files to an information management tool designated by the contact person.
- Submission and transfer of drawing files through e-mail.
- Should a file transfer exceed the e-mail file transfer limit, the file can be uploaded to an FTP site if permitted under regional rules.
- In the case of inability to access a FTP site, lack of Internet access, no permission, or security considerations of the drawing content (unencrypted Protected B, Protected C, Confidential, Secret, Top Secret), a portable electronic storage media (CD, DVD, USB key, etc.) will be delivered to the designated contact person.

 Note: The FTP sites are not secure. Therefore, files containing sensitive information (requiring security clearance greater than Protected A) cannot be uploaded to this site and must be transferred via a portable electronic storage media.

After uploading the file, e-mail the following information to the designated contact person:

- Project location
- Project name
- Project number
- Fully qualified URL path/file name(s) link

 Notes:

- Uploaded files must be named using only alphanumeric characters with no spaces.
- All files are deleted from the site every second day. Timely notification is required to ensure file retrieval.
- No files are to be presented as an executable (.exe extension).
- Files should not be password-protected
- Files should not contain any electronic signature.
- Drawings should not contain hyperlinks.

2.5 Production of Contract Drawings

The following formats should be applied.

2.5.1 Sheet Size for Page Setup

This table shows the sheet designations and sizes for the drawing page setup. Drawing sheet size will conform to the following specifications:

Sheet Designation	Overall Size (mm)
B1	707 x 1000
A0	841 x 1189
A1	594 x 841
A2	420 x 594
11 x 17 (Tabloid / Ledger)	279 x 432
14 x 8.5 (Legal Landscape)	356 x 216
8.5 x 14 (Legal Portrait)	216 x 356
11 x 8.5 (Letter Landscape)	279 x 216
8.5 x 11 (Letter Portrait)	216 x 279

Note: The paper size naming may vary depending on the printer drivers.

Note: When drawings larger than A0 are required, it is recommended that they use a width of 841 mm and a length in increments of 150 mm. Digital files of standard PWGSC or client title block formats will be provided in the required standard sizes and **must not be altered or modified without authorization.**

2.6 Disclaimers and Limitation of Liabilities

Maps, drawings, and data produced for PWGSC purposes should be considered for illustrative or reference purposes only by users outside of PWGSC.

PWGSC and its agents, consultants, contractors, or employees provide these materials and information "as is" without warranty of any kind, implied or express, as to the information being accurate or complete, and without any warranty of merchantability and fitness for a particular purpose.

PWGSC does not assume any legal liability or responsibility for the accuracy, completeness, or usefulness of the maps, drawings, data, or information incidental thereto. PWGSC recommends that users exercise their own skill and care with respect to their use or seek professional advice.

Under no circumstances will PWGSC be liable to any person or business entity for any direct, indirect, special, incidental, consequential, or other damages as a result of any use of the maps, drawings, data, or any information incidental thereto, including, without limitation, any lost profits or business interruption.

2.7 Copyright

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Without prejudice to any rights or privileges of the Crown, where any work is, or has been, prepared or published by or under the direction or control of Her Majesty or any government department, the copyright in the work shall, subject to any agreement with the author, belong to Her Majesty. The copyrights ownership can also be transferred to the client by written contract. **Use of any PWGSC content without permission, in whole or in part, is strictly forbidden.**

3.0 PWGSC Computer Aided Drafting Standard

This section describes the general PWGSC Computer Aided Drafting Standard. Specific instructions can be added in the context of a request for proposal.

3.1 File Presentation

Files presented must conform to the following rules:

- A drawing must be purged of all definitions that are not used, such as layer names, text styles, dimension styles, layer filters, and blocks.
- A drawing must not contain any object definitions without geometry, such as empty text or blocks without objects.
- No objects should reside on layer "0" or "DEFPOINTS" except for objects contained in a block definition and dimensions. Use the "Plot/Non plot" layer property instead of the Defpoints layer.
- A drawing must not contain errors that are detectable using the Audit command.
- Drawings are to be modelled at full scale (real-world units) in model space, with text, symbols, hatch patterns, and line widths adjusted by the required scale factor.

All presented files must also adhere to the following rules of best practice:

- When appropriate to the type of drawing, lines must be drawn in an orthogonal mode.
- All vector endpoint intersections must be drawn with closed corners.
- The drawing must be saved with properly formatted Page Setup (Paper Size, Plot Style, Plot Area, Plot Scale, etc.). The main layout must be active and all the viewports adjusted and locked to the correct scale.

3.2 Layering Standard

All digital CADD files must follow the PWGSC Layering Standard. The standard facilitates data management by using a layering structure and naming convention to organize the drawing data in the CADD files into related data groups.

[See Annex A – CADD Layers](#) for the complete Standard Layer List.

[See Annex B – Layer Field Descriptions](#) for the abbreviations and descriptions lists used to create layer names.

3.2.1 Sorting Graphic Data into Related Data Groups

Layers are used to sort the graphical data types depicted by the line work into related data groups. (They are not intended for use in sorting line weights, line types, colours, or other schemes.)

Layering is the only way to identify what the entities on a graphical screen represent without resorting to annotations. For example, it answers questions such as whether a rectangle represents a building outline, a concrete pad, a storage tank, or whether it is an annotation box. All digital CADD files must follow the PWGSC Layering Standard to create the appropriate layers to accommodate the grouping of related data.

To simplify the layering, drawing data can be broken into two major groupings: principal data and supporting data. The level of complexity and number of layers required for the two groups are significantly different.

3.2.2 Principal Data

Principal data is contained mainly in the plan views of the facility, i.e., the base plan, floor plan, site plan, etc.

This type of data requires strict adherence to layer naming and proper grouping of data. The line work used to depict facility components must always be drawn using the most up-to-date and accurate information available. Line work depicting objects must be placed in the proper standard layer according to the data type being represented. For example, in a floor plan, the walls, doors, windows, and bathroom fixtures must be grouped under separate layers.

3.2.3 Supporting Data

Supporting data is made up of sections, details, elevations, schedules, legends, and title blocks, etc.

This type of data requires minimal layering breakdown. Line work in a detail representing different components does not need to be placed in separate layers. For example, a building construction detail can be drawn with foundation wall, frame wall, floor, and roof line work in a single layer, although the dimensions, annotation, and hatching should be separated.

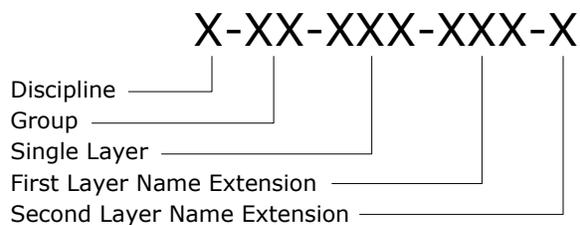
3.2.4 Layering Naming Convention

Layering of CADD information must adhere to the layering naming convention described in this section.

The layer is the basic tool for organizing and managing graphic information. Layers are used to sort graphic objects into groupings of related data. PWGSC has developed a modular, alphanumeric layer nomenclature format designed to sort graphic data in a specific manner.

The layer name format consists of five fields separated by hyphens.

- The first three fields—Discipline, Group, and Single Layer—are mandatory.
- The last two fields—First Layer Name Extension and Second Layer Name Extension—are optional fields that allow a more precise data identification where necessary.



[See Annex A – CADD Layers](#) for a list of the most frequently used layer names and their descriptions.

[See Annex B – Layer Field Descriptions](#) for a complete list of the field abbreviations and descriptions for the last four of the five fields of the layer name structure.

Two-field layer names (X-XX) can only be used under special conditions and must have PWGSC approval.

Discipline Field **X-XX-XXX**

The Discipline field identifies the discipline responsible for the layer content. Where an object cannot be associated with a specific discipline, or is applicable to all disciplines, the special abbreviation of “G” may be used to indicate “General Information.”

Discipline Field Abbreviations List:

A	Architecture
B	Bridges and Dams Engineering
C	Civil Engineering, Site Design, and Landscape Architecture
E	Electrical Systems
G	General Information
H	Mechanical
I	Interior Design
L	Legal Surveys
M	Marine
R	Real Property Space Management
S	Building Structure

Group Field X-~~XX~~-XXX

The Group field identifies groupings of common types of drawing information relevant to each discipline. The Group abbreviations defined for each discipline are listed in the Standard Layer List in [Annex A – CADD Layers](#). In addition, there are some common Group abbreviations defined for use with all disciplines for supporting graphic data such as sections, details, and others. [Annex B – Layer Field Descriptions](#) contains a complete list of all Group abbreviations and their descriptions.

Examples of common Group field abbreviations:

DT	Details, Sections, Elevations
GL	Global
GR	Grid
LG	Legend
PL	Plan
SC	Schedules
TL	Title Block

Single Layer Field X-XX-~~XXX~~

The Single Layer field subdivides the classifications to identify each layer more precisely. Single Layer abbreviations allow information pertaining to Physical Properties, Materials, Graphics, Text and discipline related data such as building systems to be included. The Single Layer abbreviations are listed in the Standard Layer List in [Annex A – CADD Layers](#) and [Annex B – Layer Field Descriptions](#).

First Layer Name Extension (Optional) X-XX-XXX-~~XXX~~-X

The First Layer Name Extension, like the Single Layer field, allows information pertaining to Physical Properties, Materials, Graphics, Text and discipline related data to be included. The extensions use the same abbreviations as the Single Layer field. They may be used with any valid layer from the Standard Layer List. They may also be used as a Single Layer field value where appropriate.

Examples of common Single Layer and First Layer Name Extension abbreviations for all disciplines: ([See Annex B - Layer Field Descriptions](#) for a complete list.)

Physical Properties:

ABV	Above ground, above grade
EME	Emergency
EQP	Equipment
EXT	Exterior
HOR	Horizontal
INT	Interior
NOD	Node, horizontal reference point
OPN	Openings
UND	Underground, below grade
VER	Vertical

Materials:

ASP	Asphalt
BLK	Block
BRK	Brick
CON	Concrete
CRP	Carpet
FIN	Finishes
INS	Insulation
STL	Steel
STO	Stone
TIM	Timber

Graphics:

3DM	3D model components of 2D symbols
CLR	Colours
DIG	Digitized or vectorized from scanned image
HAT	Hatching
LIN	Line work
OLN	Outlines
PRO	Profiles
SPC	Special
SYM	Symbols, bubbles, detail notation, bar scales
TAB	Tables
TMP	Temporary

Texts:

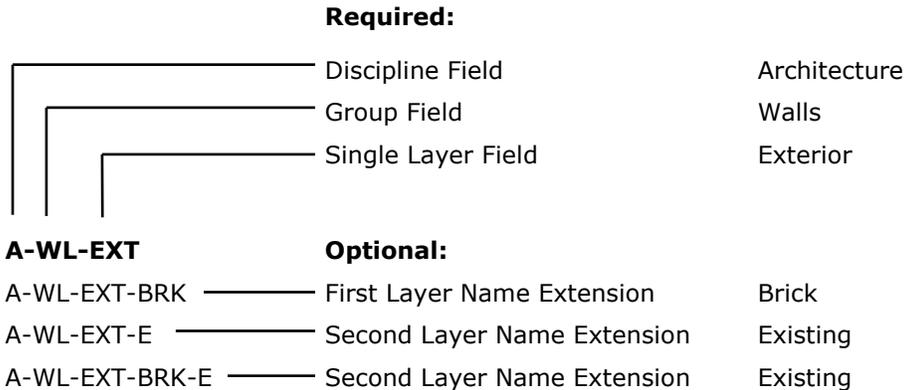
ATT	Attributes
DIM	Dimensions
IDN	Identification numbers or names
SPT	Spot elevations
TXT	Text, notations

Second Layer Name Extension (Optional) X-XX-XXX-XXX-**X**

The Second Layer Name Extension allows information pertaining to Geometry, Construction, Status, Second Language, and Numerical Options to be included. The extensions may be used with any valid layer from the Standard Layer List. [Annex B – Layer Field Descriptions](#) contains a complete list of all Second Layer Name Extension abbreviations and their descriptions.

Valid Layer Name Formats:

Four variants of the layer name format will be accepted, as indicated below:



Free Text Examples:

Add an underscore character at the end of a valid layer name to append free text to the layer name.

- M-SN-SPT_-1.0** Soundings at -1.0 m depth
- M-SN-HWL_14 January 1990** High Water Line on a specific date

Existing Floor Plan Examples:

Where plans are specifically titled “New” (or “Existing), the “N” (or “E”) Second Layer Name Extension modifier indicating the construction status may be omitted, but all disparate construction status extensions must be included.

- A-WL-INT-N** Architecture - Wall - Interior - New
- A-WL-INT-X** Architecture - Wall - Interior - Remove
- A-WL-OLN** Architecture - Wall Outline - Exterior (“Existing” implied)
- A-DR-INT** Architecture - Door - Interior (“Existing” implied)
- A-DR-INT-N** Architecture - Door - Interior - New
- A-WD-EXT** Architecture - Window - Exterior (“Existing” implied)

Symbols Examples:

When a symbol is placed to represent an object, it must be placed in a symbols layer.

- E-SD-SYM** Electrical - Site Distribution - Symbols (Power poles, luminary, etc.)
- G-GL-SYM** General - Global - Symbols (Key plans, north arrow, bar scale, etc.)

Detail Examples:

Supporting data such as dimensions, annotation, and hatching should be separated as indicated in the examples below. Colour should be set “Bylayer” for the majority of the entities in a layer and specifically where necessary to obtain varying line weights in that layer.

G-DT-LIN	General - Detail - Line work (Wall, floor and roof line work)
G-DT-TXT	General - Detail - Text (Annotations, title, graphic scale, etc.)
G-DT-DIM	General - Detail - Dimensions
G-DT-HAT	General - Detail - Hatching (Insulation, wood grain, etc.)

Schedule Examples:

A-SC-LIN	Architecture - Schedule - Line work (Schedule grid or Line work)
A-SC-TXT	Architecture - Schedule - Text (Schedule data, annotation)

Plan Views Examples:

Supporting data can also appear on plan views.

H-PL-TXT	Mechanical - Plan - Text (Titles, graphic scale, annotation bubbles)
S-PL-DIM	Structural - Plan -Dimensions

3.2.5 Colour Assignment Standard: Layer Colours and Pen Weights

Colour is to be used as a method of defining line weight to the plotter. Layers must be assigned appropriate colours and entities should be created with colour “Bylayer” where possible, except as provided for in the creation of symbols. If a CTB is provided by PWGSC, it must be used.

Suggested Line Weight Settings:**Extra Thin - 0.10 mm**

Centre Lines / Axis, Grid Lines

Thin - 0.15 to 0.25 mm

Dimension Lines	Hatching Intermediate	Contour Lines
Leader and Extension	Lines Phantom Lines	Text - Normal

Medium - 0.30 mm to 0.50 mm

Hidden Lines	Index Contour Line
Text - Sub Headings	Visible Object Outlines

Thick - 0.70 mm

Cutting Lines	Match Lines	Reference Lines
Section Lines	Text - Titles/Major Headings	Viewing Planes

Extra Thick - 1.00 mm

Title Sheet Border

3.2.6 Provision for Creation of New Layers

Because the Standard Layer List ([Annex A – CADD Layers](#)) does not cover all possibilities, the layering standard provides for the ability to create new layer names for new objects as required.

As in the preceding example of E-SD-SYM, a quick look in the Standard Layer List under the Electrical Systems section would indicate that this layer name is invalid since it is not on the list. However, it is an acceptable layer name created by adding an existing *First Layer Name Extension* to an existing *Discipline-Group* abbreviation.

The rules for creating new layer names are as follows:

- a) A proper standard layer name for the object must not already exist.
- b) Must follow the standard layer name format.
- c) Must use an existing Discipline abbreviation. (**E**-SD-SYM)
- d) Must use an existing Group abbreviation. (E-**SD**-SYM)
Must use an existing three-character Single Layer field abbreviation or First Layer Name Extension. (E-SD-**SYM**)

3.3 Block Standard

AutoCAD® blocks are used to group entities. Graphic blocks shall **not** be exploded. Blocks representing simple objects or simple symbols shall not contain nested blocks (blocks made of blocks). The use of groups is preferable when grouping blocks together, for example, a table with chairs around it. Most symbols should be created with linetype and colour "Byblock." This allows complete control over the appearance of the symbol. By default a symbol will take on the properties of the layer it is placed on, but it can be changed to suit requirements independent of the layer settings.

There are two different ways of creating and inserting AutoCAD® blocks, depending on their complexity. The basic rules are as follows:

1. **Simple** blocks with one data type, e.g., toilet fixtures, furniture:

- a) Create the block on layer "0."
- b) The block must be inserted on the proper layer, e.g., office chair inserted on layer I-FU-SET.

2. **Complex** graphics requiring the use of multiple data types:

- a) Create each data type on its proper layer.
- b) Colour and linetype must be "Bylayer" or "Byblock" so that these two attributes may be assigned to the symbol regardless of the layer properties the symbol is inserted on, e.g., title blocks created with objects on different layers.

Objects that could be represented by AutoCAD® blocks are categorized as being either symbols or graphics.

3.3.1 Graphics

Graphics are AutoCAD® blocks that are dimensionally accurate pictorial representations of real objects. A graphic may be a simplified representation of a building component or assembly such as a desk or chair, but it is accurate with respect to the component's principal dimensions.

Drawing scale does not affect the insertion of graphics. Graphics may be fixed or variable, and basic rules for their creation and insertion must be followed:

1. Fixed - Not scaled
 - a) Objects must be created full size.
 - b) Graphics must be inserted with 1-by-1 scale in model space.
2. Variable - Scaled to represent different size objects such as doors, round tables, etc.
 - a) Objects must be created inside a 1-by-1 square
 - b) Blocks must be inserted using the actual dimensions of the objects they represent in model space.

3.3.2 Symbol (Annotative)

Symbols are AutoCAD® blocks that are pictorial representations of objects not drawn to scale, such as an electrical outlet symbol. Drawing scale affects symbols in the same manner as annotation and therefore must be inserted into a working drawing at a scale factor corresponding to the drawing or plot scale as required.

 Note: It is now possible to create annotative blocks that can scale themselves automatically to any given scale. To avoid confusion, it is strongly recommended to use only one method throughout each project drawing set: the traditional method that lets the user choose the insertion scale, or the Annotative option that automatically manages the insertion scale.

Basic rules for the creation of symbols must be followed:

- a) Symbols should be drawn at actual plotted size and not smaller than 2.5 mm. The Annotative option can also be selected when creating the block.
- b) Symbols should be inserted using the plotted scale if they are inserted in model space, and 1 if they are inserted in paper space (layout), i.e., 50x on a 1:50 floor plan in model space, or 1x on a 1:1 drawing sheet in paper space. If the block was created with the annotative option selected, it will scale itself automatically during the insertion.

3.3.3 Block Library

Taking into account the specific needs of each project and the huge diversity, there is no national block library.

- a) If a block library is provided with a project, the consultant/CADD service must use it.
- b) All the blocks should be created respecting the rules described in this block standard.
- c) Use of blocks should be uniform throughout each project drawing set.
- d) If no blocks are provided, the consultant/CADD service must have their block library pre-approved by PWGSC.

3.3.4 Block Naming

A good structure for block naming is very important to allow for the creation and management of schedules, inventories, legends, etc. If the consultant/CADD service uses their own block library, they need to use a pertinent naming convention that must be pre-approved by the lead technologist.

3.4 Text Style Standard

Text styles for use in drawings must be created using Standard AutoCAD® SHX, the following TTF font files: Arial, Arial Narrow, and StylusBT and any font files specifically provided by PWGSC.

Annotative text styles are allowed.

Text style usage should be uniform throughout each project drawing set and limited to a maximum of four different font files per project that will be determined in collaboration with PWGSC.

The height of text styles must be set to 0 (not fixed) so that it can be changed to suit different scaling requirements.

All French characters should be accented whether upper or lower case.

Private company logos must not contain a special font file.

Paragraphs must be created with MTEXT objects.

 Note: It is now possible to create annotative text styles that can size themselves automatically to any given scale. To avoid confusion, it is strongly recommended to use only one method throughout each project drawing set: traditional text styles or annotative text styles.

3.4.1 Text Style Naming

Text style names should reflect the information below:

- Usage
- Font name
- Any other special effects (if required)

Examples:

NOTES_SIMPLEX	Text style with SIMPLEX used for notes
TITLE_ARIAL_WF-1.2	Text style with ARIAL and width factor 1.2 used for titles
SPECIAL_SIMPLEX_OA-20	Text style with SIMPLEX, oblique angle 20 used for special notes
NOTES_ARIAL_ANNO	Text style with ARIAL and Annotative property enabled for notes

3.4.2 Text height

Standard text height for:

Notes, dimensions, annotations, etc.	2.5 mm
Major headings	4.5 mm, 5.0 mm
Subheadings	3.5 mm.

Text smaller than 2.5 mm can only be used under special conditions and must have PWGSC approval.

3.5 Dimension Style Standard

All dimensioning must be created on entities in model space with associative dimensions.

Annotative dimension styles are now allowed. However, as for blocks and text styles, it is strongly recommended to use only one method throughout each drawing set: traditional dimension styles set with different overall scales to suit different printing scales, or annotative dimension styles that are set up automatically based on the drawing scale.

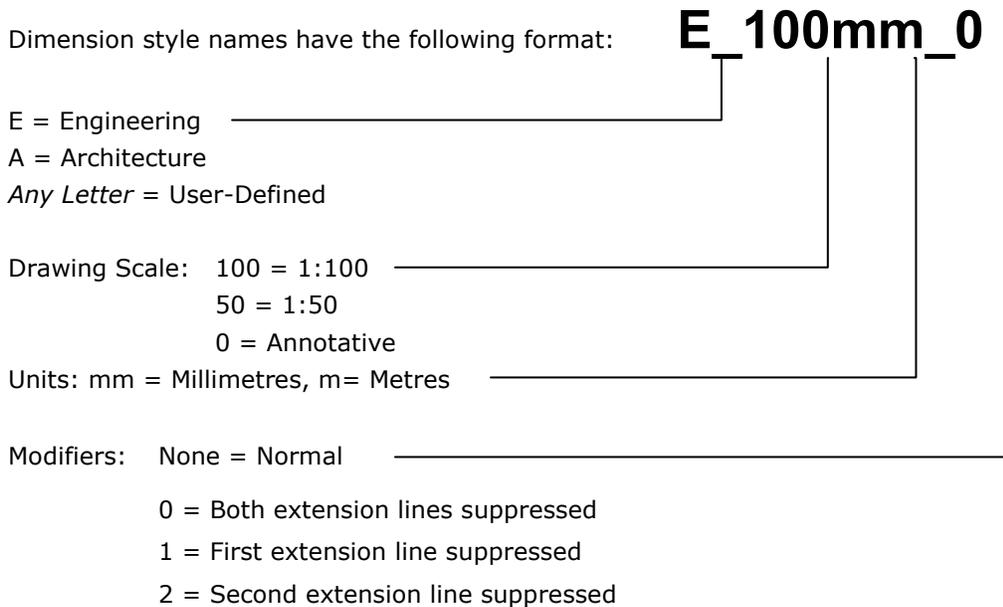
Two dimensioning formats are used to cover most applications for PWGSC projects:

- a) Engineering with arrowheads for dimension terminators
- b) Architectural with ticks for dimension terminators

3.5.1 Dimension Style Naming

Dimension style usage should be uniform throughout each project drawing set. Using dimension styles reduces the time necessary to create, edit, and maintain dimensions. Dimension styles are created by specifying values for a number of dimension variables and saving the style with a unique name. The dimension style controls the appearance of all the dimensions created while the dimension style is active. Changes to the dimension style will automatically be reflected in the associated dimensions.

Usage of override properties is not allowed and the dimensions must be associative. A new dimension style should be created to work with different properties.



Examples:

- A_50mm** Normal Architectural dimension for floor plans
- A_0mm_Anno** Architectural dimension with Annotative property enabled
- A_50mm_0** Architectural dimension with no extension lines to dimension to grid lines
- E_1000m** Normal Engineering dimension for site plans with metres as base unit

3.6 Linetype and Hatch Standard

The appearance of linetypes in a drawing is determined by the system variables LTSCALE, PSLTSCALE, MSLTSCALE, and MEASUREMENT.

- The MEASUREMENT variable determines which linetype description file to use for linetype loading:
 - “1” sets the default files to the **metric** unit files **acadiso.lin** and **acadiso.pat**. (See Note 1 below.)
 - “0” sets the default files to the **imperial** unit files **acad.lin** and **acad.pat**. These must not be used. (See Note 2 below.)
- The LTSCALE variable sets the global linetype scale factor.
- The PSLTSCALE controls linetype appearance in paper space.
- The MSLTSCALE controls the linetype appearance in model space in conjunction with the annotative scale (CANNOSCALE system variable in AutoCAD 2008+). When using MSLTSCALE, the variable LTSCALE should be set to between 0.5 and 1.

Note 1: Drawings must not contain linetypes, complex linetypes or hatch patterns other than those respectively defined in the acadiso.lin and acadiso.pat files supplied with the AutoCAD® based Autodesk products or other linetypes supplied by PWGSC.

Note 2: The linetypes and hatch patterns contained respectively in the acad.lin and acadiso.pat files should not be used because they are drawn to be used with imperial drawings. For consistent linetype appearance and plotting results, the required values for the variables are as follows:

1. Final Drawings: Title sheet must be in paper space with multiple, variously scaled VIEWPORTS.

- a) MEASUREMENT = 1
- b) LTSCALE between 0.5 and 1.0 (See Note 3 below.)
- c) PSLTSCALE = 1 (On)

Note 3: The LTSCALE value should be set between 0.5 and 1.0 while printing in paper space depending on the size of the linetypes used in the drawing.

Do not set the linetype scale at the entity level. The Current Object Scale in the Linetype Properties dialog box (system variable CELTSCALE) must be set to 1.0 to ensure that the creation of new entities do not have entity-level linetype scaling.

For consistent hatch pattern plotting and scanning results, grey scale SOLID hatch patterns are not permitted on contract drawings.

3.7 Title Blocks and Graphic Scales

3.7.1 Title Block Set-up

Completed drawings must adhere to the following composition standard:

- a) Title block sheets must always be inserted in a layout (paper space) at 0,0,0 with scale factor of 1 and rotation angle of 0.
- b) Model space graphics must appear in the layout in correctly scaled VIEWPORTS.
- c) There must be only one (1) title block per layout.
- d) The title block is not to be exploded. Attributes must be used to enter title block information.
- e) No entities outside the title block perimeter.

3.7.2 Information in Title Blocks

All project drawings must be compiled on standard sheets and must be in accordance with the PWGSC corporate identity. The lead technologist for each project will coordinate the size of the sheet to be used and provide a standard title block and the content of the title block fields.

Each title block must contain the information below:

- a) Project name
- b) Address
- c) Drawing name, e.g. floor plan, building
- d) Measured or designed by and date
- e) Drawn by and date
- f) Approved by and date
- g) Project manager
- h) PWGSC project number
- i) Tender
- j) Drawing number

- k) Revision chart
- l) Consultant or CADD service identification
- m) North arrow
- n) Site plan (if pertinent)

3.7.3 Headings, Titles, and Graphic Scales

To facilitate scaling from reduced or enlarged reproductions, each plan, section, detail, elevation, profile, etc. on a completed drawing sheet shall be accompanied by a graphic scale. The graphic scale shall be located immediately below the pertinent heading on final plot.

3.8 Systems of Measurement and Preferred Scales

The International System of Units (S.I.) must be used to prepare all drawings.

The unit for linear dimensioning is the millimetre, except where the scope of the drawing requires the use of the metre, such as in site plans.

Integers shall indicate millimetres, e.g. 435, 4300. Decimal numbers with three decimal places shall indicate metres, e.g. 5.435, 4.300.

All other dimensions and notations should be followed by the unit symbol.

Preferred Viewport Scale:

1:1	1:25	1:500
1:2	1:50	1:1000
1:5	1:100	1:2000
1:10	1:200	1:5000
1:20	1:250	1:10000

4.0 Drawing File Naming Conventions

All CADD information submitted must be arranged in a logical format so that it can be easily accessed and modified by the user. This standard provides a framework for the information and will assist in data entry, manipulation, storage, and retrieval at different stages of the design and operation of the facility over its life cycle.

Annex A – CADD Layers

The Standard Layer List below lists the most-used layer names defined under the PWGSC Layering Standard. New layer names can always be created using the field abbreviations and extensions listed in [Annex B – Layer Field Descriptions](#). The French abbreviations are listed just as a reference and should only be used with drawings annotated in French.

A layer name may include an additional subdivision for grouping subsets of layers that represent building systems or categories of related data. Each subdivision contains a primary layer (underlined) and supplementary layers (in grey) to subdivide the information with greater precision. The use of supplementary layers is optional and depends on a drawing's requirements.

Architecture		
English Abvn	Description	French Abvn
A-CI	Circulation	A-CI
A-CI-CVY	Horizontal conveyors, moving sidewalks	A-CI-HOR
<u>A-CI-ELE</u>	<u>Elevators</u>	<u>A-CI-ELE</u>
A-CI-ELE-BRF	Lift platforms for barrier-free access	A-CI-ELE-ACF
<u>A-CI-RMP</u>	<u>Ramps</u>	<u>A-CI-RAM</u>
A-CI-RMP-BRF	Barrier-free ramps	A-CI-RAM-ACF
<u>A-CI-STR</u>	<u>Stairs, stairwells, and ladders</u>	<u>A-CI-ESC</u>
A-CI-STR-ESC	Escalators	A-CI-ESC-ROU
A-CL	Ceilings	A-PF
A-CL-BKH	Bulkheads	A-PF-GYP
<u>A-CL-FIN</u>	<u>Ceiling finishes</u>	<u>A-PF-FIN</u>
A-CL-FIN-IDN	Ceiling finishes description	A-PF-FIN-NUI
<u>A-CL-GRD</u>	<u>Physical ceiling grid</u>	<u>A-PF-TRA</u>
A-CL-GRD-SCD	Planning grid lines	A-PF-TRA-SCD
A-CL-OPN	Openings, penetrations, skylights	A-PF-OUV
A-DK	Deck	A-TR
A-DK-BAR	Deck railings	A-TR-BAR
A-DK-OLN	Deck outline	A-TR-CON
A-DR	Doors	A-PO
<u>A-DR-EXT</u>	<u>Exterior doors, jambs, casework, swings</u>	<u>A-PO-EXT</u>
A-DR-EXT-IDN	Exterior doors identification numbers	A-PO-EXT-NUI
<u>A-DR-INT</u>	<u>Interior doors, jambs, casework, swings</u>	<u>A-PO-INT</u>
A-DR-INT-IDN	Interior doors identification numbers	A-PO-INT-NUI
A-DR-INT-PRT	Interior doors in a partition wall	A-PO-INT-CLS
A-EM	Emergency	A-UR
<u>A-EM-HAT</u>	<u>General hatching</u>	<u>A-UR-HAC</u>
A-EM-HAT-COR	Corridor hatching	A-UR-HAC-COR
A-EM-HAT-STR	Staircase hatching	A-UR-HAC-ESC
A-EM-HAT-WAL	Wall hatching	A-UR-HAC-MUR
<u>A-EM-OLN</u>	<u>General outline</u>	<u>A-UR-CON</u>
A-EM-OLN-COR	Corridor outline	A-UR-CON-COR
A-EM-OLN-STR	Staircase outline	A-UR-CON-ESC
A-EM-OLN-WAL	Wall outline	A-UR-CON-MUR

A-EM-SYM	Emergency symbols: exit signs, stairs, first aid kit location, etc.	<i>A-UR-SYM</i>
A-EM-TXT	Emergency text	<i>A-UR-TEX</i>
A-FL	Floors	A-PC
<u>A-FL-CTP</u>	<u>Countertops</u>	<u>A-PC-CMP</u>
A-FL-CTP-PRT	Countertops on partitions	<i>A-PC-CMP-CLS</i>
<u>A-FL-FIN</u>	<u>Floor finishes</u>	<u>A-PC-FIN</u>
A-FL-FIN-IDN	Floor finishes description	<i>A-PC-FIN-NUI</i>
A-FL-LEV	Floor level changes, ramps, truck wells	<i>A-PC-NIV</i>
A-FL-MIL	Architectural specialties, casework and millwork	<i>A-PC-EBE</i>
A-FL-OPN	Openings, floor hatching	<i>A-PC-OUV</i>
A-FL-OVH	Overhead items, skylights, overhangs, soffits	<i>A-PC-SUS</i>
A-FL-RAS	Raised floors	<i>A-PC-SUR</i>
A-GL	General	A-GL
A-GL-ATT	Attributes	<i>A-GL-ATT</i>
A-GL-DIM	General architectural dimensions	<i>A-GL-DIM</i>
A-GL-IDN	Identification, elevation points	<i>A-GL-NUI</i>
A-GL-RME	Read Me general drawing info.	<i>A-GL-LIS</i>
A-GL-TMP	Under construction lines, temporary aids	<i>A-GL-TEM</i>
A-GL-TXT	General text (street names)	<i>A-GL-TEX</i>
A-PL	Plan Information	A-PN
A-PL-OLN	Open-to-Below plan information outline	<i>A-PN-CON</i>
A-RF	Roofs	A-TO
A-RF-OLN	Roofs edge and features	<i>A-TO-CON</i>
A-RF-OPN	Roof openings for fans, stacks and ducts	<i>A-TO-OUV</i>
A-RF-OVH	Overhead items, roof above, canopies, soffits	<i>A-TO-SUR</i>
A-RF-WLK	Roof boardwalks, catwalks	<i>A-TO-PAS</i>
A-WD	Windows	A-FN
A-WD-EXT	Exterior window panes and frames	<i>A-FN-EXT</i>
<u>A-WD-INT</u>	<u>Interior window panes and frames, side windows</u>	<u>A-FN-INT</u>
A-WD-INT-PRT	Interior windows in a partition wall	<i>A-FN-INT-CLS</i>
A-WD-OVH	Overhead windows, skylights	<i>A-FN-SUR</i>
A-WD-SIL	Window sills	<i>A-FN-ALL</i>
A-WL	Non-Structural Walls	A-MU
<u>A-WL-ACC</u>	<u>Architectural or protection elements, guards</u>	<u>A-MU-ACC</u>
A-WL-ACC-BRF	Barrier-free accessories (grab bars, etc.)	<i>A-MU-ACC-ACF</i>
<u>A-WL-EXT</u>	<u>Exterior walls</u>	<u>A-MU-EXT</u>
A-WL-EXT-HAT	Exterior walls hatching	<i>A-MU-EXT-HAC</i>
<u>A-WL-FIN</u>	<u>Wall finishes</u>	<u>A-MU-FIN</u>
A-WL-FIN-IDN	Wall finishes description	<i>A-MU-FIN-NUI</i>
<u>A-WL-HED</u>	<u>Door and window headers</u>	<u>A-MU-LIN</u>
A-WL-HED-PRT	Door and window headers on partition	<i>A-MU-LIN-CLS</i>

<u>A-WL-INT</u>	<u>Interior walls</u>	<i>A-MU-INT</i>
A-WL-INT-LOW	Interior walls - low walls	<i>A-MU-INT-BAS</i>
A-WL-INT-LOW-PRT	Interior partitions - low walls	<i>A-MU-INT-BAS-CLS</i>
A-WL-INT-PRT	Interior partition walls	<i>A-MU-INT-CLS</i>
A-WL-OLN	Wall outlines, building footprints, sheds, etc.	<i>A-MU-CON</i>
A-WL-WSR-PRT	Washroom partitions	<i>A-MU-SAT-CLS</i>

Bridges and Dams Engineering

English Abvtn	Description	French Abvtn
B-AP Approach Slabs B-DA		
B-AP-PLN	Approach slabs in plan view	B-DA-PLN
B-DK Deck and Components B-TA		
B-DK-BAR	Barriers, railings	B-TA-BAR
B-DK-CRB	Curbs, sidewalks	B-TA-BOR
B-DK-DRN	Deck drains	B-TA-DRA
B-DK-JNT	Expansion joints	B-TA-JOC
B-DK-PLN	Deck plan	B-TA-PLN
B-DK-REB	Deck reinforcing	B-TA-ACR
B-DK-STG	Steel grating	B-TA-GRI
B-GL General B-GL		
B-GL-DIM	Dimensions	B-GL-DIM
B-GL-HAT	Hatching	B-GL-HAC
B-GL-LAY	Layout line work	B-GL-TRI
B-GL-TXT	Text	B-GL-TEX
B-SB Substructure B-SO		
B-SB-ABU	Abutments	B-SO-CUL
B-SB-APR	Approach slabs	B-SO-APR
B-SB-BRG	Bearing	B-SO-POR
B-SB-FTG	Footing	B-SO-SEM
B-SB-LIN	Bearing plan line work	B-SO-TRI
B-SB-PIR	Piers	B-SO-PII
B-SB-REB	Substructure reinforcing	B-SO-ACR
B-SR Scour Protection B-PA		
B-SR-GAB	Gabions	B-PA-GAB
B-SR-RRP	Riprap	B-PA-PIR
B-SS Superstructure B-SP		
B-SS-BEM	Beams	B-SP-POU
B-SS-BRC	Bracing	B-SP-ENT
B-SS-CTW	Catwalks	B-SP-PAS
B-SS-REB	Superstructure reinforcing	B-SP-ACR
B-SS-SNL	Stringers	B-SP-LON

Civil Engineering, Site Design and Landscape Architecture

English Abv'n	Description	French Abv'n
C-BH	Borehole Data (Geotechnical)	C-FO
C-BH-IDN	Borehole identification numbers	C-FO-NUI
C-BH-LOG	Borehole logs and data	C-FO-SCH
C-BH-SMP	Soil sample locations	C-FO-SON
C-BH-SPR	Stratigraphic profiles	C-FO-STR
C-BH-SYM	Symbols	C-FO-SYM
C-BH-WEL	Geotechnical or environmental monitoring wells	C-FO-PUA
C-DI	Diesel Fuel Distribution	C-DI
C-DI-MAN	Diesel fuel manholes	C-DI-PUA
C-DI-MET	Diesel fuel meters	C-DI-CPT
C-DI-PIP	Diesel fuel pipelines	C-DI-PIP
C-DI-VAL	Diesel fuel valves	C-DI-VAN
C-EN	Environment	C-EN
C-EN-CTM	Contamination zone	C-EN-CTM
C-EN-TNK	Holding tank	C-EN-RSV
C-GL	General	C-GL
C-GL-PIC	Inserted pictures	C-GL-IMA
C-HY	Hydrology	C-HY
C-HY-CAT	Catchments area	C-HY-BAV
C-HY-FLO	Flow, discharge	C-HY-ECO
C-HY-ICE	Ice thickness	C-HY-GLA
C-LD	Landscaping	C-AX
C-LD-ANT	Antenna	C-AX-ANT
C-LD-ART	Artwork, special features	C-AX-OBA
C-LD-BRD	Foot bridges	C-AX-PAS
C-LD-CON	Concrete features, slabs	C-AX-GRA
C-LD-FEN	Fencing	C-AX-CLO
C-LD-FIL	Filling zone	C-AX-REM
C-LD-FLG	Flagpoles	C-AX-MAT
C-LD-FTN	Fountains, pools	C-AX-BSN
C-LD-FUR	Site furnishings, benches, garbage cans, etc.	C-AX-MOB
C-LD-GRA	Grading	C-AX-NVL
C-LD-IRR	<u>Irrigation system</u>	<u>C-AX-IRR</u>
C-LD-IRR-PIP	Irrigation system piping	C-AX-IRR-TUY
C-LD-IRR-SYM	Irrigation heads, controls, valves	C-AX-IRR-SYM
C-LD-RWL	Retaining walls	C-AX-SOU
C-LD-SPO	Equipment, sports facilities, goal nets, shooting targets, etc.	C-AX-EQU
C-LD-STR	Stairs (not attached to buildings)	C-AX-ESC
C-LD-SWK	Sidewalks	C-AX-TRO
C-LD-TER	Terraces, courtyards, patios (not attached to buildings)	C-AX-TER

C-LD-TOE	Toe of erosion control, armourstone, riprap, berms	<i>C-AX-BRV</i>
C-LD-TOP	Crest of erosion control, armourstone, riprap, berms	<i>C-AX-HRV</i>
C-LD-TRL	Trails, footpaths	<i>C-AX-SEN</i>
C-LD-TUN	Tunnels	<i>C-AX-TUN</i>
C-LD-TXT	Descriptive information text	<i>C-AX-TEX</i>
C-NZ	Natural Gas Distribution	<i>C-GN</i>
C-NZ-MAN	Natural gas manholes	<i>C-GN-PUA</i>
C-NZ-MET	Natural gas meters	<i>C-GN-CPT</i>
C-NZ-PIP	Natural gas pipelines	<i>C-GN-PIP</i>
C-NZ-VAL	Natural gas valves	<i>C-GN-VAN</i>
C-OI	Oil Distribution	<i>C-PE</i>
C-OI-MAN	Oil manholes	<i>C-PE-PUA</i>
C-OI-MET	Oil meters	<i>C-PE-CPT</i>
C-OI-PIP	Oil pipelines	<i>C-PE-PIP</i>
C-OI-VAL	Oil valves	<i>C-PE-VAN</i>
C-PG	Propane Gas Distribution	<i>C-GP</i>
C-PG-MAN	Propane gas manholes	<i>C-GP-PUA</i>
C-PG-MET	Propane gas meters	<i>C-GP-CPT</i>
C-PG-PIP	Propane gas pipelines	<i>C-GP-PIP</i>
C-PG-VAL	Propane gas valves	<i>C-GP-VAN</i>
C-PR	Profile Data	<i>C-PR</i>
C-PR-HOR	Horizontal profiles	<i>C-PR-HOR</i>
C-PR-VER	Vertical profiles	<i>C-PR-VER</i>
C-RO	Roads	<i>C-RO</i>
C-RO-ACR	Fire department access routes	<i>C-RO-URG</i>
C-RO-ALI	Alignment	<i>C-RO-TRC</i>
C-RO-ASP	Asphalt road	<i>C-RO-ASP</i>
C-RO-BAR	Barrier	<i>C-RO-BAR</i>
C-RO-BRD	Bridges, overpasses, etc.	<i>C-RO-PON</i>
C-RO-CLI	Road centreline	<i>C-RO-MED</i>
C-RO-CNT	Highway construction staging	<i>C-RO-OCC</i>
C-RO-CRB	Curbs	<i>C-RO-BOR</i>
C-RO-GRL	Guides, guard rails, median dividers, bollards	<i>C-RO-PRT</i>
C-RO-GRV	Gravel road	<i>C-RO-GRV</i>
C-RO-GUT	Gutter lines	<i>C-RO-CAN</i>
C-RO-HWY	Highway plan	<i>C-RO-TRR</i>
C-RO-JER	Jersey barrier	<i>C-RO-JER</i>
C-RO-MRK	Markings and road striping	<i>C-RO-MAC</i>
C-RO-MSH	Mass hauling diagrams	<i>C-RO-SCH</i>
C-RO-RMP	Ramps, on-ramps, loading docks, etc.	<i>C-RO-RAM</i>
<u>C-RO-ROD</u>	<u>Drivable road limits (asphalt) road, lots</u>	<u><i>C-RO-LIM</i></u>
C-RO-ROD-APX	Drivable road limits' approximate location	<i>C-RO-LIM-APX</i>
C-RO-SHO	Shoulders	<i>C-RO-ACT</i>
C-RO-STG	Staging layout plan	<i>C-RO-PHA</i>

C-RO-STR	Bridge abutments, piers, and supports	<i>C-RO-PIL</i>
C-RO-SWK	Sidewalks	<i>C-RO-TRO</i>
C-RO-TRL	Trails, footpaths	<i>C-RO-SEN</i>
C-RO-TUN	Road tunnels, underpasses, etc.	<i>C-RO-TUN</i>
C-RO-TXT	Road description, information text	<i>C-RO-TEX</i>
C-RW	Railways	C-CF
C-RW-ALI	Alignment	<i>C-CF-TRC</i>
C-RW-BRD	Bridges	<i>C-CF-PON</i>
C-RW-CLI	Rail centrelines	<i>C-CF-MED</i>
C-RW-RAI	Railway lines, switches	<i>C-CF-DIA</i>
C-RW-RMP	Ramps	<i>C-CF-RAM</i>
C-RW-STR	Bridge abutments, piers, trestles, and supports	<i>C-CF-PIL</i>
C-RW-TUN	Tunnels	<i>C-CF-TUN</i>
C-SA	Sanitary Sewer	C-ES
C-SA-CAT	Drainage catch areas	<i>C-ES-BAV</i>
C-SA-CLE	Cleanout	<i>C-ES-RNT</i>
C-SA-IND	Industrial sewer	<i>C-ES-IND</i>
C-SA-IOT	Sanitary inlet outlet structure	<i>C-ES-SES</i>
C-SA-MAN	<u>Sewer manholes, catch basins</u>	<i>C-ES-PUA</i>
C-SA-MAN-IDN	Text regarding t/g elevation, inverts elevation, etc.	<i>C-ES-PUA-TEX</i>
C-SA-PMP	Pumping stations	<i>C-ES-PMP</i>
C-SA-SEP	<u>Septic system</u>	<i>C-ES-SEP</i>
C-SA-SEP-FIL	Septic field filling zone	<i>C-ES-SEP-REM</i>
C-SA-SEP-PIP	Septic field piping	<i>C-ES-SEP-TUY</i>
C-SA-SEP-TNK	Septic tank	<i>C-ES-SEP-RSV</i>
C-SA-SEW	<u>Sewer lines system</u>	<i>C-ES-EGO</i>
C-SA-SEW-ABN	Abandoned sanitary sewer lines	<i>C-ES-EGO-ABN</i>
C-SA-SEW-CMB-MLI	Combined main sewer lines	<i>C-ES-EGO-CMB-PRI</i>
C-SA-SEW-CMB-SLI	Combined service sewer lines	<i>C-ES-EGO-CMB-SEV</i>
C-SA-SEW-MLI	Main sanitary sewer lines	<i>C-ES-EGO-PRI</i>
C-SA-SEW-SLI	Sanitary service sewer lines	<i>C-ES-EGO-SEV</i>
C-SA-SYM	<u>Junction symbols</u>	<i>C-ES-SYM</i>
C-SA-SYM-IDN	Text description - type of junction	<i>C-ES-SYM-TEX</i>
C-SA-TMT	Sewage treatment areas	<i>C-ES-TEU</i>
C-SA-TXT	General text: length of sewer, slope, material, etc.	<i>C-ES-TEX</i>
C-SF	Natural Site Features	C-CS
C-SF-DBR	Debris, rubble, loose rock and soil	<i>C-CS-DEB</i>
C-SF-MAR	Marshes, wetlands	<i>C-CS-TEH</i>
C-SF-PIT	Borrow pit	<i>C-CS-BEM</i>
C-SF-RMN	<u>Archaeological remnants</u>	<i>C-CS-VST</i>
C-SF-RMN-ABV	Archaeological remnants above ground	<i>C-CS-VST-AUD</i>
C-SF-RMN-UND	Archaeological remnants underground	<i>C-CS-VST-SOU</i>
C-SF-TRE	Trees, tree lines	<i>C-CS-ARB</i>
C-SF-TRE-TXT	Text describing trees	<i>C-CS-ARB-TEX</i>
C-SF-TXT	Site feature description text	<i>C-CS-TEX</i>
C-SF-WTR	Natural boundaries watercourses, shorelines	<i>C-CS-LBM</i>

C-SI	Signs and Guideposts	C-SI
C-SI-GDP	Guideposts	<i>C-SI-POT</i>
C-SI-SGL	Sign layouts and details	<i>C-SI-DET</i>
C-SI-SGN	Signs	<i>C-SI-ECR</i>
C-SI-TXT	Signage text	<i>C-SI-TEX</i>
C-SV	Survey Control, Non-Legal	C-LV
C-SV-BEN	Local bench marks	<i>C-LV-RNL</i>
C-SV-BND	Non-legal boundaries	<i>C-LV-LIP</i>
C-SV-CHN	Chainage	<i>C-LV-CHI</i>
C-SV-CLN	Radial ties, traverse lines, control lines	<i>C-LV-LCH</i>
<u>C-SV-CPT</u>	<u>Control points</u>	<i>C-LV-POA</i>
C-SV-CPT-HOR	Horizontal control points	<i>C-LV-POA-HOR</i>
C-SV-CPT-VER	Vertical control points	<i>C-LV-POA-VER</i>
C-SV-GRD	Survey grid	<i>C-LV-QUA</i>
C-SV-HOR	Horizontal alignment	<i>C-LV-HOR</i>
C-SV-LIM	Limits of contract, non-legal	<i>C-LV-LIM</i>
C-SV-LIN	Survey feature connectivity line work	<i>C-LV-TRI</i>
C-SV-MON	Found legal monuments	<i>C-LV-RAR</i>
<u>C-SV-PAR</u>	<u>Parcel line work</u>	<i>C-LV-PAC</i>
C-SV-PAR-TXT	Parcel text	<i>C-LV-PAC-TEX</i>
C-SV-PNT	Survey points	<i>C-LV-POL</i>
C-SV-SEL	Super elevation	<i>C-LV-SUE</i>
<u>C-SV-STA</u>	<u>Station equation labels</u>	<i>C-LV-STA</i>
C-SV-STA-IDN	Station labels	<i>C-LV-STA-NUI</i>
C-SV-STA-PTS	Station points	<i>C-LV-STA-PTS</i>
C-SV-STB	Setbacks	<i>C-LV-MAR</i>
C-SV-VER	Vertical alignment	<i>C-LV-VER</i>
C-SW	Storm Water Drainage and Systems	C-EP
C-SW-CAT	Drainage catchments areas	<i>C-EP-BAV</i>
C-SW-CUL	Culverts	<i>C-EP-PON</i>
C-SW-DCL	Ditch centre lines	<i>C-EP-MED</i>
C-SW-IOT	Storm inlet outlet structure	<i>C-EP-SES</i>
<u>C-SW-MAN</u>	<u>Catch basins, manholes</u>	<i>C-EP-PUA</i>
C-SW-MAN-IDN	Manhole description text: elevation, direction	<i>C-EP-PUA-TEX</i>
C-SW-MNG	Storm water management pond	<i>C-EP-BSN</i>
C-SW-PMP	Pumping stations	<i>C-EP-PMP</i>
<u>C-SW-SEW</u>	<u>Sewer lines system</u>	<i>C-EP-EGO</i>
C-SW-SEW-ABN	Abandoned storm sewer lines	<i>C-EP-EGO-ABN</i>
C-SW-SEW-MLI	Storm main sewer lines	<i>C-EP-EGO-PRI</i>
C-SW-SEW-SLI	Storm service sewer lines	<i>C-EP-EGO-SEV</i>
C-SW-SUB	Subdrains	<i>C-EP-DRA</i>
<u>C-SW-SYM</u>	<u>Junction symbols</u>	<i>C-EP-SYM</i>
C-SW-SYM-IDN	Junction description text	<i>C-EP-SYM-TEX</i>
C-SW-TXT	Text describing length of sewer, slopes, material	<i>C-EP-TEX</i>

C-TP	Topographical Information	C-TG
C-TP-MAJ	Major contours	C-TG-COP
C-TP-MIN	Minor contours	C-TG-COS
C-TP-SPT	Spot elevation	C-TG-POC
<u>C-TP-SRF</u>	<u>Surface model line work</u>	<u>C-TG-MNT</u>
C-TP-SRF-BRL	Surface model break lines	C-TG-MNT-LCO
C-TP-SRF-TXT	Surface calculation text	C-TG-MNT-TEX
C-TP-TOE	Bank (toe)	C-TG-BRV
C-TP-TOP	Top of bank	C-TG-HRV
C-VG	Vegetation	C-VG
<u>C-VG-FLW</u>	<u>Flowers</u>	<u>C-VG-FLR</u>
C-VG-FLW-ANN	Annual flowers	C-VG-FLR-ANN
C-VG-FLW-PER	Perennial flowers	C-VG-FLR-VIV
<u>C-VG-GCV</u>	<u>Ground cover</u>	<u>C-VG-CVS</u>
C-VG-GCV-DEC	Deciduous ground cover	C-VG-CVS-CDC
C-VG-GCV-EVR	Evergreen ground cover	C-VG-CVS-PST
C-VG-GCV-ORN	Ornamental ground cover	C-VG-CVS-ORN
<u>C-VG-GRS</u>	<u>Grass area</u>	<u>C-VG-PEL</u>
C-VG-GRS-SED	Seeded grass area	C-VG-PEL-ESM
C-VG-GRS-SOD	Sodded grass area	C-VG-PEL-EGZ
<u>C-VG-SRB</u>	<u>Shrubs</u>	<u>C-VG-ABT</u>
C-VG-SRB-DEC	Deciduous shrubs	C-VG-ABT-CDC
C-VG-SRB-EVR	Evergreen shrubs	C-VG-ABT-PST
C-VG-SRB-ORN	Ornamental shrubs	C-VG-ABT-ORN
<u>C-VG-TRE</u>	<u>Trees</u>	<u>C-VG-ARB</u>
C-VG-TRE-DEC	Deciduous trees	C-VG-ARB-CDC
C-VG-TRE-ORN	Flowering trees, fruit trees	C-VG-ARB-ORN
C-VG-VIN	Vines	C-VG-VIG
C-WM	Water and Fire	C-CE
C-WM-FHY	Fire hydrants	C-CE-BOI
C-WM-FRL	Fire lines	C-CE-CAX
<u>C-WM-MAN</u>	<u>Manholes, storage, valves</u>	<u>C-CE-PUA</u>
C-WM-MAN-IDN	Text describing; t/g elevation, t/pipe elevation	C-CE-PUA-TEX
C-WM-PMP	Pumping stations	C-CE-PMP
C-WM-RAW	Raw water lines	C-CE-CEN
<u>C-WM-SYM</u>	<u>Junction symbols</u>	<u>C-CE-SYM</u>
C-WM-SYM-IDN	Text describing type of junction	C-CE-SYM-TEX
C-WM-TXT	Water main descriptive text	C-CE-TEX
C-WM-WEL	Water wells	C-CE-PUE
<u>C-WM-WLI</u>	<u>Water line</u>	<u>C-CE-CED</u>
C-WM-WLI-MLI	Water main	C-CE-CED-PRI
C-WM-WLI-SLI	Water service line	C-CE-CED-SEV

Electrical Systems

English Abvtn	Description	French Abvtn
E-CK	Clock Systems	E-HO
E-CK-EQP	Clock equipment	E-HO-EQU
E-CK-REC	Clock locations	E-HO-PRS
E-CK-WRG	Wiring	E-HO-CAB
E-DA	Data Systems	E-DN
E-DA-EQP	Data equipment	E-DN-EQU
E-DA-OUT	Data outlets, jacks	E-DN-PRS
E-DA-WRG	Wiring	E-DN-CAB
E-EG	Emergency Generation	E-AS
E-EG-COD	Conduits	E-AS-COD
E-EG-EQP	Emergency power generation equipment	E-AS-EQU
E-EG-GEN	Generators, control switchboards	E-AS-GEN
E-EL	Emergency Lighting	E-EU
E-EL-CLG	Emergency luminaries ceiling-mounted	E-EU-PFD
E-EL-ESG	Exit signs	E-EU-SOS
E-EL-EXT	Emergency outside luminaries attached to buildings, poles	E-EU-EXT
E-EL-WAL	Emergency luminaries wall-mounted	E-EU-MUR
E-EP	Emergency Power Equipment	E-RU
E-EP-CTL	Motors and controls	E-RU-MOC
E-EP-DCB	DC battery systems	E-RU-ACU
E-EP-REC	Receptacles	E-RU-PRS
E-EP-TEN	Special tenant systems	E-RU-LOC
E-EP-UPS	UPS and conditioned power	E-RU-ASC
E-EW	Emergency Power Wiring and Cabling	E-CU
E-EW-CBT	Cable trays, ducts, and raceways	E-CU-CCC
E-EW-CLG	Ceiling-mounted wiring	E-CU-PFD
E-EW-CLT	Control wiring for emergency lighting	E-CU-CCE
E-EW-EXP	Exposed inside/outside wiring	E-CU-EXT
<u>E-EW-HVD</u>	<u>High voltage wiring</u>	<u>E-CU-HTE</u>
E-EW-HVD-CLG	High voltage in ceiling space	E-CU-HTE-PFD
<u>E-EW-LVD</u>	<u>Low voltage wiring</u>	<u>E-CU-BTE</u>
E-EW-LVD-CLG	Low voltage in ceiling space	E-CU-BTE-PFD
E-EW-LVD-FLR	Low voltage under floor	E-CU-BTE-PCH
E-EW-PAN	Electrical panel for emergency power	E-CU-PAN
E-EW-UPS	Uninterruptible power system (UPS)	E-CU-ASC
E-FR	Electrical Fire Protection	E-AI
E-FR-ELD	Electromagnetic locking devices	E-AI-DVE
E-FR-EQP	Equipment: master fire warning panel, alarm, annunciator panels	E-AI-EQU
E-FR-SIG	Signalling devices	E-AI-SIG
E-FR-SYM	Electrical FP symbols: pull stations, heat, smoke detectors	E-AI-DDA
<u>E-FR-VCE</u>	<u>Emergency voice communication</u>	<u>E-AI-CVU</u>
E-FR-VCE-WRG	Emergency voice communication wiring	E-AI-CVU-CAB

E-FW	Flat Wiring	E-CP
E-FW-CBL	Flat wiring cable location	E-CP-CAB
E-FW-CNB	Flat wiring connection boxes	E-CP-BOJ
E-GD	Grounding	E-MT
E-GD-WRG	Wiring, rods, bus plates	E-MT-EQU
E-LP	Lightning Protection	E-PT
E-LP-EQP	Equipment and devices	E-PT-EQU
E-LP-WRG	Wiring	E-PT-CAB
E-NG	Normal Power Generation	E-AN
E-NG-COD	Conduits	E-AN-COD
E-NG-EQP	Normal power generation equipment	E-AN-EQU
E-NG-GEN	Generators, control switchboard	E-AN-GEN
E-NL	Normal Lighting	E-EN
E-NL-CLG	Luminaries ceiling-mounted	E-EN-PFD
E-NL-CTL	Lighting controls	E-EN-COM
E-NL-EXT	Outside luminaries attached to buildings, poles	E-EN-EXT
E-NL-WAL	Luminaries in workspace and wall-mounted	E-EN-MUR
E-NP	Normal Power Equipment	E-RN
E-NP-CTL	Motors and controls	E-RN-MOC
E-NP-EQP	Normal power equipment: ceiling fans, etc.	E-RN-EQU
E-NP-HVD	High voltage distribution	E-RN-HTE
E-NP-LVD	Low voltage distribution	E-RN-BTE
E-NP-MEC	Electrical connections to mechanical equipment	E-RN-MEC
E-NP-OUT	Outlets, receptacles	E-RN-PRS
E-NP-PAN	Electrical panels	E-RN-PAN
E-NP-RAD	Radiant heating panels	E-RN-RAD
E-NP-TEN	Special tenant systems	E-RN-LOC
E-NW	Normal Power Wiring and Cabling	E-CN
E-NW-CBT	Cable trays, ducts, and raceways	E-CN-CCC
E-NW-CTL	Control wiring lighting	E-CN-CCE
E-NW-EXP	Exposed inside/outside wiring	E-CN-EXT
<u>E-NW-HVD</u>	<u>High voltage wiring</u>	<u>E-CN-HTE</u>
E-NW-HVD-CLG	High voltage wiring in ceiling space	E-CN-HTE-PFD
<u>E-NW-LVD</u>	<u>Low voltage wiring</u>	<u>E-CN-BTE</u>
E-NW-LVD-CLG	Low voltage wiring in ceiling space	E-CN-BTE-PFD
E-NW-LVD-FLR	Low voltage under floor	E-CN-BTE-PCH
E-NW-LVD-WOR	Low voltage in workspace	E-CN-BTE-PTV
E-NW-PST	Power poles with receptacles	E-CN-COL
E-NW-TEN	Tenant systems in workspace	E-CN-RPT
E-NW-UPS	Ups and conditioned power	E-CN-ASC
E-PA	Sound and PA Systems	E-SV
E-PA-EME	Emergency	E-SV-URG
E-PA-EQP	Sound equipment, speakers	E-SV-EQU
E-PA-OUT	Outlets	E-SV-PRS

E-PA-SYM	Symbols	<i>E-SV-SYM</i>
E-PA-WRG	Wiring	<i>E-SV-CAB</i>
E-PH	Telephone Systems	<i>E-TE</i>
E-PH-EQP	Equipment	<i>E-TE-EQU</i>
E-PH-OUT	Outlets	<i>E-TE-PRS</i>
E-PH-PAN	Telephone panel	<i>E-TE-PAN</i>
E-PH-WRG	Wiring	<i>E-TE-CAB</i>
E-SD	Site Distribution and Electrical Equipment	<i>E-DS</i>
E-SD-COD	Conduits	<i>E-DS-COD</i>
E-SD-DUC	Concrete ducts	<i>E-DS-CBE</i>
E-SD-EQP	Site distribution equipment: transformers, pedestals	<i>E-DS-EQU</i>
<u>E-SD-HVD</u>	<u>High voltage distribution</u>	<u><i>E-DS-HTE</i></u>
E-SD-HVD-ABV	High voltage distribution - above grade	<i>E-DS-HTE-AER</i>
E-SD-HVD-UND	High voltage distribution - below grade	<i>E-DS-HTE-SOU</i>
<u>E-SD-LTG</u>	<u>Lighting and wiring</u>	<u><i>E-DS-ECL</i></u>
E-SD-LTG-ABV	Lighting and wiring - above grade	<i>E-DS-ECL-AER</i>
E-SD-LTG-UND	Lighting and wiring - below grade	<i>E-DS-ECL-SOU</i>
<u>E-SD-LVD</u>	<u>Low voltage distribution</u>	<u><i>E-DS-BTE</i></u>
E-SD-LVD-ABV	Low voltage distribution - above grade	<i>E-DS-BTE-AER</i>
E-SD-LVD-UND	Low voltage distribution - below grade	<i>E-DS-BTE-SOU</i>
<u>E-SD-MAN</u>	<u>Manhole, handwells, junction box, pull pit ground inspection box</u>	<u><i>E-DS-PUA</i></u>
E-SD-MAN-IDN	Text describing; t/g elevation, line elevation	<i>E-DS-PUA-IDN</i>
E-SD-MUN	Municipal and utility services	<i>E-DS-MUN</i>
E-SD-POL	Poles and towers (electrical, communication)	<i>E-DS-POT</i>
E-SD-SUB	Substations	<i>E-DS-SST</i>
<u>E-SD-TEL</u>	<u>Telephone lines</u>	<u><i>E-DS-TEL</i></u>
E-SD-TEL-ABV	Telephone lines - above grade	<i>E-DS-TEL-AER</i>
E-SD-TEL-UND	Telephone lines - below grade	<i>E-DS-TEL-SOU</i>
E-SD-TXT	Text describing type of distribution system	<i>E-DS-TEX</i>
<u>E-SD-VID</u>	<u>Video lines</u>	<u><i>E-DS-VID</i></u>
E-SD-VID-ABV	Video lines – above grade	<i>E-DS-VID-AER</i>
E-SD-VID-UND	Video lines – below grade	<i>E-DS-VID-SOU</i>
E-SE	Security Systems	<i>E-SS</i>
E-SE-ALM	Intrusion alarms	<i>E-SS-SAA</i>
E-SE-CTL	Intrusion controls and controllers	<i>E-SS-COT</i>
E-SE-ELK	Electrical security locks	<i>E-SS-VEE</i>
E-SE-LAN	Intrusion system LAN	<i>E-SS-REL</i>
E-SE-SEN	Motion sensors	<i>E-SS-DEI</i>
E-SE-VCL	Video controllers (digital)	<i>E-SS-COM</i>
E-SE-VCM	Video cameras and monitors	<i>E-SS-EQU</i>
E-SE-WRG	Intrusion controller wiring	<i>E-SS-CAB</i>
E-SG	Signal Systems	<i>E-SI</i>
E-SG-EQP	Equipment	<i>E-SI-EQU</i>
E-SG-OUT	Outlets	<i>E-SI-SOR</i>
E-SG-WRG	Wiring	<i>E-SI-CAB</i>

E-SM	Electrical Schematics	E-SM
E-SM-CLK	Clock system schematics	E-SM-HOL
E-SM-DAS	Data systems schematics	E-SM-DAT
E-SM-EFP	Electrical fire protection schematics	E-SM-ALI
<u>E-SM-EPR</u>	<u>Emergency distribution schematics</u>	<u>E-SM-ALU</u>
E-SM-EPR-GEN	Emergency generation schematics, generators	E-SM-ALU-GEN
E-SM-EPR-LTG	Emergency lighting schematics	E-SM-ALU-ECL
E-SM-EPR-EQP	Emergency power equipment	E-SM-ALU-EQU
E-SM-EPR-TXT	Text for emergency distribution	E-SM-ALU-TEX
E-SM-EPR-WRG	Emergency wiring schematics	E-SM-ALU-CAB
E-SM-GND	Grounding schematics	E-SM-MIT
E-SM-HVD	High voltage (>750v) emergency distribution	E-SM-HTE
E-SM-KRK	Kirk key interlocks	E-SM-KRK
E-SM-LAN	Local area network schematics	E-SM-REL
E-SM-LTP	Lightning protection schematics	E-SM-PRF
E-SM-LVD	Low voltage emergency distribution	E-SM-BTE
<u>E-SM-MMS</u>	<u>Maintenance management system (MMS) tag numbers</u>	<u>E-SM-SGE</u>
E-SM-EPR-MMS	MMS tag numbers for emergency distribution	E-SM-ALU-SGE
E-SM-HVD-MMS	MMS tag numbers for high voltage distribution	E-SM-HTE-SGE
E-SM-NPR-MMS	MMS tag numbers for normal power distribution	E-SM-ANV-SGE
<u>E-SM-MTR</u>	<u>Metering</u>	<u>E-SM-CPT</u>
E-SM-MTR-EQP	Metering equipment, switch board	E-SM-CPT-EQU
E-SM-MTR-TXT	Metering text	E-SM-CPT-TEX
E-SM-MTR-WRG	Metering wiring	E-SM-CPT-CAB
<u>E-SM-NPR</u>	<u>Normal power distribution schematics</u>	<u>E-SM-ANV</u>
E-SM-NPR-EQP	Normal power distribution equipment	E-SM-ANV-EQU
E-SM-NPR-LTG	Normal lighting schematics	E-SM-ANV-ECL
E-SM-NPR-TXT	Text for normal power distribution	E-SM-ANV-TEX
E-SM-NPR-WRG	Normal power wiring	E-SM-ANV-CAB
E-SM-PAS	Public address system schematics	E-SM-COV
E-SM-SGN	Signal schematic	E-SM-SGN
E-SM-TEL	Telephone schematics	E-SM-TEL
E-SM-UPS	Uninterruptible power system (UPS)	E-SM-ASC
E-SM-VID	Video system schematics	E-SM-VID
E-SY	Electricity on System Furniture	E-EA
E-SY-LAN	LAN network jack	E-EA-REL
E-SY-LTG	Normal powered lighting	E-EA-ECL
E-SY-OUT	Electrical outlet	E-EA-PRS
E-SY-PST	Electrical posts on system furniture	E-EA-COL
E-SY-TEL	Telephone outlet	E-EA-TEL
E-VD	Video Conferencing Systems	E-VD
E-VD-EQP	Equipment	E-VD-EQU
E-VD-OUT	Outlets	E-VD-PRS
E-VD-WRG	Wiring	E-VD-CAB

General Information

English Abvn	Description	French Abvn
G-DT	Details	G-DT
G-DT-DIM	Detail, section, elevation dimensions	<i>G-DT-DIM</i>
G-DT-HAT	Detail, section, elevation hatching	<i>G-DT-HAC</i>
G-DT-LIN	Detail, section, elevation linework	<i>G-DT-TRI</i>
G-DT-TXT	Detail, section, elevation annotation, text	<i>G-DT-TEX</i>
G-GL	General	G-GL
G-GL-CAL	Callout blocks	<i>G-GL-BUF</i>
G-GL-SYM	Symbols, key plan, north arrow, bar scale	<i>G-GL-SYM</i>
<u>G-GL-TXT</u>	<u>Text</u>	<u><i>G-GL-TEX</i></u>
G-GL-TXT-E	English text	<i>G-GL-TEX-A</i>
G-GL-TXT-F	French text	<i>G-GL-TEX-F</i>
G-GL-XRE	External reference	<i>G-GL-XRE</i>
G-LG	Legend	G-LE
G-LG-LIN	Symbol legend line work	<i>G-LE-TRI</i>
G-LG-TXT	Symbol legend text	<i>G-LE-TEX</i>
G-TL	Title Block	G-CT
G-TL-ATT	Attributes for title block	<i>G-CT-ATT</i>
G-TL-LGO	Logos	<i>G-CT-LOG</i>
G-TL-LIN	Line work for title block	<i>G-CT-TRI</i>
G-TL-RME	Title block read me layer	<i>G-CT-LIS</i>
G-TL-SYM	Title block insertion Layer	<i>G-CT-SYM</i>
G-TL-TXT	Text for title block	<i>G-CT-TEX</i>
G-TL-VPT	Viewport boundaries	<i>G-CT-MET</i>

Mechanical		
English Abvn	Description	French Abvn
H-CS	Control Systems	H-SR
H-CS-AIR	Control air piping	H-SR-AIR
H-CS-EQP	Control systems equipment	H-SR-EQU
H-CS-SYM	Control system symbols: thermostats, humidistat, sensors, etc.	H-SR-SYM
H-CS-TXT	Control system text	H-SR-TEX
H-CS-WRG	Control wiring	H-SR-CAB
H-DW	Domestic Water	H-ED
H-DW-CLD	Domestic cold water	H-ED-EFR
H-DW-EQP	Domestic water equipment: pumps, water softeners, filters, etc.	H-ED-EQU
<u>H-DW-FIX</u>	<u>Plumbing fixtures</u>	<u>H-ED-APP</u>
H-DW-FIX-PRT	Plumbing fixtures on partitions	H-ED-APP-CLS
<u>H-DW-HOT</u>	<u>Domestic hot water</u>	<u>H-ED-ECD</u>
H-DW-HOT-RCL	Domestic hot water recirculation	H-ED-ECD-REC
H-DW-HOT-TNK	Domestic hot water tanks	H-ED-ECD-RSV
H-DW-ROW	Reverse osmosis water (medical)	H-ED-EOI
H-FP	Fire Protection	H-PI
<u>H-FP-CEX</u>	<u>Chemical extinguishing system</u>	<u>H-PI-EXC</u>
H-FP-CEX-PIP	Chemical extinguishing piping	H-PI-EXC-TUY
H-FP-CEX-EQP	Chemical extinguishing equipment	H-PI-EXC-EQU
H-FP-EPE	Explosion-proof equipment	H-PI-EQA
H-FP-EQP	Fire protection equipment: fire hose cabinet, fire dampers, etc.	H-PI-EQU
<u>H-FP-FEX</u>	<u>Foamed extinguishing system</u>	<u>H-PI-EXM</u>
H-FP-FEX-PIP	Foamed extinguishing piping	H-PI-EXM-TUY
H-FP-FEX-EQP	Foamed extinguishing equipment	H-PI-EXM-EQU
<u>H-FP-SPK</u>	<u>Sprinkler system</u>	<u>H-PI-GIC</u>
H-FP-SPK-PIP	Sprinkler piping	H-PI-GIC-TUY
H-FP-SPK-EQP	Sprinkler equipment	H-PI-GIC-EQU
H-FP-SPK-SYM	Sprinkler system symbols: sprinkler heads, backflow preventer, etc.	H-PI-GIC-SYM
H-FP-SPK-TXT	Sprinkler system text	H-PI-GIC-TEX
H-FP-SPK-ZNS	Sprinkler system zones	H-PI-GIC-ZON
<u>H-FP-STP</u>	<u>Standpipe system</u>	<u>H-PI-CMG</u>
H-FP-STP-PIP	Standpipe piping	H-PI-CMG-TUY
H-FP-STP-EQP	Standpipe equipment	H-PI-CMG-EQU
H-FP-SYM	Fire protection symbols: fire extinguisher, hydrants	H-PI-SYM
H-FP-TXT	Fire protection text	H-PI-TEX
H-HC	Heating and Cooling	H-CH
<u>H-HC-CHL</u>	<u>Chilled water</u>	<u>H-CH-ERF</u>
H-HC-CHL-RET	Chilled water return	H-CH-ERF-RET
H-HC-CHL-SUP	Chilled water supply	H-CH-ERF-ALM
H-HC-CNV	Convectors	H-CH-CNV
<u>H-HC-COT</u>	<u>Cooling tower water</u>	<u>H-CH-TRF</u>
H-HC-COT-RET	Cooling tower water return	H-CH-TRF-RET
H-HC-COT-SUP	Cooling tower water supply	H-CH-TRF-ALM

H-HC-GLY	Glycol	<i>H-CH-GLY</i>
H-HC-GLY-RET	Glycol return	<i>H-CH-GLY-RET</i>
H-HC-GLY-SUP	Glycol supply	<i>H-CH-GLY-ALM</i>
H-HC-HWA	Heating water	<i>H-CH-ECF</i>
H-HC-HWA-RET	Heating water return	<i>H-CH-ECF-RET</i>
H-HC-HWA-SUP	Heating water supply	<i>H-CH-ECF-ALM</i>
H-HC-HYD	Hydronic equipment	<i>H-CH-HYD</i>
H-HC-RAD	Radiant heat tubing	<i>H-CH-TCR</i>
H-HC-REF-EQP	Refrigerant equipment	<i>H-CH-FRI-EQU</i>
H-HC-RFG	Refrigerant gas	<i>H-CH-GAF</i>
H-HC-RFL	Refrigerant liquid	<i>H-CH-FLF</i>
H-HC-STM	Steam	<i>H-CH-VAP</i>
H-HC-STM-RET	Steam condensate (return)	<i>H-CH-VAP-RET</i>
H-HC-STM-SUP	Steam supply	<i>H-CH-VAP-ALM</i>
H-HC-STM-EQP	Steam equipment	<i>H-CH-VAP-EQU</i>

H-PB	Plumbing	H-PB
H-PB-CMA	Compressed air	<i>H-PB-AIC</i>
H-PB-CMA-EQP	Compressed air equipment	<i>H-PB-AIC-EQU</i>
H-PB-CO2	Carbon dioxide gas	<i>H-PB-CO2</i>
H-PB-DWV	Drainage waste and vent system	<i>H-PB-REV</i>
H-PB-DWV-SYM	Symbols: roof drains, floor drains, etc.	<i>H-PB-REV-SYM</i>
H-PB-DWV-VEN	Ventilating circuit, vents	<i>H-PB-REV-EVE</i>
H-PB-DWV-WST	Drainage circuit	<i>H-PB-REV-EEU</i>
H-PB-EQP	Plumbing equipment: pumps, coils motors, grease interceptor, etc.	<i>H-PB-EQU</i>
H-PB-FOI	Fuel oil	<i>H-PB-MAZ</i>
H-PB-FOI-EQP	Fuel equipment	<i>H-PB-MAZ-EQU</i>
H-PB-FOI-RET	Fuel oil return	<i>H-PB-MAZ-RET</i>
H-PB-FOI-SUP	Fuel oil supply	<i>H-PB-MAZ-ALM</i>
H-PB-FOI-VEN	Fuel oil vent	<i>H-PB-MAZ-EVE</i>
H-PB-HEG	Helium gas	<i>H-PB-HEL</i>
H-PB-HYG	Hydrogen gas	<i>H-PB-HYG</i>
H-PB-MAN	Access holes	<i>H-PB-PUA</i>
H-PB-MEG	Methane gas	<i>H-PB-MTH</i>
H-PB-NGA	Natural gas	<i>H-PB-GAN</i>
H-PB-NIT	Nitrogen gas	<i>H-PB-AZO</i>
H-PB-OXY	Oxygen gas	<i>H-PB-OXY</i>
H-PB-PGA	Propane gas	<i>H-PB-GAP</i>
H-PB-SYM	Plumbing symbols: gauges, fittings, valves elbows, unions, reducer	<i>H-PB-SYM</i>
H-PB-VAC	Cleaning system, vacuum	<i>H-PB-NET</i>

H-PP	Fuel and Process Piping	H-TC
H-PP-MAN	Manholes fuelling stations	<i>H-TC-PUA</i>
H-PP-MET	Meters	<i>H-TC-CPT</i>
H-PP-PIP	Fuel and process piping	<i>H-TC-TUY</i>
H-PP-PMP	Pumping stations	<i>H-TC-PMP</i>

H-PP-TNK	Fuel tanks	<i>H-TC-RSV</i>
H-PP-VAL	Valves	<i>H-TC-VAN</i>
H-SM	Mechanical Schematics and Riser Diagrams	<i>H-SM</i>
H-SM-CSY	Control system schematics	<i>H-SM-COM</i>
H-SM-DRS	Duct riser diagrams	<i>H-SM-CMC</i>
H-SM-DUC	Duct schematic diagrams	<i>H-SM-COD</i>
H-SM-PIP	Piping schematic diagrams	<i>H-SM-TUY</i>
H-SM-PRS	Piping riser diagrams	<i>H-SM-CMT</i>
H-SM-SYM	Symbols	<i>H-SM-SYM</i>
H-SM-WST	Waste schematics	<i>H-SM-EEU</i>
H-VA	Ventilation and Air Conditioning	<i>H-VC</i>
H-VA-COA	Combustion air ductwork	<i>H-VC-ACO</i>
H-VA-EQP	Equipment: fans, dampers, coils, filters, etc.	<i>H-VC-EQU</i>
<u>H-VA-EXH</u>	<u>Exhaust air system</u>	<u><i>H-VC-AEV</i></u>
H-VA-EXH-DUC	Exhaust air ductwork	<i>H-VC-AEV-COD</i>
H-VA-EXH-GRI	Exhaust grilles	<i>H-VC-AEV-GRI</i>
H-VA-INS	Duct insulation, acoustical lining	<i>H-VC-ISO</i>
<u>H-VA-OTA</u>	<u>Outside air system</u>	<u><i>H-VC-AEX</i></u>
H-VA-OTA-DUC	Outside air ductwork	<i>H-VC-AEX-COD</i>
H-VA-OTA-GRI	Outside air grilles	<i>H-VC-AEX-GRI</i>
<u>H-VA-RET</u>	<u>Return system</u>	<u><i>H-VC-REP</i></u>
H-VA-RET-DUC	Return ductwork	<i>H-VC-REP-COD</i>
H-VA-RET-GRI	Return grilles	<i>H-VC-REP-GRI</i>
<u>H-VA-SUP</u>	<u>Supply system</u>	<u><i>H-VC-AMA</i></u>
H-VA-SUP-DUC	Supply ductwork	<i>H-VC-AMA-COD</i>
H-VA-SUP-DIF	Supply diffusers	<i>H-VC-AMA-DIF</i>
H-VA-VAV	Variable air volume boxes	<i>H-VC-DAV</i>
H-VA-VEN	Flue, vent, breaching	<i>H-VC-EVE</i>

Interior Design

English Abvn	Description	French Abvn
I-BP	Blocking Plan	I-BE
I-BP-DIM	Dimensions	I-BE-DIM
I-BP-OLN	Sector outlines	I-BE-CON
I-BP-TXT	Text, notes	I-BE-TEX
I-EI	Employee Information	I-EM
I-EI-IDN	Employee identification	I-EM-NUI
I-EQ	Equipment	I-EQ
I-EQ-CMP	Computers	I-EQ-ORD
I-EQ-OEQ	Office equipment	I-EQ-EXI
I-EQ-SPC	Special equipment	I-EQ-SPE
I-FU	Furniture	I-MO
I-FU-ACC	Accessories, coat trees, racks	I-MO-ACC
I-FU-ART	Artwork	I-MO-ART
I-FU-CAB	Storage cabinets, files	I-MO-RAG
I-FU-CLR	Furniture colour	I-MO-COU
I-FU-DSK	Desks, freestanding work surfaces	I-MO-SUT
I-FU-NOF	Non-office furniture, first aid room beds, etc.	I-MO-APE
I-FU-PLT	Plants	I-MO-PLT
I-FU-SET	Seating	I-MO-SIE
I-FU-SHL	Shelving	I-MO-ETA
I-FU-TAB	Tables	I-MO-TAB
I-FU-TXT	Annotations, text furniture	I-MO-TEX
I-FU-SIZ	Furniture size	I-MO-DIM
I-SI	Signage	I-SI
I-SI-EQP	Barrier-free signs	I-SI-ACF
I-SI-OFF	Office signage	I-SI-BUR
I-SI-SPC	Special signage	I-SI-SPE
I-SY	System Furniture	I-EA
I-SY-CLR	Panel colour	I-EA-COU
I-SY-OVH	Panel overhead storage, etc.	I-EA-SUR
I-SY-SCR	Panels, screens	I-EA-ECA
I-SY-SIZ	Panel sizes	I-EA-DIM
I-SY-SUR	Work surfaces for system furniture	I-EA-SUT

Legal Surveys

English Abvn	Description	French Abvn
L-AZ	Airport Zoning	L-ZA
L-AZ-ZNS	Zoning surfaces, runway strips, centrelines	L-ZA-ZON
L-GL	General	L-GL
L-GL-TXT	General text	L-GL-TEX
L-CF	Cadastral Fabric	L-CD
L-CF-BDY	Legal surveyed boundary	L-CD-LIF
L-CF-DIM	Parcel segment labelling, bearings, and distance	L-CD-DIM
L-CF-EAS	Limited interest estate, easement, right of way	L-CD-DRO
L-CF-OTH	Other parcels/boundaries	L-CD-AUT
L-CF-STB	Setbacks	L-CD-MAR
L-CF-SYM	Symbols: coordinate monument, control point	L-CD-SYM
L-CF-TXT	Parcel labelling, description, property ID, book number, etc.	L-CD-TEX
L-SP	Legal Site Plan	L-PS
L-SP-CAN	Canadian boundaries	L-PS-FCN
L-SP-CLS	CLSR boundaries, reserves, parks	L-PS-RTC
L-SP-PRO	Provincial boundaries	L-PS-PRV
L-SP-REG	Regional and municipality boundaries	L-PS-MUN
L-SV	Legal Survey	L-LT
L-SV-CLN	Radial ties, traverse lines, control lines	L-LT-LCH
L-SV-GRD	Survey grid	L-LT-QUA
<u>L-SV-PNT</u>	<u>Survey points</u>	<u>L-LT-POL</u>
L-SV-PNT-ELV	Survey point elevation	L-LT-POL-ELV
L-SV-PNT-IDN	Survey point number text	L-LT-POL-NUI
L-SV-PNT-TXT	Survey point description	L-LT-POL-TEX
L-SV-SYM	Symbols: survey pins, iron bars, etc.	L-LT-SYM
L-SV-TXT	Identification text	L-LT-TEX

Marine

English Abvtn	Description	French Abvtn
M-BW	Breakwater Features	M-BL
M-BW-OLN	Breakwater outline	M-BL-CON
M-BW-TOE	Toe of breakwater	M-BL-BRV
M-BW-TOP	Crest of breakwater, berms	M-BL-HRV
M-GL	General	M-GL
M-GL-DIM	Dimensions	M-GL-DIM
M-GL-HAT	Hatching	M-GL-HAC
M-GL-LAY	Layout line work	M-GL-TRI
M-GL-TXT	Text	M-GL-TEX
M-NV	Navigation	M-NA
M-NV-BUO	Buoys	M-NA-BOU
M-NV-CAR	Cards	M-NA-SYM
M-NV-COR	Navigation corridors, channels	M-NA-TVN
M-NV-EQP	Floating aids, marker buoys, fog horns	M-NA-EQU
M-NV-SPA	Spars	M-NA-MAT
M-SK	Skid-way, Haul-outs, Slipways	M-CA
M-SK-BED	Vessel beds	M-CA-PLF
M-SK-BLK	Anchor blocks, haul out blocks	M-CA-BLA
M-SK-FTG	Footings	M-CA-SOA
M-SK-GUA	Guards	M-CA-GUA
M-SK-OLN	Skid-way outline	M-CA-CON
M-SK-RAI	Railway	M-CA-TRC
M-SK-SKD	Skid timbers, skid poles	M-CA-POU
M-SK-SLB	Concrete slabs, precast panels	M-CA-DPP
M-SK-SSP	Steel sheet piling	M-CA-PAL
M-SN	Hydrographic Survey Information, Non Legal	M-RH
M-SN-DAT	Chart datum contour, 0.00 m	M-RH-ZDC
M-SN-DRG	Dredged area or limits	M-RH-LID
M-SN-HNT	High normal tide	M-RH-MHN
M-SN-HWL	High water lines	M-RH-LHM
M-SN-LNT	Low normal tide	M-RH-MBN
M-SN-LWL	Low water lines	M-RH-LBM
M-SN-MAJ	Major sea bottom contours	M-RH-PFM
M-SN-MIN	Minor sea bottom contours	M-RH-SFM
M-SN-SPT	Soundings, spot elevations	M-RH-SON
M-SN-TID	Tide gauges, tidal equipment, tide datum	M-RH-EQU
M-WF	Wharf Features	M-CQ
M-WF-BEM	Pile caps, beams	M-CQ-POU
M-WF-BRC	Bracing, wales	M-CQ-ENT
M-WF-CAI	Caissons	M-CQ-FLO
M-WF-CRW	Crown slopes, crowns	M-CQ-SOM
M-WF-CTW	Catwalks	M-CQ-PAS
M-WF-CWK	Cribwork, ballast floor	M-CQ-CCV

M-WF-CWL	Cope walls, cope beams	<i>M-CQ-MPC</i>
M-WF-DRK	Derricks, cranes, gallows	<i>M-CQ-GRU</i>
M-WF-DRN	Drains, scuppers	<i>M-CQ-DRA</i>
M-WF-FND	Fenders	<i>M-CQ-DEF</i>
M-WF-FST	Floating wharves	<i>M-CQ-QUF</i>
M-WF-FTG	Footings, mattresses, deck substructures	<i>M-CQ-SEM</i>
M-WF-FWL	Firewalls	<i>M-CQ-MCF</i>
M-WF-GUA	Guards	<i>M-CQ-BAR</i>
M-WF-GWY	Gangways	<i>M-CQ-PAE</i>
M-WF-JNT	Construction, control joints	<i>M-CQ-JOC</i>
M-WF-LAD	Ladders	<i>M-CQ-ECH</i>
M-WF-MOR	Mooring cleats, mooring rings, bollards	<i>M-CQ-TAA</i>
M-WF-OLN	Wharf and dolphin outlines	<i>M-CQ-CON</i>
M-WF-PIL	Piles and bents	<i>M-CQ-PIL</i>
M-WF-SSP	Steel sheet piling	<i>M-CQ-PAL</i>
M-WF-TIE	Tie rods, anchor blocks, tie back walls	<i>M-CQ-TBA</i>

Real Property Space Management

English Abvtn	Description	French Abvtn
R-BC	Building Common Areas "Accessory B"	R-CB
R-BC-COR	Shared public corridors	R-CB-COR
R-BC-OLN	General shared building outline	R-CB-CON
R-BC-RMS	Shared rooms	R-CB-SAL
R-BS	Building Service Areas	R-SB
R-BS-OLN	General building service outline	R-SB-CON
R-BS-RMS	Building service rooms	R-SB-SAL
R-BS-SFT	Vertical shafts, elevators, stairs (takes walls over RMS)	R-SB-PUV
R-EX	Exterior Site Areas	R-EX
R-EX-OLN	Exterior site areas	R-EX-CON
R-FC	Floor Common Areas	R-AE
R-FC-CNV	Convectors (baseboard, radiators)	R-AE-CNV
R-FC-COL	Building structure, columns (interior and perimeter)	R-AE-COL
R-FC-COR	Primary circulation	R-AE-COR
R-FC-ENC	Encroachments (unusable space)	R-AE-EMP
R-FC-FIR	Fire egress cross over areas, fire refuge areas	R-AE-SOS
R-FC-LOB	Floor elevator lobbies	R-AE-HAL
R-FC-OLN	General outline of floor common areas	R-AE-CON
R-FC-RMS	Electrical, telecom, janitor's closets	R-AE-SAL
<u>R-FC-WSR</u>	<u>Washrooms</u>	<u>R-AE-SAT</u>
R-FC-WSR-BRF	Accessible washrooms	R-AE-SAT-ACF
R-GA	Gross Area	R-AB
R-GA-EXT	Exterior gross area	R-AB-EXT
R-GA-INT	Interior gross area	R-AB-INT
R-GL	General	R-GL
R-GL-TXT	Street names for space audit	R-GL-TEX
R-PK	Parking	R-ST
R-PK-0000-BRF	Barrier-free parking	R-ST-0000-ACF
R-PK-0000-DEP	Parking number - department name	(Special use only) R-ST-0000-MIN
R-PK-DIV	Parking divisions	R-ST-DIV
R-PK-EXT	Exterior parking	(Special use only) R-ST-EXT
R-PK-IDN	Parking identification numbers	R-ST-NUI
R-PK-INT	Interior parking	(Special use only) R-ST-INT
R-PK-OLN	Outlines	R-ST-CON
R-PK-SPC	Special parking	R-ST-SPE
R-SU	Surface Maintenance Building	R-SU
R-SU-CLG	Ceiling finishes	R-SU-PFD
R-SU-COR	Primary corridors	R-SU-COR
R-SU-DEP	Space allocation by department	R-SU-MIN
R-SU-DIV	Division of area	R-SU-DIV
R-SU-EXT	Exterior finishes	R-SU-EXT

R-SU-FLR	Floor finishes	<i>R-SU-PCH</i>
R-SU-FLR-HIG	High-traffic area	<i>R-SU-PCH-ELV</i>
R-SU-FLR-LOW	Low-traffic area	<i>R-SU-PCH-BAS</i>
R-SU-GRP	Space allocation by group / branch	<i>R-SU-GRP</i>
R-SU-IDN	Surface identification number	<i>R-SU-NUI</i>
R-SU-OLN	Outlines	<i>R-SU-CON</i>
R-SU-RMS	Rooms	<i>R-SU-SAL</i>
R-SU-SFT	Shafts	<i>R-SU-PUV</i>
R-SU-SPC	Special surfaces	<i>R-SU-SPE</i>
R-SU-WAL	Walls	<i>R-SU-MUR</i>
R-SU-WIN	Windows	<i>R-SU-FEN</i>
R-UC	User Common	R-AC
R-UC-COR	Shared public corridors	<i>R-AC-COR</i>
R-UC-OLN	General shared user outline	<i>R-AC-CON</i>
R-UC-RMS	Shared rooms	<i>R-AC-SAL</i>
R-US	Usable	R-AU
R-US-001, 002...	Usable area polygons by location	<i>R-AU-001, 002</i>
R-US-COR	Primary circulation areas	(Special use only) <i>R-AU-COR</i>
R-US-DEP	Space allocation by department	(Special use only) <i>R-AU-MIN</i>
R-US-DIV	Division of areas	<i>R-AU-DIV</i>
R-US-GRP	Space allocation by group / branch	(Special use only) <i>R-AU-GRP</i>
R-US-IDN	Location identification numbers	<i>R-AU-NUI</i>
R-US-OLN	General usable outlines	(Special use only) <i>R-AU-CON</i>
R-US-RMS	Room identification numbers	(Special use only) <i>R-AU-SAL-NUI</i>
R-US-UNT	Space allocation by units	(Special use only) <i>R-AU-UNI</i>
R-ZN	Zoning	R-ZO
R-ZN-CLE	Cleaning zoning	<i>R-ZO-NET</i>
R-ZN-FIR	Fire egress zoning	<i>R-ZO-SOS</i>
R-ZN-SEC	Security zoning	<i>R-ZO-SEU</i>

Structure

English Abvn	Description	French Abvn
S-CL	Ceilings	S-PF
S-CL-BEM	Ceiling beams	S-PF-POU
S-FL	Floors	S-PC
S-FL-BEM	Floor beams	S-PC-POU
S-FL-BRC	Bracing	S-PC-ENT
S-FL-DEK	Decking, waffle	S-PC-PLA
S-FL-FRM	Framing	S-PC-CHR
S-FL-JNT	Joints, expansion, construction	S-PC-JOC
S-FL-JST	Joists	S-PC-PLP
S-FL-OLN	Floor outlines	S-PC-CON
S-FL-OPN	Floor openings	S-PC-OUV
S-FL-SLB	Floor slabs	S-PC-DPP
S-FL-STR	Structural landings	S-PC-ESC
S-FN	Foundations	S-FD
S-FN-FIL	Backfill, soil line	S-FD-REM
S-FN-FTG	Footings	S-FD-SEM
S-FN-OLN	Foundation outlines	S-FD-CON
S-FN-PIL	Piles, caissons, piers	S-FD-PIE
S-GR	Structural Grid	S-QU
S-GR-EXT	Structural grid lines outside building	S-QU-EXT
S-GR-INT	Structural grid lines inside building	S-QU-INT
S-RF	Roofs	S-TO
S-RF-BEM	Beams	S-TO-POU
S-RF-BRC	Bracing	S-TO-ENT
S-RF-DEK	Decking, waffle	S-TO-PLA
S-RF-FRM	Framing, roof trusses	S-TO-CHR
S-RF-JNT	Joints, expansion, construction	S-TO-JOC
S-RF-JST	Joists	S-TO-PLP
S-RF-OLN	Roof outlines	S-TO-CON
S-RF-OPN	Roof openings	S-TO-OUV
S-RF-SLB	Roof slabs	S-TO-DPP
S-WL	Walls, Columns	S-MU
S-WL-BRC	Cross bracing	S-MU-ENT
S-WL-BRG	Bearing walls	S-MU-POR
S-WL-COL	Columns	S-MU-COL
S-WL-JNT	Joints, expansion, construction	S-MU-JOC
S-WL-OPN	Wall openings	S-MU-OUV
S-WL-RWL	Retaining walls	S-MU-STM

Annex B – Layer Field Descriptions

Ext.	Description	Ext.	Description
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Group Field

The following table lists the Group field abbreviations that can be used to create new layer names. This is the second part of the layer name following the Discipline field:

X-**XX**-XXX

AP	Approach Slabs	OI	Oil Distribution
AZ	Airport Zoning	PA	Sound and PA Systems
BC	Building Common Areas "Accessory B"	PB	Plumbing
BH	Borehole Data (Geotechnical)	PG	Propane Gas
BP	Blocking Plan	PH	Telephone Systems
BS	Building Service Areas	PK	Parking
BW	Breakwater Features	PL	Plan
CF	Cadastral Fabric	PP	Fuel and Process Piping
CI	Circulation	PR	Profile Data
CK	Clock Systems	RF	Roofs
CL	Ceilings	RO	Roads
CS	Control Systems	RW	Railways
DA	Data Systems	SA	Sanitary Sewer
DI	Diesel Fuel Distribution	SB	Substructure
DK	Deck	SC	Schedules
DM	Dams	SD	Site Distribution and Electrical Equipment
DR	Doors	SE	Security Systems
DT	Details	SF	Natural Site Features
DW	Domestic Water	SG	Signal Systems
EG	Emergency Generation	SI	Signage
EI	Employee Information	SK	Skid-way, Haul-outs, Slipways
EL	Emergency Lighting	SM	Schematics
EM	Emergency	SN	Hydrographic Survey Information, Non-Legal
EN	Environment	SP	Legal Site Plan
EP	Emergency Power Equipment	SR	Scour Protection
EQ	Equipment	SS	Superstructure
EW	Emergency Power Wiring and Cabling	SU	Surface Maintenance Building
EX	Exterior Site Areas	SV	Survey
FC	Floor Common Areas	SW	Storm Water and Drainage
FL	Floors	SY	System Furniture
FN	Foundations	TL	Title Block
FP	Fire Protection	TP	Topographical Information
FR	Electrical Fire Protection	UC	User Common
FU	Furniture	US	Usable
FW	Flat Wiring	VA	Ventilation and Air Conditioning
GA	Gross Area	VD	Video Conferencing Systems
GD	Grounding	VG	Vegetation
GL	Global	WD	Windows
GR	Grid	WF	Wharf Features
HC	Heating and Cooling	WL	Walls, Columns
HY	Hydrology	WM	Water and Fire
LD	Landscaping	ZN	Zoning
LG	Legend		
LP	Lightning Protection		
NG	Normal Power Generation		
NL	Normal Lighting		
NP	Normal Power Equipment		
NV	Navigation		
NW	Normal Power Wiring and Cabling		
NZ	Natural Gas		

Single Layer Field and First Layer Name Extension

Ext.	Description	Ext.	Description
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The following table lists the Single Layer field and First Layer Name Extension abbreviations that can be used to create new layer names. This is the third or fourth part (if required) of the layer name following the Group field:

X-XX-**XXX** X-XX-XXX-**XXX**-X

3DM	3D model components of 2D symbols	CLK	Clock system
ABN	Abandoned	CLE	Cleaning, clean out
ABU	Abutments	CLN	Control lines
ABV	Above ground, above grade	CLR	Colours
ACC	Accessories	CLS	CLSR boundaries, reserves, parks
ACR	Fire department access routes	CLT	Control wiring for emergency lighting
AIR	Control air piping	CMA	Compressed air
ALI	Alignment	CMB	Combined sewers
ALM	Intrusion alarms	CMP	Computers
ANN	Annual flowers	CNB	Flat wiring connection boxes
ANT	Antenna	CNV	Convectors
APC	Approach surface (airport)	CO2	Carbon dioxide gas
APP	Approximate	COA	Combustion air ductwork
APR	Approach slabs	COD	Conduits
ART	Artwork	COL	Columns
ASP	Asphalt	CON	Concrete
ATT	Attributes	CNT	Construction
AWP	Acid waste piping (medical)	COR	Corridors
BAR	Barriers, railings	COT	Cooling tower
BDY	Legal limits, fee simple, admin., control	CRB	Curbs
BED	Vessel beds	CRP	Carpet
BEM	Beams	CRW	Crown slopes, crowns
BEN	Local benchmarks	CSY	Control system schematics
BIR	Bird hazard (airport)	CPT	Control points
BKH	Bulkheads	CTL	Controls
BLK	Block	CTM	Contamination (environment)
BND	Boundaries	CTP	Countertops
BRC	Bracing	CTW	Catwalks
BRF	Barrier-free	CUL	Culverts
BRG	Bearing	CVY	Horizontal conveyors, moving sidewalks
BRD	Bridges	CWL	Cope walls, cope beams
BRK	Brick	CWK	Cribwork, ballast floor
BRL	Break lines	DAS	Data systems schematics
BRM	Crest of breakwater, berms	DAT	Chart datum contour, 0.00 m
BUO	Buoys	DBR	Debris, rubble, loose rock and soil
BYP	By-pass box	DCB	DC battery systems
CAB	Cabinet	DCL	Ditch centre lines
CAI	Caissons	DEC	Deciduous
CAL	Callout blocks	DEK	Deck
CAN	Canadian boundaries	DEP	Space allocation by department
CAR	Cards	DIF	Diffusers
CAT	Catchments area	DIG	Digitized or vectorized from scanned Image
CBL	Flat wiring cable location	DIM	Dimensions
CBT	Cable trays, ducts, and raceways	DIV	Divisions
CEX	Chemical extinguisher	DRA	Drainage
CHL	Chilled water	DRG	Dredged area or limits
CHN	Chainage	DRK	Derricks, cranes, gallows
CLD	Cold water	DRN	Drains, scuppers
CLG	Ceiling-mounted equipment, wiring, or finishes	DRS	Duct riser diagrams
CLI	Centrelines	DSK	Desks, work surfaces, tables

Ext.	Description	Ext.	Description
DUC	Ducts	GRV	Gravel
DWV	Drainage waste and vent system	GUA	Guards
EAS	Easement	GUT	Gutter lines
EFP	Electrical fire protection schematics	GWY	Gangways
ELD	Electromagnetic locking devices	HAT	Hatching
ELE	Elevators	HED	Door and window headers
ELK	Electrical security locks	HEG	Helium gas
ELV	Elevation (survey points)	HIG	High
EME	Emergency	HNT	High normal tide
ENC	Encroachments (unusable space)	HOR	Horizontal
EPE	Explosion-proof equipment	HOT	Hot water
EPR	Emergency power wiring & equipment	HTE	Heating units
EQP	Equipment	HVD	High voltage distribution
ESC	Escalator	HWA	Heating water
ESG	Exit signs	HWL	High water lines
EVR	Evergreen	HWY	Highway plan
EXH	Exhaust	HYD	Hydronic equipment
EXJ	Expansion joints	HYG	Hydrogen gas
EXP	Exposed inside/outside wiring	ICE	Ice thickness
EXT	Exterior	IDN	Identification
FDR	Floor drains	IMP	Imports (Revit families)
FEN	Fencing	IND	Industrial
FEX	Foamed extinguisher	INS	Insulation
FHY	Fire hydrants	INT	Interior
FIL	Backfill, soil line	IOT	Inlet outlet
FIN	Finishes	IRR	Irrigation system
FIR	Fire egress	JER	Jersey wall
FIX	Plumbing fixtures	JNT	Joints
FLG	Flagpoles	JST	Joists
FLO	Flow, discharge	KRK	Kirk key interlocks
FLR	Floor-mounted equipment, wiring or finishes	LAD	Ladders
FLU	Flue, vent, breaching	LAN	Local area network
FLW	Flowers	LAY	Layout line work
FND	Fenders	LEV	Floor level changes, ramps, truck wells
FOI	Fuel oil	LGT	Lighting control schematics and diagrams
FRL	Fire lines	LIM	Limits
FRM	Framing	LIN	Line work
FST	Floating wharfs	LNT	Low normal tide
FTG	Footing	LOB	Floor elevator lobbies
FTN	Fountains, pools	LOG	Borehole logs and data
FUR	Site furnishings, benches, garbage cans, etc.	LGO	Logos
FWL	Fire walls	LOW	Low
GAB	Gabions	LTG	Normal powered lighting
GCV	Ground cover	LTP	Lightning protection schematics
GDP	Guideposts	LVD	Low voltage distribution
GEN	Generators	LWL	Low water lines
GLY	Glycol	MAJ	Major contours
GLZ	Glass, glazing	MAN	Manholes
GND	Grounding schematics	MAR	Marshes, wetlands
GPS	Global Positioning System	MEC	Electrical connections to mechanical equipment
GRA	Grading	MEG	Methane gas
GRD	Grid	MET	Meters
GRI	Grilles	MIL	Architectural specialties, casework and millwork
GRL	Guides, guardrails, median dividers, bollards	MIN	Minor contours
GRP	Space allocation by group / branch	MLI	Main lines
GRS	Grass, lawn area	MMS	Maintenance Management System
		MNG	Storm water management pond

Ext.	Description	Ext.	Description
MON	Monuments	RFL	Refrigerant liquid
MOR	Mooring cleats, bollards	RLN	Reference lines
MRK	Markings and road striping	RME	Read Me info
MSH	Mass hauling diagrams	RMN	Remnants (archaeology)
MTR	Metering wiring & equipment	RMP	Ramps
MUN	Municipal and utility services	RMS	Rooms
NGA	Natural gas	ROD	Drivable road limits (asphalt) road, lots
NIT	Nitrogen (medical)	ROW	RO water or distilled water (medical)
NOD	Node, horizontal reference point	RPL	Reference plan
NOF	Non-office furniture, first aid room beds, etc.	RPS	Real Property information
NPR	Normal power schematics, risers	RRP	Riprap
OEQ	Office equipment	RWL	Retaining walls
OFF	Office signage	SAF	Life safety
OLN	Outlines	SAN	Sanitary
OPN	Openings	SCD	Secondary
ORN	Ornamental	SCR	System furniture panels, screens
OUT	Outlets	SEC	Security zoning
OTA	Outside air	SED	Seeded area
OTH	Other	SEL	Super elevation
OVH	Overhead	SEN	Motion sensors
OXY	Oxygen (medical)	SET	Seating
PAN	Distribution panel (electrical, telephone)	SEP	Septic (field, tank, etc.)
PAR	Parcel line work	SEW	Sewer
PAS	Public address system schematics	SFT	Shafts
PER	Perennial	SGL	Sign layouts and details
PGA	Propane gas	SGN	Signs
PIC	Inserted pictures	SHL	Shelving
PIL	Piles	SHO	Shoulder
PIP	Pipes, piping	SIG	Signalling devices
PIR	Piers	SIL	Window sills
PIV	Post indicator valve	SIZ	Size
PIT	Borrow pit	SKD	Skid timbers, skid poles
PLM	Plume outline	SLB	Slabs
PLN	Approach slabs in plan view	SLI	Service lines
PLT	Plants	SMP	Soil sample locations
PMP	Pumping stations	SND	Sand
PNT	Survey points	SNL	Stringers
POL	Poles and towers (electrical, communication)	SOD	Sodded
PRI	Primary	SPA	Spars
PRF	Profiles	SPC	Special
PRO	Provincial boundaries	SPK	Sprinkler system
PRS	Piping riser diagrams	SPO	Sports facilities, goal nets, etc.
PRT	Partitions (walls)	SPR	Stratigraphic profiles
PST	Posts	SPT	Spot elevations
RAD	Radiant heat	SRB	Shrubs
RAI	Railway	SRF	Surface model line work
RAS	Raised floors	SSP	Steel sheet piling
RAW	Raw water lines	STA	Stations (survey)
RCK	Rock	STB	Setbacks
RCL	Recirculation	STG	Staging layout plan
RDR	Roof drains	STI	Strip (airport)
RDR	Roof drains	STL	Steel
REB	Reinforcing	STM	Steam
REC	Receptacles	STO	Stone
REF	Refrigerant equipment	STP	Standpipe
REG	Regional and municipality boundaries	STR	Stairs, stairwells, and ladders
RET	Return	SUB	Sub
RFG	Refrigerant gas	SUP	Supply
		SUR	Work surfaces, D-tops, P-tops, etc.

Ext.	Description	Ext.	Description
SWK	Sidewalks	VAC	Vacuum piping
SYM	Symbols	VAL	Valves
TAB	Tables	VAV	Variable air volume boxes
TEL	Telephone	VCE	Emergency voice communication
TEN	Tenant	VCL	Video controllers (Digital)
TER	Terraces	VCM	Video cameras and monitors
TID	Tide gauges, tidal equipment, tide datum	VEN	Vents
TIE	Tie rods, anchor blocks, tie-back walls	VER	Vertical
TIM	Timber	VID	Video system schematics
TMP	Temporary	VIN	Vines
TMT	Sewage treatment areas	VPC	Valve pump chamber
TNK	Tanks	VPT	Viewports
TOE	Toe of bank, breakwater, berms	WAL	Wall-mounted equipment or wiring
TOP	Top of bank, crest of breakwater, berms	WEL	Well
TRE	Trees	WIN	Windows
TRL	Trails	WLI	Water lines
TRS	Transitional surface (airport)	WLK	Roof boardwalks, catwalks
TUN	Tunnels	WOR	Working area
TXT	Text	WRG	Wiring
UCD	Underlying cadastral fabric, deeds, lots, plans	WSR	Washrooms
UND	Underground, below grade	WST	Waste schematics
UNT	Space allocation by units	WTR	Watercourse
UPS	Ups and conditioned power	XRE	External reference
		ZNS	Zoning surfaces

Second Layer Name Extension

Ext.	Description	Ext.	Description
------	-------------	------	-------------

The following table lists the Second Layer Name Extension abbreviations that can be used to create new layer names. This is the fourth or fifth part of the layer name following the Single Layer field or First Layer Name Extension:

X-XX-XXX-**X** X-XX-XXX-XXX-**X**

1 to 9	Options or Phases 1 to 9
A	English Text (Anglais)
B	As Built (As Constructed)
E	Existing
F	French Text
M	To be Moved or Relocated
N	New
P	Planned or Proposed
S	Base
X	To Be Removed

Annex C – Glossary

“As-built” shall mean a set of construction drawings reflecting on-site changes required during the project as well as the original design intent.

“AutoCAD®” shall mean the CADD software developed by Autodesk® Inc.

“Base plan” shall mean a clean, two-dimensional floor plan of a building drawn from field surveys containing all pertinent graphic information. The intent is to use base plan files for project drawings, then update them once a project is complete and the area affected is re-measured.

“CADD” shall mean Computer-Aided Design and Drafting.

“CAFM” shall mean Computer-Aided Facilities Management.

“CLSR” shall mean Canadian Land Survey Records.

“DM-5” shall mean Enterprise Document and Record Management. This is a PWGSC internal electronic document filing system (formally known as EDRM or TIDIS).

“DOS” shall mean the Disk Operating System which manages the flow of information to and from various parts of the Personal Computer system.

“GIS” shall mean Geospatial Information System.

“Layers” shall mean the AutoCAD® system of dividing drawing elements.

“Legacy drawings” shall mean older hardcopy drawings, microfiche aperture cards not in digital format, or older CADD files not produced to the present standard.

“PWGSC” shall mean the Department of Public Works and Government Services Canada.

“RPB” shall mean Real Property Branch, a branch of PWGSC.

“SDIM” shall mean Spatial Data Information Management, a general term referring to managing CADD/CAFM/GIS drawings.

SECTION 5

PWGSC REVIEW FORM

SECTION 6

DIRECTORY STRUCTURE FOR TENDER DOCUMENTS

User Manual
on
Directory Structure and Naming Convention
Standard
for
Construction Tender Documents on CD-ROM

Issued by:
Real Property Contracting Directorate
PWGSC
May 2005

Last Updated Date: May 6, 2005

Version 1.0

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PREFACE

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

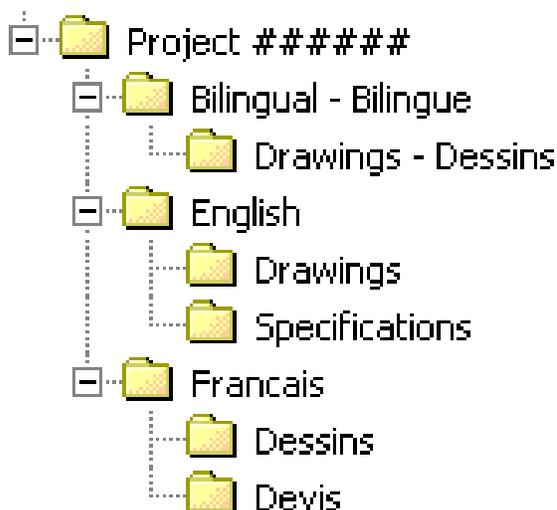
There is therefore a need to adopt a common directory structure and file naming convention to ensure that the information made available to contractors electronically and in hard (printed) copy is in accordance with the sequence adopted in the real property industries, both for design and construction.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

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

1. DIRECTORY STRUCTURE

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

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



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

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

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

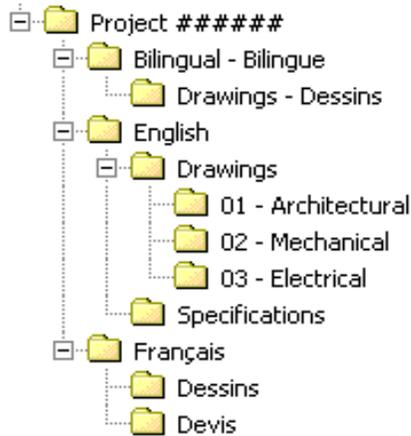
1.2 4th Tier Sub-Folders for Drawings

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

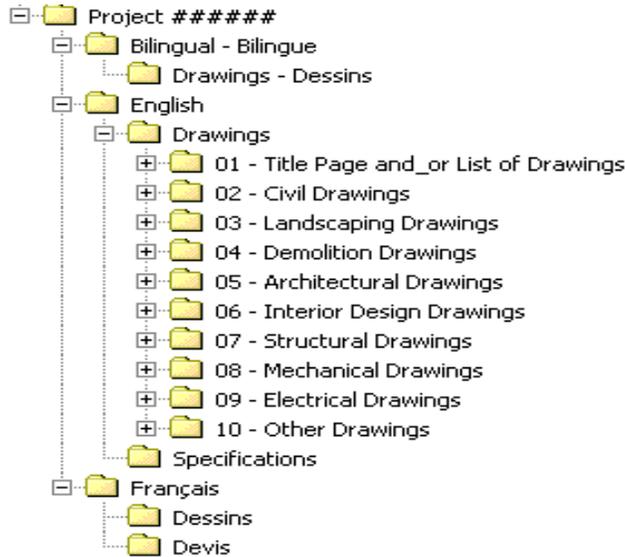
Because the order of appearance of the sub-folders on the screen will also determine the order of printing, it is necessary to start with a number the identification name of the sub-folders in the “*Drawings – Dessins*”, “*Drawings*” and “*Dessins*” folders.

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

Examples of 4th Tier sub-folders for drawings:



or



1.2.1 Naming Convention

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

For the “Drawings” and “Dessins” folders:

- Y

Where:

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

Y = The title of the folder

Example: 03 – Mechanical

For the “*Drawings - Dessins*” folder:

- Y - Z

Where:

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

Y = The English title of the folder

Z = The French title of the folder

Example: 04 - Electrical - Électricité

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

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

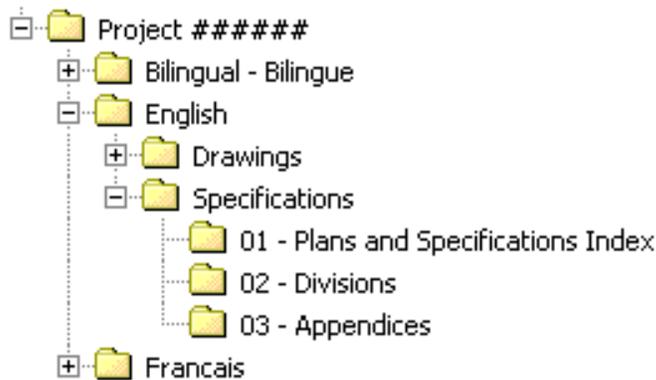
- The alphanumerical sorting is done on an ascending order;
- The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the drawing PDF files in the 01 sub-folder will be printed in alphanumerical order before the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

1.3 4th Tier Sub-Folders for Specifications

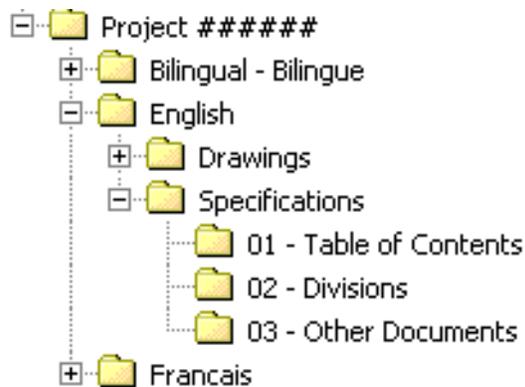
The “*Specifications*” and “*Devis*” folders must have 4th Tier sub-folders created to reflect the various elements of the specifications.

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

Examples of 4th Tier sub-folders for specifications:



or



1.3.1 Naming Convention

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

For the “*Specifications*” and “*Devis*” folders:

- Y

Where:

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

Y = The title of the folder

Example: 02 - Divisions

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

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

- The alphanumerical sorting is done on an ascending order;

- The alphanumerical order of the sub-folders determines the order of appearance on the screen as well as the order of printing (as an example: all the specifications PDF files in the 01 sub-folder will be printed, in alphanumerical order before the PDF files in the 02 sub-folder, etc...);
- Each specifications PDF file within each sub-folder will also be sorted alphanumerically. This will determine the order of appearance on the screen as well as the order of printing (i.e. Division 01 will be printed before Division 02, 01 - Appendix A before 02 - Appendix B, etc...).

2. NAMING CONVENTION FOR PDF FILES

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

2.1 Drawings

Each drawing must be a **separate single page** PDF file. The naming convention of each drawing must be:

X### - Y

Where:

- X = The letter or letters from the drawing title block (“A” for Architectural or “ID” for Interior Design for example) associated with the discipline
- ### = The drawing number from the drawing title block (one to three digits)
- Y = The drawing name from the drawing title block (for bilingual drawings, the name in both English and French is to appear)

Example: A001 - First Floor Details

Each drawing that will be located in the appropriate discipline 4th Tier sub-folders must be named with the same letter (“A” for Architectural Drawings for example) and be numbered. The drawing number used to name the PDF file must match as much as possible the drawing number of the actual drawing (the exception being when leading zeros are required). The following important points about drawings are to be noted:

- The drawing PDF files within each sub-folder are sorted alphanumerically for both displaying and printing. If there are more than 9 drawings in a particular discipline the numbering must use at least two numerical digits (i.e. A01 instead of A1) in order to avoid displaying drawing A10 between A1 and A2. The same rule applies when there are more than 99 drawings per discipline i.e. three digits instead of two must be used for the numbering (for example M003 instead of M03);
- If drawing PDF files are included in the “*Bilingual - Bilingue*” folder, these cannot be included as well in the “*English*” and/or “*Français*” folders;

- If drawings not associated with a particular discipline are not numbered (Title Page or List of Drawings for example), these will be sorted alphabetically. While this does not represent a problem if there is only one drawing in the sub-folder, it could disrupt the order when there are two or more drawings. If the alphabetical order of the drawings name does not represent the order on the hard copy set, the drawings are to be named as per the following standard convention when converted in PDF format to ensure proper display and printing order.

- Y

Where:

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

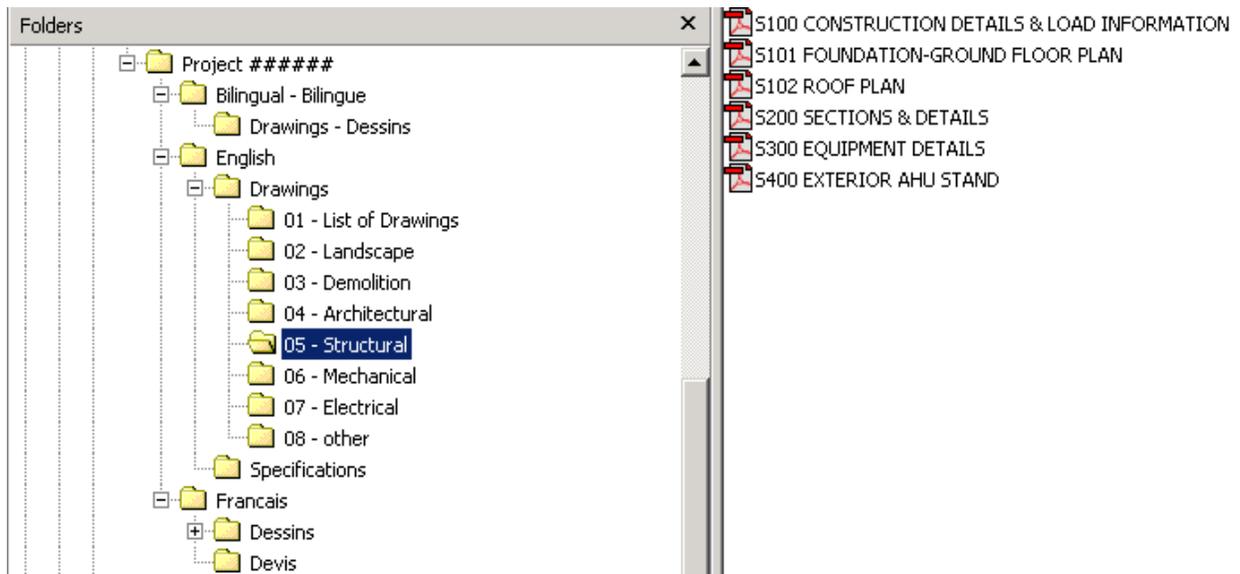
Y = The name of the drawing

Example: 01 - Title Page

02 - List of Drawings

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

Example of a 4th Tier Drawings sub-folder’s content:



2.2 Specifications

Each Specifications Division must be a separate PDF file and all pages contained in each PDF file must have the same physical size (height, width). The Plans and Specifications Index must also be a separate PDF file. If there are other documents that are part of the Specifications (e.g. Appendix or other) these are to be separate PDF files as well.

2.2.1 Documents other than Specifications Divisions

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

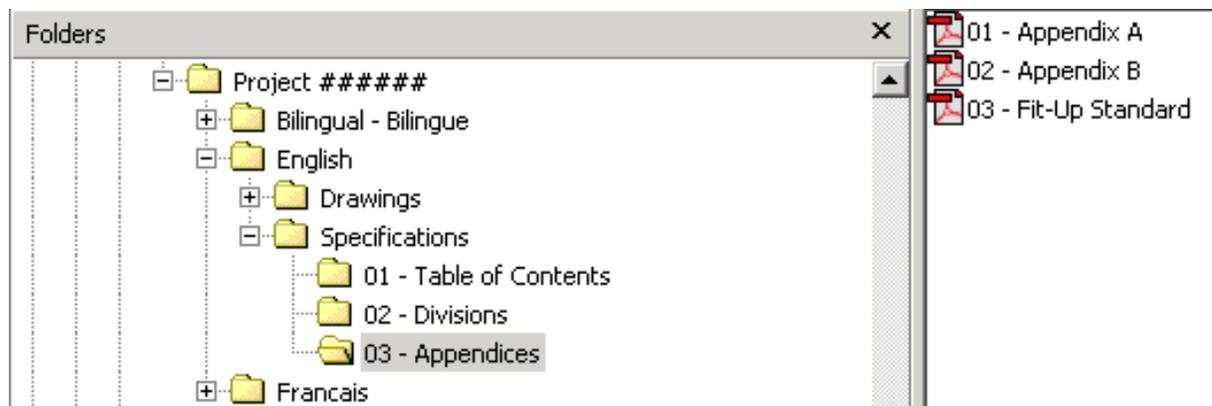
- Y

Where:

= Two digit number ranging from 01 to 99 with leading zeros required
Y = Name of the document

Example: 01 - Plans and Specifications Index

Example of a sub-folder content (sub-folder other than “*Divisions*”):



2.2.2 Specifications Divisions

The Specifications Divisions must be named as follows:

Division ## - Y

Where:

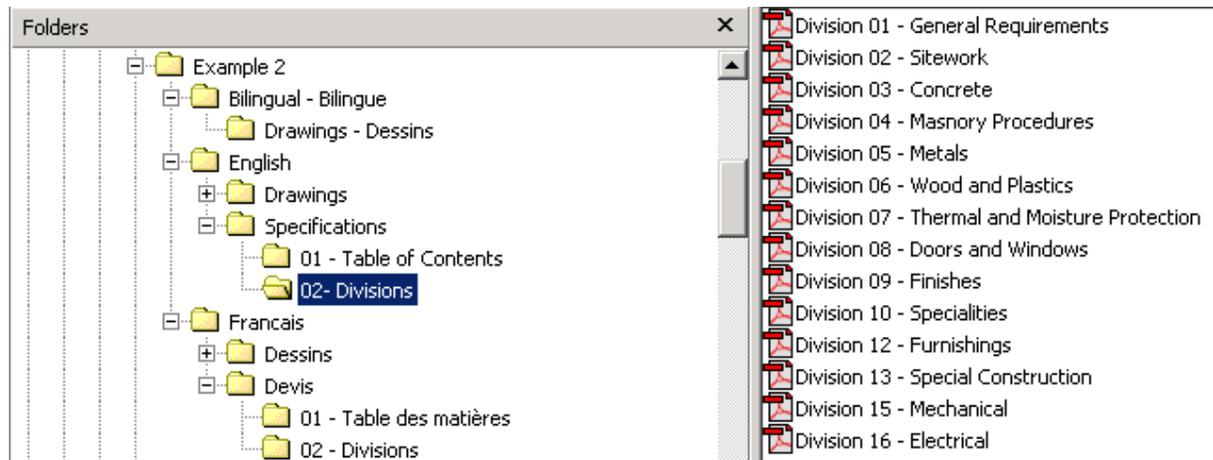
Division ## = The actual word “*Division*” followed by a space and a two digit number ranging from 01 to 99 (with leading zeros required)
Y = Name of the Specifications Division as per *MasterFormat*

Example: Division 05 - Metals

The following important point about specifications is to be noted:

- The Numbering of the Divisions **cannot** be altered from *MasterFormat* even if some Divisions are not used in a given project. For example, Division 05 will always remain Division 05 even if Division 04 is not used for a given project.

Example of a “*Divisions*” sub-folder content:



3. CD-ROM LABEL

Each CD-ROM is to be labeled with the following information:

Project Number / Numéro de projet

Project Title / Titre du projet

Documents for Tender / Documents pour appel d'offres

CD X of/de X

Example:

Project 123456 / Projet 123456

Repair Alexandra Bridge / Réparation du pont Alexandra

Documents for Tender / Documents pour appel d'offres

CD 1 of/de 1

SECTION 7

PDF FORMAT FOR TENDER DOCUMENTS

Basic Reference Guide
on
Converting Construction Drawings
in
Portable Document Format (PDF)

Issued by:
Real Property Contracting Directorate
PWGSC
May 2005

Last Updated Date: May 3, 2005

Version 1.0

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PREFACE

Portable Document Format (PDF) is the standard format for documents that are posted on the Government Electronic Tendering System (GETS). There is therefore a need to obtain from architectural and engineering consultants an electronic copy of drawings and specifications in PDF for tendering Government of Canada (GoC) construction projects.

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

The purpose of this document is to provide basic information on the conversion of Computer Aided Design and Drafting (CADD) drawings in PDF. Creating a PDF file from a CADD drawing is a relatively simple process once all the necessary configurations and settings are in place. It actually should not take any longer than it would take to create a plot file or to send a drawing to a printer. The information in this guide is not intended to cover all technical aspects of the conversion, which can be done using various methods, but rather to highlight important points about the process and file settings. The conversion of specifications is not covered in this basic reference guide since it does not require any special configuration or setting.

The information provided in this basic reference guide is not an indication that consultants are relieved from following the established standards for the production of drawings and specifications. The sole purpose of this guide is to provide basic information on the PDF conversion process bearing in mind that additional detailed technical information is available from the various software manufacturers.

1. PRINTER DRIVERS

Adobe Acrobat provides two different printer drivers that are able to convert CADD drawing into PDF format, Acrobat PDF Writer and Acrobat Distiller. Before creating a PDF file from a CADD drawing, a choice must be made as to which one will be used.

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

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

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

2. PRINTER CONFIGURATION

Before converting a CADD drawing to PDF, an Acrobat printer configuration file for the PDF paper size needs to be created. This function can be done in the CADD software rather than using a custom paper size defined for the Acrobat distiller feature. The recommended method is to add a PostScript Adobe plotter in the CADD software and making the necessary setting in terms of media source and size, scale and orientation. The configuration can then be re-used to simplify the conversion process for future files that use the same page size.

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

3. CREATING PDF FILES

Once the printer configuration has been done in the CADD software, open up Acrobat Distiller and make the necessary settings in the *preferences* and *job options* sub-menu. Ensure that the page size match the sheet size selected in the CADD software to create the file. Particular settings can be saved under different names for future use.

With the Acrobat Distiller application open, ensure the required sheet size is displayed in the *job options* window. Then it is simply a matter of bringing the CADD file into the Acrobat Distiller creation box.

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

4. PDF FILES SETTINGS

4.1 *Security*

Adobe Acrobat contains security features that can be used to secure the files by restricting any changes to the files. However, since the files will be posted on GETS and will be used for printing copies, the files **must not** be password protected and **must** allow printing.

4.2 *Drawing Orientation*

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

4.3 *Font Type*

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

4.4 *Resolution*

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

4.5 *Scale*

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

5. SCANNING

Scanning is not recommended and should be done only when the drawing is not available electronically. When scanning a drawing, it is important that it be done in real size (scale 1:1) to ensure that the scale remains intact in subsequent printing. It is recommended that each scanned drawing be opened and verified to ensure that the resolution, scale and border are of an acceptable quality.

6. FINAL CHECKLIST

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

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

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

7. ADDITIONAL INFORMATION

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

SECTION 8

PACIFIC REGION SPECIFICATION GUIDE

8 PACIFIC REGION SPECIFICATION GUIDE

.1 Background Information:

It is the policy of PWGSC to prepare the CONSTRUCTION SPECIFICATIONS using the current version of National Master Specifications (NMS). Through PWGSC, the Government partners with the private sector to support Construction Specifications Canada (CSC) and the Canadian Construction Documents Committee (CCDC) in their role as keepers of standardized construction documents.

As of September 2004 the NMS Secretariat released a six digit version of the National Master Specifications system. Projects awarded to Consultants after October 1st 2005 will not be accepted if they are based on the older five digit numbering system. Consultants should ensure that their Contract Documents use the most current NMS and are coordinated with the latest PWGSC Instructions to Tenderers and General Conditions.

.2 National Master Specifications (NMS)

Consultants have to obtain/purchase their own NMS specifications. It is imperative that PWGSC's Consultants use the latest version of the NMS when preparing Specifications for PWGSC Contracts.

.3 Regional Specifications (Supplement to NMS)

Consultants have to request through the Project Manager, the Pacific Region Specification Masters of Division 01, an abridged or replacement sections of the NMS Division 01 which include requirements pertinent to the federal, provincial and/or regional authorities having jurisdiction. It is imperative to use the Pacific Region Health and Safety Section 013533.

.4 Role of CSC, CSI,:

Specification MasterFormat is jointly produced, maintained and published by Construction Specifications Canada (CSC) and the Construction Specifications Institute (CSI) in the USA.

.5 Principles of PWGSC's Contract Documents:

PWGSC does not use CCDC documents. PWGSC's contract documents are based on the standard CCDC documents but with customization in the General Conditions and Instructions to Tenderers to meet government contracting rules. The Federal Government Conditions of Contract "C" and other contractual general condition documents are available on the following web site: <http://sacc.pwgsc.gc.ca/sacc/index-e.jsp>.

An NMS User's Guide is available on the NMS Secretariat web site located at <http://www.pwgsc.gc.ca/NMS>. The NMS User's Guide can also be downloaded from the web site of any of the NMS's private sector publishers.

Instructions to Tenders. See:

<http://sacc.pwgsc.gc.ca/sacc/query.do?lang=en&id=9403&date=2004/12/10&eid=8>

General Conditions. See:

<http://sacc.pwgsc.gc.ca/sacc/query.do?lang=en&id=R0202D&date=2004/05/14&eid=>

.6 Review of Tender Documents:

- .1 A&ES is mandated to review the Tender Documents to ensure that they are Tender ready.
- .2 Consultants are advised that A&ES will undertake an intense review of "Tender Documents" including all the Drawings and Divisions of the Specifications to ensure that the package is "tender ready" before it is delivered to RPC (Real Property Contracting) for tendering.
- .3 In accordance with our QMS (Quality Management System) preliminary reviews are usually done at the 33% and 66% stages to ensure that the documents are being developed in a logical and technically competent matter following PWGSC standards. This is not an in-depth technical review and does not relieve Consultant's of their technical and professional responsibilities.
- .4 Consultants are required to undertake their own quality control process and must review, correct and coordinate (between disciplines) their documents before submitting them to PWGSC.
- .5 The focus of the 100% review is to ensure that the Contract Documents are not only technically complete but that they also conform with Government Contracting (RPC) regulations.

.7 Consultant's (short) Check List:

Ensure the following before submitting Contract Documents to the Project Manager.

- .1 Standard practice for the preparation of Construction Documents requires that the drawings show the basic configuration of the project, the dimensions, and details of how it is constructed. All notes regarding the method of construction, the quality of the workmanship and materials, and standards and codes used are to be written into the specifications. **No specifications are to appear on the drawings.**
- .2 Specifications will be written (edited) using the latest version the National Master Specifications (NMS) which is a Treasury Board Requirement for all departments. Drawings and specifications properly titled, numbered, co-ordinated and indexed.

- .3 The Drawings and Specifications will be complete and clear so that a contractor can prepare a meaningful bid without guess work. PWGSC will ensure that the Tender Documents are correct and complete and do not need excessive addenda.
- .4 Do not use / include private sector or other home grown specs.
- .5 The prime Consultant's Specifications writer is responsible to review all sections submitted by other disciplines (Civil, Landscape, Struct., Mech. & Elect.) for purposes of overall coordination as well as consistency regarding contractual information.
- .6 Specifications describe the workmanship and quality of the work. Contracting issues should not appear in the specifications. Therefore remove references to:
- * General Conditions
 - * Contract terms and CCDC documents
 - * Priority of documents
 - * Security Conditions
 - * Terms of Payments
 - * Tendering process /requirements
 - * Bonding requirement
 - * Insurance requirements
 - * Release of Lien and deficiency holdbacks
 - * Alternative, Unit and Separate prices
- .7 Ensure that there are no specification clauses with square brackets "[]" or lines " _____ " indicating that the spec is incomplete and missing information.
- .8 When trade names or manufacturer's products have to be used for complex mechanical or electrical systems, list manufacturer and model under term "Acceptable materials:". See Section 016110. A minimum of three products should be listed.
- .9 Cash Allowances.
In general, DO NOT USE this Section on PWGSC Projects.
NMS section 012100 (Cash) Allowances (as is written) is intended for Private Sector.
Government Projects should be competitively priced by the Contractors.
Cash allowances provide for items which cannot be specified and/or priced in the Tender.

The services of SOME Utility Companies justify the use of the Section. The following items do not justify the use of this Section

- Not fully specified products and/or systems
- As built drawings & specifications
- Building permits
- Building signs
- Security services
- Maintenance manuals

When used under exceptional circumstances, the "Cash Allowances Section" requires written justification, verified /signed by the Senior Project Manager and Authorized by the Manager of Real Property Contracting.

- .10 When particular inspections / approvals are required (example -glue lam, seismic restrains, structural steel etc.), use the term: "Specialty Engineer" which is defined as a professional Engineer registered in BC, who is responsible for the components designed or installed by the Contractor and who signs and seals shop drawings.
- .11 Remove Pre- qualification and additional qualification criteria for GC, sub-trades and subcontractors.
- .12 Remove requirements for mandatory "Canadian Content".
- .13 Substitute all references to "LEED Gold or Silver" with the word "LEED".
- .14 Do not include any references to Certificates and Transcripts.
- .15 Remove references to mandatory pre-bid site meetings.
- .16 Remove references to Liens - not applicable for Federal Contracts.
- .17 Remove references to Final Payment or Terms of Payment or Payment of Holdback.
- .18 Remove references to warranty bonds by subcontractors. The contract is with the general contractor who is responsible for the performance of the subcontractors. The specification to read- warranties to be provided by the "Contractor".
- .19 Remove references to license number of a trade or subcontractor being included with tender.

- .20 Remove clauses referring to Contract Method, Fixed prices, Lump sums, Measurement of payment etc..
- .21 Do not indicate on drawings that a portion of the work which will be revised by addenda.
- .22 Eliminate references to approvals by others such as: owner, architect, consultant, interior designer and replace with the term "Departmental Representative" which represents all of the above. The definition of "Departmental Representative" is listed in the Federal Government's General Conditions of Contract.

.8 PWGSC A&ES Review List:

A&ES will review the Contract Documents against the last QMS Review Sheets, to ensure that information in the Consultant's (short) Check List have been addressed and to verify for any additional technical issues before accepting the Documents for Tender.

A&ES will review the Contract Documents for compliance with Government of Canada Contracting rules (RPC requirements):

- Are the Drawings properly titled, dated and is there an index on the Drawings and an index in the Specifications and is the Specification Index of documents correct?
- Are the Drawings and Specifications complementary and coordinated?
- The Drawings describe only the configuration and details of the work, not quality.
- Specifications cover the methods of construction and the quality of materials and workmanship.
- Specifications deal only with the scope of the work, not contracting issues. Contracting issues are covered by RPC documents; Instructions to Bidders and General Conditions included by PWGSC.

For more information or comment please contact:

Brian Laing,

A/Regional Specification Writer/NMS Coordinator

Professional & Technical Services Group

Public Works & Government Services Canada, Pacific Region

brian.laing@pwgsc.gc.ca

Phone: 604-775-6814

Fax: 604-775-6647

SECTION 9

PACIFIC REGION

MASTER SPECIFICATION

DIVISION ONE SECTIONS

SPEC NOTES:

• This Section is intended for MEDIUM SIZE projects - but could be used on other projects, and is not to replace Division 01 of the NMS. It is a broadscope Section intended to supplement the requirements for Government projects. Ensure that the information in this section neither duplicates nor contradicts other sections from Division 01 of the NMS or other Pacific Region sections of Division 01 required to be included in the project.

- Section 013533 - Health and Safety - is required for all projects.
- Section 011425 - Designated Substances Report - is required on pertinent projects.
- Section 012100 - Cash Allowances in general - DO NOT USE this section. Specify what is required - government projects should be competitively priced by Contractor.
- Section 014715 - Sustainable Requirements - is required on pertinent projects.
- Section 017419 - Waste Management and Disposal - is required on all projects.
- Section 017830 - Closeout Submittals - is required on all projects.
- Section 011155 - General Instructions - to be given to Consultants.
- Pacific Region Master Sections of Division 01 - can be given to Consultants.

1. Codes .1 Perform work to CURRENT Codes, Construction Standards and Bylaws, including Amendments up to the TENDER closing date

2. Description of Work .1 Work under this Contract covers _____ at _____ [B.C.],[Yukon].

.2 Work to be performed under this Contract includes, but is not limited to, the following items covered further in the Contract documents:

.1 _____

.2 _____

.3 _____

.4 _____

2. Description of Work .3
(continued)

- "Green" requirements:
- .1 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject of Departmental Representative's approval of submitted MSDS Product Data.
 - .2 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.
 - .3 Adhere to waste reduction requirement for reuse or recycling of waste materials, thus diverting materials from landfill.
- .4 Work not included in Contract comprises such work and services specifically listed as: _____

_____.

3. Contract Documents .1

- The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the work.
- .2 Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work.

• SPEC NOTE:
Delete this clause, if not applicable.

4. Other Contracts .1

- Another Contract [other contracts] is [are] currently in progress at [site] [building].
- .2 General Contractor[s] is [are]:
- .1 [_____].
 - .2 [_____].
- .3 Further Contracts may be awarded while this contract is in progress.

-
- 4. Other Contracts**
(continued) .4 Cooperate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.
- .5 Coordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of this Work.
- 5. Division of Specifications** .1 The specifications are subdivided in accordance with the current 6-digit National Master Specifications System.
- .2 A division may consist of the work of more than 1 subcontractor. Responsibility for determining which subcontractor provides the labour, material, equipment and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.
- 6. Time of Completion** .1 Complete the project _____ facility ready for use within _____ weeks after Contract Award.
- 7. Hours of Work** .1 Restrictive as follows:
- .1 Schedule deconstruction, removal and construction work after normal working hours of the building and during the day on weekends and/or holidays. Normal weekday working hours of the building are _____ hours.
- .2 Notify Departmental Representative of all after hours work, including weekends and holidays.
-

-
- 8. Work Schedule** _____ .1 Carry on work as per indicated "PHASES" and as follows:
- .1 Within 10 working days after Contract award, provide a "phasing bar chart" and a schedule showing anticipated progress stages and final completion of the work within the time period required by the Contract documents. Indicate the following:
 - .1 Submission of shop drawings, product data, MSDS sheets and samples.
 - .2 Commencement and completion of work of each section of the specifications or trade for each phase as outlined.
 - .3 Final completion date within the time period required by the Contract documents.
 - .2 Do not change approved Schedule - without notifying Departmental Representative.
 - .3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.
- 9. Cost Breakdown** _____ .1 Before submitting the first progress claim, submit a breakdown of the Contract lump sum prices in detail as directed by the Departmental Representative and aggregating Contract price.
- 10. Codes, Bylaws, Standards** _____ .1 Perform work in accordance with the National Building Code of Canada (NBC) _____, and other indicated Codes, Construction Standards and/or any other Code or Bylaw of local application.
- .2 Comply with applicable local bylaws, rules and regulations enforced at the location concerned.
 - ____.3 Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents.

**10. Codes, Bylaws,
Standards
(continued)**

.4 In any case of conflict or discrepancy, the most stringent requirements shall apply.

11. Documents Required

.1 Maintain 1 copy each of the following at the job site:

- .1 Contract drawings.
- .2 Contract specifications.
- .3 Addenda to Contract documents.
- .4 Copy of approved work schedule.
- .5 Reviewed/approved shop drawings.
- .6 Change orders.
- .7 Other modifications to Contract.
- .8 Field test reports.
- .9 Reviewed/approved samples.
- .10 Manufacturers' installation and application instructions.
- .11 One set of record drawings and specifications for "as-built" purposes.
- .12 National Building Code of Canada _____.
- .13 Current construction standards of workmanship listed in technical Sections.
- .14 Building Safety Plan.

**12. Regulatory
Requirements**

- .1 Obtain and pay for - Building Permit, Certificates, Licenses and other permits required by regulatory municipal, provincial or federal authorities to complete the work.
- .2 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .3 Furnish inspection certificates in evidence that the work installed conforms with the requirements of the authority having jurisdiction.

- 13. Contractor's Use of Site** .1 Use of site:
- .1 Exclusive and complete for execution of work.
 - .2 Assume responsibility for assigned premises for performance of this work.
 - .3 Be responsible for coordination of all work activities on site, including the work of other contractors engaged by the Departmental Representative such as moving contractors and furniture installers.
- .2 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .3 Do not unreasonably encumber site with material or equipment
- .4 Use only indicated [elevators] for moving workers and material.
- .1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
 - .2 Accept liability for damage, safety of equipment and overloading of existing equipment.
- 14. Examination** .1 Examine site and be familiar and conversant with existing conditions likely to affect work.
- SPEC NOTE:
• Use the following paragraph only where it is anticipated that work might cause other damage.
- .2 Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.
- 15. Existing Services** .1 Where work involves breaking into or connecting to existing services, carry out work at times directed by the authorities having jurisdiction.
- 16. Location of Equipment and Fixtures** .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

**16. Location of
Equipment and
Fixtures
(continued)**

- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform Departmental Representative of impending installation and obtain his approval for actual location.
- .4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative and/or as specified.

SPEC NOTE:

- Delete this clause when a separate Section 024118 Deconstruction, Removals and Alterations is used.

17. Cutting and Patching

- .1 Cut existing surfaces as required to accommodate new work.
- .2 Remove items so shown or specified.
- .3 Do not cut, bore, or sleeve load-bearing members.
- .4 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .5 Fit work airtight to pipes, sleeves, ducts and conduits.
- .6 Conceal pipes, ducts and wiring in raised floors, wall and ceiling construction of finished areas except where indicated otherwise.
- .7 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

SPEC NOTE:

- Use the following paragraph for small renovation projects where a separate Section 078400 Firestop and Smoke Seal is not used. Ensure that drawings show fire resistance rating of surrounding separations.

- .8 Install firestops and smoke seals in accordance with ULC-S115, around pipe, ductwork, cables and other objects penetrating fire separations to provide fire resistance not less than the fire resistance of surrounding floor, ceiling, and wall assembly.

17. Cutting and Patching
(continued)

- .9 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.

18. Setting Out of Work

- .1 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .2 Provide devices needed to lay out and construct work.
- .3 Supply such devices as templates required to facilitate Departmental Representative's inspection of work.

19. Acceptance of
Substrates

- .1 Each trade shall examine surfaces prepared by others and job conditions which may affect his work, and shall report defects to the Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

20. Quality of Work

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 The workmanship, erection methods and procedures to meet minimum standards set out in the National Building Code of Canada _____ and _____ Construction Standards.
- .3 In cases of dispute, decisions as to standard or quality of work rest solely with the Departmental Representative, whose decision is final.

21. Works Coordination

- .1 Coordinate work of subtrades:
- .1 Designate one person to be responsible for review of contract documents and shop drawings and managing coordination of Work.

21. Works Coordination
(continued)

- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.
 - .1 Provide each subcontractor with complete plans and specifications for Contract, to assist them in planning and carrying out their respective work.
 - .2 Develop coordination drawings when required, illustrating potential interference between work of various trades and distribute to affected parties.
 - .1 Pay particularly close attention to overhead work above ceilings and within or near to building structural elements.
 - .2 Identify on coordination drawings, building elements, services lines, rough-in points and indicate location services entrance to site.
 - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
 - .4 Publish minutes of each meeting.
 - .5 Plan and coordinate work in such a way to minimize quantity of service line offsets.
 - .6 Submit copy of coordination drawings and meeting minutes to Departmental Representative for information purposes.
- .3 Submit shop drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- .4 Work cooperation:
 - .1 Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.

SPEC NOTE:

- Delete clause "Products Supplied by Departmental Representative" when Contractor is responsible to supply all products/materials.

**24. Products Supplied
by Departmental
Representative** .1

Products supplied by Departmental Representative - refer to following sections:

- .1 _____
- .2 _____
- .3 _____

.2 Contractor's duties:

- .1 Pick up from _____ distributor of _____.
- .2 Promptly inspect stored products, and give written report to Departmental Representative on condition of all items received.
- .3 Transport and deliver to site.
- .4 Handle materials at site.
- .5 Install and finish products as specified.

SPEC NOTES:

- For AIRPORT project use a separate Section 013219 Security.
- Confirm with Departmental Representative what paragraphs/items are applicable.

25. Security Clearances .1

Personnel employed on this project will be subject to security check. Obtain requisite clearances, as instructed, for each individual required to enter the premises.

.2 Personnel will be checked at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

.3 Contractor shall be fully responsible for securing the premises and its contents throughout the construction period.

27. Testing and Inspections
(continued)

- .3 Where tests or inspections by designated testing laboratory reveal work is not in accordance with the Contract requirements, Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.
- .4 Contractor shall furnish labour and facilities to:
 - .1 Notify Departmental Representative in advance of planned testing.
- .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .6 Pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by Departmental Representative.
- .7 The Departmental Representative may require, and pay for, additional inspection and testing services not included in Paragraph 27.1.
- .8 Provide Departmental Representative with 2 copies of testing laboratory reports as soon as they are available.

28. As-Built Documents

- .1 The Departmental Representative will provide 2 sets of drawings, 2 sets of specifications, and 2 copies of the original AutoCAD files for "as-built" purposes.
- .2 As work progresses, maintain accurate records to show all deviations from the Contract documents. Note on as-built specifications, drawings and shop drawings as changes occur.
- .3 Refer to Section _____.

29. Cleaning

- .1 Daily conduct cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.

SPEC NOTE:

• Delete the following clause when Sections 015100 - Temporary Facilities, or 015600 - Temporary Barriers and Enclosures, is/are used.

31. Public Way

- Construction .1 Design, erect and maintain hoarding and covered pedestrian walkways to support all loads including windloads and provide protection, complete with signs and electrical lighting as required by authority having jurisdiction.
- .2 Provide [one] lockable truck entrance gate[s] and [one] pedestrian door as directed and conforming to applicable traffic restrictions on adjacent street. Equip gates with locks and keys. Paint public side of site enclosure in colour selected by Departmental Representative.

32. Environmental Protection

- Protection .1 Prevent extraneous materials from contaminating air beyond construction area, by providing temporary enclosures during work.
- .2 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
- .3 Ensure proper disposal procedures in accordance with all applicable territorial regulations.

33. Maintenance Materials, Special Tools and Spare Parts

- Parts .1 Specific requirements for maintenance materials, tools and spare parts are specified in individual technical sections of Divisions 02 to ____.

34. Additional Drawings .1

The Departmental Representative may furnish additional drawings for clarification. These additional drawings have the same meaning and intent as if they were included with plans referred to in the Contract documents.

- 34. Additional Drawings**
(continued) .2 Upon request, Departmental Representative may furnish up to a maximum of 10 sets of Contract documents for use by the Contractor at no additional cost. Should more than 10 sets of documents be required the Departmental Representative will provide them at additional cost.
- 35. Building Smoking Environment** .1 Smoking within the building is not permitted.
- 36. System of Measurement** .1 The metric system of measurement (SI) will be employed on this Contract.
- 37. Familiarization with Site** SPEC NOTE:
• Do not use term "Mandatory".
- .1 Before submitting tender, visit site - as indicated in tender documents and become familiar with all **conditions likely to affect the cost of the work.**
- 38. Submission of Tender** .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract documents and inspected the site, and is fully conversant with all conditions.

END OF SECTION

SPEC NOTES:

- This section is to be used strictly on all Transport Canada AIRPORT projects.
- Refer/include Section 013527 - Airports in Use.
- Refer/include when applicable Section 018010 - Standby Time.

1. Restricted or Secure Area

- .1 Any area on airport property to which access is restricted by sign and/or monitored is a secure or restricted area.
- .2 In general, access to the airside of the Airport is restricted to the access points indicated on the drawings or as subsequently approved by the Airport Manager. All personnel and vehicles entering or leaving the construction site must follow prescribed access routes and be under escort or surveillance.
- .3 Security measures shall be taken at the Contractor's expense to meet the Airport's security requirements.
- .4 The RCMP may, for security reasons, remove all of the Contractor's workforce from the Airport at any time. No assessment for temporary "Stop Work" periods will be payable by Transport Canada.

2. Contractor's Responsibility

- .1 General Contractor and subcontractor shall be responsible for construction, personnel and vehicles employed on project and requiring access to restricted areas.
- .2 All Contract personnel and equipment must remain within designated work areas at all times.
- .3 Contractors shall be responsible for the security of their own equipment and materials.

3. Passes and Keys

- .1 Passes are mandatory on airside and other restricted areas for all personnel engaged in work and are subject to AIRPORT RESTRICTED AREA ACCESS CLEARANCE.
- .2 Passes for personnel requiring access to restricted area will be made available on application to the Airport Manager.
- .3 Departmental Representative will provide _____ commissionaires (approved by Airport Manager) to have permanent passes and be present during all times phases of the project.

-
- 3. Passes and Keys**
(continued)
- .4 Permanent passholders - Commissionaires shall provide ESCORT and SURVEILLANCE to temporary passholders.
- .5 Temporary passes will be issued at beginning and returned at end of each working day. Their safekeeping will be responsibility of Contractor.
- .6 On completion of project, passes will be returned to Airport Manager. A charge of \$500.00 will be issued for each pass not returned.
- 4. Responsible Personnel**
- .1 Provide the Departmental Representative and the Airport Manager with a list of responsible personnel and phone numbers, and those of subcontractors, who may be contacted after working hours in case of emergency.
- 5. Deliveries**
- .1 Any delivery vehicle required to encroach on aircraft movement/manoeuvring areas not closed to aircraft traffic must comply with the requirements of Section 013527.
- .2 Escort vehicle and trained escort personnel must be provided by Contractor.
- 6. Existing Security Barriers**
- .1 Security barriers, such as doors, fences, gates, locks, or door hardware, which are required to be removed, must be replaced, if practicable, at the end of each work day. If it is necessary to remove barriers for an extended period, enclose unprotected areas with temporary hoarding. Where the possibility exists that the restricted area may be left unprotected at the end of the work day, inform the Airport Manager immediately.
- .2 Failure to restore such security barriers when required will result in their restoration by other forces and the cost of such restoration being recovered from the Contractor.
- 7. Daily Security**
- .1 Ensure that access to the restricted area is secured at the end of each work day.
- .2 When work is to be done within the restricted area after scheduled working hours, notify the Airport Manager of area and times.

7. Daily Security
(continued)

- .3 The Contractor shall follow the Airport Manager's instructions to maintain airport security during all phases of construction. Any work required to restore airport security will be carried out the Contractor's expense.

END OF SECTION

SPEC NOTES:

- This section includes submissions of data or products to confirm or deny conformance to Contract documents.
- Coordinate this section with Section 017800 - Closeout Submittals.
- Include this section on majority of projects.

- | | | |
|---------------------|----|--|
| 1. Approvals | .1 | Approval of shop drawings and samples: refer to Section 011155, Clause_____. |
| 2. General | .1 | This Section specifies general requirements and procedures for the Contractor's submissions of shop drawings, product data, samples and other requested submittals to Departmental Representative for review. Additional specific requirements for submissions are specified in individual technical sections. |
| | .2 | Present shop drawings, product data and samples in SI Metric units. |
| | .3 | Where items or information is not produced in SI Metric units, converted values are acceptable. |
| | .4 | Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submissions. |
| | .5 | Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract documents and stating reasons for deviations. |
| | .6 | Contractor's responsibility for deviations in submission from requirements of Contract documents is not relieved by Departmental Representative's review of submission unless Departmental Representative gives written acceptance of specific deviations. |
| | .7 | Make any changes in submissions which Departmental Representative may require consistent with Contract documents and resubmit as directed by Departmental Representative. |
| | .8 | Notify Departmental Representative in writing, when resubmitting, of any revisions other than those requested by Departmental Representative. |
| | .9 | Do not proceed with work until relevant submissions are reviewed and approved by the Departmental Representative. |

-
- 3. Submission Requirements**
- .1 Coordinate each submission with the requirements of the work and the Contract documents. Individual submissions will not be reviewed until all related information is available.
 - .2 Allow [(5) five], [(10) ten] days for Departmental Representative's review of each submission, unless noted otherwise.
 - .3 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .4 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract documents.
 - .5 Details of appropriate portions of work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions (including identified field dimensions) and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
 - .5 After Departmental Representative's review, distribute copies.
-

-
- 4. Shop Drawings**
- .1 Shop drawings: original drawings or modified standard drawings provided by Contractor to illustrate details of portions of work which are specific to project requirements.
 - .2 Maximum sheet size: 850 x 1050 mm.
 - .3 Submit 6 prints of shop drawings for each requirement requested in the specification sections and/or as requested by the Departmental Representative.
 - .4 Cross-reference shop drawing information to applicable portions of the Contract documents.
- 5. Shop Drawings Review**
-
- .1 Review of shop drawings by Public Works and Government Services Canada is for the sole purpose of ascertaining conformance with the general concept.
 - .2 This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same.
 - .3 This review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and Contract documents.
 - .4 Without restricting the generality of the foregoing, the Contractor is responsible for:
 - .1 Dimensions to be confirmed and correlated at the job site.
 - .2 Information that pertains solely to fabrication processes or to techniques of construction and installation.
 - .3 Coordination of the work of all sub-trades.
- 6. Product Data**
-
- SPEC NOTE:
 Ensure request in Technical Sections - MSDS Data Sheets for all products containing possible dangerous to Health - VOCs.
- .1 Product data: manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other specified information.

6. Product Data
(continued)

- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 Cross-reference product data information to applicable portions of Contract documents.
- .5 Submit 6 copies of product data.

7. Samples

- .1 Samples: examples of materials, equipment, quality, finishes and workmanship.
- .2 Where colour, pattern or texture is a criterion, submit a full range of samples.
- .3 **Reviewed and accepted samples will become the standard of workmanship and material against which installed work will be verified.**

8. Progress Schedule

- .1 Submit work schedule and cost breakdown as required in Section 011155.

9. Test Results and Inspection Reports

- SPEC NOTE:
List technical sections indicating the requirement for Test Results/Inspection Reports.
- .1 Submit in duplicate test results and inspection reports required by following Sections _____

_____.

END OF SECTION

SPEC NOTES:

- Include this section on ALL Public Works and Government Services Canada (PWGSC) construction and maintenance projects thus ensuring health and safety on construction sites, and meeting the requirements laid out in PWGSC/RPS DM Directive 073.
- Close coordination with the Contractor's Work Plan should define the scope of the work. Broad statements in this text may be interpreted to require more work than intended, adding to construction costs unnecessarily.
- Avoid over specifying/edit to specific project requirements.
- Interpretation inquiries: Chris Patterson, PWGSC Regional Construction Safety Coordinator, tel. (604) 775-6662, or Brian Laing, PWGSC A/Regional Specification Writer, tel. (604) 775-6814.

1. References

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II
 - .2 Canada Occupational Health and Safety Regulations.

- .2 National Building Code of Canada (NBC):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.

- .3 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-2009 Code of Practice for Access Scaffold
 - .2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes
 - .3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

- .4 Fire Protection Engineering Services, HRSDC:
 - .1 FCC No. 301, Standard for Construction Operations.
 - .2 FCC No. 302, Standard for Welding and Cutting.

- .5 American National Standards Institute (ANSI):
 - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

- .6 Province of British Columbia:
 - .1 Workers Compensation Act Part 3-Occupational Health and Safety.
 - .2 Occupational Health and Safety Regulation

- .7 Yukon Territory
 - .1 Occupational Health and Safety Act, R.S.Y.

SPEC NOTE:

Delete sections not included in the Contract specifications

- 2. Related Sections** .1 Refer to the following current NMS sections as required:
- .1 Project management and coordination: Section [013100]
 - .2 Construction progress schedules: Section [013218]
 - .3 Submittals procedures: Section [013300]
- 2. Related Sections (continued)**
- .4 Health and safety for contaminated sites: Section[013515]
 - .5 Special procedures - traffic control: Section[013531]
 - .6 Procedures for deconstruction of structures: Section[013573]
 - .7 Temporary utilities: Section[015100]
 - .8 Construction facilities: Section[015200]
 - .9 Temporary barriers and enclosures: Section[015600]
 - .10 Structure demolition: Section[024116]
 - .11 Underground storage tanks removal: Section[026500]
 - .12 Asbestos abatement: Section[028210] [028211] [028212]
 - .13 Polychlorinated biphenyl (PCB) abatement: Section[028400]
 - .14 Rock removal: Section[312317]
- 3. Workers' Compensation Board Coverage**
- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
 - .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.
- 4. Compliance with Regulations**
- .1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
 - .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

5. Submittals

- .1 Submit to Departmental Representative submittals listed for review. [in accordance with Section 013300]
- .2 Work effected by submittal shall not proceed until review is complete.
- .3 Submit the following:
 - .1 Health and Safety Plan.
 - .2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .3 Copies of incident and accident reports.
 - .4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .5 Emergency Procedures.
- .3 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within [] days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.
- .4 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.
- .5 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

6. Responsibility

SPEC NOTE:
If MULTIPLE EMPLOYER WORKPLACE use THE FOLLOWING AS CLAUSE

.1 & renumber.

- (.1 Assume responsibility as the Prime Contractor for work under this contract.)
- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

7. Health and Safety Coordinator

SPEC NOTE:

If the nature of the Work is hazardous or the complexity of the project is intricate, a Health and Safety Coordinator may be required by the Contractor unless already prescribed by legislation. Additionally there may be a requirement for a Registered Occupational Hygienist or Certified Industrial Hygienist to be included. Delete this clause if the project is neither hazardous nor intricately complex.

- .1 The Health and Safety Coordinator [/Registered Occupational Hygienist] [/Certified Industrial Specified Hygienist] must:
 - .1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.
 - .2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.
 - .3 Be on site during execution of work.

8. General Conditions

- .1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
 - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
 - .2 Secure site at night time [or provide security guard] as

deemed necessary to protect site against entry.

**9. Project/Site
Conditions**

SPEC NOTE:

Refer to site characterization data contained in various agency submittals (Work Plans, Health and Safety Plans) and site condition/assessment reports. List relevant site characterization data which is required by the Contractor in order to develop a site-specific Health and Safety Plan, standing site Health and Safety Plan, and emergency procedures.

SPEC NOTE:

Provide bidders with copies of the site-specific hazard assessment and site-specific procedures (e.g. for emergencies, confined spaces, hazardous materials, lockout and de-energization, etc.).

.1 Work at site will involve contact with:

- .1 [].
- .2 [].

**10. Regulatory
Requirements**

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

11. Work Permits

.1 Obtain speciality permit[s] related to project before start of work.

12. Filing of Notice

SPEC NOTE:

The Departmental Representative or General Contractor must complete and submit the Notice of Project form in accordance with and when required by B.C. Occupational Health and Safety Regulation s20.2. In Yukon Territory, a notice of unspecified form is required.

.1 The [Departmental Representative] [General Contractor] is to complete and submit a Notice of Project as required by [Provincial] [Territorial] authorities.

.2 Provide copies of all notices to the Departmental Representative.

**13. Health and Safety
Plan**

.1 Conduct a site-specific hazard assessment based on review of

Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety/organization chart for project.

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

**13. Health and Safety
Plan
(continued)**

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work.

.4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

-
- .3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
 - .4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
 - .5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

14. Emergency Procedures

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory agencies applicable to work and as per legislated regulations.

14. Emergency Procedures (continued)

- .3 Local emergency resources.
- .4 Departmental Representative [site staff].
- .2 Include the following provisions in the emergency procedures:
 - .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - .2 Evacuate all workers safely.
 - .3 Check and confirm the safe evacuation of all workers.
 - .4 Notify the fire department or other emergency responders.
 - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - .6 Notify Departmental Representative [site staff].
- .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.

- .4 Underground work.
- .5 Work on, over, under and adjacent to water.
- .6 Workplaces where there are persons who require physical assistance to be moved.
- .4 Design and mark emergency exit routes to provide quick and unimpeded exit.

SPEC NOTE:

When the project is to last more than 1 year, include paragraph 14.5.

- .5 At least once each year, emergency drills must be held to ensure awareness and effectiveness of emergency exit routes and procedures, and a record of the drills must be kept.
- .6 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

15. Hazardous Products

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

**15. Hazardous Products
(continued)**

- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per [Section 013300].
 - .2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.
 - .3 Provide adequate means of ventilation in accordance with [Section 015100].

SPEC NOTE:

Clauses 16, 17, 18 and 19 refer to specific types of hazards. Delete where not applicable.

16. Asbestos Hazard

- .1 Modifications to spray- or trowel-applied asbestos surfaces can be hazardous to health.
- .2 Removal and handling of asbestos will be performed as indicated in Sections [024116] and [028210] [028211] [028212].

17. PCB Removals

- .1 Mercury-containing fluorescent tubes and ballasts which contain

polychlorinated biphenyls (PCBs) are classified as hazardous waste.

- .2 Remove, handle, transport and dispose of as indicated in Section [028400].

18. Removal of Lead-Containing Paints

- .1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.
- .2 Carry out demolition activities involving lead-containing paints in accordance with applicable [Provincial] [Territorial] regulations.

19. Ammonia Gas Hazard

SPEC NOTE:
Include this clause if excavation work is done at an airport.

- .1 Excavation activities in areas adjacent to aprons and taxiways of certain airports have resulted in encounters with ammonia gas.
 - .1 Ammonia gas results from decomposition of urea, used for de-icing purposes, which seeps through surface pavement joints and cracks to become trapped in sometimes heavily concentrated pockets in underlying and adjacent soil.

19. Ammonia Gas Hazard (continued)

- .2 Advise all workers, before any such excavation work, that should the smell of ammonia be detected at any time when working in excavations, then the workers must immediately leave the excavation area until such time as the volume of ammonia can be measured and appropriate safety measures are taken.
- .3 Ensure that all workers are aware that, at certain levels of concentration, unprotected exposure to ammonia can result in nose and throat irritation, breathing difficulty, and eye and skin irritation. Prolonged exposure without adequate protection could result in serious and permanent damage to personal health.
- .4 Notify Departmental Representative immediately upon detection of ammonia.

- .5 The Departmental Representative will act to have the ammonia gas concentration measured immediately and, depending upon the results, will direct procedures to be adopted for the safety of all personnel in adjacent areas.

**20. Electrical Safety
Requirements**

- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
- .1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.
- .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

21. Electrical Lockout

- .1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

**21. Electrical Lockout
(continued)**

SPEC NOTE:

Procedures specified for lockout need to be consistent with site procedures for existing facilities or equipment.

- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

22. Overloading

- .1 Ensure no part of work is subjected to a load which will endanger

its safety or will cause permanent deformation.

23. Falsework.1 Design and construct falsework in accordance with CSA S269.1- 1975 (R2003).

24. Scaffolding .1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 and B.C. Occupational Health and Safety Regulations.

25. Confined Spaces SPEC NOTE:
In B.C., comply with Occupational Health and Safety Regulation, Part 9. In Yukon Territory, comply with Canada Occupational Health and Safety Regulation, Part XI.

.1 Carry out work in confined spaces in compliance with [provincial] [territorial] regulations.

26. Blasting .1 Perform blasting (rock removal) operations as specified in [Section 312317].

27. Powder-Actuated Devices .1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

28. Fire Safety and Hot Work .1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

28. Fire Safety and Hot Work (continued) .2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

29. Fire Safety Requirements .1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible

materials in accordance with the National Fire Code of Canada.

**30. Fire Protection and
Alarm System**

- .1 Fire protection and alarm systems shall not be:
- .1 Obstructed.
 - .2 Shut off.
 - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- .3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

31. Unforeseen Hazards

- .1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

32. Posted Documents

- .1 Post legible versions of the following documents on site:
- .1 Health and Safety Plan.
 - .2 Sequence of work.
 - .3 Emergency procedures.
 - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - .5 Notice of Project.
 - .6 Floor plans or site plans.

**32. Posted Documents
(continued)**

- .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

SPEC NOTE:

The General Contractor to include the name of the "qualified coordinator responsible for the coordination of health

and safety activities" in accordance with Section 118 of the Workers' Compensation Act.

- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

33. Meetings .1 **Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.**

34. Correction of Non-Compliance .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

END OF SECTION

SPEC NOTES:

- This section specifies description methods of ensuring materials or product quality as well as quality of work.
- The term 'new' includes new manufactured products that have some or all of the materials from recycled sources.
- Include this section on ALL Public Works and Government Services Canada (PWGSC) construction and maintenance projects.

**1. Products/Material
and Equipment**

- .1 Use NEW products/material and equipment unless otherwise specified. The term "products" is referred to throughout the specifications.
- .2 Use products of 1 manufacturer for material and equipment of the same type or classification unless otherwise specified.
- .3 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .4 Notify Departmental Representative in writing of any conflict between these specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed.
- .5 Provide metal fastenings and accessories in the same texture, colour and finish as base metal in which they occur.
 - .1 Prevent electrolytic action between dissimilar metals.
 - .2 Use non-corrosive fasteners, anchors and spacers for securing exterior work.
- .6 Fastenings which cause spalling or cracking are not acceptable.
- .7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .8 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .9 Bolts may not project more than 1 diameter beyond nuts.
- .10 Types of washers as follows:
 - .1 Plain type washers: use on equipment and sheet metal.
 - .2 Soft gasket lock type washers: use where vibrations occur.
 - .3 Resilient washers: use with stainless steel.
- .11 Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

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| 1. <u>Products/Material and Equipment (continued)</u> | .12 | Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from site. |
| | .13 | Store products in accordance with suppliers' instructions. |
| | .14 | Touch up damaged factory finished surfaces to Departmental Representative's satisfaction.
.1 Use primer or enamel to match original.
.2 Do not paint over nameplates. |
| 2. <u>Quality of Products</u> | .1 | Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. If requested, furnish evidence as to type, source and quality of the products provided. |
| | .2 | Defective products will be rejected regardless of previous inspections.
.1 Inspection does not relieve responsibility, but is precaution against oversight or error.
.2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection. |
| | .3 | Retain purchase orders, invoices and other documents to prove that all products utilized in this Contract meet the requirements of the specifications. Produce documents when requested by the Departmental Representative. |
| | .4 | Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative based upon the requirements of the Contract documents. |
| | .5 | Unless otherwise indicated in the specifications, maintain uniformity of manufacture for any particular or like item throughout the building. |
| | .6 | Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms. |
| 3. <u>Availability of Products</u> | .1 | Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. |
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| 3. <u>Availability of Products (continued)</u> | .2 | If delays in supply of products are foreseeable, notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work. |
| | .3 | In event of failure to notify Departmental Representative at the start of work and should it subsequently appear that the work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in either the Contract price or the Contract time. |
| 4. <u>Manufacturer's Instructions</u> | .1 | Unless otherwise indicated in the specifications, install or erect products in accordance with the manufacturer's instructions.
.1 Do not rely on labels or enclosures provided with products.
.2 Obtain written instructions directly from the manufacturer. |
| | .2 | Notify Departmental Representative in writing of conflicts between the specifications and the manufacturer's instructions so that the Departmental Representative may establish the course of action. |
| | .3 | Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and re-installation at no increase in either the Contract price or the Contract time. |
| 5. <u>Contractor's Options for Selection of Products for Tendering</u> | .1 | Products are specified by " Prescriptive " specifications: select any product meeting or exceeding specifications. |
| | .2 | Products specified under " Acceptable Products " (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products. |
| | .3 | Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard. |
| | .4 | Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Special Instructions to Tenderers". |
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- 5. Contractor's Options for Selection of Products for Tendering (continued)** .5 When products are specified by a referenced standard or by or Performance specifications, upon request of Departmental Representative obtain from manufacturer an *independent laboratory* report showing that the product meets or exceeds the specified requirements.
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- 6. Substitution After Contract Award** .1 No substitutions are permitted without prior written approval of the Departmental Representative.
- .2 **Proposals for substitution may only be submitted after Contract award.** Such request must include statements of respective costs of items originally specified and the proposed substitution.
- .3 Proposals will be considered by the Departmental Representative if:
- .1 products selected by tenderer from those specified are not available;
 - .2 delivery date of products selected from those specified would unduly delay completion of Contract, or
 - .3 alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.
- .4 **Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.**
- .5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

END OF SECTION

SPEC NOTES:

- This section is intended for small size projects.
- Include Section Waste Management and Disposal on ALL Public Works and Government Services Canada (PWGSC) construction and maintenance projects.
- For large size and/or complex projects - expand clauses or use NMS narrowscope section.

<u>1. Related Work</u>	.1	Refer to every technical section for waste management and disposal.
<u>2. Definitions</u>	.1	Waste Audit (WA): relates to projected waste generation. Involves controlled separation of waste.
	.2	Waste Reduction Workplan (WRW): a written report which addresses opportunities for reduction, re-use or recycling of materials.
	.3	Materials Source Separation Program (MSSP): consists of a series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at point of generation.
<u>3. Materials Source Separation</u>	.1	Before project start-up, prepare Materials Source Separation Program. Provide separate containers for re-usable and/or recyclable materials of the following: <ul style="list-style-type: none">.1 Gypsum board..2 Metals..3 Wood..4 Plastics..5 Other materials as indicated in technical sections.
	.2	Implement Materials Source Separation Program for waste generated on project in compliance with approved methods and as approved by Departmental Representative.
	.3	Locate containers in locations, to facilitate deposit of materials without hindering daily operations.
	.4	Locate separated materials in areas which minimize material damage.
<u>4. Diversion of Materials</u>	.1	Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the approval of the

- 4. Diversion of Materials (continued)**
- .1 (continued): Departmental Representative and consistent with applicable fire regulations.
 - .1 Mark containers.
 - .2 Provide instruction on disposal practices.
- 5. Storage, Handling and Application**
- .1 Do work in compliance with Waste Reduction Workplan.
 - .2 Handle waste materials not re-used, salvaged, or recycled in accordance with appropriate regulations and codes.
 - .3 Materials in separated condition: collect, handle, store on site, and transport off-site to an approved and authorized recycling facility.
 - .4 Materials must be immediately separated into required categories for re-use or recycling.
 - .5 Unless specified otherwise, materials for removal become the Contractor's property.
 - .6 On-site sale of salvaged/recyclable material is not permitted.
 - .7 **Provide Departmental Representative with receipts** indicating quantity of material delivered to landfill.
 - .8 **Provide Departmental Representative with receipts** indicating quantity and type of materials sent for recycling.

END OF SECTION

SPEC NOTES:

- Include this section on ALL Public Works and Government Services Canada (PWGSC) construction and maintenance projects.
- This section specifies the administrative process associated with preliminary and final inspections of the work.
- This section specifies procedures for closeout submittals, revised project documents, and delivery of indicated spare parts and maintenance materials.
- Refer to Section 013300 and individual Technical Sections for requested documents.

1. Submission

- .1 Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- .2 Revise content of documents as required before final submittal.
- .3 Phasing of submission:
 - .1 2 weeks before substantial performance of the work for Phase 1 construction, submit to Departmental Representative 4 final copies of operation and maintenance manuals.
 - .2 2 weeks before substantial performance of the work for Phase 2 construction, submit to Departmental Representative 4 final copies of Phase 2 supplements to operation and maintenance manuals.
- .4 Ensure spare parts, maintenance materials and special tools provided are new, neither damaged nor defective, and of same quality and manufacture as products provided in work.
- .5 If requested, furnish evidence as to type, source and quality of products provided.
- .6 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

2. Format

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, 3 “D” ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 Cover: identify each binder with type or printed title “Project Record Documents”; list title of project and identify subject matter of contents.
- .4 Arrange content by systems under section numbers and sequence of Table of Contents.

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- 2. Format (continued)** .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Text: manufacturer's printed data, or typewritten data.
- .7 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- 3. Contents, Each Volume** .1 Table of Contents – provide the following:
- .1 Title of project.
Date of submission.
 - .2 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- 4. As-built Documents** .1 **Contract drawings** and shop drawings: legibly mark each item to record actual construction, including:
- .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract drawings.
 - .5 References to related shop drawings and modifications.
- .2 **Contract Specifications:** legibly mark each item to record actual "Workmanship of Construction", including:
- .1 Manufacturer, trade name, and catalogue number of each "Product/Material" actually installed, particularly optional items and substitute items.
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- 4. As-Built Documents** .2 (continued):
(continued) .2 Changes made by addenda and change orders.
- .3 As-built information:
.1 Record changes in red ink.
.2 Mark on 1 set of drawings, specifications and shop drawings at completion of project and, before final inspection, neatly transfer notations to second set.
.3 Provide 1 set of CD's in AutoCAD 14 file format with all as-built information on the CD's.
.4 Submit all sets to the Departmental Representative.
- 5. Equipment and** .1 Operating procedures – include the following:
Systems .1 Start-up, break-in, and routine normal operating instructions and sequences.
.2 Regulation, control, stopping, shutdown, and emergency instructions.
.3 Summer, winter, and any special operating instructions.
- .2 Maintenance requirements – list routine procedures:
.1 _____
.2 _____
.3 _____
.4 _____
- .3 Provide servicing and lubrication schedule, and list of lubricants required.
- .4 Include manufacturer's printed operation and maintenance instructions.
- .5 Include sequence of operation by controls manufacturer.
- .6 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .7 Provide installed control diagrams by controls manufacturer.
- .8 Provide Contractor's coordination drawings with installed colour coded piping diagrams.
- .9 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

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| 5. <u>Equipment and Systems (continued)</u> | .10 | Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage. |
| | .11 | Additional requirements: as specified in individual specification Sections. |
| 6. <u>Manufacturer's Documentation Reports</u> | .1 | When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and system, instruct Departmental Representative's indicated facility's personnel, and provide detailed written report that demonstration and instructions have been completed. |
| | .2 | Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times. |
| 7. <u>Spare Parts</u> | .1 | Provide spare parts in quantities specified in individual specification Sections. |
| | .2 | Provide items of same manufacture and quality as items in work. |
| | .3 | Deliver to on-site location as directed; place and store. |
| | .4 | Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual. |
| | .5 | Obtain receipt for delivered products and submit to Departmental Representative. |
| 8. <u>Maintenance Materials</u> | .1 | Provide maintenance and extra materials in quantities specified in individual specification sections. |
| | .2 | Provide items of same manufacture and quality as items in work. |
| | .3 | Deliver to on-site location as directed; place and store. |
| | .4 | Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual. |
| | .5 | Obtain receipt for delivered products and submit to Departmental Representative. |
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- 9. Special Tools**
- .1 Provide special tools in quantities specified in individual specification Sections.
 - .2 Provide items with tags identifying their associated function and equipment.
 - .3 Deliver to location as directed; place and store.
 - .4 Receive and catalogue all items.
 - .1 Submit inventory listing to the Departmental Representative.
 - .2 Include approved listings in maintenance manual.
- 10. Warranties, Bonds, Test Reports, Inspection Reports**
- .1 Separate each Document with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier and manufacturer with name, address, and telephone number of responsible principal.
 - .3 Obtain Warranties, Bonds, Test Results, Inspection Reports executed in duplicate by subcontractors, suppliers, manufacturers, and inspection agencies within 10 days after completion of the applicable item of work.
 - .4 Except for items put into use with the Departmental Representative's permission, leave date of beginning of time of warranty until the date of substantial performance is determined.
 - .5 Verify that documents are in proper form, contain full information, and are notarized.
 - .6 Co-execute submittals when required.
 - .7 Retain warranties and bonds until time specified for submittal.
- 11. Completion**
- .1 Submit a written certificate that the following have been performed:
 - .1 Work has been completed and inspected for compliance with the Contract documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced, and are fully operational.
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11. Completion
(continued)

- .1 (continued):
 - .4 Certificates required by the Boiler Inspection Branch, Fire Commissioner of Canada, and utility companies have been submitted.
 - .5 Operation of systems has been demonstrated to the personnel indicated by the Departmental Representative.
 - .6 Work is complete and ready for final inspection.

END OF SECTION

SPEC NOTES:

- This section specifies procedures for services of an independent testing organization(s) employed by the Departmental Representative. It provides for a schedule listing sections in which testing, adjusting, and balancing are required. Requirements for testing, adjusting, and balancing service, standards, and quantities required for the entire contract should be specified in individual Technical Sections and referenced to this Section.
- See NMS Sections 019113, 019131, 019133 and 019141 for larger and/or complex projects.

- 1. Section Includes**
- .1 Includes general requirements for commissioning facilities and facility systems.
 - .2 Refer to sections of Mechanical, Electrical and Communications disciplines.
- 2. Definitions**
- .1 Acronyms:
 - .1 AFD - Alternate Forms of Delivery, service provider.
 - .2 BMM - Building Management Manual.
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PI - Product Information.
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.
 - .2 Cx - a required program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved.
- 3. Quality Assurance**
- .1 Testing organization: current member in good standing of AABC certified to perform specified services.
 - .2 Comply with applicable procedures and standards of the certification sponsoring association.
 - .3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.
- 4. References**
- .1 Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation, Total Systems Balance, Air Distribution-Hydraulics Systems.

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- 5. Submittals**
- .1 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.
 - .2 Submit documentation to confirm organization compliance with quality assurance provision.
 - .3 Submit 3 preliminary specimen copies of each of report forms proposed for use.
 - .4 Ten (10) days prior to Substantial Performance, submit 3 copies of final reports on applicable forms.
 - .5 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.
- 6. Procedures - General**
- .1 Comply with procedural standards of certifying association under whose standard services will be performed.
 - .2 Notify Departmental Representative 3 days prior to beginning of operations.
 - .3 Accurately record data for each step.
 - .4 Report to Departmental Representative any deficiencies or defects noted during performance of services.
- 7. Contractor's Responsibilities**
- .1 Prepare each system for testing and balancing.
 - .2 Cooperate with testing organization and provide access to equipment and systems.
 - .3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.
 - .4 Notify testing organization 7 days prior to time project will be ready for testing, adjusting, and balancing.
- 8. Preparation**
- .1 Provide instruments required for testing, adjusting, and balancing operations.
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- 8. Preparation**
(continued)
- .2 Make instruments available to Departmental Representative to facilitate spot checks during testing.
- .3 Retain possession of instruments and remove at completion of services.
- .4 Verify systems installation is complete and in continuous operation.
- .5 Verify lighting is turned on when lighting is included in cooling load.
- .6 Verify equipment such as computers, laboratory and electronic equipment are in full operation.
- 9. Final Reports**
- .1 Organization having managerial responsibility shall make reports.
- .2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.
- .3 Identify each instrument used, and latest date of calibration of each.
- 10. Completion of Commissioning**
- .1 Upon completion of Cx leave systems in normal operating mode.
- .2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.
- .3 Cx deliverables have been submitted and accepted by Departmental Representative.

END OF SECTION