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

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:

Regional Manager/Real Property Contracting/PWGSC
Ontario Region, Tendering Office
12th Floor, 4900 Yonge Street
Toronto, Ontario
M2N 6A6
Ontario

Revision to a Request for a Standing Offer
Révision à une demande d'offre à commandes

Departmental Individual Standing Offer (DISO)

Offre à commandes individuelle du département(OCID)

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

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

Comments - Commentaires

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

Issuing Office - Bureau de distribution

Regional Manager/Real Property Contracting/PWGSC
Ontario Region, Tendering Office
12th Floor, 4900 Yonge Street
Toronto, Ontario
M2N 6A6
Ontario

Title - Sujet DOC Services Architecturaux	
Solicitation No. - N° de l'invitation EQ754-161519/A	**Date** 2016-02-09
Client Reference No. - N° de référence du client 20161519	**Amendment No. - N° modif.** 007
File No. - N° de dossier PWL-5-38165 (027)	**CCC No./N° CCC - FMS No./N° VME**
GETS Reference No. - N° de référence de SEAG PW-$PWL-027-2095	
Date of Original Request for Standing Offer **Date de la demande de l'offre à commandes originale**	2015-12-21
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2016-02-23**	**Time Zone** **Fuseau horaire** Eastern Standard Time EST
Address Enquiries to: - Adresser toutes questions à: Jackson, Dahlia	**Buyer Id - Id de l'acheteur** pwl027
Telephone No. - N° de téléphone (416) 512-5918 ( )	**FAX No. - N° de FAX** (416) 512-5862
Delivery Required - Livraison exigée	
Destination - of Goods, Services, and Construction: **Destination - des biens, services et construction:** Région d'Ontario	
Security - Sécurité This revision does not change the security requirements of the Offer. Cette révision ne change pas les besoins en matière de sécurité de la présente offre.	

Instructions: See Herein

Instructions: Voir aux présentes

Acknowledgement copy required **Accusé de réception requis**	**Yes - Oui** ☐	**No - Non** ☐

The Offeror hereby acknowledges this revision to its Offer.
Le proposant constate, par la présente, cette révision à son offre.

Signature **Date**

Name and title of person authorized to sign on behalf of offeror. (type or print)
Nom et titre de la personne autorisée à signer au nom du proposant.
(taper ou écrire en caractères d'imprimerie)

For the Minister - Pour le Ministre

Canada

Modification nº 007

La présente modification vise à 1) apporter des révisions aux sections de la demande d'offre à commandes suivante : i) Énoncé de l'Offre à commandes - Services Requis, ii) annexe D - Faire affaire avec les SAG Région d'Ontario - Offres à commandes, et iii) annexe E – Normes pour l'immeuble de base de TPSGC pour les immeubles à bureaux et 2) répondre à des demandes d'éclaircissement.

1. Révision à la demande d'offre à commandes

(i) Référence : Énoncé de l'Offre à commandes - Services Requis

a) Énoncé de l'Offre à commandes, Administration de l'entente (AE), AE 2 Exigences fonctionnelles, AE 2.1 Codes, règlements et documents de référence en matière de conception, article 2.1.2 :

« Pour une liste non exhaustive des codes, règlements, normes et directives applicables, consulter le document de TPSGC *Faire affaire avec les Services d'architecture et de génie de la région de l'Ontario – Offres à commandes* (annexe D). »

Les proposants doivent suivre les instructions suivantes :

Supprimer : Dans son intégralité.

Insérer : « Pour une liste non exhaustive des codes, règlements, normes et directives applicables, consulter le document de TPSGC *Faire affaire avec la TPSGC* (annexe D) et « Ébauche – Normes pour l'immeuble de base de TPSGC pour les immeubles à bureaux (annexe E). »

b) Énoncé de l'Offre à commandes, Administration de l'entente (AE), AE 2 Exigences fonctionnelles, 2.4 Produits à livrer dans le cadre du projet - généralités, article 2.4.3 :

Les proposants doivent suivre les instructions suivantes :

Ajouter : Pour obtenir les normes relatives à la présentation, à la documentation et à la conception en ce qui a trait à la prestation des services décrits aux présentes, veuillez consulter le document de TPSGC *Faire affaire avec les SAG de la région de l'Ontario – Offres à commandes***,** l'annexe D du document de la DOC. Les normes comprises dans le document de TPSGC *Normes pour l'immeuble de base de TPSGC pour les immeubles à bureaux* et les exigences de chaque étape de réalisation du projet, telles qu'elles sont décrites dans chaque commande subséquente, doivent être appliquées dans le cadre de l'étendue des services.

c) Toutes les autres références au document *Faire affaire avec les SAG de la région de l'Ontario – Offres à commandes* dans le document de l'invitation à soumissionner doivent être modifiées pour qu'on puise lire : *Faire affaire avec TPSGC*.

(ii) Référence : Annexe D - Faire affaire avec la SAG Région d'Ontario - Offres à commandes

Les proposants doivent suivre les instructions suivantes :

Supprimer : Dans son intégralité.

Insérer : Faire affaire avec la TPSGC (*qui se trouve à la pièce jointe de cette modification*)

(iii) Référence : annexe E, Normes pour l'immeuble de base de TPSGC pour les immeubles à bureaux

Les proposants doivent suivre les instructions suivantes :

Ajouter : Normes pour l'immeuble de base de TPSGC pour les immeubles à bureaux (*pièce jointe de cette modification*) à titre d'annexe E.

2. Réponses aux demandes d'éclaircissement

Q1. Quelles sont, le cas échéant, les exigences en matière de permis pour le spécialiste de la conservation du patrimoine dans le cadre de la DOC nº EQ754-161519/A?

R1. Il n'y a aucune exigence relative à des permis pour ce spécialiste. Toutefois, le spécialiste doit démontrer une expérience et de l'expertise pertinente dans le domaine de la conservation du patrimoine, et il doit être membre d'une organisation de conservation du patrimoine, comme l'Association canadienne d'experts-conseils en patrimoine. Le spécialiste doit également connaître les normes et les lignes directrices pour la conservation des lieux patrimoniaux au Canada.

Q2. Les sections 4.15 et 4.16 du document « Faire affaire avec les Services d'architecture et de génie de TPSGC de la région de l'Ontario » de la DOC semblent indiquer qu'il n'est pas obligatoire d'utiliser NMSEdit Professional si des copies papier et électroniques compatibles avec la version 3.00.01G de NMSEdit Professional ou MS Word 2010 et PDF sont fournies. Merci de confirmer qu'il n'est pas obligatoire d'utiliser le logiciel NMSEdit et que les versions mises à jour de NMS pourront être téléchargées en format .rtf ou MS Word.

R2. L'utilisation du logiciel NMSEdit n'est pas actuellement obligatoire puisque la région de l'Ontario fournit les sections NMS en .rtf ou en format Ms Word. Toutefois, la région de l'Ontario pourrait ne plus offrir cette option à l'avenir, selon l'orientation d'Ottawa.

Q3. À la page 2, section IP3 du document de la DOC, on peut lire : *dans le cadre de certaines commandes subséquentes aux offres à commandes, on exige que les experts-conseils et leurs employés possèdent une attestation de sécurité d'installation (ASI) au niveau FIABILITÉ.* Puisque les attestations de sécurité d'installations (ASI) sont à tout le moins au niveau Secret, est-ce que TPSGC pourrait confirmer si les experts-conseils et leur personnel ont besoin d'une ASI de niveau Secret, ou une vérification d'organisme désignée (VOD) de niveau Fiabilité?

R3. Merci de consulter la modification nº 006, 2) Changements à la section Instructions particulières aux proposants (IP), IP 3 Exigences en matière de sécurité.

Q4. Dans l'addenda 5, la question et la réponse 5 indiquent qu'une copie du certificat de pratique et/ou de l'autorisation doit être fournie. Est-ce que cette preuve de pratique s'applique uniquement à l'entrepreneur principal/architecte, ou est-ce qu'elle s'applique à tous les experts-conseils et les spécialistes sous-traitants principaux? Pouvez-vous préciser quelles sortes de preuve d'autorisation souhaitez-vous obtenir pour ces disciplines?

R4. Une copie du certificat de pratique ou de l'autorisation doit être fournie par le proposant. Les experts-conseils et les spécialistes sous-traitants peuvent indiquer leurs accréditations professionnelles actuelles ou la manière dont ils prévoient respecter les exigences provinciales de l'Ontario en matière de permis dans le formulaire Identification des membres de l'équipe de l'annexe C.

Q5. Où dans la proposition souhaitez-vous qu'on accuse réception des modifications? Devons-nous vous envoyer une télécopie pour signaler que nous les avons reçues, ou l'indiquer dans la proposition?

R5. L'accusé de réception des pages couvertures des modifications peut être fourni avec la proposition.

Q6. Sur la page couverture des révisions du document de la DOC. Dans le coin droit, au bas de la page, on peut lire : *Accusé de réception requis*. Il y a des boîtes « Oui » et « Non ». Je ne suis pas certain de ce que cela veut dire. Merci de m'éclairer.

R6. Il devrait y avoir un crochet dans la boîte « Oui ». Veuillez soumettre un accusé de réception des pages couvertures des modifications avec la proposition.

Q7. Est-ce qu'il est possible d'identifier la même personne à titre de 3.2.4 Personnel principal et 3.2.5 Personnel du projet?

R7. Oui, c'est possible. Toutefois, la personne doit respecter les attentes les plus élevées, au minimum.

Q8. Demande d'éclaircissement concernant l'utilisation de « personnel principal », « architecte principal » et « ingénieur principal » :

ANNEXE B – PROPOSITION DE PRIX INSTRUCTIONS, les rôles principaux suivants sont indiqués comme suit :

1. Architecturaux : *architecte principal*

2. Génie en structures : *génie principal*

3. Génie mécanique : *génie principal*

4. Génie électrique : *génie principal*

Dans la section 3.2.4, on nous demande de les identifier comme Personnel principal. C'est également le cas dans l'annexe C, Identification des membres de l'équipe.

Merci de préciser si les technologues et les techniciens principaux doivent être catégorisés de la même manière que les ingénieurs et les architectes principaux. Si non, est-ce que les architectes et ingénieurs principaux peuvent être catégorisés comme « personnel principal »?

R8. Seuls les ingénieurs et les architectes principaux ayant l'expérience pertinente devraient être identifiés comme du « personnel principal ».

Q9. Concernant l'IG 2. 3), pourriez-vous préciser la valeur des commandes subséquentes individuelles? *Les proposants doivent aussi noter que la valeur des commandes subséquentes pourra varier de 10 000 $ (plus petits besoins) à la valeur limite de 1 000 000 $ (circonstances exceptionnelles).* Pouvez-vous préciser si ces chiffres font référence au coût du projet (coûts essentiels et accessoires), les coûts de construction ou les honoraires professionnels? Cela nous aidera à sélectionner les projets à citer en référence les plus appropriés dans notre réponse.

R9. Ces valeurs estimatives des commandes subséquentes font référence aux frais totaux pour les services d'expert-conseil (c.-à-d., aux honoraires professionnels).

Toutes les autres modalités de la demande de soumissions demeurent inchangées.

ANNEXE D

FAIRE AFFAIRE AVEC LA TRAVAUX PUBLICS ET SERVICES GOUVERNEMENTAUX CANADA (TPSGC)

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

Canada

Respect • Integrity • Excellence • Leadership

Serving GOVERNMENT, Serving CANADIANS.

Faire affaire avec la Travaux publics et Services gouvernementaux Canada (TPSGC)

www.pwgsc-tpsgc.gc.ca

Dernière mise à jour: 8 avril 2013

TABLE DES MATIÈRES

SECTION 1 INTRODUCTION

Le présent document doit être utilisé de pair avec le cadre de référence, les deux documents étant complémentaires. Le cadre de référence présente les exigences propres à un projet tandis que ce sont plutôt des renseignements communs à l'ensemble des projets qui figurent au présent document. En cas de contradiction entre les deux documents, les exigences du cadre de référence l'emportent sur celles du présent document.

SECTION 2 NORME NATIONALE CDAO DE TPSGC

Les dessins doivent être conformes à la Norme nationale CDAO de Travaux publics et Services gouvernementaux Canada (TPSGC) et à la norme CSA B78.3 de l'Association canadienne de normalisation.

Veuillez consulter le site suivant :
http://www.tpsgc-pwgsc.gc.ca/biens-property/cdao-cadd/index-fra.html

Le lien ci-dessus est donné sous réserve de modifications. L'expert-conseil doit vérifier auprès du gestionnaire de projet pour s'assurer que le lien ainsi que les renseignements auxquels il mène sont à jour et pertinents en ce qui concerne la Norme nationale CDAO de TPSGC.

SECTION 3 GUIDE DE RÉDACTION DES DOCUMENTS DE CONSTRUCTION DE TPSGC

1 Objectif

Le présent document a pour objectif d'énoncer les principes directeurs régissant la rédaction de documents de construction (soit les devis, les dessins et les addenda) pour Travaux publics et Services gouvernementaux Canada (TPSGC).

Les dessins, les devis et les addenda doivent être complets et précis afin que l'entrepreneur puisse préparer une soumission sans se fier aux conjectures. La pratique courante pour la rédaction des documents de construction nécessite ce qui suit :

- les dessins représentent le moyen graphique d'illustrer le travail à effectuer, dans la mesure où ils indiquent la forme, la dimension, l'emplacement, la quantité de matériaux et la relation entre les composants de l'édifice;
- les devis comprennent les descriptions écrites des matériaux et des procédés de construction quant à la qualité, à la couleur, au motif, au rendement et aux caractéristiques des exigences relatives aux matériaux, à l'installation et à la qualité du travail;
- les addenda sont des modifications apportées aux documents de construction ou aux procédures de soumission, lesquels addenda sont publiés durant le processus de soumission.

2 Principes relatifs aux documents contractuels de TPSGC

Les documents contractuels de TPSGC sont fondés sur les principes usuels des marchés publics. TPSGC n'utilise pas les documents du Comité canadien des documents de construction (CCDC).

Le cadre de référence est établi et communiqué par TPSGC, de même que les autres documents contractuels et soumissions connexes. Vous pouvez consulter les clauses à titre informatif à l'adresse suivante : **http://sacc.tpsgc.gc.ca/sacc/query-f.jsp**. Les questions devraient être adressées au gestionnaire de projet.

3 Assurance de la qualité

Les experts-conseils doivent exécuter leurs propres processus de contrôle de la qualité et doivent réviser, corriger et coordonner (entre les spécialités) leurs documents avant de les envoyer à TPSGC.

DEVIS

1 Devis directeur national

Le Devis directeur national (DDN) est un devis directeur de la construction disponible dans les deux langues officielles divisé en 48 parties et utilisé dans le cadre d'une vaste gamme de projets de construction et de rénovation. Pour préparer le devis de projet, l'expert-conseil doit se fonder sur l'édition actuelle du DDN, en conformité avec le Guide d'utilisation du DDN.

L'expert-conseil doit assumer la responsabilité première en ce qui a trait au contenu et doit modifier, corriger et compléter le DDN au besoin afin de produire un devis de projet approprié et exempt de contradiction et d'ambiguïté.

2 Organisation du devis

Les sections à portée restreinte décrivant des unités de travail uniques sont préférables dans le contexte de travaux plus complexes, tandis que les sections à portée étendue conviennent mieux aux travaux moins complexes. Utiliser soit le format de page du DDN 1/3 – 2/3, soit le format pleine page de Devis de construction Canada.

Commencer chaque section sur une nouvelle page et indiquer le numéro de projet, le titre de la section et le numéro de la page sur chaque page. La date du devis, le titre du projet et le nom de l'expert-conseil ne doivent cependant pas y figurer.

3 Terminologie

Utiliser l'expression « représentant du Ministère » plutôt que ingénieur, TPSGC, propriétaire, expert-conseil ou architecte. « Représentant du Ministère » s'entend de la personne désignée dans le contrat ou au moyen d'un avis écrit donné à l'entrepreneur pour agir en tant que représentant du Ministère dans le cadre du contrat. Il peut s'agir d'une personne désignée et autorisée par écrit par le représentant du Ministère à l'entrepreneur.

Les notes comme « vérification sur place », « selon les instructions », « pour correspondre à ce qui existe », « exemple », « égal à », « équivalent à » et « à déterminer sur place par le représentant du Ministère » ne devraient pas faire partie du devis parce qu'elles ont tendance à rendre les soumissions imprécises et volumineuses. Le devis doit en effet permettre aux soumissionnaires de calculer toutes les quantités et de présenter une proposition précise. S'il est impossible de déterminer les quantités (p. ex. les fissures à réparer), présenter une estimation aux fins de la soumission (prix unitaires). S'assurer que la terminologie utilisée dans l'ensemble du devis est cohérente et qu'elle est conforme à celle des documents normalisés applicables relatifs aux marchés de construction.

4 Dimensions

Les dimensions doivent être exprimées uniquement au moyen des valeurs du système métrique (pas de cotation double).

5 Normes

Comme les références figurant au DDN ne sont pas nécessairement à jour, il incombe à l'expert-conseil de veiller à ce que le devis de projet soit fondé sur la dernière édition applicable de toutes les références citées. Voici une liste de quelques sites Web qui contiennent les publications les plus à jour de normes relatives aux références dans le contexte de devis de construction.

- Normes de l'Association canadienne de normalisation (CSA) : http://www.csa.ca
- Normes de l'Office des normes générales du Canada (ONGC) : http://www.tpsgc-pwgsc.gc.ca/cgsb/
- Normes de l'American National Standards Institute (ANSI) : http://www.ansi.org (en anglais seulement)
- Normes de ASTM International : http://www.astm.org (en anglais seulement)
- Normes des Laboratoires des assureurs du Canada (ULC) : http://www.ulc.ca (en anglais seulement)
- Référence générale à des normes : http://www.cssinfo.com

Le site Web du DDN (http://www.tpsgc-pwgsc.gc.ca/biens-property/ddn-nms/index-fra.html) contient également des liens vers d'autres documents de référence dans le DDN, à partir de la rubrique Liens.

6 Désignation des matériaux

La pratique qui consiste à préciser les noms commerciaux, les numéros de modèles, etc., va à l'encontre de la politique du Ministère, sauf dans des circonstances particulières. La méthode de désignation des matériaux utilisés doit être appliquée en fonction de normes reconnues, comme celles établies par l'Association canadienne du gaz (ACG), l'Office des normes générales du Canada (ONGC), l'Association canadienne de normalisation (CSA) et les Laboratoires des assureurs du Canada (ULC) ou par des associations commerciales comme l'Association canadienne des entrepreneurs en couverture (ACEC) et l'Association canadienne de terrazzo, tuile et marbre (ACTTM). Il faut se conformer aux normes canadiennes dans la mesure du possible.

Si la méthode susmentionnée ne peut être utilisée et en l'absence de normes, désigner les matériaux au moyen d'appellations non restrictives et non commerciales en matière de « prescription » et de « rendement ».

En cas de circonstances exceptionnelles ou justifiées, ou encore en l'absence de normes et lorsqu'il est impossible de désigner les matériaux au moyen d'une appellation non restrictive et non commerciale en matière de « prescription » et de « rendement », indiquer le nom commercial. Inclure tous les matériaux connus acceptables pour les travaux prévus et, en ce qui a trait à l'équipement, indiquer les renseignements par type et par numéro de modèle.

Produits acceptables – Utiliser le format de paragraphe ci-dessous.

Produits acceptables :

1. Modèle [_____] de l'entreprise ABC.
2. Modèle [_____] de l'entreprise DEF.
3. Modèle [_____] de l'entreprise GHI.

Il est possible de recourir à des matériaux différents de ceux précisés durant la période de soumission. Cependant, il incombera à l'expert-conseil d'examiner et d'évaluer toutes les demandes d'approbation visant des matériaux de remplacement.

Le terme « fabricants acceptables » ne doit pas être utilisé dans la mesure où la concurrence s'en trouve restreinte et parce qu'un tel terme ne permet pas de garantir que les matériaux ou

les produits en question seront acceptables. La liste des mots et expressions à éviter figure dans le guide d'utilisation du DDN.

Fournisseur unique : Il est possible de recourir à des fournisseurs uniques pour les matériaux et les travaux ayant trait aux systèmes exclusifs (p.ex. systèmes d'alarme incendie, systèmes de contrôle de gestion de l'énergie). Une justification devra être fournie dans ce contexte.

La formulation relative aux fournisseurs uniques devrait se lire comme suit dans la Partie 1 :

« Entrepreneur désigné

1 Retenir les services de [_____] pour réaliser les travaux prévus dans la présente section. »

La formulation relative aux fournisseurs uniques pour les SCCE devrait se lire comme suit dans la Partie 1 :

« Entrepreneur désigné

Retenir les services de [_____] ou de son représentant autorisé pour réaliser les travaux relatifs à toutes les sections des SCCE. »

et dans la Partie 2 en tant que Matériaux

1 Un système [_____] est actuellement installé dans l'immeuble. Tous les matériaux doivent être choisis de façon à en garantir la compatibilité avec le système [_____] existant.

La formulation relative aux fournisseurs uniques de matériaux (p. ex. systèmes d'alarme incendie) devrait se lire comme suit dans la Partie 2 :

Produits acceptables

1 Les seuls produits acceptables sont [_____]. »

Avant d'inscrire le fournisseur unique pour les matériaux ou les travaux, l'expert-conseil doit en obtenir l'approbation du gestionnaire de projet.

7 Prix unitaires

Les prix unitaires sont utilisés lorsque la quantité peut seulement être évaluée (p. ex. travaux de terrassement), et ils exigent l'approbation préalable du gestionnaire de projet.

Formulation à utiliser :

[Les travaux relatifs à la présente section] ou [définir les travaux particuliers au besoin, comme le dérochement] seront rémunérés selon les quantités réelles calculées sur place et les prix unitaires indiqués dans le formulaire d'acceptation et de soumission.

Dans chaque section applicable du DDN, remplacer le paragraphe intitulé « Calcul du paiement » par « Prix unitaires ».

Exemple de tableau de prix unitaire :

Le tableau de prix unitaire sert à désigner les travaux auxquels s'applique une entente à prix unitaire.

(a) Le prix par unité et le prix total estimé doivent être inscrits pour chaque article faisant partie de la liste.

(b) Le travail compris dans chaque article est tel qu'il est décrit dans la section de référence du devis.

Sujet	Référence au devis	Catégorie de travail, d'usine ou de matériaux	Unité de mesure	Quantité estimée	Prix par unité TPS/TVH en sus	Prix total estimé (TPS/TVH en sus)
MONTANT TOTAL ESTIMÉ Inscrire le montant au sous-paragraphe 1)(b) du BA03						

8 Allocations en espèces

Les documents de construction devraient être complets et faire état de l'ensemble des exigences visant les travaux précisés au contrat. Les allocations en espèces ne doivent être utilisées que dans des circonstances particulières (p. ex. entreprises de services publics, municipalités) lorsqu'aucune autre méthode de désignation n'est appropriée. Obtenir l'approbation préalable du gestionnaire de projet avant d'intégrer les allocations en espèces, et utiliser ensuite la « section 01 21 00 – allocations » du DDN afin de préciser ce critère.

9 Garanties

La pratique de TPSGC consiste à obtenir une garantie de 12 mois et à éviter les garanties prolongées de plus de 24 mois. Lorsqu'il est nécessaire de prolonger la période de garantie au-delà des 12 mois prévus dans les conditions générales du contrat, utiliser la formulation dans la Partie 1 des sections techniques applicables, sous le titre « Garantie prolongée » :

- « En ce qui a trait aux travaux de la présente section [_____], la période de garantie de 12 mois est prolongée à 24 mois. »

- Si la garantie prolongée doit s'appliquer à une partie du devis en particulier, modifier l'énoncé précédent comme suit : « En ce qui a trait à la section [_____], la période de garantie de 12 mois est prolongée à [_____] mois. »

Supprimer toutes les références aux garanties des fabricants.

10 Étendue des travaux
Aucun paragraphe intitulé « Étendue des travaux » ne doit être inclus.

11. Paragraphes « Résumé » et « Contenu de la section » dans la Partie 1 – Généralités
Ne pas utiliser les expressions « Résumé » et « Contenu de la section ».

12 Sections connexes
Dans chaque section du devis au point 1.1, Sections connexes, coordonner la liste des annexes et sections connexes. S'assurer de coordonner les renvois aux diverses sections du devis et qu'il n'y a pas de références à des sections ou à des annexes qui n'existent pas.

13 Table des matières
Dresser la liste des plans et des sections du devis en indiquant correctement le nombre de pages, le nom des sections et le titre des dessins selon le format illustré à l'Annexe A.

14 Guide régional
L'expert-conseil devrait communiquer avec le gestionnaire de projet pour connaître les exigences régionales concernant la Division 01 ou d'autres formes abrégées de devis pouvant être nécessaires. Par exemple, dans la région de la capitale nationale, on doit nécessairement utiliser la Section 01 00 10 – Instructions générales pour tous les projets.

15 Santé et sécurité
Tous les devis de projet doivent comprendre la Section 01 35 29.06 – Santé et sécurité. Vérifier auprès du gestionnaire de projet s'il y a des directives afin de répondre aux exigences régionales.

16 Rapport sur les substances désignées
Ajouter la Section 01 14 25 – Rapport sur les substances désignées.

17 Rapports d'étude sur le sous-sol
Les rapports d'étude sur le sous-sol doivent être intégrés après la Section 31 et le paragraphe suivant doit y être ajouté :

Rapports d'étude sur le sous-sol

1. Les rapports d'étude sur le sous-sol sont compris dans le devis à la suite de la présente section.

Le gestionnaire de projet donnera d'autres directives s'il juge qu'il n'est pas pratique d'inclure les rapports d'étude sur le sous-sol.

Lorsque des documents de soumission doivent être produits dans les deux langues officielles, les rapports d'étude sur le sous-sol doivent être bilingues.

En plus des rapports d'étude sur le sous-sol qu'il faut fournir, les renseignements sur les fondations doivent être inclus dans les dessins des fondations tel qu'il est prévu au Code national du bâtiment du Canada de 2005 (Division C, Partie 2, 2.2.4.6).

18 Expérience et qualifications

Supprimer les exigences relatives à l'expérience et aux qualifications dans les sections du devis.

19 Préqualification et soumissions préalables à l'adjudication

Le devis ne doit pas imposer à l'entrepreneur ni au sous-traitant des exigences obligatoires en matière de préqualification ou de soumissions préalables à l'adjudication qui pourraient devenir une condition d'adjudication du contrat. S'il y a lieu d'exiger un processus de préqualification ou des soumissions préalables à l'adjudication, il faut communiquer avec le gestionnaire de projet.

Il ne doit pas y avoir de référence aux certificats, aux transcriptions ou aux numéros de permis d'un entrepreneur ou d'un sous-traitant visé par la soumission.

20 Questions de passation de marché

Le devis permet de décrire la qualité d'exécution et la qualité des travaux. Les questions de passation de marché ne doivent pas faire partie du devis. La Division 00 du DDN n'est pas utilisée dans le cadre des projets de TPSGC.

Supprimer toutes les références faites dans le devis aux éléments suivants :

- Instructions générales à l'intention des soumissionnaires
- Conditions générales
- Documents du CCDC
- Ordre de priorité des documents
- Clauses de sécurité
- Modalités de paiement ou retenue
- Processus d'appel d'offres
- Exigences de garantie
- Exigences relatives aux assurances
- Établissement des prix de rechange et individuel
- Visite des lieux (obligatoire ou facultative)
- Mainlevée du droit de rétention et retenues pour vices cachés

DESSINS

1 Cartouches d'inscription

Utiliser le cartouche d'inscription de TPSGC pour réaliser les dessins et les esquisses (y compris les addenda).

2 Dimensions
Les dimensions doivent être exprimées seulement au moyen des valeurs du système métrique (pas de cotation double).

3 Appellations commerciales
Les appellations commerciales ne doivent pas figurer sur les dessins. Voir la Section 3, Devis, 6. Désignation des matériaux pour connaître la façon de désigner les matériaux selon leur appellation commerciale.

4 Notes du devis
Les notes du devis ne doivent pas figurer sur les dessins.

5 Terminologie
Utiliser l'expression « représentant du Ministère » plutôt que ingénieur, TPSGC, propriétaire, expert-conseil ou architecte. « Représentant du Ministère » s'entend de la personne désignée dans le contrat ou au moyen d'un avis écrit donné à l'entrepreneur pour agir en tant que représentant du Ministère dans le cadre du contrat. Il peut s'agir d'une personne désignée et autorisée par écrit par le représentant du Ministère pour l'entrepreneur.

Les notes comme « vérification sur place », « selon les instructions », « pour correspondre à ce qui existe », « exemple », « égal à », « équivalent à » et « à déterminer sur place par le représentant du Ministère » ne devraient pas faire partie du devis dans la mesure où les soumissions deviennent ainsi imprécises et volumineuses. Le devis doit en effet permettre aux soumissionnaires de calculer toutes les quantités et de présenter une proposition précise. S'il est impossible de déterminer les quantités (p. ex. les fissures à réparer), présenter une estimation aux fins de la soumission (prix unitaires). S'assurer que la terminologie utilisée dans l'ensemble du devis est cohérente et qu'elle est conforme à celle des documents normalisés applicables relatifs aux marchés de construction.

6 Renseignements à inclure
Les dessins devraient indiquer les quantités et la configuration relatives au projet ainsi que les dimensions et le détail de la façon dont le projet est structuré. Il ne devrait pas y avoir de références à des travaux ultérieurs et aucun renseignement ne pourra être modifié au moyen d'un futur addenda. L'étendue des travaux devrait être clairement précisée et les éléments qui ne sont pas visés par le contrat devraient être éliminés ou fort peu nombreux.

7 Numérotation des dessins : Il faut attribuer aux différentes séries de dessins des numéros en fonction du type de dessin et de la discipline visée selon le tableau suivant (les exigences établies à la Section 2 de la Norme nationale CDAO de TPSGC remplaceront les exigences ci-dessous, s'il y a lieu).

À l'étape de conception du projet, chaque soumission et chaque examen doivent être indiqués dans la zone de notes du titre du dessin. Toutefois, au moment de la rédaction des documents de construction, toutes les notes de révision devraient être supprimées.

Discipline	**Dessin**
Démolition	D1, D2, etc.
Architecture	A1, A2, etc.
Génie civil	GC1, GC2, etc.
Aménagement paysager	AP1, AP2, etc.
Mécanique	M1, M2, etc.
Électrique	E1, E2, etc.
Structure	S1, S2, etc.
Aménagement intérieur	AI1, AI2, etc.

8 **Exigences de présentation :** Les dessins doivent être présentés en séries comportant les dessins pertinents de démolition, d'architecture, de structure, de mécanique et d'électricité, dans cet ordre. Tous les dessins devraient être réalisés selon les mêmes dimensions normalisées.

9 **Impression :** Impression à l'encre noire sur papier blanc. Il est acceptable de présenter des bleus pour la présentation de documents complets à 33 %, à 66 % et à 99 %. Communiquer avec le gestionnaire de projet pour connaître la dimension des imprimés à présenter aux fins d'examen.

10 **Reliure :** Agrafer ou relier autrement les imprimés de façon qu'ils forment des séries. Lorsque les présentations comptent plus de vingt feuilles, les dessins pour chacune des spécialités peuvent être reliés séparément pour en faciliter la manipulation et la consultation.

11 **Légendes :** Fournir une légende des symboles, des abréviations, des références, etc., sur la première page de chaque série de dessins ou, lorsqu'il s'agit d'importantes séries de dessins, immédiatement après la page de titre et les pages d'index.

12 **Nomenclatures :** Lorsque les nomenclatures couvrent des feuilles entières, il faut les placer à côté des plans ou à la fin de chaque série de dessins pour en faciliter la consultation. *Voir la norme ONGC 33-GP-7, Présentation de dessins d'architecture, où sont précisées les règles à cet égard.*

13 **Nord :** Sur tous les plans, il faut indiquer où se trouve le nord. Il faut orienter tous les plans de la même façon pour faciliter le recoupement. Dans la mesure du possible, les plans devraient être dessinés de façon que le nord corresponde au haut de la feuille.

14 **Symboles utilisés dans les dessins :** Il faut observer les conventions généralement acceptées et comprises par les membres des différents corps de métier et se conformer à celles utilisées dans les publications de TPSGC.

ADDENDA

1 Présentation

Le format des addenda doit correspondre à celui présenté à l'Annexe B. Il ne doit pas comporter de renseignements personnalisés.

Chaque page de l'addenda (y compris les pièces jointes) doit être numérotée de manière séquentielle. Toutes les pages doivent comporter le numéro de projet de TPSGC et le bon numéro d'addenda. Les esquisses doivent être présentées selon le format de TPSGC et doivent être estampillées et signées.

Les renseignements sur l'expert-conseil (nom, adresse, n° de téléphone, n° de projet) ne devraient pas apparaître dans l'addenda ni dans les pièces jointes (à l'exception des esquisses).

2 Contenu

Chaque élément devrait faire référence à un paragraphe réel du devis ou à une note ou un détail figurant sur les dessins. Le style explicatif n'est pas acceptable.

DOCUMENTATION

Traduction

Au besoin, toute la documentation comprise dans les documents relatifs aux marchés de construction devra être présentée dans les deux langues officielles.

S'assurer que les documents en français et en anglais sont équivalents à tous les égards. Il ne peut y avoir aucun énoncé disant qu'une version l'emporte sur l'autre.

L'expert-conseil doit fournir ce qui suit :

- Pour chaque présentation de documents de construction, une liste de vérification pour la soumission de documents de construction remplie et signée. Consulter l'Annexe A à ce sujet.
- Les devis originaux imprimés au recto sur du papier bond blanc de 216 mm x 280 mm.
- Une table des matières conforme au modèle présenté à l'Annexe C.
- Un addenda (si nécessaire) conforme au modèle présenté à l'Annexe B (publié par TPSGC).
- Les dessins originaux reproductibles, scellés et signés par le responsable de la conception.
- Les renseignements relatifs à la soumission, c'est-à-dire :
  - La description de toutes les unités et des quantités estimées à intégrer dans le tableau des prix unitaires.
  - La liste des domaines de spécialité importants, y compris les coûts. TPSGC déterminera ensuite le cas échéant, les domaines de spécialité qui feront l'objet d'une soumission par l'intermédiaire du bureau de dépôt des soumissions.
  - Système électronique d'appels d'offres du gouvernement (SEAOG) : Les experts-conseils doivent fournir une copie électronique conforme de la version finale des documents (dessins et devis) sur un ou plusieurs CD-ROM en fichiers de format de document portable (PDF), sans protection par mot de passe ni restrictions en matière d'impression. Comme la copie électronique conforme des

dessins et du devis ne sert qu'à des fins de soumission, elle n'a pas besoin d'être signée ni scellée. Voir les Annexes D et E à ce sujet.

TPSGC doit fournir ce qui suit :

- Instructions générales et particulières à l'intention des soumissionnaires
- Formulaire de soumission et d'acceptation
- Documents normalisés relatifs au contrat de construction

SECTION 4 CATÉGORIES D'ESTIMATION DE COÛTS DE CONSTRUCTION UTILISÉES PAR TPSGC

DESCRIPTION DES CATÉGORIES D'ESTIMATION DE COÛTS UTILISÉES PAR TPSGC POUR ÉVALUER LES COÛTS DE CONSTRUCTION DES PROJETS IMMOBILIERS

Estimation de catégorie D (estimation indicative) :

Fondée sur un énoncé complet des exigences et sur une description sommaire des solutions potentielles, cette estimation donne une idée du coût final du projet et permet de classer les différentes options envisagées.

Soumettre les estimations de coûts de catégorie D dans un format conforme à la dernière version de l'analyse des coûts par élément publiée par l'Institut canadien des économistes en construction. Indiquer le coût au m^2 en fonction des données statistiques de l'industrie actuellement disponibles pour le type de bâtiment et l'emplacement pertinents. Joindre également un résumé et fournir le détail complet des éléments de travail, des quantités, des prix unitaires, des allocations et des hypothèses.

Le niveau de précision d'une estimation de catégorie D doit être tel que la réserve pour éventualités ne dépasse pas les 20 %.

Estimation de catégorie C :

Cette estimation est fondée sur une liste complète des exigences et des hypothèses, dont une description détaillée de l'option de conception privilégiée, des conditions du marché et de l'expérience en matière de construction et de conception. Elle doit suffire à prendre de bonnes décisions d'investissement.

Soumettre les estimations de coûts de catégorie C dans un format conforme à la dernière version de l'analyse des coûts par élément publiée par l'Institut canadien des économistes en construction. Indiquer le coût au m^2 en fonction des données statistiques de l'industrie actuellement disponibles pour le type de bâtiment et l'emplacement pertinents. Joindre également un résumé et fournir le détail complet des éléments de travail, des quantités, des prix unitaires, des allocations et des hypothèses.

Le niveau de précision d'une estimation de catégorie C doit être tel que la réserve pour éventualités ne dépasse pas les 15 %.

Estimation de catégorie B (estimation fondée) :

Cette estimation est fondée sur les dessins de l'avant-projet et sur le devis préliminaire, ce qui comprend la conception de tous les principaux systèmes et sous-systèmes ainsi que les résultats des études du terrain et des installations. Elle doit permettre d'établir des objectifs réalistes en matière de coûts et doit suffire à obtenir l'approbation finale du projet.

Soumettre les estimations de coûts de catégorie B dans un format conforme à la dernière version de l'analyse des coûts par élément publiée par l'Institut canadien des économistes en construction. Joindre également un résumé et fournir le détail complet des éléments de travail, des quantités, des prix unitaires, des allocations et des hypothèses.

Le niveau de précision d'une estimation de catégorie B doit être tel que la réserve pour éventualités ne dépasse pas les 10 %.

Estimation de catégorie A (estimation préalable à l'appel d'offres) :

Cette estimation est fondée sur les dessins et le devis de construction définitifs, élaborés avant l'appel d'offres concurrentiel. Elle doit permettre de comparer et de négocier les moindres détails des offres présentées par les entrepreneurs.

Soumettre les estimations de coûts de catégorie A en respectant la dernière version du format d'analyse des coûts par élément et du format commercial, publiés par l'Institut canadien des économistes en construction. Joindre également un résumé et fournir le détail complet des éléments de travail, des quantités, des prix unitaires, des allocations et des hypothèses.

Le niveau de précision d'une estimation de catégorie A doit être tel que la réserve pour éventualités ne dépasse pas les 5 %.

SECTION 5 GESTION DU CALENDRIER

1 Gestion, planification et contrôle du calendrier

L'expert en gestion, planification et contrôle du calendrier (expert conseil en ordonnancement) créera un système de planification et de contrôle (système de contrôle) permettant de planifier, d'ordonnancer et de suivre le projet, puis de rendre compte de son avancement. Il rédigera également un rapport sur la gestion, la planification et le contrôle du calendrier (rapport d'étape). L'élaboration et le suivi du calendrier de projet requièrent la participation conséquente d'un agent d'ordonnancement possédant les compétences et l'expérience nécessaires.

L'expert conseil en ordonnancement respectera les pratiques exemplaires de l'industrie en matière d'élaboration et de mise à jour des calendriers, conformément à ce que préconise le Project Management Institute (PMI).

Les systèmes de contrôle de TPSGC fonctionnent actuellement au moyen des logiciels Primavera Suite et MicroSoft Project. Tout logiciel utilisé par l'expert-conseil doit être entièrement intégré à ces programmes à l'aide d'une des nombreuses suites logicielles disponibles sur le marché.

1.1 Conception de calendriers

Les calendriers de projet servent de guide à la réalisation du projet et indiquent également à l'équipe de projet le moment où les activités doivent avoir lieu. Ils sont fondés sur des techniques de réseau et utilisent la méthode du chemin critique.

Voici ce dont il faut tenir compte dans la conception d'un système de contrôle :

1. le degré de précision nécessaire au contrôle et à l'établissement de rapports;
2. le cycle d'établissement des rapports (les rapports sont produits mensuellement et en fonction de ce qui est précisé dans le cadre de référence; cet aspect concerne également les rapports sur les exceptions);
3. la durée du projet, indiquée en nombre de jours;
4. les éléments nécessaires à l'établissement de rapports dans le cadre du Plan de communication des équipes de projets;
5. la nomenclature et la structure de codification à respecter pour l'appellation et le compte rendu des activités, des calendriers et des rapports.

1.2 Élaboration de calendriers

Afin de suivre et de signaler l'avancement du projet et aussi de faciliter l'examen du calendrier, il est important d'établir une norme visant l'ensemble des calendriers et des rapports produits. Il faut ainsi uniformiser la structure de répartition du travail, la détermination des jalons, l'appellation des activités, les extrants inscrits au calendrier de même que le format et l'orientation du papier.

Structure de répartition du travail

Dans l'élaboration du calendrier, l'expert-conseil doit appliquer les normes et les pratiques de TPSGC. Les deux exigences de base concernent le Système national de

gestion de projet (SNGP) et la structure de répartition du travail (SRT), laquelle vient appuyer les niveaux 1 à 4 du SNGP.

La SRT comprend plusieurs niveaux :

- Niveau 1 Titre du projet (SNGP)
- Niveau 2 Étape du projet (SNGP)
- Niveau 3 Phase du projet (SNGP)
- Niveau 4 Processus nécessaires au respect des jalons établis relativement aux produits livrables et aux points de vérification (SNGP)
- Niveau 5 Sous-processus et produits livrables à l'appui du niveau 4
- Niveau 6 Activités particulières (liste de tâches)

Si les projets ne comporteront pas nécessairement tous la totalité des étapes, des phases et des processus indiqués dans le SNGP, leur structure demeure néanmoins identique.

Jalons principaux et secondaires

Les produits livrables et les points de vérification du SNGP constituent les principaux jalons, lesquels sont nécessaires à l'élaboration de tout calendrier. Ces jalons sont utilisés pour les rapports de gestion au sein de TPSGC et permettent de suivre l'avancement du projet à l'aide de l'analyse des écarts. Les résultats des processus (niveau 4) et les résultats des sous-processus (niveau 5) constituent les jalons secondaires et servent également dans le cadre de l'analyse des écarts.

Par ailleurs, un code est attribué à chaque jalon puis utilisé dans le cadre des rapports de situation et des rapports de gestion.

Les jalons doivent avoir une durée zéro, et ils servent à évaluer l'avancement du projet.

Les jalons peuvent également représenter des contraintes externes, comme la réalisation d'une activité qui ne s'inscrit pas dans le cadre du projet tout en ayant une incidence sur celui-ci.

Activités

La conception de toutes les activités doit se faire en fonction des objectifs du projet, de son étendue ainsi que des jalons principaux et secondaires. Elle doit en outre tenir compte des réunions avec l'équipe de projet et nécessite que l'agent d'ordonnancement ait une parfaite compréhension du projet et de ses processus.

Fractionner les éléments du projet en composants plus petits et plus faciles à gérer, ce qui permettra d'organiser et de définir l'étendue globale des travaux relativement aux niveaux 5 et 6. Ces composants doivent pouvoir être planifiés, exprimés en coûts, suivis et contrôlés. En procédant ainsi, il sera possible de dresser la liste des activités du projet.

Chaque activité constitue un élément de travail distinct dont la responsabilité revient à une seule personne.

Le travail à accomplir pour chacune d'entre elles sera décrit à l'aide de propositions verbales (p. ex. Examiner le rapport d'avant-projet).

La durée des activités ne doit pas être supérieure à 2 cycles de mise à jour, sauf si elles n'ont pas encore été intégrées à une « séquence d'activités ».

Chaque activité sera inscrite au niveau 6 de la SRT et se verra attribuer un code pour les rapports de situation et les rapports de gestion.

Enfin, les activités ainsi créées seront liées les unes aux autres dans les calendriers de projet.

Logique de projet

Une fois la SRT, les jalons et la liste des activités élaborés, il est alors possible de lier ces éléments de façon logique en commençant par le jalon que constitue le lancement du projet. Le lien entre chaque activité et chaque jalon doit être logique et fondé sur un rapport de type « fin à début » (FD), « fin à fin » (FF), « début à début » (DD) ou « début à fin » (DF). Il ne doit pas y avoir d'activité ou de jalon à durée indéterminée.

Privilégier le rapport de type « fin à début ».

Dans l'élaboration des rapports, éviter d'utiliser les décalages temporels et les contraintes au lieu des activités et de la logique.

Durée des activités

La durée d'une activité (en nombre de jours) correspond au délai jugé nécessaire à la réalisation d'une tâche.

Il faut tenir compte du nombre de ressources nécessaires et disponibles pour accomplir une activité (p. ex. la disponibilité des monteurs de charpentes durant un « boom de la construction »). S'assurer en outre de tenir compte d'autres facteurs tels que le type ou le niveau de compétence des ressources disponibles, le nombre d'heures de travail possible, les conditions météorologiques, etc.

Ce processus permettra de créer plusieurs listes et calendriers différents qui seront intégrés au rapport d'étape.

Liste des activités

La liste des activités définit l'ensemble des activités et jalons nécessaires à la réalisation du projet intégral.

Liste des jalons

La liste des jalons définit tous les jalons principaux et secondaires dans le cadre d'un projet.

Calendrier principal

Le calendrier principal oriente l'établissement de rapports à l'intention de la direction relativement aux niveaux 4 et 5 de la SRT. Il indique en outre les principales activités et les jalons clés tirés du calendrier détaillé. Il est également possible d'intégrer les

prévisions des flux de trésorerie au niveau 5 de la SRT afin de suivre le plan des dépenses.

Calendrier détaillé du projet

Le calendrier détaillé doit comporter assez de renseignements (jusqu'aux niveaux 6 et 7 de la SRT) pour permettre de suivre et de contrôler l'avancement du projet. Il est en outre suffisamment précis pour garantir une planification et un contrôle adéquats.

1.3 Examen et approbation du calendrier

Une fois que l'agent d'ordonnancement a défini et codé correctement l'ensemble des activités, il faut les classer dans un ordre logique, puis fixer leur durée. L'agent d'ordonnancement pourra ensuite analyser le calendrier pour vérifier si les dates des jalons correspondent bien aux exigences contractuelles, pour ensuite le modifier au besoin en jouant sur les durées, le niveau des ressources ou la logique.

Une fois le calendrier détaillé correctement préparé, l'agent d'ordonnancement le présentera à l'équipe de projet afin qu'elle l'approuve et s'en serve comme base de référence. Il se peut que de nombreuses modifications soient apportées avant que le calendrier n'obtienne l'approbation de l'équipe et qu'il réponde enfin aux exigences contractuelles.

La version définitive doit être copiée et sauvegardée à titre de base de référence pour qu'il soit possible de surveiller les écarts, lesquels seront ensuite mentionnés dans les rapports.

1.4 Suivi et contrôle du calendrier

Une fois que le calendrier est établi comme base de référence, il peut être mieux suivi et contrôlé, et il est alors possible de produire des rapports.

Le suivi s'effectue en comparant le degré d'achèvement des activités de référence (exprimé en pourcentage) et les dates des jalons avec les dates réelles et prévues. On peut ainsi repérer les écarts, noter les retards possibles, les questions non résolues ou les préoccupations, puis proposer des solutions (sous forme de rapports) qui permettront de traiter les problèmes graves liés à la planification et à l'ordonnancement.

Pendant toute la durée du projet et dès les premières étapes, analyser toutes les activités qui sont sur le point de commencer, en cours ou achevées, puis établir des rapports en la matière.

Les nombreux rapports qui découleront de l'analyse du calendrier de référence seront intégrés au rapport de gestion du calendrier dans la section Services requis (SR).

Rapport d'étape

Le rapport d'étape indique l'état d'avancement de chaque activité à la date de sa publication. Il signale toute modification passée ou future de la logique, fait état des prévisions relatives à l'avancement et à l'achèvement, et indique en outre les dates de début et de fin réelles de toutes les activités ayant fait l'objet d'un suivi.

Le rapport d'étape comprend les éléments suivants :

Un compte rendu qui détaille le travail accompli jusque là, compare l'avancement des activités avec le calendrier planifié et présente les prévisions actuelles. Ce compte rendu devrait en outre résumer les progrès accomplis jusque là en justifiant les écarts et les retards réels ou probables. Il doit également décrire les mesures à prendre pour combler les retards et résoudre les problèmes afin de respecter le calendrier détaillé et les chemins critiques.

Le compte rendu commence par un énoncé de l'état général du projet, puis il passe en revue les retards et les problèmes potentiels, évalue le bon déroulement du projet, signale les retards éventuels, les questions et les préoccupations non réglées, et indique les solutions permettant de remédier aux graves problèmes de planification et d'ordonnancement.

Un rapport sur les écarts qui comprend les documents d'ordonnancement connexes, donne le détail des tâches accomplies jusque là et compare l'avancement du travail avec le calendrier prévu. Ce rapport devrait en outre résumer les progrès accomplis jusque là en justifiant les écarts et les retards réels ou probables. Il doit également décrire les mesures à prendre pour combler les retards et résoudre les problèmes afin de respecter le calendrier détaillé et les chemins critiques.

Un rapport d'évaluation du déroulement du projet qui indique toutes les activités et les jalons dont la marge totale est négative, nulle ou de cinq jours maximum afin de pouvoir repérer facilement les chemins critiques ou quasi critiques dans l'ensemble du projet.

Les pièces jointes suivantes doivent également figurer au rapport d'étape : le diagramme de la SRT, les listes des activités, les listes des jalons, les calendriers principaux et le calendrier détaillé du projet.

Rapport sur les exceptions

L'agent d'ordonnancement doit assurer un suivi et un contrôle permanents; il doit repérer rapidement les problèmes imprévus ou critiques susceptibles d'avoir une incidence sur le projet, puis en informer les personnes concernées.

En cas de problèmes imprévus ou critiques, l'agent d'ordonnancement informera le gestionnaire de projet et proposera des solutions de rechange en présentant un rapport sur les exceptions.

Ce rapport sera suffisamment détaillé pour permettre de définir clairement les éléments suivants :

1. Modification de l'étendue du projet : établir la nature, la raison et l'incidence globale de toutes les modifications qui ont été ou qui seront probablement apportées à l'étendue et qui ont une incidence sur le projet.
2. Retard ou avancement des échéances : déterminer la nature, la raison et l'incidence globale de toutes les variations de durée qui ont été repérées ou qui sont susceptibles de se produire.
3. Solutions de retour vers la base de référence du projet : déterminer la nature et l'incidence probable de toutes les solutions proposées pour ramener le projet à

sa durée de référence.

1.5 Soumissions courantes

Pour chaque étape de soumission ou pour chaque produit livrable, fournir un rapport d'étape complet et à jour. Le contenu de ce rapport variera en fonction des exigences et de la phase de projet concernée. Habituellement, un rapport d'étape comporte les éléments suivants :

1. un résumé;
2. un compte rendu;
3. un rapport sur les écarts;
4. un rapport d'évaluation du déroulement du projet;
5. un rapport sur les exceptions (selon le cas);
6. un diagramme de la structure de répartition du travail;
7. une liste des activités;
8. une liste des jalons;
9. le calendrier principal et les prévisions relatives aux flux de trésorerie;
10. le calendrier de projet détaillé (diagramme à flèches ou diagrammes à barres).

1.6 Extrants inscrits au calendrier et formats des rapports

Le format et l'orientation du papier sont de simples suggestions et ne jouent pas de rôle particulier. Le format peut varier en fonction des renseignements et du nombre de colonnes nécessaires.

Rapport d'étape

Format du papier :	lettre
Orientation du papier :	portrait
Format du titre :	titre du projet, type de rapport, date d'impression, date des données, bloc de révision
Corps du texte :	le texte du rapport doit respecter le format des autres rapports rédigés au sein du ministère des Approvisionnements et Services (MAS).
Colonnes des rapports sur les écarts :	Code de l'activité, Nom de l'activité, Date de fin prévue, Date de révision prévue, Écart, Variance, Degré d'achèvement (en %)
Colonnes des rapports d'évaluation du déroulement du projet :	Code de l'activité, Nom de l'activité, Durée, Date de début, Date de fin, Degré d'achèvement (en %), Marge totale

Rapport sur les exceptions

Format du papier :	lettre
Orientation du papier :	portrait
Format du titre :	titre du projet, type de rapport, date d'impression, date des données, révision
Corps du texte : au sein du MAS	le texte doit respecter le format des autres rapports rédigés

Format du papier :	lettre
Orientation du papier :	paysage
Format du titre :	titre du projet, type de rapport, date d'impression, date des données, révision
Colonnes :	Code de l'activité, Nom de l'activité, Durée, Temps restant, Date de début, Date de fin, Marge totale

Structure de répartition du travail (arborescence) :

Format du papier :	lettre
Orientation du papier :	portrait
Colonnes :	Code de la SRT, Nom de la SRT, Durée, Estimation des coûts, Dates de début et de fin
Format du bas de page :	titre du projet, type de rapport, date d'impression, date des données, bloc de révision

Liste des activités

Format du papier :	lettre
Orientation du papier :	portrait
Colonnes :	Code de l'activité, Nom de l'activité, Date de début, Date

	de fin, Activité précédente, Activité suivante
Format du bas de page :	titre du projet, type de rapport, date d'impression, date des données, bloc de révision

Trier par Début anticipé, par Fin anticipée, puis par Code d'activité et terminer avec la SRT.

Liste des jalons

Format du papier :	lettre
Orientation du papier :	portrait
Format du bas de page :	titre du projet, type de rapport, date d'impression, date des données, bloc de révision
Colonnes :	Code de l'activité, Nom de l'activité, Date de début, Date de fin

Trier par Début anticipé, par Fin anticipée, puis par Code d'activité et ne pas inclure la SRT.

Calendrier principal (diagramme à barres)

Format du papier :	format tabloïde (11 po sur 17 po)
Orientation du papier :	paysage
Format du bas de page :	titre du projet, type de rapport, date d'impression, date des données, bloc de révision
Colonnes :	Code de l'activité, Nom de l'activité, Durée, Degré d'achèvement (en %), Date de début, Date de fin, Marge totale

Trier par Début anticipé, par Fin anticipée, puis par Code d'activité et terminer avec la SRT.

Calendriers détaillés de projet (diagramme à barres)

Format du papier :	format tabloïde (11 po sur 17 po)
Orientation du papier :	paysage
Format du bas de page :	titre du projet, type de rapport, date d'impression, date des données, bloc de révision
Colonnes :	Code de l'activité, Nom de l'activité, Durée, Degré d'achèvement (en %), Date de début, Date de fin, Marge totale

Trier par Début anticipé, par Fin anticipée, puis par Code d'activité et terminer avec la SRT.

ANNEXE A – Liste de vérification pour la soumission des documents de construction à de TPSGC

Dernière mise à jour : 30 novembre 2012

Date :	
Titre du projet :	**Lieu du projet :**
Numéro du projet :	**Numéro du contrat :**
Nom de l'expert-conseil :	**Gestionnaire de projet de TPSGC :**
Stade de la soumission : **66%** **99%** **100%**	

Sujet	Vérifié par	Commentaires	Suivi
Devis			
1 Devis directeur national			
1a La plus récente édition du DDN a été utilisée.			
1b Les sections du DDN concernant tous les travaux indiqués dans les dessins sont présentes et ont été modifiées.			
2 Organisation du devis			
2a Le format de page 1/3 – 2/3 du DDN ou le format pleine page du Devis de construction Canada a été utilisé.			
2b Chaque section commence sur une nouvelle page et le numéro du projet, le titre de la section, le numéro de la section ainsi que le numéro de la page figurent sur chaque page.			
2c La date du devis et le nom de l'expert-conseil ne sont pas indiqués.			
3 Terminologie			
3a Le terme « représentant du Ministère » est utilisé au lieu des termes « ingénieur », « TPSGC », « propriétaire », « expert-conseil » ou « architecte ».			
3b Les notes « vérification sur place », « selon les instructions », « pour correspondre à ce qui existe », « exemple », « égal à », « équivalent à » et « à déterminer sur place par » ne sont pas utilisées.			
4 Dimensions			
4a Les dimensions ne sont exprimées qu'avec les valeurs du système			

métrique.			
5 Normes			
5a L'édition la plus récente de toutes les références citées a été utilisée.			
6 Désignation des matériaux			
6a La méthode de désignation des matériaux repose sur des normes reconnues. Les appellations commerciales et les numéros de modèle exacts ne sont pas précisés.			
6b Les matériaux sont prescrits à l'aide de normes et de critères de performance (sinon, le bon format de matériaux acceptables a été utilisé).			
6c Indiquez si des appellations non restrictives et non commerciales sont utilisées pour les « devis descriptifs » et pour les « devis de performance ».			
6d Indiquez si une liste des produits jugés acceptables a été utilisée.			
6e Le terme « fabricants acceptables » n'est pas utilisé.			
6f Il n'y a pas eu recours à un fournisseur unique.			
6g Si l'on a eu recours à un fournisseur unique, la formulation adéquate a été utilisée et une justification a été fournie à la DAMI pour tous les produits provenant d'un fournisseur unique.			
7 Prix unitaires			
7a Les prix unitaires ne sont utilisés que pour les travaux dont l'appréciation est difficile.			
8 Allocations en espèces			
8a Indiquez si des allocations en espèces ont été utilisées.			
9 Garanties			
9a Indiquez si la durée des garanties dépasse 12 ou 24 mois.			
9b Les garanties des fabricants ne sont pas indiquées.			
10 Étendue des travaux			
10 Il n'y a aucun paragraphe intitulé Étendue des travaux dans le document.			
11 Paragraphes « Résumé » et « Contenu de la section »			
11a Dans la Partie 1 de la section, les paragraphes « Résumé » et « Contenu de la section » ne sont pas utilisés.			
12 Sections connexes			
12a La liste des renvois à des annexes et à des sections connexes est juste.			

13 Table des matières			
13a La table des matières présente la liste complète des plans et des sections du devis avec le bon nombre de pages ainsi que les bons titres de dessins et noms de sections.			
14 Spécifications du guide régional			
14a Les instructions générales figurent dans le guide (Section 01 00 10 dans le SCN).			
15 Santé et sécurité			
15a La Section 01 35 29.06 – Santé et sécurité est comprise.			
16 Rapport sur les substances désignées			
16 a La Section 01 14 25 – Rapport sur les substances désignées est comprise.			
***17* Rapports d'étude sur le sous-sol**			
17a Les rapports d'étude sur le sous-sol sont compris dans la Division 31.			
18 Expérience et qualifications			
18a Les exigences en matière d'expérience et de qualifications ne figurent pas dans les sections du devis.			
19 Préqualification			
19a La soumission ne comprend pas d'exigences obligatoires en matière de préqualification de l'entrepreneur ou du sous-traitant, ni de références à des certificats, à des transcriptions ou à des numéros de permis d'un entrepreneur ou d'un sous-traitant.			
20 Questions de passation de marché			
20a Les questions de passation de marché ne figurent pas dans le devis.			
20b La Division 00 du DDN n'est pas utilisée.			
21 Questions de qualité			
21a Il n'y a aucune clause du devis entre crochets « [ ] » ou lignes « ____ » indiquant que le devis est incomplet ou qu'il manque des renseignements.			

Sujet	Vérifié par	Commentaires	Suivi
Dessins			
1 Cartouches d'inscription			
1a Le cartouche d'inscription de TPSGC est utilisée.			
2 Dimensions			
2a Les dimensions sont exprimées uniquement avec les valeurs du système métrique.			
3 Appellations commerciales			
3a Les appellations commerciales ne sont pas utilisées.			
4 Notes du devis			
4a Il n'y a aucune note relative au devis.			
5 Terminologie			
5a Le terme « représentant du Ministère » est utilisé au lieu des termes « ingénieur », « TPSGC », « propriétaire », « expert-conseil » ou « architecte ».			
5b Les notes « vérification sur place », « selon les instructions », « pour correspondre à ce qui existe », « exemple », « égal à », « équivalent à » et « à déterminer sur place par » ne sont pas utilisées.			
6 Renseignements à inclure			
6a Les dessins d'architecture et de génie portent le sceau et la signature du responsable de la conception.			
6b Les détails du projet liés à la quantité de matériaux, à la configuration, aux dimensions et à la construction sont compris.			
6c Les références faites à des travaux et éléments futurs qui ne sont pas dans le contrat n'apparaissent pas dans le document ou sont mentionnées au minimum et clairement identifiées comme telles.			

Je confirme que les plans et le devis ont été rigoureusement examinés et que tous les points de la liste ci-dessus ont été réglés ou intégrés. Je reconnais et j'accepte que le fait de signer certifie que tous les éléments cités ci-dessus ont été réglés.

Représentant de l'expert-conseil : _____

Nom de l'entreprise : _____

Signature :_____ Date : _____

ANNEXE B – Exemple d'addenda
Dernière mise à jour : 22 avril 2008

ADDENDA N^{o} _____

Numéro du projet : _____

Les modifications suivantes aux documents de soumission entrent en vigueur immédiatement. Le présent addenda fera partie des documents contractuels.

DESSINS

NOTE AU RÉDACTEUR : Indiquer le numéro et le titre du dessin, dresser ensuite la liste des modifications ou indiquer le numéro et la date de révision, puis réimprimer le dessin avec l'addenda.

1 A1 Architecture

.1

DEVIS

NOTE AU RÉDACTEUR : Indiquer le numéro et le titre de la section.

1 Section 01 00 10 – Instructions générales

NOTE AU RÉDACTEUR : Dresser la liste des modifications (p. ex. suppression, ajout ou modification) par article ou par paragraphe.

.1 Supprimer l'article (xx) en entier.
.2 Se référer au paragraphe (xx.x) et modifier...

2 Section 23 05 00 – Exigences générales concernant les résultats des travaux – Mécanique

.1 Ajouter le nouvel article (x) suivant :

ANNEXE C – Exemple de table des matières
Dernière mise à jour : 22 avril 2008

N° du projet : _____ **Table des matières**
Page 1 de ___

DESSINS ET DEVIS

DESSINS :

NOTE AU RÉDACTEUR : Dresser la liste des dessins par numéro et par titre.

C-1	Génie civil
L-1	Aménagement paysager
A-1	Architecture
S-1	Structure
M-1	Mécanique
E-1	Électrique

DEVIS :

NOTE AU RÉDACTEUR : Dresser la liste des divisions, sections (par numéro et par titre) et indiquer le nombre de pages.

DIVISION	SECTION	NOMBRE DE PAGES
DIVISION 01	01 00 10 – Instructions générales.....	xx
	01 14 25 – Rapport sur les substances désignées.....	xx
	01 35 30 – Santé et sécurité.....	xx
DIVISION 23	23 xx xx	
DIVISION 26	26 xx xx	

ANNEXE D

MANUEL DE L'UTILISATEUR SUR LA STRUCTURE DU RÉPERTOIRE ET LES CONVENTIONS D'APPELLATION NORMALISÉES DES DOCUMENTS D'APPEL D'OFFRES POUR LA CONSTRUCTION EN FORMAT CD-ROM

Publié par

la Direction de l'attribution des marchés immobiliers

TPSGC

Mai 2005

Dernière mise à jour : le 3 juin 2008

Version 1.0

PRÉFACE

Le gouvernement du Canada (GC) s'est engagé à créer un environnement électronique pour la plupart de ses services. Cet engagement concerne la publication et la diffusion des possibilités de contrats et comprend les demandes de soumissions de construction. Par conséquent, il est nécessaire d'obtenir un exemplaire des dessins et des devis de construction (en format PDF ***sans*** protection par mot de passe) sur un ou plusieurs CD-ROM afin de faciliter le transfert électronique de ces documents vers le Service électronique d'appels d'offres du gouvernement (SEAOG).

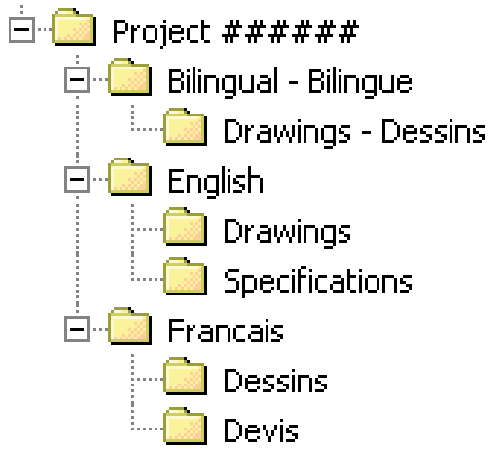
Il s'avère donc nécessaire d'utiliser une structure de répertoire et une convention d'appellation des fichiers communes afin de veiller à ce que les renseignements fournis aux entrepreneurs par voie électronique ou sur copie papier sont conformes aux normes adoptées par les industries de l'immobilier, tant en matière de conception que de construction. Le présent manuel définit la norme que doivent respecter les experts-conseils et les imprimeurs au moment du formatage et de l'organisation de l'information, et ce, que les dessins et devis soient créés par le balayage de documents papier ou enregistrés en format PDF à partir du logiciel d'origine (AutoCAD, NMS Edit, MS-Word, etc.).

Il est important de noter que la procédure décrite dans le présent manuel ne dispense pas les experts-conseils de suivre les normes établies pour la création de dessins et de devis. Le présent guide vise uniquement à fournir une norme pour organiser et nommer les fichiers électroniques qui seront enregistrés sur CD-ROM.

1. STRUCTURE DE RÉPERTOIRE

1.1 Sous-dossiers de 1er, 2e et 3e niveaux

Chaque CD-ROM, que ce soit pour la première demande de soumissions (appel d'offres) ou pour une modification (addenda), doit comprendre les éléments suivants de la structure de répertoire :



Il est important de tenir compte des remarques suivantes au sujet de cette structure de répertoire :

- Le dossier « *Projet ######* » constitue le 1er niveau de la structure de répertoire et « ###### » représente chaque chiffre du numéro de projet. Le numéro de projet doit toujours être utilisé pour nommer le dossier de 1er niveau et il doit toujours être indiqué. Il est possible d'ajouter du texte libre à la suite du numéro de projet, comme par exemple une brève description ou le titre du projet.
- Les dossiers « *Bilingual – Bilingue* », « *English* » et « *Français* » constituent le 2e niveau de la structure de répertoire. Les dossiers de 2e niveau **ne peuvent pas** être renommés car le SEAOG utilise ces noms à des fins de validation. La structure doit toujours comporter au moins un des dossiers « *Bilingual – Bilingue* », « *English* » ou « *Français* », et ceux-ci doivent toujours contenir un sous-dossier de 3e niveau.
- Les dossiers « *Drawings – Dessins* », « *Drawings* », « *Specifications* », « *Dessins* » et « *Devis* » constituent le 3e niveau de la structure de répertoire. Les dossiers de 3e niveau **ne peuvent pas** être renommés car le SEAOG utilise ces noms à des fins de validation. Chaque document doit comporter au moins un dossier de 3e niveau.

IMPORTANT :	Les éléments applicables de la structure de répertoire (dossiers des 1er, 2e et 3e niveaux) sont obligatoires et ne peuvent pas être modifiés.

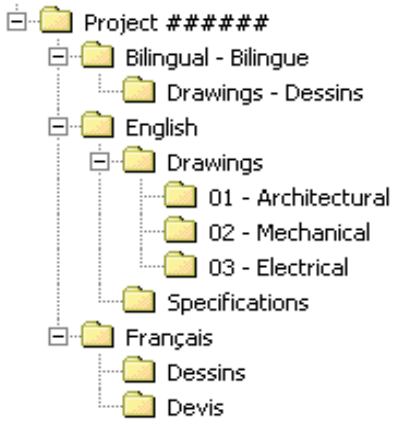
1.2 Sous-dossiers de 4e niveau pour les dessins

Les dossiers « *Drawings – Dessins* », « *Drawings* » et « *Dessins* » doivent comporter des sous-dossiers de 4e niveau qui ont été créés pour refléter les différentes spécialités du jeu de dessins.

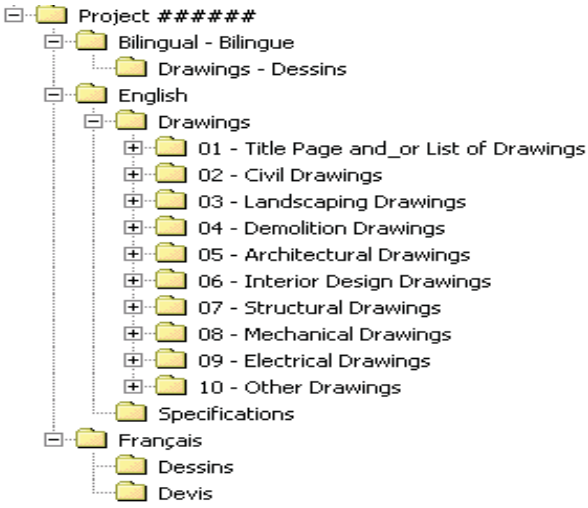
Étant donné que l'ordre d'apparition à l'écran des sous-dossiers détermine également leur ordre d'impression, le nom des sous-dossiers inclus dans les dossiers « *Drawings – Dessins* », « *Drawings* » et « *Dessins* » doit obligatoirement être précédé d'un chiffre.

Remarque : Le premier sous-dossier doit toujours être réservé à la page de titre ou à la liste des dessins, à moins que le premier dessin du jeu ne soit réellement un dessin numéroté relevant d'une discipline particulière.

Exemples de sous-dossiers de 4e niveau pour les dessins :



ou



1.2.1 Convention d'appellation

Les sous-dossiers de 4e niveau pour les dessins doivent respecter la convention d'appellation suivante.

Pour les dossiers « *Drawings* » et « *Dessins* » :

- Y

où :

= un numéro à deux chiffres allant de 01 à 99 (le zéro de tête doit être inclus)
Y = le nom du dossier

Exemple : 03 – Mécanique

Pour le dossier « *Drawings* – *Dessins* » :

- Y - Z

où :

= un numéro à deux chiffres allant de 01 à 99 (le zéro de tête doit être inclus)
Y = le nom anglais du dossier
Z = le nom français du dossier

Exemple : 04 – Electrical – Électricité

Il convient de remarquer que la numérotation des sous-dossiers de 4e niveau sert uniquement à des fins de classement et ne correspond pas à une discipline particulière. Par exemple, le sous-dossier « *Architectural* – *Architecture* » pourrait recevoir le numéro 05 lorsqu'un projet comprend déjà quatre autres spécialités ou il pourrait recevoir le numéro 01 dans un autre projet où l'architecture apparaît en premier dans le jeu de dessins.

Il est primordial que l'ordre d'apparition des dessins sur le CD-ROM soit exactement identique à celui du document imprimé. Le SEAOG se conformera aux règles suivantes pour classer les dessins en vue de les afficher à l'écran ou de les imprimer :

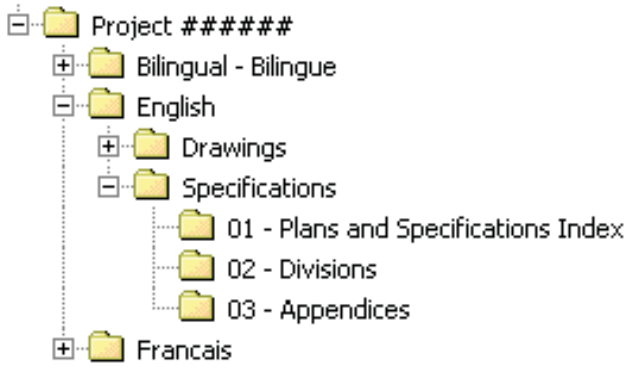
- Le classement alphanumérique s'effectue par ordre croissant.
- L'ordre alphanumérique des sous-dossiers détermine leur ordre d'apparition à l'écran de même que leur ordre d'impression (p. ex. tous les fichiers de dessin en format PDF qui se trouvent dans le sous-dossier 01 seront imprimés par ordre alphanumérique avant les dessins du sous-dossier 02 et ainsi de suite).
- Chaque fichier de dessin en format PDF contenu dans chaque sous-dossier sera également classé par ordre alphanumérique. Cela déterminera son ordre d'apparition à l'écran et son ordre d'impression (p. ex. le Dessin A001 sera imprimé avant le Dessin A002, le Dessin M02 avant le Dessin M03, et ainsi de suite).

1.3 Sous-dossiers de 4e niveau pour les devis

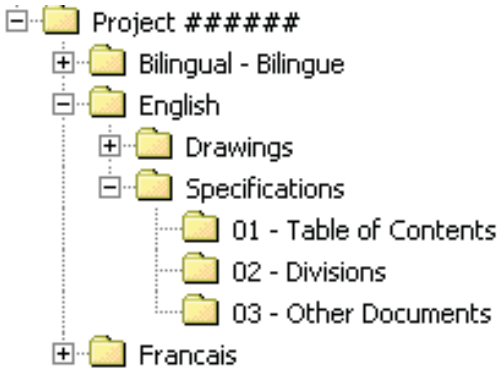
Les dossiers « *Specifications* » et « *Devis* » doivent comprendre des sous-dossiers de 4e niveau, correspondant aux différents éléments du devis.

Étant donné que l'ordre d'apparition à l'écran des sous-dossiers détermine également leur ordre d'impression, le nom des sous-dossiers figurant dans les dossiers « *Specifications* » et « *Devis* » doit obligatoirement débuter par un chiffre.

Exemples de sous-dossiers de 4e niveau pour les devis :



ou



1.3.1 Convention d'appellation

Les sous-dossiers de 4e niveau pour les devis doivent respecter la convention d'appellation décrite ci-dessous.

Pour les dossiers « *Specifications* » et « *Devis* » :

- Y

où :

## =	un numéro à deux chiffres allant de 01 à 99 (le zéro de tête doit être inclus)
Y =	le nom du dossier

Exemple : 02 – Divisions

Il convient de remarquer que la numérotation des sous-dossiers de 4e niveau sert uniquement au classement et ne correspond pas à une discipline particulière.

Il est primordial que l'ordre d'apparition des éléments du devis sur le CD-ROM soit exactement identique à celui du document imprimé. Le SEAOG se conformera aux règles suivantes pour

classer chaque élément du devis en vue de les afficher à l'écran ou de les imprimer :

- Le classement alphanumérique s'effectue par ordre croissant.
- L'ordre alphanumérique des sous-dossiers détermine leur ordre d'apparition à l'écran de même que leur ordre d'impression (p. ex. tous les fichiers de devis en format PDF qui se trouvent dans le sous-dossier 01 seront imprimés par ordre alphanumérique avant les fichiers PDF du sous-dossier 02 et ainsi de suite).
- Tous les fichiers de devis en format PDF contenus dans chaque sous-dossier seront également classés par ordre alphanumérique. Cela déterminera leur ordre d'apparition à l'écran et leur ordre d'impression (p. ex. le fichier Division 01 sera imprimé avant le fichier Division 02, le fichier 01 – Annexe A avant le fichier 02 – Annexe B et ainsi de suite).

2. CONVENTION D'APPELLATION POUR LES FICHIERS PDF

Les dessins, les éléments du devis et tous les autres documents faisant partie du document d'appel d'offres doivent être convertis en PDF (sans protection par mot de passe) en respectant la convention d'appellation décrite ci-dessous. En outre, chaque fichier PDF doit être enregistré dans le bon sous-dossier de la structure de répertoire.

2.1 Dessins

Chaque dessin doit être présenté sur **une seule page** dans un fichier PDF **distinct**. Voici la convention d'appellation des dessins :

X### - Y

où :

X = la ou les lettre(s) figurant dans le cartouche du dessin (p. ex. « *A* » pour Architecture ou « *AI* » pour Aménagement intérieur) et indiquant la discipline concernée

= le numéro figurant dans le cartouche du dessin (composé d'un à trois chiffres)

Y = le titre apparaissant dans le cartouche du dessin (dans le cas des dessins bilingues, le titre anglais et le titre français doivent tous deux apparaître)

Exemple : A001 – Détails du rez-de-chaussée

Tous les dessins se rapportant à une même discipline et enregistrés dans un même sous-dossier de 4^{e} niveau doivent comporter la même lettre (p. ex. « *A* » pour les dessins architecturaux) et être numérotés. Le numéro figurant dans le nom du fichier PDF doit, dans la mesure du possible, correspondre au numéro du dessin (sauf dans les cas où un zéro de tête est nécessaire).
Il est important de tenir compte des remarques suivantes en ce qui concerne les dessins :

- Les fichiers de dessin en format PDF qui se trouvent dans chaque sous-dossier sont classés par ordre alphanumérique à des fins d'affichage et d'impression. Si une discipline particulière comporte plus de 9 dessins, les numéros doivent alors être

composés d'au moins deux chiffres. On doit par exemple nommer le premier dessin A01, et non pas A1, afin que le dessin A10 n'apparaisse pas entre les dessins A1 et A2. La même règle s'applique lorsqu'une discipline comporte plus de 99 dessins. Les numéros doivent dans ce cas être composés de trois chiffres (p. ex. M003 au lieu de M03).

- Les fichiers de dessin en format PDF qui se trouvent dans le dossier « *Bilingual – Bilingue* » ne doivent pas figurer à la fois dans les dossiers « *English* » et « *Français* ».

- Les dessins qui n'appartiennent pas à une discipline particulière (p. ex. la page de titre ou la liste des dessins) et qui ne sont pas numérotés seront classés par ordre alphabétique. Bien que cela ne pose aucun problème lorsqu'il n'existe qu'un seul dessin de ce type dans un sous-dossier, cela pourrait altérer le classement si le sous-dossier en comporte plusieurs. Par conséquent, si l'ordre alphabétique des dessins ne correspond pas à l'ordre des copies papier, les dessins doivent être nommés conformément à la convention d'appellation décrite ci-dessous lors de leur conversion en format PDF, afin d'être affichés et imprimés dans le bon ordre.

  ## - Y

  où :

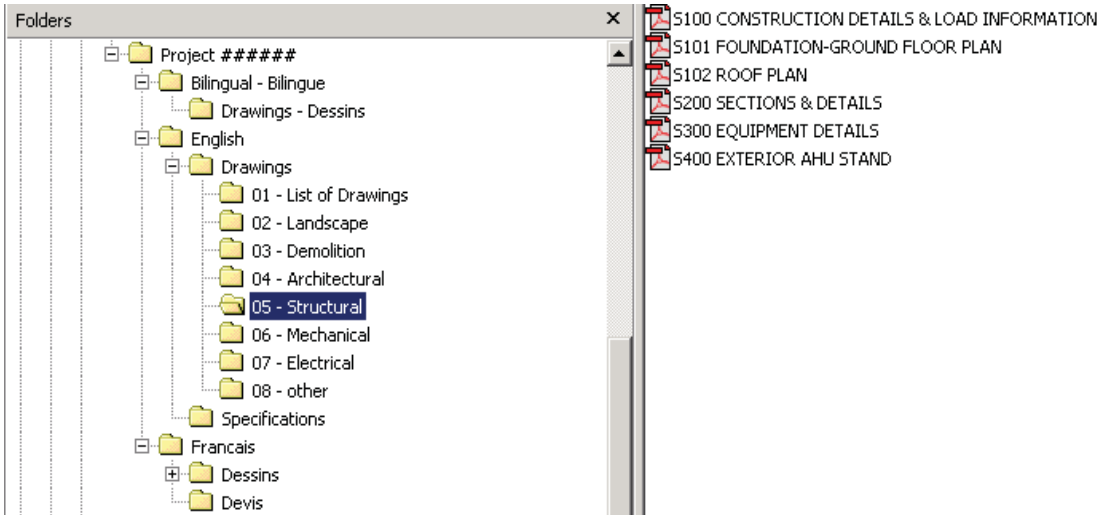
  ## = un numéro à deux chiffres allant de 01 à 99 (le zéro de tête doit être inclus)

  Y = le titre du dessin

  Exemple : 01 – Page de titre
  02 – Liste des dessins

  Si les fichiers PDF ne sont pas numérotés, le fichier « *Liste des dessins* » apparaîtra avant le fichier « *Page de titre* » en raison du classement alphabétique.

Exemple d'un sous-dossier de 4e niveau contenant des dessins :



2.2. Devis

Chaque division du devis doit figurer dans un fichier PDF distinct et toutes les pages de ce fichier doivent avoir le même format (longueur et largeur). L'index des plans et des devis doit lui aussi figurer dans un fichier PDF distinct. Tout autre document inclus dans le devis, par exemple une annexe, doit également figurer dans un fichier PDF distinct.

2.2.1 Documents autres que les divisions du devis

Étant donné que les fichiers PDF enregistrés dans les sous-dossiers du devis sont classés par ordre alphanumérique (et en ordre croissant) à des fins d'affichage et d'impression, tous les fichiers figurant dans les dossiers autres que le sous-dossier « *Divisions* » doivent être numérotés de la façon suivante :

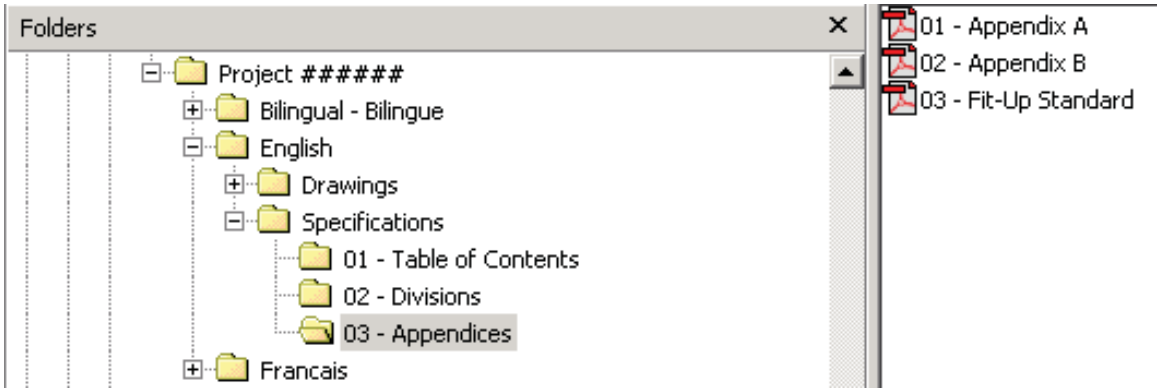
- Y

où :

## =	un numéro à deux chiffres allant de 01 à 99 (le zéro de tête doit être inclus)
Y =	le titre du document

Exemple : 01 – Liste des plans et des sections du devis

Exemple de contenu d'un sous-dossier (autre que le sous-dossier « *Divisions* ») :



2.2.2 Divisions du devis

Les divisions du devis doivent être nommées de la façon suivante :

Division ## - Y

où :

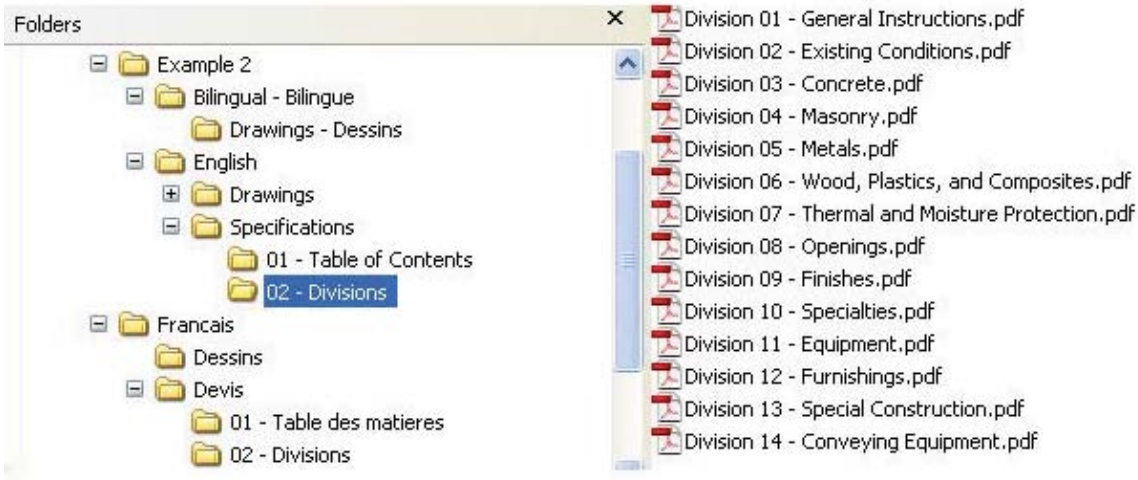
Division ## =	le mot « *Division* » suivi d'une espace, puis d'un numéro à deux chiffres allant de 01 à 99 (le zéro de tête doit être inclus)
Y =	le nom de la division du devis conformément au **Répertoire normatif DCC et DSI**™

Exemple : Division 05 – Métaux

Il est important de tenir compte des remarques suivantes en ce qui concerne le devis :

- Il **faut respecter** la numérotation des divisions établie par le **Répertoire normatif DCC et DSI**™ , même si certaines divisions ne sont pas utilisées dans un projet particulier. Ainsi, la Division 05 sera toujours la Division 05, même si la Division 04 ne figure pas dans le projet.

Exemple du contenu du sous-dossier « *Divisions* » :



3. ÉTIQUETTE DU CD-ROM

Les renseignements suivants doivent figurer sur chaque CD-ROM :

Numéro du projet / Project *Number*
Titre du projet / Project *Title*/
Documents d'appel d'offres / Documents for Tender
CD *X* de/of *X*

Exemple :

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

ANNEXE E

GUIDE DE RÉFÉRENCE DE BASE SUR LA CONVERSION DES DESSINS DE CONSTRUCTION EN FORMAT DE DOCUMENT PORTABLE (PDF)

Publié par

la Direction de l'attribution des marchés immobiliers

TPSGC

Mai 2005

Dernière mise à jour : 3 mai 2005

Version 1.0

PRÉFACE

Le format de document portable (PDF) est le format standard pour les documents qui sont publiés dans le SEAOG. Il faut donc obtenir des experts-conseils en architecture et en génie une version électronique des dessins et des devis en format PDF pour les appels d'offres relatives à des projets de construction du GC.

Pour obtenir la meilleure qualité en termes de résolution et d'impression, les experts-conseils doivent, dans la mesure du possible, faire en sorte que les fichiers de dessin et de devis en format PDF soient dérivés du logiciel d'origine qui a servi à les créer. On ne peut numériser les dessins que dans des circonstances particulières, par exemple quand le document d'appel d'offres de construction ne comprend aucune version électronique d'un dessin.

Le présent document contient des renseignements de base concernant la conversion de dessins de conception et dessin assistés par ordinateur (CDAO) en format PDF. La création d'un fichier PDF à partir d'un dessin de CDAO est un processus relativement simple une fois que toutes les configurations et tous paramètres sont définis. En fait, la conversion ne devrait pas prendre plus de temps qu'il n'en faut pour créer un fichier de tracé ou pour envoyer un dessin à une imprimante. Le présent guide ne vise pas à traiter de tous les aspects techniques de la conversion, qui peut être effectuée de différentes façons, mais à souligner les points importants du processus et des paramètres des fichiers. En outre, le présent guide ne traite pas de la conversion de devis étant donné que cette conversion n'exige pas de configuration ou de paramètres particuliers.

Les renseignements contenus dans le présent guide de référence ne signifient pas que les experts-conseils n'ont pas à suivre les normes établies en matière de production de dessins et de devis. Le présent guide ne sert qu'à donner des renseignements de base concernant le processus de conversion de dessins et de devis en format PDF en tenant compte du fait qu'il est possible d'obtenir des renseignements techniques détaillés supplémentaires des différents fabricants de logiciels.

1. PILOTES D'IMPRESSION

Adobe Acrobat est fourni avec deux pilotes d'impression différents qui peuvent convertir les dessins de CDAO en fichiers PDF : Acrobat PDF Writer et Acrobat Distiller. Avant de créer un fichier PDF à partir d'un dessin de CDAO, il faut choisir le pilote qui doit être utilisé.

Acrobat PDF Writer est un pilote d'impression non PostScript qui fonctionne mieux avec des documents qui ne contiennent pas de graphiques complexes.

Acrobat Distiller est un pilote d'impression PostScript qui fonctionne mieux avec des documents contenant des remplissages PostScript, des graphiques en format Encapsulated PostScript ou d'autres éléments complexes.

Il est recommandé d'utiliser Acrobat Distiller pour créer des fichiers PDF à partir de dessins d'architecture et de génie en raison de leur taille et de leur nature graphique complexe.

2. CONFIGURATION D'IMPRESSION

Avant de convertir un dessin de CDAO en fichier PDF, il est nécessaire de créer un fichier de configuration d'impression Acrobat pour indiquer le format de papier du fichier PDF. On peut exécuter cette fonction dans le logiciel de CDAO plutôt que d'utiliser un format de papier personnalisé défini pour la fonction Acrobat Distiller. La méthode recommandée est d'ajouter un traceur Adobe PostScript dans le logiciel de CDAO et de définir les paramètres voulus en ce qui a trait à la source de support, au format, à l'échelle et à l'orientation. La configuration peut ensuite être réutilisée pour simplifier le processus de conversion pour des fichiers créés ultérieurement qui utilisent le même format de page.

Bien que cela ne soit pas recommandé, il est également possible de définir un format personnalisé dans Acrobat Distiller, dans le menu *Propriétés*.

3. CRÉATION DE FICHIERS PDF

Une fois la configuration d'impression terminée dans le logiciel de CDAO, lancez Acrobat Distiller et définissez les paramètres voulus dans les sous-menus *Préférences* et *Options de tâche*. Assurez-vous que les dimensions de la page correspond au format de papier sélectionné dans le logiciel de CDAO pour créer le fichier. Des paramètres particuliers peuvent être enregistrés sous différents noms pour usage ultérieur.

Lorsque l'application Acrobat Distiller est ouverte, assurez-vous que le format de papier voulu s'affiche dans la fenêtre *Options de tâche*. Ensuite, il suffit d'amener le fichier de CDAO dans la boîte de création d'Acrobat Distiller.

Une barre de progression s'affiche pendant la conversion et le nouveau fichier PDF devrait s'ouvrir et s'afficher pour que vous puissiez le vérifier.

4. PARAMÈTRES DES FICHIERS PDF

4.1 Sécurité

Adobe Acrobat comporte des fonctions de sécurité qui permettent de protéger les fichiers en limitant les changements qui peuvent être apportés à ces derniers. Cependant, étant donné que les fichiers seront diffusés dans le SEAOG et qu'ils sont destinés à être imprimés, les fichiers **ne doivent pas** être protégés par un mot de passe et ils **doivent** pouvoir être imprimés.

4.2 Orientation des dessins

Les fichiers de dessin PDF finaux doivent être affichés à l'écran selon l'orientation souhaitée pour la visualisation par les utilisateurs. Pour ce faire, on peut ajuster la configuration du traceur. Si le dessin n'est pas orienté correctement après la conversion, on peut le faire pivoter manuellement dans Adobe Acrobat.

4.3 Type de police

Pour éviter des problèmes au moment de la conversion et pour minimiser le risque d'erreurs d'affichage des caractères, les polices utilisées pour la production de dessins d'exécution doivent être des *polices PostScript ou True Type*.

4.4 Résolution

Étant donné que les fichiers PDF sont destinés à être imprimés, il est important de sélectionner une résolution convenable. Il est recommandé de sélectionner une résolution de 600 points par pouce.

4.5 Échelle

Lorsque vous choisissez l'échelle de traçage dans Adobe, il est important de choisir l'échelle 1:1 pour garantir l'intégrité de l'échelle avec laquelle les dessins ont été créés dans le logiciel de CDAO.

5. NUMÉRISATION

La numérisation n'est pas recommandée et ne devrait être utilisée que si le dessin n'est pas disponible sous forme électronique. Lorsque vous numérisez un dessin, il est important de le faire à la taille réelle du dessin (échelle 1:1) pour veiller à ce que l'échelle reste intacte lors des impressions subséquentes. On recommande d'ouvrir et de vérifier chaque dessin numérisé pour s'assurer que la résolution, l'échelle et les bordures sont de qualité acceptable.

6. LISTE DE VÉRIFICATION FINALE

Une fois que le dessin a été converti en fichier PDF, on vous recommande de l'ouvrir et de vérifier les éléments suivants :

- Le format de papier correspond au format que l'on voulait obtenir lors de la création du document (le format s'affiche dans le coin inférieur gauche du dessin).
- L'orientation de la feuille est bonne.
- Le type et l'épaisseur des lignes, de même que les polices, correspondent à ceux du dessin de CDAO.
- Le fichier PDF est en noir et blanc.
- Chaque dessin est un fichier PDF unique.
- Le fichier PDF n'est pas protégé par un mot de passe et il peut être imprimé.

Si tous les éléments de la liste sont vérifiés, le fichier PDF est utilisable.

7. RENSEIGNEMENTS SUPPLÉMENTAIRES

Pour obtenir de plus amples renseignements sur la création de fichiers PostScript et EPS, veuillez consulter le guide de l'utilisateur du logiciel de CDAO utilisé pour produire les dessins. Pour obtenir de plus amples renseignements sur la création de fichiers PDF, veuillez consulter le guide de l'utilisateur d'Acrobat Distiller ou visitez le site Web d'Adobe à l'adresse suivante : www.adobe.com.

ANNEXE E

NORMES POUR L'IMMEUBLE DE BASE DE TPSGC

POUR LES IMMEUBLES À BUREAUX

PWGSC BASE BUILDING STANDARD

FOR OFFICE BUILDINGS

DRAFT

Date: 2015-10-13

How to Use This Document:

This document is divided into sections that describe both the general approach endorsed by Public Works and Government Services Canada (PWGSC) and the technical standards that apply to each major discipline involved in the design of the base building.

Under Section 7.1, General Design Objectives; high level goals for the project are identified. These have applicability for all subsequent sections. An example is the goals of functional suitability which has as its guide for evaluation a functional program. Flexible and Adaptable can be weighed against project planning, efficiency of mechanical systems etc.

For the service provider:

- In the case of a new facility, follow this Standard.
- In the case of a building rehabilitation, this Standard requires an evaluation of the existing conditions before commencement of the project in order to evaluate and identify the variances from the Standard that would be applicable. Refer to Appendix for Variance Procedure.
-

For the regional centre of expertise (COE):

- In the case of new construction or renovations, project reporting must follow the processes identified in the *Design and Technical Oversight Procedure* for Architectural and Engineering Services.

1 Effective Date:

2 Cancellation

This Standard is to be used in place of an informal draft Real Property Branch (RPB) *Federal Office Building Standard* (FOBS) that has been circulated internally.

3 Authority

This Standard is issued under the authority of the Assistant Deputy Minister (ADM), Real Property Branch (RPB), Public Works and Government Services Canada (PWGSC).

4 Context

This Standard is issued pursuant to the *Department of Public Works and Government Services Act* and the *Federal Real Property and Federal Immovables Act*. It also supports the PWGSC *Sustainable Buildings Policy* and complements the PWGSC *National Project Management System* and the *Government of Canada Workplace 2.0 Fit-up Standards*.

5 Scope

This Standard applies to all new PWGSC office buildings, major renovations of existing office buildings, as well as rehabilitations of Federal Heritage Buildings Review Office designated heritage office buildings. The focus of the standard is primarily buildings. Buildings are often designed as part of campuses as well as the urban design and landscape. In addition, there is an exemption process to address the limitations found with projects for existing buildings.

This Base Building Standard is recommended for office buildings under the administration of Crown Corporations and other custodial departments. However, where PWGSC provides optional services to departments and agencies, PWGSC will promote and recommend the application of this Standard. All custodial departments are encouraged to adopt and apply the *PWGSC Base Building Standard* in order to support a government-wide approach.

6 Purpose

The purpose of this document is to establish minimum base building design standards and technical requirements for office buildings in order to ensure the following:

- That service providers understand our unique requirements when delivering design and construction services.
- Requirements are clear such that base lines for funding responsibilities can be identified.
- The development, construction, and maintenance of PWGSC's portfolio of buildings reflect a high level of design quality.
- The approach to design is performed consistently and to a level of quality that satisfies PWGSC requirements.
- The project achieves sustainable targets as well as life cycle costing goals.

7 Details

7.1 General Design Objectives

Most of the interactions between the Canadian Federal Government and Canadians occur in buildings delivered by PWGSC, thus, the quality of these buildings must project a consistent and positive image of the Government of Canada to the public. Design solutions therefore must:

- Meet the standards prescribed in this document. Where standards cannot be met, alternative solutions must be provided;
- Satisfy the immediate occupancy needs outlined in the functional program and strive to anticipate future building uses; and,
- Make building systems to be adaptable to future uses and changing priorities.

General design objectives are noted below must be incorporated and applied to all design solutions for the base building standards for offices and illustrate:

- Functional Suitability
- Health, Safety and Security
- Sustainable and Enduring Development
- Creativity, Innovation and Technical Competence
- Inspiring and Attractive
- Financial Performance based upon Life-Cycle Costing

7.1.1 Functional Suitability

Ensure design solutions are appropriate to their use and consider performance of the asset over its entire life. Design solutions must:

- respond effectively and efficiently to the operational requirements of the project;
- respond effectively to site-specific context and conditions considering urban design and landscape architecture;
- meet local urban design and planning guidelines; and
- be flexible and adaptable.

7.1.2 Health, Safety, Universal Accessibility and Security

Ensure design solutions create environments that promote health, safety, and security. Design solutions must:

- comply specifically (but not limited to):
    - National Building Code;
    - National Fire Code;
    - Canada Labour Code;
    - Canada Occupational Health and Safety Code;
    - CAN/CSA B651-12: Accessibility for the Built Environment; and
    - Treasury Board's Government Security Policy.
- comply with additional health and safety codes and standards outlined in Appendices;
- ensure security requirements form an integral part of the planning and design process;

- ensure that there is a voluntary compliance with provincial codes when necessary.

7.1.3 Sustainable and Enduring Development

PWGSC is committed to the principles of sustainable development in all of its operations. The principles of sustainability must be incorporated in all the phases of project delivery, especially in the initial stages when most of the key decisions are taken. The building's design for energy use must be optimized through an integrated design approach with all disciplines and must meet the following performance requirements and those listed throughout this standard.

Ensure design solutions maximize a sustainable approach to building designs as well as improving the social value of supporting more livable communities. The reduction of the environmental footprint in proposing reducing, recycling and reusing as well as creating economic efficiencies in the design. Design solutions must:

- meet LEED Gold for new buildings, alternately 4 Green Globes, and 28% better than National Energy Code of Canada for Buildings. ;
- meet LEED Silver for renovations, alternately 3 Green Globes, and 24% better than National Energy Code of Canada for Buildings;
- utilize passive solar design to maximize the energy performance potential of the building and occupant comfort;
- be tailored to local climate to ensure durability and high performance of building systems;
- for rehabilitations to HVAC, interiors and envelope modifications refer to Appendix D of the National Energy Code of Canada for Buildings for energy efficiency goals;
- have an effective choice of building materials and systems to ensure durability and meet pre-determined durability targets set out for each project; and,
- be consistent with the Federal Sustainable Development Strategy (FSDS).

7.1.4 Creativity, Innovation and Technical Competence

Ensure design solutions demonstrate creativity, innovation and technical competence in their approach to program and context. However, only proven solutions are acceptable. Design solutions must:

- maximize project potential as it relates to program requirements for the building and site;
- be innovative and creative in the problem-solving response to program and site constraints;
- have technical competence in the integration of design, building science and engineering disciplines; and
- propose solutions that provide best value to the Crown over the life cycle of an asset.

7.1.5 Inspiring and Attractive

Ensure design solutions take into consideration the physical expression of the asset and contribute positively to the local context.

- design solutions must: enhance the immediate environment, both for direct users and the broader community; and
- be recognizable as a federal office building, reflecting the image of the Crown's values of long term sustainability.
- integrate visually within the unique context of an area;

- provide clarity and consistency of architectural form and detailing;

7.1.6 Financial Performance based upon Life-Cycle Costing

Ensure design solutions demonstrate the balance between capital construction costs, operational costs, and sustainability. Design solutions must:

- demonstrate best value to the Crown from a life-cycle approach to financial performance of the asset from construction to demolition; and
- be evaluated using life-cycle cost analysis according to industry best practice.

7.1.7 Other Considerations

For all projects, commissioning activities support the general design objectives. Integration of commissioning goals should begin at the earliest stages of project development. In the case of existing buildings interventions must integrate heritage values when they are being redeveloped. Discussions should also commence at the inception of the project.

7.1.7.1 Heritage Resources

In the case of rehabilitations of designated heritage office buildings, the design solutions must:

- respect the heritage values of a designated property in accordance with Treasury Board Policy on Management of Real Property;
- present coherent and well reasoned concepts for renovations of new buildings and rehabilitations of federally designated historic properties by following the *Standards and Guidelines for Historic Properties in Canada*;
- the *Policy for Stewardship of Heritage Properties*; and,
- RPB Procedure for the Stewardship of Federal Heritage Buildings.

7.1.7.2 Commissioning Activities

Commissioning of the base building is a fundamental activity of all professional disciplines. Commissioning of each must be carried out in accordance with PWGSC *Commissioning Policy* and related documents and CSA Z320 *Building Commissioning Standard*. Commissioning shall include:

- preparation of a 'basis of design' which explains the understanding of requirements of the BBS and identifies how they are to be met;
- implementation of a commissioning plan identifying how functional performance requirements will be confirmed;
- setting out commissioning activities that are to be completed over the life-cycle of the project;
- application and integration of heritage conservation specialty knowledge;
- identification of operational requirements, issues and concerns;
- development of commissioning specifications for testing of equipment, systems, subsystems and integrated systems;
- documentation of the concept of operations;
- inspection and testing equipment and systems;
- placing equipment and systems in operation;

- balancing equipment and systems;
- evaluating the performance of systems, building envelope against the design specifications;
- timely transfer of project documentation from the project team to those responsible for operation and maintenance;
- preparation of operating manuals; and,
- training of building operators.

7.2 Site Development

The site's development provides the first impression to Canadians of a federal office building. Real Property Branch is a custodian of real property assets and a provider of general-purpose office accommodation to federal departments, Real Property goals include:

- meeting the custodial requirements of accommodation as per the TB standards
- following the guidelines for designated cultural landscapes in the Standards and Guidelines for the Conservation of Historic Places in Canada; and
- meeting the various site development requirements of LEED, or Green Globes pre-established for the project;
- ensuring that Provincial and Municipal Official Plans, zoning bylaws, urban design guidelines and other priorities are considered for the site development in the delivery of the real property program

7.2.1 Site Specific Analysis

A site specific analysis report must be prepared for each project which illustrates that the above goals have been reviewed and evaluated as part of developing an integrated strategy. The site analysis must demonstrate a clear understanding of the existing site conditions.

7.2.2 Urban Design

PWGSC is committed to working closely with Canada's communities collaboratively in support of local planning priorities while meeting sustainable objectives of the department. The federal government's intent is to support the quality of life of communities with appropriate, sensitive urban design.

The measurement of success will be the degree of compatibility with the physical characteristics of the area and environment surrounding it including neighbouring land uses.

7.2.2.1 Design Objectives

Urban design is important to ensure an appropriate 'fit' of the building or building complex within the urban environment. The building's form and adjacent open space areas must be integrated to ensure a cohesive, sensitive solution. This objective must demonstrate:

- aligning with the urban design guidelines, best practices and approvals requirements of local communities;
- enhancing the quality of life of the community by:
    - linking, where possible, with the public transit system and including bicycle and pedestrian pathways to reduce stress on the existing transportation system;
    - preserving and protecting the ecological features, heritage and cultural values of the community; and
- supporting the livable qualities of the neighbourhood and community by:
    - demonstrating that building massing includes adequate setbacks proportional to existing neighbourhood supporting the integration of the building into the local context;

- providing appropriate pedestrian sidewalk widths to include and support trees, rest areas with benches and other site features to generate a lively pedestrian culture to ensure accessibility for all users;
- illustrating a respect for human scale and use at street level;

- integrating into the existing streetscape by:
  - orienting the front of the building to the main thoroughfare and providing an open space in front of the façade where the main entrance is located;
  - creating an animated and transparent ground floor level along commercial street frontages such as maximizing the use of clear glazing at public entrance areas and lobbies;
  - incorporating elements to aid in the reduction of wind tunnel and wind shearing effects at grade levels around the building;
  - integrating site furniture (benches, waste receptacles, light standards), plantings, bus shelters with the building's design and to assist in improving the functionality of the streetscape and neighbourhood;
  - locating service entrances away from active public streetscapes. If space is limited, design service entrances so they are screened from the street in order to preserve the sense of place and aesthetic appeal of the streetscape. There must be no manoeuvring or backing in from the street;
  - demonstrating the use of the principles of crime prevention through environmental design for the planning of the site, opportunities for passive surveillance and territorial control.

7.2.2.2 Master Planning

Master planning is fundamental for the appropriate organization and development of sites. For federal precincts, campuses, office complexes or an office building, a master planning exercise must be undertaken for a project site area. At a minimum the following elements must be studied:

- site's capacity to be able to accommodate the building or a building complex's functional, operational and experiential components;
- natural and built environment including topography, and climatic conditions;
- surrounding context of the site in relation to;
  - rural, suburban and urban core contexts;
  - neighbourhood and streetscape typologies;
  - heritage designations;
  - servicing
  - emergency access
  - public transit opportunities;
- projected growth and development of the surrounding area;
- on site circulation of employees, operations, functional requirements, public transit links, general public use;
- provincial laws and standards as well as local municipal official plans, technical standards, and bylaws for the site and adjacent land areas and urban fabric; and
- project specific cost and risk and issues for the site's development.

- Master planning for multiple building complexes or a campus, must incorporate open areas which can be either adjacent to the building or at another location as determined by the site master plan.
- Security elements must be integrated with the site and building's design.

7.2.3 Landscape Architecture

The intent of this section is to ensure the provision of integrated design and technical solutions to create liveable and sustainable environments. Provided are design strategies that will encompass varying scales of planning, design and management of sites.

7.2.3.1 Design Objectives

The objective of this section is to establish sound landscape architectural design requirements for federal office buildings. Design goals are to:

- create a well developed site that will support and enhance the building's function and operation;
- enhance the user experience outside the building and on the site;
- enhance the linkages and connections with the adjacent streetscapes and neighbourhoods
- support and enhance sustainable best practices to strengthen the inter-relationship of the landscape and building with the environment through the use of green infrastructure, reducing, recycling and reusing of materials and other sustainable practices and strategies;
- support and enhance the social values by applying universal accessibility best practices;
- ensure low maintenance solutions to create operational efficiencies

7.2.3.2 Site Design

Site design strategies must utilize the environment to reduce operational costs and support an effective functional program for employees and the public by:

- demonstrating how sun radii, wind, topography and vegetation are used to create microclimates to enhance the experience of the site and building for the occupant and visitor experiences;
- illustrating how scale and massing of the building and its infrastructure such as parking structures and circulation systems will not negatively impact adjacent open spaces or streetscapes or critical viewlines;
- demonstrating how the design of the exterior circulation systems and site amenities supports the building's functionality such as selecting appropriate locations for principle building entrances and key destination points that are easily identifiable when approaching the building.
- demonstrating how wayfinding and orientation systems are efficient and effective and assist in preserving the social and aesthetic values of the landscape surrounding the building.

7.2.3.3 Technical Requirements

7.2.3.3.1 Site Areas

Site areas around buildings must encourage interaction with the environment and social interaction of the occupants and support passive recreation. The outdoor space must be:

- designed with appropriate landscaping materials selected to reduce impervious hardscape elements;
- designed using native plants to limit maintenance requirements and promote biodiversity;
- integrated with vegetative elements to create a dynamic landscape throughout the year that takes in consideration the four seasons;
- focused on eliminating use of potable water for irrigation and using where required grey water irrigation systems and plantings which require little to no irrigation;
- planned with trees placed to provide shaded rest areas as well as in achieving reductions in heat and glare on hard surfaces, and general enhancement of pedestrian comfort;
- planned with the intent of integrating planting in and around the building and parking area so that it promotes visual surveillance for safety and security.

7.2.3.3.2 Circulation

Convenience and clarity of the exterior circulation system is a priority and it must be planned to achieve the following objectives:

- demonstration of a clear design strategy for pedestrian, bicycle, vehicular, service delivery, construction, emergency and exterior material handling circulation routes, intersections as well as staging areas, vehicular lay by's or drop-off areas for building occupantsparking, waste and snow storage areas;
- provide space for drop-off zones and waiting areas for pedestrians and vehicles.
- integration with existing walkways, paths, and vehicular circulation networks;
- demonstration of parking areas and circulation routes that maximize sustainable best practices to reduce impacts on the natural environment through best practices for stormwater and heat island reduction

7.2.3.3.3 Vegetation

Vegetation strategies must include:

- conservation and enhancement of existing natural areas and restoration of damaged areas to provide habitat and promote biodiversity;
- reinstatement of trees removed from site on a ratio of 2 new trees for every tree removed

7.2.3.3.4 Site Grading

Grading strategies must demonstrate an integrated approach to the site and building and adjacent land areas. There must be no negative impacts to riparian zones, ecologically sensitive landscapes, existing trees and shrubs that will be remaining, and adjacent land areas not owned by the federal government.

Site grading must:

- demonstrate the reuse of materials through efficient excavation, transporting, placing, and compaction materials excavated within a site;
- demonstrate avoidance of the potential for settlements resulting from compression of the underlying soils;
- include the reduction of need to limit excavations where high water levels and permeable ground conditions occur;
- minimize the need for retaining walls;
- minimize the need for constructing cut slopes; and
- minimize the need for removal of topsoil or other organic soils including fill materials.

7.2.3.3.5 Site Drainage

The site drainage planning must develop a strategy to minimize the volume of stormwater and snow melt runoff going to municipal systems, and, to improve water quality. The approach should if possible be based on the historical conditions of ecosystems in the region.

In all cases, the design of site drainage must minimize the negative impacts of site grading strategies to municipal infrastructure, adjacent landscapes, surface water bodies, and below ground water tables through:

- use of above and below ground, sustainable green infrastructure storm water control systems and site design such as the elimination of curbs on-site;
- a system design incorporating an integrated storm water retention and detention program for a roof to reduce stormwater and where applicable to provide irrigation. A green roof strategy or rainwater harvesting strategy must be clearly demonstrated as to its viability and effectiveness;
- the provision of grey water irrigation to assist vegetation growth on-site if irrigation is required;
- provision of proper drainage to eliminate standing water that is at risk of harbouring mosquitoes or other disease-carrying insects.

For all projects, the following minimum criteria must be respected;

- major systems; site surface drainage must be designed to be capable of addressing a minimum 100 year storm event;
- minor systems; storm sewer collection systems must be designed to address a minimum 1:5 years storm event without surcharge;
- new developments must provide quantity control; limit runoff from minor system for new development sites to a minimum 5 year predevelopment level. Attenuate a 1:100 year storm event and water run-off from site to a minimum of the 1:5 predevelopment flow rate;
- storm drainage systems must rely on gravity flow only

7.2.3.3.6 Soil Erosion

Site planning and design must control and minimize soil erosion, waterway sedimentation, and airborne dust. The site plan and sedimentation control plan for all land related construction activities must conform to erosion and sediment control requirements of provinces and municipalities and:

- minimize erosion effects of construction activities; and,
- mitigate risk of erosion of embankments and sloped areas especially those that could impact riparian zones, waterways and stormwater retention ponds.

7.2.3.3.7 Site Furniture

Design and provision of site furnishings and shaded rest stops are an important aspect of site planning. The durable furnishings must be integrated with building design.

7.2.3.3.8 Site Lighting

Designs must achieve light pollution reduction and where applicable meet regulatory requirements such as LEED. Refer to electrical section for additional standards. Designs must support:

- the reduction of light fixture glare;
- light trespass to adjacent sites;
- balance of providing good visibility, meeting security concerns while respecting the character of a site, streetscape or neighbourhood;
- respect light hierarchies as per master planning and urban design requirements.

7.2.4 Civil Engineering

7.2.4.1 Design Objectives

The design objectives for civil engineering associated with site development for new construction and existing buildings include;

- meeting provincial and municipal requirements found in Official Plans, Zoning Bylaws, technical standards and other design and technical guidelines for the development of sites;
- meeting and integrating project requirements of the utility and services authorities having jurisdiction including installation, access, maintenance and replacement of equipment;
- locating piping for all systems under dedicated service corridors, vehicular circulation routes and be accessible for maintenance all year long;
- addressing trenching to minimize differential frost settlements of the cuts, reduction of settlement effects of trenches and pipes as well as frost protection of the pipes;
- controlling storm water and sanitary sewage to meet discharge standards of the authority having jurisdiction over the receiving outlet;
- sizing sanitary systems to accommodate ‘peak waste flow’ including long term development forecasts as well as allowances for infiltration following municipal guidelines;
- providing sanitary system separate from the storm water system;

7.2.4.2 Water Supply Services

Campus planning must use a loop system fed from more than one source and the entire distribution network to be configured to ensure redundancy of supply. Buildings must also have two feeds to ensure redundancy.

Service connections for individual site and building water supply must meet following design and technical requirements:

- system design must confirm available flow rates from the surrounding system. Flow rate, testing and hydraulic analysis must be completed as part of the design to confirm capacities and pipe sizing;
- flow and pressure requirements for site fire protection demands must be met, including the requirements of NBC, NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances* , and responding fire protection services with the design;
- domestic water demands (peak and average) must be met with the design;
- service lines to buildings are to be grounded as required by Electrical Code of Canada. Use of 3.0 m minimum metallic, continuous ductile iron or copper piping outside the building footprint is the preferred method of grounding;
- provide modular wall seals at water service entries to buildings;
- provide cathodic protection of water main and associated appurtenances based upon soil and ground water conditions and municipal standards.

7.2.4.3 Storm Water Management Services

Storm water management services must be integrated with landscape architectural design requirements for surface water flows. Refer to landscape architecture site drainage section for specific requirements. The gravity based system must have as a minimum:

- pipe flow velocity within a range of 0.6 m/s to 3 m/s, under full flow pipe conditions;
- system design that optimizes on site water detention; and,
- stormwater system components must conform to municipal or provincial regulations and have the following:
    - sumps in maintenance holes and catch basins; and,
    - for maintenance holes with depths exceeding a maximum of 5.0 m, provide safety platforms.

7.2.4.4 Site Grading

Site grading must be integrated with landscape architectural design requirements. Refer to municipal requirements and landscape architecture grading section for detailed requirements.

7.2.4.5 Sanitary Services

On campuses, the sanitary sewer system design for individual buildings must be integrated with overall master planning requirements.

In rural areas, follow requirements of provincial authorities having jurisdiction/municipal requirements for septic systems or onsite sewage treatment. Cesspools are not permitted.

Individual sites and buildings must have the sanitary service system sized to accommodate ‘peak waste flow’ as well as the long term needs of the site. The system design criteria must include:

- cleanouts to be interior to the building, where exterior access required, provide maintenance holes;

- follow municipal requirements as well as local guidelines for leakage allowances. Include these design values for extraneous flow rates in calculating peak sanitary flows;
- pipe velocity flow rates must be confirmed after construction and data submitted as part of commissioning process;
- sizes for piping must follow municipal standards and the following;
    - maintenance holes to be benched;
    - provide external drop pipes at maintenance holes where inlet elevation exceeds 600 mm or in accordance with local authority having jurisdiction; and,
    - for maintenance hole depths exceeding 5.0 m, provide safety platforms within maintenance holes.

7.3 Architecture and Interior Design

7.3.1 Design Objectives

The site, setting, and appearance of a federal building, contributes to the image of the Government of Canada. The base building design for a federal building and its interior public spaces must contribute to the overall architectural value of the building. The main building signage and flagpoles must be integrated into the design of the building.

Federal buildings must have a Load Factor ranging from 1.1 to 1.3 based upon the 2010 BOMA Office Building Standard ANSI/BOMA Z65.1 using Method B. Buildings must meet the National Energy Building Code targets noted and the following technical performance standards with reference to other detailed requirements of the Mechanical and Electrical sections:

- The building envelope must be air tight and must meet air leakage of 1.27 $L/s \cdot m^2$ @ 75 Pa must be met with all five faces. All buildings must have an air leakage testing to confirm that target is met.
- The building must be designed to minimize stack effect and solutions to achieve objectives must be identified.
- The building design service life is to be 50 years minimum following CSA S478, *Guidelines on Durability in Buildings*.

7.3.2 Building Common and Service Areas

7.3.2.1 Entrances

The building must be designed to direct the visitor to a principal entrance of the office building. It must be conveniently located, have a grade level approach based on existing site conditions as well as be clearly articulated on the exterior design of the building. The design must meet the following design and technical requirements:

- have a canopy for weather protection, sized for sheltering and for emphasizing the main entrance;
- have weather protection for secondary and tertiary entrances and these to be clearly articulated on the exterior of the building;
- provide conventional swing doors and vestibule at the principal and secondary entrances;
- exterior overhead door locations require one personnel door;
- incorporate building and way finding signage in compliance with the *Federal Identity Program.* Design to include standard federal signage mounted on a prominent facade and a flagpole mounted on facade or rooftop.
- deploy solutions to inhibit the buildup of dirt and moisture in the lobby;
- deploy solutions to maintain the integrity of the security of the lobby; and
- incorporate appropriate decorative or accent lighting to support the design concepts.

7.3.2.2 Lobbies

The main building lobby must provide a welcoming impression to Canadians visiting the office building and reflect a positive identity for the Federal government. Lobbies must meet the following design and technical requirements:

- be clearly visible from the exterior of the building both day and night;
- locate the elevator lobby and main building lobby such that they are visible from the building entrance vestibules;
- be laid out to allow continuous flow of pedestrian traffic with space large enough to accommodate all employee traffic during peak hours. Interlink ground floor entrance areas from the street and the parking lot areas.
- the circulation requirements must include additional floor area for a visitor and security desk approximately 24 m2 in area as well as surrounding area for security screening;
- accommodate the placement of reception and security control functions to provide visual supervision and physical control of the lobbies, elevator lobbies and escalators;
- be designed to adhere to security requirements (see 7.9);
- utilize durable interior finishes for all areas with high impact resistance for heavy pedestrian traffic was well as can be easily cleaned and maintained (painted GWB is not considered durable); and
- have appropriate decorative or accent lighting to support the design concepts.

7.3.2.3 Building Core and Support Spaces

The core is the central area of the floor plate which includes elevators, exit stairs, washrooms, mechanical and service shafts as well as electrical rooms. The elevator lobby and the main building lobby must be designed as an interconnected reception area.

Planning for building cores must establish distances to perimeter glazing following LEED requirements – the workstations no more than 12 m from window wall. Planning of office floor plates must be flexible to allow subdivision of typical floors into a minimum of two separate tenant areas, not compromising life safety for occupants. There must be acoustic separation of STC 52 of the building core from Tenant Areas. Building support areas and inter-relationships determined in the functional program must be achieved in the design.

7.3.2.3.1 Elevators

All occupied areas of a federal multi-story building must be served by at least one fully automatic passenger elevator. Elevator cab sizes, the class or the service capacity to be determined through an elevator traffic capacity and wait time analysis. Number of elevators to be based on occupant load and meet the following technical requirements:

- office areas to have a minimum capacity established based on the floor plate, anticipated population and the required handling efficiencies to provide efficient service at both peak periods and all other times in accordance with high standards in the elevator industry; and,
- the passenger waiting times below:
    - response in less than 20 seconds to 55% of hall calls;
    - response in less than 30 seconds to 80% of hall calls;
    - response in less than 50 seconds to 90% of hall calls;
    - response in less than 90 seconds to 99% of hall calls;
    - response in less than 180 seconds to 100% of hall calls;
    - cars to be dispatched from main floor when 65% loaded;
    - car and landing doors to open or close completely in five seconds maximum;
    - each car capable of being operated independently.

- passenger elevators, if more than one, must be grouped in banks of at least two for efficiency;
- provide a separate service elevator withClass C-1 loading to serve all floors of the building including the parking levels and all mechanical and elevator penthouses and roof top equipment areas. The capacity of this elevator must be 2268 kg. The lobbies for these elevators must be designed for at least the same load as the elevator capacity. Freight elevators must have a ceiling height of no less than 3.7 m;
- provide a shuttle elevator from the ground floor lobby to below grade parking with fully automatic operation with selective-collective operation. Shuttle elevators must be designed for the environment of the unheated parking garages. Capacity will be established based on anticipated traffic flow;
- if no separate freight or service elevator is provided, one passenger elevator must be designated as a service elevator. For midrise office buildings provide a freight elevator;
- a minimum ceiling height of 3.0 m is required in service and freight elevator cabs, service elevators to be a minimum 1727 mm x 2745 mm x 3000 mm high ;
- all gearless and geared elevators shall be provided with VVF regenerative motor drives;

A non-proprietary elevator control system must be used, and the PWGSC Project Manager must define the extent of control. Destination control systems must be used. Security controls must be installed with override systems to follow functional program.

Passenger elevators finishes must be focal points for the interior design of the building. Finishes for all surfaces must be durable, easily replaced and low maintenance. Door surfaces must be durable, scratch resistant and easily replaced. Inside and outside finishes must be coordinated with adjacent wall surfaces.

All finishes for service elevators must meet the service level requirements for durability, walls and ceilings must be metal. Flooring must be durable, non-slip, easily maintainable, and replaceable.

In passenger elevators, recessed down lights or indirect fixtures must be used. Freight elevators to have recessed ceiling light fixtures.

Emergency power must be provided to one passenger, shuttle, and freight elevator as well a having the transfer of power from one elevator to another in the same group.

All elevators shall be provided with fire fighters emergency operation with the service elevator being the dedicated fire fighters elevator for the building.

Provide conduit for remote video monitoring system for elevators, machine room from the security control room. Integrate with rough-ins required for a remote monitoring system for the elevator controls.

Provide rough-ins for security system interface and control capacity to be provided with elevator controls.

Travel distances from a given office or workstation to an elevator must not exceed 60 m.

The location of stairs and design within buildings must be inviting and encourage their use rather than elevators, to the fullest extent feasible.

7.3.2.3.2 Escalators

Escalators must be installed in a parallel arrangement and must meet the following requirements:

- be heavy duty in design (16 hours per day) with cleated risers and be reversible. The unit should be self contained;
- have an angle of inclination of 30 degrees from horizontal;
- have nominal step width of 800 mm (4,320 passengers/hour) and operate at 0.50 m/s.
- balustrades and other components and finishes must be selected to correspond with Lobby finishes;
- provide technology i.e., soft start semi-conductors, multi-speeds or other opportunities to minimize energy use.

7.3.2.3.3 Stairways (open for convenience)

Open stairways that connect lobby and atrium spaces must use a similar materials palette as the lobby space. Open risers are not to be provided.

7.3.2.3.4 Mechanical, Electrical and Telecommunication Equipment Rooms

Mechanical, Electrical and Telecommunication equipment rooms must be designed with adequate aisle space and clearances around equipment to accommodate maintenance and equipment replacement. These rooms must meet the following criteria:

- Locate mechanical rooms such that heat and sound will not be transmitted to other parts of the building.
- Mechanical spaces must be large enough to allow for a safe working environment and provide adequate area for maintenance service requirements and for future expansion.
- They must have hoists, rails, and fasteners for chains provided to facilitate removal of heavy equipment.
- Provide easy access to roof mounted equipment by elevator cab stop or a large stairway to facilitate maintenance. Do not use temporary ladders, steep stairwells and ship's ladders.
- Main mechanical and electrical equipment rooms (such as mechanical penthouse or basement rooms) must not be less than 3.6 m clear in height from underside of structure.
- Doorways and corridors to the building exterior must be of adequate size to permit replacement of equipment. The path may include knock-out panels, hoists, and provisions for cranes, but must allow equipment replacement.
- Mechanical and electrical rooms must be accessible from non-occupied spaces such as corridors.
- Primary substations (electrical vaults) or rooms containing main secondary switchgear must not be located below garage ramps, washrooms or janitor closets or at an elevation that requires sump pumps for drainage.
- Transformer vault rooms and emergency generator rooms' locations must follow local requirements of the authority having jurisdiction.
- Floor-mounted electrical and mechanical equipment such as switchgears, main building transformers, motor control centers and generators, chillers, boilers, pumps, air-handling units, electric motors, motor starters, tanks, etc., must be set on concrete housekeeping pads, curbs, or saddles at least 100 mm wider on all sides than the equipment they support, and at least 100 mm thick.

- Fuel tanks or storage tanks must have a housekeeping pad that incorporates a raised barrier of adequate volume for spill containment.

7.3.2.3.5 Vertical Shafts

Vertical shafts for running pipes, ducts, and flues must be located adjacent to other building core elements and:

- Shafts must be straight vertical runs for services.
- Shafts must be sized 20% larger in area to accommodate planned expansion of the systems.
- Bus ducts require a raised containment curb edge at floor slab penetrations. Sleeves to continue to 75 mm above floor slab.

7.3.2.3.6 Washrooms

Washrooms must be located adjacent to vertical shafts at the building core. They must be designed with water resistant, easily maintainable, durable finishes on all walls and floors. Mirrors are required above each sink, continuous for sink area.

All washroom partitions must use durable, easily maintainable materials and must be ceiling or wall hung. Separation partitions between urinals must be provided.

Each washroom to have two recessed waste receptacles, in stainless steel, one for paper towels, and one for garbage with bilingual signage to meet requirements of the PaperSave Program managed by PWGSC Crown Assets.

Washroom plumbing fixtures must be of a low-flow specification in all areas except basement areas.

7.3.2.3.7 Change Rooms, Showers, Locker Rooms

Change rooms with lockers must be located as part of washroom areas associated with relevant LEED credit. If provided, the planning of the change rooms must include lockers, and benches. The showers must be separate showers and visually separated from the locker areas. All finishes must be water resistant, easily cleanable and maintainable.

7.3.2.3.8 Custodial Spaces

Custodial spaces must be provided to support the operation and maintenance of the building and include building maintenance storage rooms, stockrooms and maintenance workrooms. Provide as a minimum 20 m2 area in basement, ground floor adjacent to Loading Docks, and rooftop penthouse. Coordinate requirements with the Functional Program.

7.3.2.3.9 Janitor Closets

Janitors' closets must be directly accessed from the office floor corridor and discretely located near the washroom facilities.

7.3.2.3.10 Recycling Centres

Corridor areas must be provided with multi-material waste and recycling recesses. Minimum three containers are typical: one for recyclables, mixed recyclables, and compostables, the

requirements must be confirmed with building management. A minimum of one station per floor or one station per 1000 m² must be provided.

7.3.2.3.11 Waste Management Rooms

Waste management rooms and equipment must be adjacent to loading docks or service entrances and meet the following:

- be sized to accommodate the required functions of central collection, separation, and storage of garbage, recycling and compostable materials;
- have areas sufficient for storage of anticipated waste material volumes generated during three-day building occupancy period of the building;
- have refrigerated areas for compostable materials;
- waste management rooms accommodate all governmental requirements pertaining to waste reduction and waste audit programs.
- facilities that use waste containers picked up by vendors must have at least one internal loading berth for the waste containers.

7.3.2.4 Building Management Spaces

Property Management, Building Systems Technicians and Building Cleaning Operations teams must have offices next to the security control centre. Approximately 15 m^2 must be allocated for this standard office space, refer to building specific functional program.

7.3.2.4.1 Security Control Centre

The security control centre must be located adjacent to the main lobby. Approximately 20 m² must be allocated for this room, which will require rough-in of specialized conduit requirements in slab and in ceiling areas for the workstations. Rough-ins required from the location of the BAS and emergency power system as well as fire alarm annunciator panel.

Planning of the building for a security command centre and inspection station must be considered, if it is not required at time of building design. The security control centre design criteria that are outlined above must be used in conjunction with the Royal Canadian Mounted Police (RCMP) *G1-103 Security Control Space Requirements*.

7.3.2.4.2 Loading Docks, Shipping and Receiving

These areas are to be available to PWGSC at all times. These areas must be convenient to service or freight elevators so that service traffic is segregated from the main passenger elevator lobbies and public corridors. They must be fully inside the building and include staging areas. Other requirements include:

- loading docks must be located for easy access by service vehicles and be separate from the main public entrances to the building;
- trucks and trailers that remain outside of the building must have expandable environmental seals provided to separate interior unloading areas from the exterior;
- dock levellers and one scissor lift must be provided to accommodate the variety of bed heights of service vehicles;
- protect edge of loading docks with edge guards and bumpers; and,

- spot lighting must be provided to illuminate the inside of trailers for the loading/unloading activities.

7.3.2.5 Structured Parking

Parking is to be exterior on-grade parking, interior below-grade, or standalone structured parking. The general management criteria are in *Real Property Branch* *Custodial Parking Policy and Custodial Parking Procedure*. Design and technical requirements include:

- planning of structures and parking spaces must be laid out for maximum efficiency;
- parking stalls must be full sized, do not provide compact vehicle sized parking stalls;
- two-way aisles must have a minimum width of 6.7 m and one-way aisle a minimum of 3.6 m and parking spaces must be a minimum size of 2.6 m wide and 5.2 m long;
- preferential parking spaces to be provided for accessible parking and for electric vehicles with their charging stations;
- accessible parking spaces must be adjacent to access aisles that are part of an accessible route to the building or facility entrance;
- access aisles and entrance platforms to elevator lobbies to use bollards and guardrails to safeguard routes;
- entrances and enclosures of elevator lobbies must be located to be visible from interior of parking facility and have a minimum 50% glazed wall areas;
- structural elements must not intrude upon the required stall dimensions. Columns must not be located within 610 mm of the required aisle except where the aisle has no stalls perpendicular to it. Each stall must have direct access to an aisle;
- maintain the entire length of the entrance and exit ramps protected from snow and ice. Snow and ice must not accumulate on the ramps;
- all vehicular entrances to structured parking to be secured with overhead doors or grilles these must be electric powered and on an emergency power circuit and operated by card-readers or other means of remote control;
- garage openings must be a minimum of 3.6 m wide with minimum height of 2.4 m and must be monitored by video camera. The clear height throughout vehicular accessible areas of a parking structure must not generally be lower than 2.25 m. A headache bar, with signage indicating the clear height, must be provided in front of each opening and mounted slightly lower than the clear height of the parking garage;

Pedestrian walkways must link the exterior structured parking or outdoor parking area with the building entrance. Passive landscape techniques must be used to prevent vehicles from encroaching upon pedestrian walkways. Pedestrian crossings of vehicular circulation lanes must be identified.

7.3.3 Building Envelope

The objective is to have an envelope which provides an effective, low energy consumption, separation between the interior and exterior environments. The use of passive solar principles is required to enhance the health and productivity of occupants.

7.3.3.1 .Exterior Wall Assemblies and Components

The envelope must meet or exceed the requirements established in the CSA S478 *Guideline on Durability in Buildings*.

- walls must have a minimum 50 year full service life and at least 30 years prior to a major rehabilitation;
- windows must have a minimum 25 year full service life and at least 15 years prior to a major rehabilitation of gasket and seal replacements;
- roofs must have as a baseline a minimum 20 year full service life;

Exterior wall design must provide complete control of migration of heat, air and moisture through the building enclosure. The exterior building envelope must be designed in accordance with 'rain-screen' principles, pressure equalized as well as control air leakage and provide continous insulation. Face-sealed envelope systems must not be used. Risk of moisture-related failures must be minimized in the design of an exterior wall and;

- the cladding design shall have the means to evacuate moisture from the wall assembly. Comply with *ASHRAE 160, Criteria for Moisture-Control Design Analysis in Buildings;*
- the window to wall ratios of glazing to opaque wall, must vary with facade orientations to maximize energy efficiencies and must reflect passive solar design best practices, and vision glazing not to exceed a maximum 40% of envelope areas;
- opaque wall assemblies must be a pressure equalized, rain screen design. They must reduce thermal bridging to a minimum, to less than 5% maximum of wall area;
- curtain wall vision glass and spandrels must use high thermal performance thermally broken, metal frames with high-performance glazing units;
- metal and glass cladding systems must meet requirements of the American Architectural Manufacturers Association, Canadian Standards Association (AAMA-CSA) 101-A440 *North American Fenestration Standard for windows, doors and skylights*, maximum air leakage as well as meet the performance class AW40;
- window wall assemblies are not permitted for multi-storey buildings; and,
- provide thermal analysis of window systems based on NFRC 500 Procedure for Determining Fenestration Product Condensation Resistance Values.

Soffits are totally exposed to weather and must therefore be designed to be resistant to migration of heat, air and moisture from the exterior to interior environments. They shall be designed:

- to resist displacement due to wind uplift allow for access to operable equipment;
- air tight and insulated to limit condensation on the enclosure materials; and
- equipment or distribution systems that may be affected by weather must not be located inside soffits.

7.3.3.2 Exterior Sun Control

Passive solar principles and techniques must be used with facade and glazing designs to maximize responsiveness to climatic conditions. The base building envelope should be designed and constructed to passively manage solar heat gain, daylight and glare with the use of passive sun shading devices. The architectural features in the form of a projection from the face of the building must not cause ice accumulations that could represent a risk to the public.

Provision for repair, maintenance, and window cleaning, must be part of the for exterior sun control system design.

7.3.3.3 Glazing

The choice and thickness of glass double or triple glazed windows, the selection of glazing coatings and type of insulating gas in the air spaces must be based on climate, energy conservation, and security requirements.

Minimize use of highly reflective glass that produces mirror images to avoid creating glare in surrounding streets and buildings.

The design of the building must include provisions for cleaning the interior and exterior surfaces of all windows, as per CAN/CSA-Z91, *Safety Code for Window Cleaning Operations*, as amended from time to time.

7.3.3.4 Interior Sun Control

All windows in general office floors must have manually operated fabric roller shades to control the amount of daylight and heat gain in the office space. The type of shade, fabric, and neutral colour must be consistent throughout the building. The light filtering capacity must range from 0% to a maximum 14% openness factor. Openness factors must be selected and located on facades to achieve optimum effectiveness based on building orientation and exposure.

The interior fabric must be resistant to the degradation by temperature variations, and colour fast when in direct sunlight. The fabric must be stain and mould resistant and dimensionally stable. All fabric and hardware must be heavy-duty commercial grade, with a minimum warranty of 5 years.

Provide remote operation controls for coverings on clerestory and atria windows. Ensure that systems and techniques are proposed for servicing for cleaning, maintenance, repair, and replacement.

7.3.3.5 Exterior Doors

Entrance doors must be constructed out of heavy duty materials to withstand continuous high traffic. The exterior side of one leaf of a double door entrance must have a lock guard or astragal to prevent tampering or break in.

Doors used for egress only must not have any operable exterior hardware.

7.3.3.6 Bird Control Devices

Building design strategies must include techniques to manage bird control and reduce opportunities for nesting.

Design facades to meet best practices of *Bird Friendly Development Guidelines and Bird Friendly Development Rating System, www.toronto.ca/lightsout/pdf/development_guidelines.pdf*.

7.3.3.7 Window Washing Equipment

Building design must include suitably engineered systems for window washing equipment. The design applies to buildings of three stories or 12 m and higher, and must conform to technical requirements found in CAN-CSA Z91-02 *Health and Safety Code for Suspended Equipment Operations.*

7.3.3.8 Roofing Systems

Roofing systems and below grade waterproofing systems require assemblies that are highly resistive to physical damage, including impact and water-entrapment resistance. Single-ply systems can only be used where the system is fully adhered to a solid structural surface. General principles that must be met include:

- roofing design including metal flashing and trim, must follow the recommendations of the Canadian Roofing Contractors' Association (CRCA) and provincial roof associations;
- roof membranes to be 2 ply fully adhered membranes. Loos-laid and single ply roof membranes must not be used;
- all inverted roof assemblies including green roofs must incorporate suitable Electric Field Vector Mapping (EFVM) charged wiring systems for non destructive testing for leaks in waterproof membrane;
- slope roofing to drains and avoid ponding on the surface of a membrane;
- exterior surface of the parapet walls and penthouses shall be consistent and integrated with the envelope assembly materials;
- roof insulation must be installed in a minimum of two layers to maximize thermal breaks;
- permanent access via stairs to all roof levels must be provided to facilitate re-occurring inspection and maintenance. The use of ship's ladders is not permitted;
- there must be continuity of the roof waterproof membrane and the wall air barrier;
- noise-emitting roof-mounted equipment must be screened with noise-abating panels;
- roof-mounted equipment must be housed in penthouses or screened by walls;
- roof-mounted equipment must be set back from the roof edge to minimize visibility and allow access for maintenance and repairs;
- critical roof-mounted equipment must be installed to permit roof system replacement or maintenance without disruption of equipment performance;
- pitch pocket details are not acceptable;
- no building element may be supported by the roofing system except walkways.
- exposed waterproof membranes on roofing assemblies shall be protected by walkways along routes to and around rooftop equipment and all public/building user activity;
- roof-mounted devices, such as antennae, lightning rods, flagpoles, roof anchors, etc., must be integrated into the building structure and roof design; and
- all podiums and roof top areas providing access to building occupants and the public must have protected waterproof membranes and insulation and structural assemblies that will withstand structural loading of planned activities. Parapet heights to ensure heights address occupancy requirements.

7.3.3.9 Skylights and Sloped Glazing /Atria

These public area architectural features at the entrance and lobby spaces pose particular challenges for operations and maintenance. They must meet the following requirements:

- skylights design must follow the requirements of AAMA/WDMA Standard 1600/I.S.7-00 *Skylights and Space Enclosures*;
- skylight placement must be calculated to prevent glare or overheating in the building interior;
- skylight and sloping glazing design must also incorporate the pressure equalized rain-screen (PER) principle which is based on the principle of pressure equilibrium.
- condensation gutters and a path for the condensation away from the framing must be incorporated; and
- design strategies must be provided for cleaning of all sloped glazing and skylights, including access and equipment required for both exterior and interior faces.

7.3.4 Thermographic and Air Pressure Testing

The design intent for the exterior building envelope must be verified with thermal and air performance testing. Building enclosure commissioning must be undertaken, by testing and reporting upon air tightness based upon ASHRAE 90.1, *Guideline 0 and 3 Fundamental Enclosure* and requirements of ASTM E2813.

Thermographic inspections must be performed at pressurized and depressurized environmental conditions on the finished construction and before occupancy. Other applicable testing methodologies must be followed to verify the actual construction and specified requirements for integrity of the air, vapour barrier and waterproof membrane assemblies within the building enclosure have been met.

The enclosure air tightness testing on all five faces of the building must be undertaken to confirm air tightness achievements. Testing must follow:

- the air tightness maximum air leakage of 1.27 $L/s \cdot m^2$ @ 75 Pa must be met with all five faces following ASTM E779, ASTM E1827 as noted in ASHRAE 189.1-2009.

7.3.5 Architectural Components

The description of components is intended to address all base building finishes inlcudeing general office areas of the building.

7.3.5.1 Partitions

Partition assemblies have construction and acoustic requirements that must be met as identified by the requirements of the functional program, and the following:

- tolerances for deflection and long-term creep must be designed at the top of a partition walls abutting structure;
- partitions finishes used at the perimeter of a humid space, such as a bathrooms, basement, and limited air control areas, must have moisture, mould, and mildew resistance;
- shower areas must use water-durable and mould-resistant partition materials as the substrate;

- physical security control area walls to include full-height 18 gauge expanded metal mesh as part of the assembly.

7.3.5.2 Interior Doors

Doors to meet the durability standard, the functional program, and must meet the following standards;

- use heavy duty doors and frames, Level 2 per ASTM/SDI 250.4 *Criteria for physical Endurance for steel doors and Hardware Reinforcing*. All doors and frames should be ULC labeled and factory primed and prepared for hardware installation;
- door hardware must meet *Best Grade* requirements of the Canadian General Standards Board (CGSB);
- wood doors to be constructed to WDMA I.S.-1A, Architectural Wood Flush Doors and DHI A115-W, Wood Door Hardware Standards, Hardware Preparation; and,
- doors leading to high traffic areas must be 70% glazed;

7.3.5.3 Acoustic Treatment

Acoustic performance must meet project requirements and the following:

- Sound Transmission Class rated must include careful and extensive sealing of all joints and apertures between components around and passing through the separation, both above and below the partitions. Doors and other opening must use sound attenuation techniques appropriate to the STC;
- ceiling tiles must have a noise reduction (NRC) or (SAA) coefficient minimum of 0.75 and a Ceiling Articulation Class (CAC) minimum 180; and
- reverberation time control in the main lobby areas must not be higher than 0.7 seconds at 500 Hz.
- comply with "Maximum Ambient Noise Levels" table and evaluation standards found in MD 15000 – *Mechanical Environmental Standard for Federal Office Buildings*.

7.3.5.4 Graphics and Signage

Graphics and signage must meet the requirements set by the Federal Identity Program Policy (FIPP). Refer to the *Federal Identity Program Policy* for the application of the Coat of Arms and flag symbol with bilingual titles, and the use of the "Canada" wordmark. For design standards, refer to the *Federal Identity Program Manual* issued by the Treasury Board and the following:

- signs for washrooms, stairwells and emergency exits must comply with the *Federal Identity Program Tactile Sign System and Installation Guide*;
- heritage buildings, signage must be compatible with original signage design, using materials, finishes, colours, typefaces size and scale as a guide for new signage design; and,
- maintenance rooms, mechanical and electrical rooms and equipment and piping to be provided with signage,

7.3.6 Interior Design Components

PWGSC provides finished interior service spaces at the core, and finishes the ceilings, perimeter walls and ceilings of tenant areas as part of the base building. Refer to the functional program for detailed requirements.

7.3.6.1 Carpet Tile

Commercial grade carpet tiles must be specified for all base building areas which will be used for general purpose office space and other functional areas as defined in the functional program. Carpet tile products must comply with the following minimum performance standards:

- tufted loop, multi-colour / textured pattern, minimum 4 fibre colours, with colour selection to take into consideration masking soiling and staining must be specified for optimum performance;
- yarn must be 100% solution dyed nylon or a combination of maximum 30 % yarn dyed, with permanent static control, permanent soil-hiding fibre cross-section with a modification ratio no greater than 2.2 and stain resistance that must be permanent and be able to resist trafficking and numerous hot water extractions without losing its effectiveness;
- carpet fibre must be a minimum pile weight of 570 g/m^2 with sufficient density to ensure long term resistance to matting and crushing;
- water based releasable adhesives are to be used which are best suited for project, environmental or flexibility reasons;
- carpet tile backings must be chosen based on project application and longevity;
- carpet tile must be Carpet and Rug Institute Green Label Plus Certified and contain a minimum of 40% recycled material, uses recovered materials and must be recyclable;
- all existing carpet being removed from buildings must be recycled; and
- during removal of carpet, dust control procedures must be followed using HEPA filters.

7.3.6.2 Other Flooring

Primary public entrance areas to the building, lobbies and elevator lobbies must be finished with hard surfaces, high density, and low porosity materials chosen for their non-slip characteristics, low moisture absorbency, and hydrophobic nature. The high traffic volume of these areas must meet durable building standard to exceed 50 years life-cycle and be easy to maintain. Painted gypsum board is not considered a durable finish.

Secondary and support areas of the building, high-traffic or service areas where acoustics are not a concern and higher-end finishes are not required as defined in the functional program must be finished with resilient flooring. Products must be chosen for their durability, recyclability, low VOC, low embodied energy, and low toxicity.

7.3.6.3 Wall Finishes

Primary public entrance areas to the building, lobbies and elevator lobbies must be finished for full height of walls with materials which exceed 50 year life-cycle standard of durable building standards, have a high density, low moisture absorbency and these hard surfaces are to be chosen for their ease of maintenance.

Wall surfaces in heavy-traffic circulation areas must be treated with materials that are chosen for their impact resistance and low-maintenance character.

Wall surfaces in general purpose office space must be finished in gypsumboard, painted.

7.3.6.4 Material Finishes - Ceilings

There are a variety of options possible with ceiling treatments, for general office spaces, at a minimum suspended acoustic tiles must be used and following requirements met:

- standard office space within heritage buildings must maintain the heritage character of the spaces which would include general volumetrics and characteristics of finish materials;
- new suspended ceilings in standard office space proposed within heritage buildings must maintain full clearance at existing windows; and,
- washrooms must have a full-length cove lighting above the counters or a lighting design which delivers a soft and uniform wall wash.

7.3.6.5 Architectural Woodwork

All wood products must be certified either by the *Forest Stewardship Council Canada* (FSC), *Sustainability Forestry Initiative* (SFI), or CAN/CSA *Sustainable Forest Management System (SFM) Standard*. The following are requirements:

- Built-in furniture and casework provided in the main building lobby must be heavy-duty; other areas must be designed for normal use.

7.4 Structural Engineering

The National Building Code of Canada (NBC) serves as the basis for structural design for office buildings.

7.4.1 Design Objectives

The structural engineering design objective for office buildings is to provide an economical and efficient structure to meet the functional requirements and to fulfill the following additional requirements:

- the limit state design (LSD) method must be used for all structural design following the requirements of the NBC;
- the design for seismic protection must conform to the Real Property Services *Seismic Resistance of PWGSC Buildings* policy;
- use a 50-year design service lifespan per CSA standard CSA S478-95 *Guideline on Durability in Buildings*;
- flexibility to accommodate likely future functional requirements must be identified and integrated into the structural design; and
- the use of rainwater detention on building roofs for stormwater management must be minimized.

7.4.2 Structural Risk Management Statement

A Structural Risk Management (SRM) Statement must be prepared and submitted at each stage of the project. Refer to the PWGSC publication *Doing Business with Real Property Branch (RPB).*

7.4.3 Serviceability

Live-load reductions must not be used for horizontal framing members, transfer girders supporting columns, and columns or walls supporting the top floor or roof.

7.4.4 Floor Loads and Moveable Shelving

Office floor loads must be designed for 3.8 kPa live load and 1.0 kPa partition allowance. New office buildings must have floor plates designed to accommodate loads for moveable filing systems for all bay areas except the first perimeter bay. The load rating for the first bay areas must exceed 4.2 kPa live load.

7.4.5 Parking Structures

New parking structures must be designed in accordance with CSA S413*: Parking Structures*, with a design service life of 70 years.

7.5 Mechanical Engineering

7.5.1 Design Objectives

The mechanical engineering design objectives are to:

- provide a safe and reliable work environment for federal employees;
- meet the requirements in the *Canada Labour Code Part II, Occupational Health and Safety* and its supporting regulations, codes, and standards, and;
- meet the requirements from Treasury Board of Canada Secretariat policies and standards.

Although PWGSC encourages innovative designs, experimental and unproven mechanical systems and equipment must not be used.

7.5.2 HVAC Requirements

HVAC requirements must satisfy MD 15000: *Mechanical Environmental Standard for Federal Office Buildings*, including but not limited to the following:

a) indoor design temperature;
b) relative humidity operating limits;
c) operating temperature range;
d) occupancy heat gain
e) outdoor design temperature;
f) minimum outdoor air ventilation rate;
g) flushing air for new constructions and major renovations;
h) provide outdoor air to flush out the building on a floor-by-floor basis;
i) indoor air contamination control;
j) vibration isolation.
k) acceptable acoustical environment; and
l) for spaces not listed in ***MD 15000,*** section 5.1. *Acceptable Acoustical Environment*, the maximum noise levels must not exceed levels specified by the *National Joint Council on Occupational Health and Safety,* Part VII Noise Control (Levels of Sound). In addition, noise management strategies must be in *compliance with the Government of Canada Workplace 2.0 Fit-up Standards*.

In addition to the requirements in MD 15000: *Mechanical Environmental Standard for Federal Office Buildings*, HVAC requirements must also satisfy the following:

a) lighting and other equipment cooling loads
b) lighting loads must be based on actual design loads for the base building
c) ventilation zone control

Interior control zones must not exceed 180 m² per zone for open office areas, or a maximum of three offices per zone for closed offices. Perimeter zones must extend no more than 4 m from an outside wall along a common exposure, and must not exceed 50 m². Interior zone controls must be designed to accommodate the effects of the following:

- solar heat gain;
- perimeter heating/cooling;
- corner spaces;
- interior spaces; and

- diversity factor for occasionally unoccupied spaces (e.g. meeting rooms).

Consideration must be given for coordinating the ventilation zoning strategy with both the electrical grid and the lighting zone strategies.

7.5.2.1 Building Pressurization

Provide an active means for HVAC systems to maintain the positive pressure relationship of the building, in accordance with ASHRAE 62.1: *Ventilation for Acceptable Indoor Air Quality*.

A negative pressure must be maintained relative to surrounding spaces in areas where exhaust systems are used or an indoor air quality contaminant source is located.

Design space and building pressurization to ensure that the maximum door opening forces do not exceed *National Building Code of Canada* limits.

7.5.3 HVAC Systems

7.5.3.1 General Requirements

HVAC systems serving the conditioned air space of office buildings *must* have separate supply and return air fans contained within the air-handling unit. In addition, building pressurization control dampers are to be located as close to the air-handling unit as possible, and must be motorized and connected to the BAS.

Locate HVAC components such as dampers and coils outside of private offices to minimize disturbances.

In systems where redundancy capacity is not being included, design consideration must be given to multiple-unit arrays of smaller HVAC components instead of a single, large component; in accordance with PWGSC's DP001 *Policy on Emergency Management in Public Works and Government Services Canada (001)* and *Operational Security Standard - Business Continuity Planning (BCP) Program* from Treasury Board Secretariat.

Dampers on mechanical ventilation systems serving transformer rooms and emergency generator rooms require limit switches tied into an alarm for the damper position. The damper position must be interlocked with its ventilation fan.

7.5.3.2 Supply and Exhaust Fans

All fans must bear the Air Movement and Control Association International, Inc. (AMCA) seal, and performance must be based on tests made in accordance with AMCA 210: *Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating*.

Scroll casings must have a plugged drain connection.

7.5.3.3 Air-Handling Systems

Air handling systems must be designed incorporating the best engineering practices from the ASHRAE Handbooks.

Individually finned tube coils must comply with AHRI, the number of rows and fin spacing must be selected for the purpose of effective cleaning. Select dehumidifying coils for no more than

negligible water droplet carryover beyond the drain pan at design conditions. They must also be equipped with mist eliminators designed for low static pressure losses.

Heating and cooling coils must consider:

- coil spacing for effective cleaning;
- coil headers for effective cleaning;
- water droplet carryover downstream from dehumidification coils;
- distance to downstream equipment from dehumidification coils;
- mist eliminators;
- coil slope for drainage; and
- drain pans complete with deep trap seals suitable for the system pressure.

All hot water heating and chilled water cooling coils must be certified by AHRI 410: *Forced-Circulation Air-Cooling and Air-Heating Coils.*

Provide air filters in accordance with MD 15000: *Mechanical Environmental Standard for Federal Office Buildings*.

Air volume control dampers must be utilized for outside air mixing boxes. Mixing boxes must only use high efficiency air blenders.

7.5.4 Humidification and Water Treatment Systems

Humidification designers must coordinate the mechanical HVAC design with envelope design architects to prevent condensation on the interior surfaces, control water vapour migration into the exterior wall assembly, and ensure adequate building pressurization.

Humidification systems must also comply with the requirements of MD 15161: *Control of Legionella in Mechanical Systems.*

7.5.4.1 Humidifiers

Humidification systems must comply with Section 5.12 Humidifiers and Water-Spray Systems of ASHRAE 62.1: *Ventilation for Acceptable Indoor Air Quality.*

A high-level humidity safety switch as well as a flow switch must be integrated with each humidification system and tied into the BAS.

7.5.4.2 Water Treatment Systems

Systems requiring water treatment include the following:

- open and closed hydronic systems including cooling towers;
- potable water;
- boiler feed water;
- spray washers;
- humidification systems;
- grey water systems; and
- decorative water systems (fountains, ponds).

Design water treatment systems for control of microbiological activity including *Legionella* control as well as slime production, dissolved solids precipitation, scaling and corrosion protection in accordance with MD 15161: *Control of Legionella in Mechanical Systems*.

The chemical feed system must have self-contained microprocessor controls capable of communicating with the BAS. The methods used to treat the system's make-up water must follow the guidelines in the ASHRAE *Handbooks*. Manual addition of chemicals is not permitted.

7.5.5 Hydronic Systems

Hydronic systems must follow the guidelines in the ASHRAE Handbooks.

Closed-loop systems must include an expansion tank and a pressure-relief valve. Hydronic systems that use a common return system for both hot water and chilled water shall not be used. Hydronic systems that use a common distribution system to supply both heated and chilled water are acceptable provided that the system is designed to allow a dead band between changeover from one mode to the other of at least 8 °C outdoor air temperature.

Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection (e.g. cooling towers) and heat addition (e.g. boilers) must have controls that are capable of providing a heat-pump water supply temperature dead band of at least 11 °C between initiation of heat rejection and heat addition by the central devices (e.g. cooling tower, boiler). Refer to CAN/CSA-B214: *Installation Code for Hydronic Heating Systems* for detailed information on hydronic systems and components.

7.5.5.1 Expansion Tanks

Use only diaphragm-type expansion tanks in hydronic systems that are pre-charged to reduce the tank size. Consider operational and maintenance constraints when selecting a suitable location for the expansion tank.

7.5.5.2 Pipes and Valves

Hydronic system designs must include reverse return piping systems with properly sized two-way control valves to minimize pressure drops. Closed-loop piping system designs must incorporate pressure-balancing controls including expansion tanks and required accessories. Isolation valves must be provided on all equipment and devices, including the following:

- main piping branches;
- heat exchangers (including chiller evaporators and condensers);
- heating and cooling coils;
- terminal units; and
- control valves.

Provide local strainers for all terminal units, heating and cooling coils, and heat exchangers. Isolation and shut-off valves greater than 66 mm Ø must be high-performance butterfly valves, and those below 66 mm Ø must be ball valves. Isolation valves must also be provided for zones off vertical risers and major horizontal branches.

Provide flexible pipe connectors as required to prevent transmission of noise and vibration through piping systems.

The use of grooved pipe connections is not permitted.

7.5.5.3 Hydronic Pumps

Design the hydronic pumping system to meet the following requirements:

- inverter duty-rated pump motors for variable-flow systems;
- best efficiency point (BEP) for the most frequently used flow rate (not the maximum flow rate);
- full flow range pumping capability without any overload conditions;
- maximum 1800 RPM for pump drives;
- chillers with corresponding primary chilled-water pumps and condenser-water pumps;
- sufficient pumping capacity for the stand-by pump(s) to maintain building operation in accordance with the requirements of the business continuity plan;
- sufficient space around each pump for the removal of the bearing unit and impeller without interfering with the operation of any other system;
- mechanical seals and labyrinth seals for all pump rotating assemblies;
- fully independent hydronic pumping systems capable of individual isolation without impacting operations;
- automatic bypass valves for variable primary-only chilled-water systems, to ensure that the minimum flow through the chiller is always maintained; and
- variable-flow pumping systems in accordance with the requirements of ASHRAE 90.1: *Energy Standard for Buildings Except Low-Rise Residential Buildings*.

7.5.5.4 Vents and Drains

System drainage connections must be provided at all low points in the hydronic system, at each heating and cooling coil, and at each terminal unit.

Automatic air vents must only be used in accessible spaces, such as mechanical rooms where maintenance personnel can observe them.

Use manual air vents at terminal units and other less accessible high points, at all localized high points in the system, and at each heating coil.

Where hydronic systems are exposed, coordinate with architectural finishes to ensure maintainability.

7.5.6 Heating Systems

7.5.6.1 Central Heating Plants

New buildings or existing buildings undergoing major renovations must be designed to use low-temperature hot water heating systems. When supplied with central heating and cooling plant (CHCP) steam, buildings must use steam-to-low-temperature–hot-water heat exchangers as part of energy transfer stations (ETS). The building heating system must be designed for supply water of maximum 60 °C and return water of minimum 35 °C.

CHCP steam must not be distributed throughout any building as a heating medium.

For shell-and-tube type heat exchangers, provide accessibility to all components without interfering with the operation of other systems and equipment, including the replacement of the tube bundle. Piping networks must include the following:

- isolating and drain valves;
- piping design that account for thermal stresses;
- piping supports with provisions for thermal movement; and
- non-condensable gas elimination.

Double-wall heat exchangers must be used in domestic hot water heating applications. Plate heat exchangers must be used for waterside economizer applications.

7.5.6.2 Dedicated Boiler Hot Water Heating Systems

Hydronic hot water heating boilers must incorporate lower operating pressure and lower operating temperature for increased operating efficiencies.

Boilers must be located in a dedicated mechanical room with all provisions made for breeching, flue stack, and combustion air complete with an outdoor air intake. The combustion air must be connected directly to the boiler. For high-rise applications, locate boilers in the rooftop penthouse to reduce static pressure on boilers.

Hot water heating systems must be designed for redundancy. Dedicated backup capacity must comply with requirements for business continuity plans in conformance with PWGSC'S DP001: *Policy on Emergency Management in Public Works and Government Services Canada (001)* and *Operational Security Standard - Business Continuity Planning (BCP) Program* from Treasury Board Secretariat.

While designing dedicated how water heating systems, incorporate the following:

- packaged boiler designs;
- factory pre-assembled components and controls;
- modular design (allowing the isolation of any boiler without interfering with the operation of any other boiler);
- separate specifications for control and relief valves to limit pressure and temperature;
- return-water temperature actuated burner controls;
- self-contained microprocessor boiler controls capable of communicating with the BAS;
- minimum boiler efficiencies as per the National Energy Code of Canada for Buildings;
- boiler systems complete with all required auxiliaries, including expansion tanks, heat exchangers, water treatment, and air separators;
- control and piping arrangements that protect the boiler from thermal shock;
- pipe sizing in compliance with ASHRAE 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings;
- primary heating sources for a building that does not include electric resistance heating and/or electric boilers, except when justified by a life-cycle costing analysis;
- sodium/potassium-free (Na-K-free gas valve actuators;
- breeching, vents, stacks, and chimneys; in compliance with NFPA 54: National Fuel Gas Code and NFPA 211: Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances;

- factory fabricated, field assembled breeching, vents, stacks and chimneys; material types, ratings and distance to adjacent building materials in compliance with NFPA 54: *National Fuel Gas Code* and NFPA 211: *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances;* and
- heat transfer fluid that is free of ethylene glycol.

7.5.7 Cooling Systems

Cooling systems must be designed in compliance to CSA B52: *Mechanical Refrigeration Code.*

Refrigeration systems, the choice of refrigerant and the leak mitigation measures must comply with ASHRAE 34 *Safety Standard for Refrigeration Systems.*

Domestic cold water must not be used for cooling systems. Only acceptable refrigerants are to be used, in accordance with CSA B52 *Mechanical Refrigeration Code.*

7.5.7.1 Chilled Water Systems

Where central heating and cooling plant (CHCP) systems are available, ensure that the cooling plant controls are integrated with the chillers and cooling towers for overall maximum integrated efficiency.

Chillers must meet CAN/CSA C743: *Performance standard for rating packaged water chillers* for energy efficiency requirements. Chiller performance must be certified by the Air-Conditioning, Heating and Refrigeration Institute (AHRI).

Demonstrate that life-cycle costing (LCC) has been used as a basis for selection or omission of the following:

- variable-frequency drive chillers;
- thermal storage solutions;
- absorption chillers;
- centrifugal chillers with magnetic bearing compressors;
- reciprocating water chillers with open or hermetic compressors;
- rotary screw chillers; and
- scroll chillers.

Chilled water system designs must incorporate the following:

- vibration isolation and seismic control measures;
- flexible piping and conduits;
- common header design for chilled water, with provisions to sequence chillers according to load requirements;
- expansion tanks, heat exchangers, water treatment, and air separators for all auxiliaries;
- recirculation/bypass control valves on chiller condenser piping to maintain the manufacturer's minimum incoming condenser water temperature;
- pressure and temperature gauges, flow and energy-use meters, including adequate illumination, along with isolation valves to allow servicing while in operation;
- microprocessor-based controls capable of communicating with the BAS;
- common header with provisions for the BAS to sequence chillers to match the cooling load;
- chiller operating limit controls;

- chiller safety controls;
- chiller freeze protection controls;
- chiller flow controls;
- control panels with self-diagnostic capability and integral safety controls;
- control panels with displays that include the following:
    - run time;
    - operating parameters including set-points;
    - electrical low-voltage alarm;
    - phase-protection loss alarm;
    - peak demand limiting controls; and
    - input/output coefficient of performance (COP);
- BAS-connected chiller leak detection and remote alarming;
- BAS-connected freeze protection, including hard-wired, low-limit switches for all freeze-prone coils;
- piping connections that include isolating and drain valves on chilled water and condenser water loops;
- minimum flow alarm through the chiller when the chiller is operating;
- piping designs that incorporate provisions for the thermal movement of piping and the reduction of thermal stresses on chiller; and
- air elimination accessories including a purge system that operates without affecting chiller operations.

Dedicated backup capacity must comply with requirements for business continuity plans in conformance with PWGSC's DP001: *Policy on Emergency Management in Public Works and Government Services Canada (001)* and *Operational Security Standard - Business Continuity Planning (BCP) Program* from Treasury Board Secretariat.

Chiller units must be connected to a common header that allows for adequate isolation of individual units without interruption of service to the remaining units.

Cooling systems with a capacity less than 175 kW (50 tons) requires a life-cycle cost analysis for incorporating or omitting cooling towers or evaporative condensers. The chilled water system design must maximize chilled water temperatures and minimize condenser water temperatures to achieve the greatest heat recovery rates and highest efficiencies.

Each chiller must be designed to permit refrigerant recovery during servicing and repair.

Chlorofluorocarbon (CFC) refrigerants are not permitted. For acceptable non-CFC refrigerants, refer to the *Federal Halocarbon Regulations* and the *Ozone-Depleting Substances Regulations* of the *Canadian Environmental Protection Act*.

7.5.7.2 Cooling Towers

Cooling tower designs must incorporate the following:

- wet bulb design temperatures that meet ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings parameters;
- Legionella abatement strategies, including microprocessor controls capable of communicating with the BAS;
- certified performance values by the Cooling Technology Institute (CTI), STD-201;

- cooling tower fan power requirements that comply with ASHRAE 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*;
- supply piping connected to a manifold to allow for any combination of equipment use;
- equalization piping between cell basins for multiple tower designs complete with isolation valves between cells;
- ladders and platforms for ease of inspection and replacement of components;
- control strategies for the prevention of "dead heading" with variable-speed pumps when the pump is operated in parallel with other pumps;
- clean-outs for sediment removal and flushing from basins;
- de-icing capability for operations in subfreezing climates;
- provisions in subfreezing climates for draining all piping during shut-downs using indoor drain-down basins;
- heat-tracing and thermal insulation for exterior piping subject to freezing;
- manual shut-down capability;
- basin heaters for all-weather waterside economizers;
- heat tracing above and below grade (down to 900 mm) for all condenser water piping operated in subfreezing climates;
- fibreglass, PVC, or stainless steel construction for condenser piping, cooling tower basins, and housings, free of bolted or riveted connections;
- vibration and sound isolation designs in accordance with CTI standards for cooling towers located on building structures;
- cooling tower elevations that maintain the required net positive suction head on condenser water pumps;
- 1200 mm minimum clear space beneath the bottom of the lowest structural member, piping, or sump on all rooftop installations (to allow re-roofing under the tower); and
- BAS-connected temperature and pressure sensors for chilled and condenser water pipes connected to the waterside economizer with automated controls for waterside economizers and sequenced with the operating chillers to match the load requirements;

7.5.8 Plumbing Systems

Plumbing systems include domestic cold water supply (DCWS), domestic hot water supply (DHWS), and domestic hot water recirculation (DHWR) systems, plumbing fixtures, traps, sanitary waste and vent systems, and storm water systems. Design the plumbing systems to meet the *National Plumbing Code of Canada*.

When designing plumbing systems, consideration must be given to the reuse of existing systems by confirming the condition of existing piping prior to re-use. To be fit for re-use, piping systems must satisfy the applicable codes listed in Annex B: References *Mechanical Codes, Standards and Legislation* as well as this Standard.

7.5.8.1 Plumbing Fixtures

All plumbing fixtures must be provided with stated water efficiency ratings and must comply with accessibility requirements as specified in the Treasury Board of Canada Secretariat *Accessibility Standard for Real Property*, CAN/CSA B651: *Accessible Design for the Built Environment*, and the PWGSC *Real Property Branch Accessibility Procedure*.

7.5.8.2 DCWS, DHWS, and DHWR Systems

The DCWS must be designed to prevent the following:

- water hammer;
- cross-contamination;
- surge;
- erosion;
- noise; and
- cavitation.

The DCWS must also be designed to minimize flow-generated noise and vibration.

In addition, the DCWS, the DHWS, and the DHWR must be designed to include the following:

- lead-free materials for all piping and fixtures in accordance with CSA B125.1: *Plumbing Supply Fittings*;
- bacterial and/or chemical treatment of raw water supplies to be used for potable water services. As an additional precaution, drinking fountains and water-bottle filling stations are to be equipped with in-line filters capable of removing lead, to meet Health Canada's *Guidelines for Canadian Drinking Water Quality*;
- a domestic hot water recirculation (DHWR) system when hot water availability exceeds 15 seconds at the furthest fixture from the heating source;
- maximum hot water temperature of 40 °C at showerheads; and
- *Legionella* controls in accordance with MD 15161: *Control of Legionella in Mechanical Systems*.

7.5.8.3 Sanitary Waste and Vent Systems

Provide separate sanitary and storm sewer runs to the property line, even in instances where the municipal sewers combine sanitary and storm sewers. Comply with the waste treatment requirements of the authority having jurisdiction.

Floor drains connected to the municipal sewer system or discharging into the environment must include safeguards for the prevention of discharges of hazardous materials where the incidence of discharges occurring is likely, such as in mechanical rooms and workshops.

Provide floor drains with materials and accessories adapted to the following specific building areas:

- cast iron drains and nickel-bronze strainers for public washrooms and other public areas;
- cast iron drains, stainless steel sediment buckets and stainless steel funnel-type strainers for kitchens and dishwashing areas;
- large-diameter cast iron drains with funnel-type strainers in equipment rooms, with the drains located appropriately to eliminate horizontal runs of drain piping;
- large cast iron or concrete basins for parking garages installed in conjunction with heavy-duty cast iron grates to incorporate sand and oil interceptors; and
- trench drains or roadway inlets for ramps exposed to rainfall.

Provide trap seal primers for all floor drains where drainage is not routinely expected from spillage, cleaning, or rainwater. Provide floor drains with adequate cleanouts and plumbing vents in accordance with plumbing codes.

Only use sewage pumps where gravity drainage is not possible. If sewage pumps are required, only the lower floors of the building must be connected to the sewage pump; fixtures on the upper floors must use gravity flow to provide drainage to the public sewer. Sewage pumps must be non-clog, screenless, grinder-type duplex pumps, with each discharge not less than 100 mm in diameter, complete with alternators and connected to the emergency electrical power grid.

Septic tanks and disposal fields must comply with all the requirements of the authority having jurisdiction.

7.5.8.4 Storm Water Drainage Systems

Piping systems must be in compliance with the National Plumbing Code and sized based upon local rainfall intensity in compliance with the *National Building Code of Canada*.

Roof drains and overflow drains must be cast iron body type with high dome grates designed to provide adequate drainage. When included in the design, controlled flow roof drains must comply with the *National Plumbing Code of Canada*.

Foundation drainage systems with drain tiles collecting into a sump pit with backwater valves, as well as duplex pumping systems must comply with the requirements of the *National Plumbing Code of Canada*.

Elevator shaft sumps must be fitted with sump pumps connected to the emergency power grid. Sump pump pits must be independent from elevator pits.

Storm water lift stations and sump pumps must only be used where gravity drainage to municipal storm sewers is not possible. Storm water lift stations and clear water sump pumps must be non-clog, screenless, duplex pumps, with each discharge complete with alternators and connected to the emergency electrical power grid. Sump pumps must be complete with sealed cover plates, vents, inspection manholes, and access to level controls.

7.5.9 Advanced Metering System

The data management must focus on key performance indicators to be meaningful and useful for the implementation of the energy management system (EnMS) as described in CAN/CSA-ISO 50001: *Energy Management Systems.*

Advanced metering systems must be installed in all new construction and major rehabilitation projects to collect information on the consumption of electricity, gas, water, and other utilities (e.g. steam, chilled water).

The metering system must include meters, communications networks, and data management capabilities. Data from variable frequency drives larger than 3.75 kW must be networked to the advanced metering system.

The advanced metering system must be networked to, or form part of, the building automation system (BAS), if present. It must record data at a frequency no less than hourly (similar trigger points are also acceptable) and store the data in a central repository. The system must be able to

show daily, monthly, and annual totalled readings and provide for combined readings to show total energy consumed for the period.

The system must include energy tracking for the whole building (and selected subsystems) by displaying the actual energy consumption in comparison to a baseline (either estimated or established). This data must be available on demand on the central operator workstation, and must be available in a form that allows for the ability to generate advisories to management when normal tolerances are not being maintained.

The advanced metering must record at a minimum the following information:

- electrical components phase voltages, phase currents, and power consumption (kW) readings for the following:
    - all risers
    - motor control centres;
    - lighting panels;
    - power distribution panels;
    - telecommunication rooms; and
    - emergency loads (on the load side of the transfer switches);
- line voltages, line currents, and power consumption (kW) readings for all feeders to the following:
    - motor loads over 15 kW;
    - all major mechanical equipment such as chillers, air-handling units, and pumps; and
    - all spaces planned to be leased;
- For mechanical components and subsystems:
    - gas and other fuels consumption;
    - domestic water consumption;
    - steam and/or hot water utilization, if provided from the outside sources; and
    - chilled water consumption, if provided from the outside sources with individual water flow or energy-measuring devices provided for chilled water lines serving computer rooms.

The water flow and airflow measuring devices must meet the requirements of ASHRAE 90.1: *Energy Standard for Buildings Except Low-Rise Residential Buildings*.

7.5.9.1 Power Monitoring

In addition to, or as part of the above listed metering, power monitoring must also form part of the advanced metering system. The power monitoring must be installed in the primary switchgear (if present and Crown-owned) as well as the main secondary switchgear and measure, at a minimum, the phase voltage, phase current, power consumption, power factor, and harmonic distortion.

7.5.10 Building Automation Systems

For a high level view of the basic recommendations for an Intelligent Building design for the BAS of a new building or major renovation, consult MD 15250: *Intelligent Buildings*.

The BAS must comply with ASHRAE 135, *A Data Communication Protocol for Building Automation and Control Networks*.

The BAS must utilize direct digital control (DDC) technology with networked distributed processing, and be user-programmable in the field for all required automated functions.

The BAS must have a non-proprietary design to monitor, control, and report on all mechanical, environmental-control, and energy-consuming systems. Open protocols, such as ASHRAE's BACnet, must be used.

Provide visual and audible identification of BAS alarm signals in the security control room during unoccupied periods. However, such alarms must not be integrated with the fire and security systems.

7.5.10.1 Operator Work Stations

The primary operator work station (OWS) must be capable of displaying information from the BAS, as well as from the advanced metering system (as described in section 7.5.9 Advanced Metering System).

If BACnet is used, the main OWS and secondary OWS must be listed by the BACnet Testing Laboratories (BTL) as either BACnet Advanced Operator Workstation (B-AWS) or BACnet Operator Workstation (B-OWS).

7.5.10.2 Master Controller

Standalone, microprocessor-based, fully programmable master control units must include the following features:

- microprocessor (CPU) with memory and hardware sufficient for the installation and for at least a 25% expansion of capability for each controller controlled by the master controller;
- controller power supply that accepts local power and provides all conditioning necessary for reliable, fail-safe operation;
- battery-backed real-time clock accurate to ± 5 seconds/year with 72-hour backup;
- battery-backed RAM with 72-hour backup;
- network interface to other controllers;
- network interface allowing access by operators (including access via OWSs); and
- automatic, complete recovery after a power failure.

All BACnet controllers must be BTL-listed.

7.5.11 Mechanical Systems for Special Spaces

7.5.11.1 Entrance and Lobbies

Positively pressurize the entrance vestibule relative to atmospheric pressure to minimize infiltration. Ensure that exterior door operations are not adversely affected and remain within acceptable limits, in conformance with the *National Building Code of Canada*.

7.5.11.2 Elevator Machine Rooms

Maintain space temperature conditions, as required by equipment specifications, and in accordance with CAN/CSA B44: *Safety Code for Elevators*. Consider the use of secondary chilled water for cooling, and the use of elevator machine room heat exhausting for heating the

remaining building. Ensure that the elevator design minimizes the draw of interior air through the stack effect.

7.5.11.3 Mechanical, Electrical, and Telecommunication Equipment Rooms

All mechanical, electrical, and telecommunication rooms must be maintained with room space conditions, such as ventilation, heating and cooling, as required by MD 15000 *Mechanical Environmental Standard for Federal Office Buildings*.

Install equipment in a manner that servicing of any equipment will not require shut-down of other equipment.

The location of water lines must comply with the requirements of the *Canadian Electrical Code*.

All telecommunications rooms must be ventilated and cooled in accordance with the requirements of the Telecommunications Industry Association (TIA) / Energy Information Administration (EIA) standard TIA/EIA 569: *Telecommunications Pathways and Spaces* and its addenda, and Treasury Board information or technology standard TBITS 6.9: *Canadian Open Systems Application Criteria (COSAC), Telecommunications wiring system in Government-Owned and leased buildings - Implementation Criteria*.

7.5.11.4 Computer Room Cooling and Ventilation

Provide cooling and ventilation of computer room cooling and ventilation in accordance with MD 15000: *Mechanical Environmental Standard for Federal Office Buildings*.

7.5.11.5 Service areas

Mechanical systems for service areas must include the following:

- janitor closets have no HVAC requirements;
- chiller equipment rooms, construct, ventilate, and equip all rooms containing refrigeration units to comply with ASHRAE 15: *Safety Code for Mechanical Refrigeration as well as* **CSA B52**: *Mechanical Refrigeration Code.*
- indoor parking garages must include exhaust systems activated by carbon monoxide detectors. Use energy recovery systems where justified by a life-cycle costing analysis.
- mail rooms must have independent HVAC systems to deal with the potential for chemical/biological contamination.
- UPS battery rooms must be ventilated/exhausted directly to the outdoors at a rate that is in compliance with code requirements and the manufacturer's recommendations. The exhaust system must be connected to the emergency power distribution system. Fans must be explosion-proof. The ductwork must consist of a dedicated, negative pressure system of corrosion-resistant material.
- high-occupancy and highly variable occupancy areas must be provided with demand-controlled ventilation (DCV) systems with CO_2 sensors; provide enthalpy energy recovery and de-humidification systems where justified by a life-cycle costing analysis.

7.5.12 Miscellaneous Requirements

7.5.12.1 Acoustical Insulation

Provide acoustical insulation where required to satisfy the requirements listed in Table 5-1: Maximum Mechanical Noise in MD 15000: *Mechanical Environmental Standard for Federal Office Buildings*.

Acoustic treatment of fan noise must be incorporated at the air-handling unit by using duct silencers on the supply and return ducts. The treatment must not use fibre insulation on the interior surfaces of the ductwork upstream of the air terminal units.

7.5.12.2 Identification of Mechanical Systems

All piping and ductwork systems in new constructions or major renovations must be identified in accordance with the Health Canada manual: *Workplace Hazardous Materials Information System (WHMIS)* manual issued by Health Canada, which represents Canada's national standard for hazard classification and communication.

7.5.12.3 Outdoor acoustical treatments

Air intakes, exhausts, mechanical rooms, cooling towers, air handling units, emergency generators and waste handling equipment shall have noise attenuation provisions, where required to achieve compliance with noise restrictions at the property line.

7.5.13 Mechanical Section Checklist

7.5.13.1 does the design provide an Energy Use Intensity value for the building/renovation?
- electricity
- natural gas
- water

7.5.13.2 is the design based on one of the three "General Method for Determining Acceptable Thermal Conditions in Occupied Spaces", as per ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy;

7.5.13.3 Graphic Comfort Zone Method

7.5.13.4 Analytical Comfort Zone Method

7.5.13.5 Elevated Air Speed

7.5.13.6 What is the Expected Fresh Air Rate?

7.5.13.7 Does the water system comply with *Legionella* abatement procedures?

7.5.13.8 What are the points measured by the advanced metering system(s)?

7.6 Fire Protection System

7.6.1 Design Objectives

The design objective of life and safety systems is to ensure the health and safety of federal employees in the event of an emergency. The fire protection system design must meet the following objectives:

- meet all NFPA standards for fire protection systems; and,
- integrate specialized tenant requirements with base building requirements.

7.6.2 Municipal Installations

All sites on or off municipal services must be evaluated and strategies provided to address issues related to health and safety.

Municipal systems must meet the NFPA 1142: *Standard on Water Supplies for Suburban and Rural Fire Fighting* and other appropriate NFPA standards that stipulate water requirements for supplying fire suppression systems. Issues to be addressed include the following:

- evaluation of pressure and flow rates to determine their adequacy;
- evaluation of pressure and/or flow rates based on 10 years of projected deterioration (or increase in demand due to population growth; and
- evaluation of the use of fire pump(s) and/or booster pump(s) feeding from a private tank or reservoir.

7.6.3 Specialized Functions for Base Building and Tenants

Office buildings may have tenants who have requirements related to specialized functions in addition to the base building requirements. These functions must be integrated into the base building system. Furthermore, base buildings include general storage facilities, which must meet the requirements of NFPA 13: *Standard for the Installation of Sprinkler Systems* and NFPA 231: *Standard for General Storage.*

Specialized tenant functions in the functional program may include one or more of the following:

- the storage arrangements and protection of a rack storage facility, which must meet the requirements of NFPA 13: *Standard for the Installation of Sprinkler Systems*, NFPA 231: *Standard for General Storage*, and NFPA 231C: *Standard for Rack Storage of Materials*;
- the storage arrangements and protection of a inflammable and combustible liquid storage area, which must meet the requirements of the *National Fire Code of Canada*, NFPA 30: *Flammable and Combustible Liquids Code*, and the applicable Factory Mutual (FM) Global Property Loss Prevention Data Sheets;
- facilities having high-value or mission-essential electrical equipment, mainframe computers, or network equipment with the potential for high dollar loss and/or business interruption, which must be designed and installed in accordance with NFPA 75: *Standard for the Fire Protection of Information Technology Equipment*; and
- fire protection requirements for cooling towers, which must meet the requirements of NFPA 214: *Standard on Water-Cooling Towers*.

7.6.4 Sprinkler Systems

Sprinkler systems must meet all of the requirements below, which supersede the design requirements of NFPA 13: *Standard for the Installation of Sprinkler Systems*:

- all sprinklers and sprinkler escutcheons installed in any new construction or renovation projects must be listed by a nationally recognized testing facility such as Underwriters Laboratories of Canada;
- all quick response glass bulb sprinklers must be equipped with protective devices to reduce damage prior to installation and be removed after the sprinkler is installed;
- flow control (on-off) sprinklers must not be installed in any new construction or renovation projects;
- all automatic sprinklers installed less than 2 m above floor must be equipped with sprinkler guards to provide protection against accidental damage;
- black steel piping and/or copper tubing must be used for all wet-pipe sprinkler piping;
- chlorinated polyvinyl chloride (CPVC) sprinkler piping must not be used;
- galvanized (internal and external) sprinkler piping must be used for all dry-pipe sprinkler systems;
- steel pipe sizes 50 mm and smaller must be Schedule 40 and must be threaded;
- steel pipe sizes larger than 50 mm must be minimum Schedule 10. Piping less than Schedule 40 must be roll grooved;
- threadable lightwall pipe must not be used;
- piping having a corrosion-resistant ratio less than one must not be used;
- plain-end fittings must not be used;
- automatic sprinklers must be installed in all new construction projects and in all renovation projects. This includes elevator machine rooms, boiler rooms, mechanical equipment rooms, walk-in freezers and cold rooms, essential electronic facilities, electrical closets, telephone closets, emergency generator rooms, uninterruptible power service and battery rooms, electrical switchgear rooms, transformer vaults*, and telephone exchange (PABX) rooms. Provide all electrical equipment with a sprinkler-proof enclosure;

  *Note: Sprinklers can be omitted in the transformer vault if the vault is provided with a 3-hour fire separation. Provide appropriate fire protection devices in the vault as required by the local utility and authority having jurisdiction;

- all sprinkler systems must be wet-pipe sprinkler systems unless installed in areas subject to freezing or as directed by the project-specific program;
- in areas subject to freezing, install either dry-pipe sprinkler systems or dry pendent sprinklers must be installed, heat must be provided in the space, and/or sprinkler piping must be rerouted. Do not use heat tape on sprinkler piping;
- antifreeze sprinkler systems must not be installed in any new construction or renovation projects;
- damage to motors, switchgear, electronic equipment, direct digital control (DDC) and alarm panels, computers, etc., must be minimized by applying spray fireproofing;
- sprinklers installed in electrical rooms and electrical closets must be equipped with sprinkler guards to provide protection against accidental damage;
- integrate sprinkler design selection and locations in historic properties.

7.6.5 Fire Alarm Systems

Fire alarm systems must meet all of the following special requirements, which are in addition to those contained in the above listed codes and standards:

- fire alarm systems must have a non-proprietary, open protocol for interoperability with other building systems;
- fire alarm systems must be monitored by the building automation system in a one-way, read-only manner;
- fire alarm systems must be standalone systems that are able to function independently of other building systems; and
- fire protection conduits must be as per the CEC section 32.

7.6.5.1 Fire Alarm System Special Requirements

The following requirements are in addition to those contained in the above listed codes and standards:

- fire alarm system should be monitored by the Building Automation System in a one way, read-only manner;
- fire alarm system must be a standalone system that is able to function independently of other building systems; and,

7.6.6 Fire Pumps and Accessories

7.6.6.1 Fire Pump Design and Installation

When a fire pump is necessary to supplement water flow and pressure, it must be sized to comply with the appropriate NFPA standards: NFPA 13, NFPA 14, and/or NFPA 20. However, fire pump operations must meet NFPA 20. Fire pumps must be designed for manual and/or automatic shut-down. Manual shut-down of the fire pump must ensure that the pump does not shut down prematurely before controlling the fire. Automatic shut-down is only permitted when activated by a low water level shut-off device.

7.6.6.2 Fire Pump Controller

The fire pump controller must be completely assembled, wired, and tested by the manufacturer before shipment from the factory. The status and condition of all fire pump units must be monitored by and signalled at the fire pump controller, and the status of the fire pump must be monitored by the fire alarm system.

7.6.6.3 Jockey Pump

A jockey pump (or pressure maintenance pump) must be utilized where it is desirable to maintain a uniform or relatively high pressure on the fire protection system. Jockey pumps must be sized to make up the allowable leakage rate within 10 minutes.

7.7 Electrical Engineering

7.7.1 Design Objectives

The electrical engineering design objectives are to provide a safe, reliable, and maintainable electric power system for office buildings. The electric system design must meet the following objectives:

- be sized to meet the anticipated loads of the building;
- be coordinated in terms of interrupting capacity, device and cable ratings, fault levels, and protective relaying;
- allow safe maintenance, minimizing shock and arc flash hazards for maintenance personnel; and,
- support power conservation initiatives.

7.7.2 Design Studies

7.7.2.1 Electrical Load Analysis

An electrical load study must be performed for new office building construction as well as rehabilitation projects where modifications to the electrical distribution system may result in overload conditions. The report must analyze the building loads, including scenarios for normal use, off-hours use (night time and weekends), emergency scenarios, and different seasons.

7.7.2.2 Short Circuit, Device Evaluation and Coordination Study

A short circuit, device evaluation, and coordination study must be performed for new office building construction as well as rehabilitation projects where modifications to the electrical distribution system may result in protective devices not being coordinated, or in equipment being subjected to short circuit currents greater than their ratings. If series rated equipment is used, it must be marked in a clear and conspicuous manner to ensure it is replaced with equipment of the same type and rating.

All electrical equipment panels containing interrupting devices must be labelled with the assembly short circuit current rating. Over-current devices (breakers, fuses, relay, etc.) and overload devices must be coordinated and have settings adjusted as per the coordination study.

7.7.2.3 Arc Flash Study

An arc flash study must be performed for new building construction as well as rehabilitation projects where modifications to the electrical distribution system may result in the need to update existing safety labelling.

The study must be performed in accordance with CSA Z462: *Workplace Electrical Safet*y. Safety labels, also in accordance with CSA Z462, must be applied on all panel boards, motor control centers, switchgear, and major electrical equipment. Labels must comply with the *Official Languages Act,* including bilingual labels prescribed under subsection 35(2) of the Act.

7.7.3 Site Utility

In buildings where low voltage is economically justifiable for the site utility, new building construction projects should have the utility company furnish power at the main utilization voltage (i.e. 600/347 V or 208/120 V).

In the case of larger buildings, or office buildings campuses where it is impractical or uneconomical to use low voltage, high voltage (over 750 V) may be used.

Redundant services should be requested from the utility company if the system supplies over 25,000 m^2 of floors space in a building and a cost benefit analysis finds the redundant connection to be warranted.

7.7.3.1 Substation Ownership and Demarcation Points

PWGSC prefers that substations be utility-owned. However, the project details along with discussions with the local utility company will dictate the ownership of the substation and the placement of the ownership and operational demarcation points. Projects involving large buildings and campus locations may require PWGSC to own substations due to cost benefits, security requirements, operational requirements, or agreement with the local utility.

7.7.3.2 Electrical Service

An underground service must be used to supply office buildings, where conditions allow. The underground service must be installed in a concrete-encased duct bank. Cables must be selected based on all aspects of the cable operation and must comply with the requirements of the local utility.

7.7.3.3 Underground Cable and Conduit

Direct buried cables must not be used. Instead, buried conduits appropriate to the site conditions must be used to facilitate the modification and repair of electrical distribution.

7.7.3.4 Concrete-Encased Duct Banks

Concrete-encased duct banks must be used where many circuits follow the same route, for runs under permanent hard pavements, and where service reliability is paramount, such as at service entrances.

The duct bank installation must comply with the *Canadian Electrical Code*. For new building construction, spare ducts for planned future expansion must be provided. In addition, extra ducts equivalent to a minimum of 25% (of the total ducts) must be provided for unknown future expansion.

Ducts must be routed so as to avoid other underground utilities, foundations, and structures. They must have watertight seals where they enter into buildings, and must slope toward manholes.

7.7.3.5 Electrical Manholes

Manholes must be spaced such that pulling tension on cables will not exceed amounts that may damage the cable integrity. Furthermore, manholes must be provided with the following:

- cable racks;
- sumps;
- hardware for cable pulling (irons, inserts etc.);
- labelling on all cables; and
- grounding.

Manholes must be large enough to have all conductors secured on cable racks and must provide adequate working space around the conductors.

Separate manholes must be provided for:

- low voltage cables (not exceeding 750 V);
- high voltage cables (exceeding 750 V); and
- telecommunications cables.

Electrical handholes may be used for low-voltage feeders (below 750 V), branch circuits, and telecommunications pathways.

7.7.4 Primary Distribution

Primary power distribution systems consist of transformers, cables, switchgear, and associated equipment and operate at high voltage (over 750 V). For projects in which PWGSC-owned primary power distribution systems are being installed, i.e. typically large buildings or campuses, the following design requirements must be met:

- Use an open-loop or primary selective system architecture for redundancy if the system supplies over 25,000 m^2 of floor space and/or if the building contains mission-critical equipment such as data centres.
- Provide a minimum spare capacity of 25% above the design demand load as determined according to the Canadian Electrical Code.

7.7.4.1 Primary Substation

Primary substations must be located so that radio frequency interference will not interfere with telecommunications frame equipment. Oil filled transformers located in underground vaults must not be positioned directly adjacent to or beneath an exit way. No building drainage system may pass through the ceiling of the room containing the primary substation.

7.7.4.1.1 Primary Substation Transformers

PWGSC-owned primary transformers must be installed in compliance with the *Canadian Electrical Code* and the *National Building Code of Canada*. The efficiency of the transformers must meet or exceed the following applicable CSA standards:

- CAN/CSA C802.1: Minimum Efficiency Values for Liquid-Filled Distribution Transformers;
- CAN/CSA C802.2: Minimum Efficiency Values for Dry-Type Transformers; and
- CAN/CSA C802.3: Maximum Losses for Power Transformers.

7.7.4.1.2 Primary Substation Switchgear

PWGSC-owned primary switchgear may be provided with draw-out type circuit breakers of the air, vacuum, or SF6 type, or fused-air interrupter switches and must comply with the following design requirements:

- include energy-reducing maintenance switching or other effective means of reducing arc flash hazard during maintenance activities such as remote operation;
- be built according to CSA C22.2 NO. 31: *Switchgear Assemblies* and meet the requirements of the local utility, including any metering requirement;
- include a mimic bus to show bussing, overcurrent devices and instrumentation; and
- include power monitors and advanced metering as per section 7.5.9 Advanced Metering System.

7.7.5 Secondary Distribution

Secondary power distribution systems consist of transformers, cables, switchgear, switchboards and associated equipment and operate at 600/347 V, 208/120 V, or for small buildings at single phase 240/120 V.

Either spot networks (when available) or double-ended substations (also known as a secondary selective circuit arrangement) must be provided if either of the following applies:

- The building is over 10,000 m^2.
- The building contains mission-critical equipment such as data centres.

Double-ended substations must comply with the following:

- The sum of the estimated demand load of both ends of the substation must not exceed the rating of either transformer.
- The transformers must have provisions for fans to increase their rated capacity.
- The double-ended substations must be equipped with two secondary main breakers and one tie breaker mechanically interlocked for manual operation, with no paralleling.

7.7.5.1 Secondary Switchgear

Secondary switchgear must meet the following design requirements:

- comply with the CSA C22.2 NO. 31: *Switchgear Assemblies* standard;
- have a main service disconnect;
- be front- and rear-accessible;
- include hardware to lock out all breakers and switches;
- only use draw-out type breakers;
- have an enclosure that is sprinkler-proof;
- contain a ground bus throughout;
- have spare space and ampacity of 25% (for new installations);
- contain energy-reducing maintenance switching if arc-flash is a risk for maintenance;
- have the state of each breaker (open/closed) monitored by the building automation system; and
- include advanced metering as per section 7.5.9 *Advanced Metering System*.

7.7.5.2 Distribution Switchboards

Distribution switchboards must meet the following design requirements:

- comply with the CSA C22.2 NO. 244-05: *Switchboards* standard;
- have a main service disconnect;
- have spare space and ampacity of 25% for new installations; and
- contain advanced metering for feeders to panel boards measuring current and totalizing watt-hours as per section 7.5.9 *Advanced Metering System*.

7.7.5.3 Secondary Transformers

Secondary transformers must be installed in compliance with the *Canadian Electrical Code* and the *National Energy Code of Canada for Buildings*. The transformers must conform to the following applicable CSA standards:

- CAN/CSA C802.1: Minimum Efficiency Values for Liquid-Filled Distribution Transformers; and
- CAN/CSA C802.2: Minimum Efficiency Values for Dry-Type Transformers.

Secondary transformers supplying large nonlinear loads must be K-rated or oversized in order to prevent overheating due to harmonics.

7.7.5.4 Motor Control Centres (MCC)

Motor control centres must meet the following design requirements:

- comply with the CSA C22.2 No. 14: *Industrial Control Equipment* standard;
- utilize a control circuit voltage of 24 VDC;
- be provided with metering and power monitoring as per section 7.5.9 *Advanced Metering System;*
- have operator controls as per section 7.7.8.4 Operator Controls; and
- include interlocks to prevent multiple motor loads with high inrush current from starting simultaneously, in order to prevent nuisance tripping of breakers and to avoid placing excessive loads on transformers or the emergency power supply system.

7.7.5.5 Variable-Frequency Drives (VFD)

In cases where motor speed is controlled to various set points, variable-frequency drives (VFD) must be used for all motors greater than 3.7 kW (5 hp). Harmonic distortion generated by VFDs must be mitigated as per section 7.7.5.10 Power Quality. Data from VFDs for motors over 3.7 kW must be networked to the advanced metering system as per section 7.5.9 *Advanced Metering System*.

7.7.5.6 Electrical Motors

Electric motor efficiency must comply with the *National Energy Code of Canada for Buildings* (NECB).

7.7.5.7 Elevator and Escalator Power

Electrical design standards in elevators and escalators must comply with the following codes and standards:

- National Building Code of Canada;
- *Canada Occupational Health and Safety Regulations SOR/86-304, Part VI*;
- CSA B44: Safety Code for Elevators and Escalators; and
- CSA B355: Lifts for Persons with Physical Disabilities.

Elevators must be powered from a breaker or fused disconnect located in the elevator machine room that is equipped with hardware for lockout.

7.7.5.8 Panelboards

Panelboards must comply with the CSA C22.2 No. 29: *Panelboards and Enclosed Panelboards* standard. Separate panelboards must be used for regular power supplying:

- lighting;
- general purpose receptacles and miscellaneous loads;
- telecommunications systems; and
- mechanical loads (heating, ventilation, and air-conditioning).

Panels powered by emergency power may contain mixed loads.

Panelboards must be of the bolt-on, circuit breaker types. Multi-pole breakers must have a single handle. Each circuit must be clearly labelled with a durable a typewritten directory within the panel. All panelboards must be fitted with lock-type doors and door-in-door trim.

Panelboards supplying the main telecommunications room, also known as distributor room C, must be provided with a surge protection device (SPD) with a surge rating of no less than 50 kA per phase (25 kA per mode).

All new panelboards must be provided with minimum 25% spare ampacity and 25% spare overcurrent devices.

7.7.5.9 Secondary Distribution Conductors

Either copper or aluminum conductors may be used in the following equipment:

- motors winding;
- distribution transformer windings;
- bus ducts;
- switchgear bussing; and
- switchboard bussing.

Copper conductors must be used for conductor sizes smaller than 1/0 as well as individual grounding and bonding conductors. Joint compound and approved fittings must be used on aluminum conductor terminations as per the *Canadian Electrical Code*.

7.7.5.10 Power Quality

The building's electrical system must comply with the standards set by the local utility for power-line flicker, total harmonic distortion, and power factor, as well as with the requirements outlined in the following sections.

7.7.5.10.1 Power Factor

The system design must maintain a minimum power factor of 0.9 lagging. Power factor correction equipment should be utilized when required. If utilized, power factor-correcting capacitors must be properly labelled, complete with listed discharge times for servicing.

7.7.5.10.2 Total Harmonic Distortion

Total harmonic distortion must not exceed limits set by the utility or interfere with electronic equipment in the building. If it exceeds these limits or interferes with electronic equipment, the distortion must be mitigated. Suitable mitigation measures include but are not limited to the following:

- varying equipment operating settings;
- selection of equipment that produces lower amounts of harmonics, such as drives with more pulses;
- selection of equipment with built-in mitigation;
- passive filters;
- isolation transformers; and
- active conditioning equipment.

7.7.6 Branch Circuits

All branch circuit wiring must be copper and no smaller than No. 12 AWG.

7.7.6.1 Lighting Branch Circuits

Lighting branch circuits may be 120 V, 347 V or DC distribution. The design of the lighting branch circuits must consider life-cycle costing, including the cost of the conductors, equipment, maintenance, and operation. Circuit loading must not exceed the maximum load specified in the *Canadian Electrical Code*.

7.7.6.2 Receptacle Branch Circuits

Standard receptacles must be duplex, CSA 5-15R, spec grade, unless otherwise required by code. Emergency power receptacles must be red. Isolated grounding receptacles must be orange. The colour of standard receptacles, switches, and faceplates must be coordinated with the architectural colour scheme.

Receptacles for housekeeping must be CSA 5-20R suitable for 15/20 A and must be placed in walls around permanent cores or corridors. The distance between receptacles in corridors must be 15 m or less, and receptacles must be located within 7.5 m from the corridor ends.

Emergency power receptacles must be provided in all electrical closets and in the main mechanical and electrical equipment rooms, when emergency power is available. Each piece of

mechanical equipment located either in the interior or exterior of a building must have access to a receptacle placed no more than 7.5 m away.

Receptacle faceplates must be labelled on the exterior with a typewritten machine-made label indicating the panel and the number of the circuit that feeds the receptacle.

7.7.7 Grounding and Lightning Protection

7.7.7.1 Grounding System

The ground source for the electrical power system must have resistance to ground of less than 5 ohms, as confirmed by the fall-of-potential ground testing method outlined in IEEE Standard 81 *Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.*

Electrical rooms must be fitted with a bonding bus interconnected with the building's grounding system with a minimum of 25% spare terminals or holes for future bonding.

All low-voltage power distribution systems must be supplemented with a separate bonding conductor.

7.7.7.2 Lightning Protection

Lightning protection requirements must be determined in accordance with the latest edition of the CAN/CSA B72-M87: *Installation Code for Lightning Protection Systems*.

Lightning arrestors must be installed on the transformer primary terminals of the main electrical service (subject to agreement with the local utility if the substation is utility-owned).

Surge protection devices compliant with Underwriters Laboratories standard UL 1449: *Surge Protective Devices* must be installed on the secondary switchgear with a minimum surge current capacity of 240 kA per phase (120 kA per mode, and must be installed on each switchboard with a minimum surge current capacity of 120 kA per phase (60 kA per mode).

7.7.8 Placement of Electrical Systems

7.7.8.1 Electrical Rooms

Electrical rooms must meet the requirements listed in architectural section 7.3.2.3.4 Mechanical, Electrical and Telecommunication Equipment Rooms, and must support the efficient vertical and horizontal distribution of power and control systems.

Electrical closets must be stacked vertically to the greatest extent possible. If an electrical room contains transformers or other heat-generating equipment, adequate cooling and/or ventilation must be provided so that environmental requirements are met as per section 7.5.2 *HVAC Requirements.*

Electrical rooms in new building construction must have adequate sleeves installed for future modifications. At a minimum, two capped 100 mm spare sleeves through the structural floors must be installed. All floor sleeve penetrations must extend 100 mm above the finished floor.

7.7.8.2 Seismic Design

Electrical equipment must to be laterally restrained for seismic load requirement as outlined in section 7.4. Structural Engineering, and the *National Building Code of Canada*.

7.7.8.3 Building Raceways

Raceway systems used in buildings must comply with the *Canadian Electrical Code* and local regulations.

7.7.8.3.1 Vertical Distribution

Risers for regular power and emergency power must be combined with other core elements to form compact groups and to maximize usable floor space. Bus duct risers must have a 100 mm curb around floor penetrations to prevent water from running down the bus duct.

7.7.8.3.2 Horizontal Distribution

Conceal raceways for horizontal electrical distribution systems within the concrete slab, in the ceiling plenum, or in or in a raised floor if one is present. Concrete encased tubing and conduit, electrical metallic tubing, rigid conduit, cable tray or modular wire distribution systems are acceptable.

In office areas, install zone distribution boxes near anticipated loads to service workstations in compliance with circuit loading outlined in the *Government of Canada Workplace 2.0 Fit-up Standards.*

7.7.8.4 Operator Controls

Commanding and signalling devices must comply with the national standard CAN/CSA Z431: *Basic and Safety Principles for Man-Machine Interface, Marking and Identification - Coding Principles for Indicators and Actuators*. The standard applies to both physical operator controls and human-machine interfaces (HMI) that form part of a building automation system.

All wired operator controls (e.g. push buttons, selector switches, and pilot lights) must be extra low voltage (below 30 V).

7.7.8.5 Colour Coding

Motor control and HMI colour coding must comply with CAN/CSA Z431: *Basic and Safety Principles for Man-Machine Interface, Marking and Identification - Coding Principles for Indicators and Actuators***.**

The CAN/CSA Z431 standard allows information to be imparted from three different perspectives:

- the condition of the process;
- the state of the equipment; and
- the safety of persons, property, and/or the environment.

Display colours and shapes for HMIs and operator controls must be from the perspective of the condition of the process or the state of the equipment. From these perspectives, green indicates a normal/operational state.

From the perspective of the safety of persons and property, green indicates a safe condition, and indicating devices must only be applied locally to facilitate service or maintenance (e.g. a green light placed near a door to indicate that it is safe to enter). In addition, indicating devices must include clear labelling to ensure correct interpretation.

7.7.8.6 Operating Controls Labeling and Language Policy

Labelling on operator controls (mechanical indicators) and HMIs must make use of symbols as per CAN/CSA Z431. Any words used on controls or in HMIs must comply with the *Official Languages Act,* including bilingual signage for regions prescribed under subsection 35(2) of the Act.

7.7.9 Emergency Electrical Power Supply

All facilities must have an emergency electrical power system for life safety if required by the *National Building Code of Canada* (NBC) and in accordance with the *Canadian Electrical Code* (CEC).

Self-contained battery units may be used for emergency light fixtures in buildings where an emergency generator is not required for other systems.

7.7.9.1 Emergency Generator System

If required, an emergency generator system must consist of a central engine generator with a separate distribution system with one or more automatic transfer switches (ATS). The emergency generator system must be provided in accordance with the latest version of CSA C282: *Emergency Electrical Power Supply for Buildings*.

In addition to CSA C282, the fuel system must also meet the requirements of the latest version of CSA B139: *Installation Code for Oil-Burning Equipment*. The base building generator fuel day tank must meet the following requirements:

- have a sufficient quantity of fuel to operate the engine for a minimum of 2 hours of running time at full load;
- be within the proximity of the generator; and
- be automatically refilled from a main storage tank with a sufficient capacity to operate the engine for a minimum of 24 hours' running time at full load.

The purpose of the tank requirements is to facilitate safe evacuation in an emergency and to protect government assets.

The emergency distribution system must be designed so that emergency power sources cannot under any condition back-feed energy into the de-energized normal system. A permanent system must be provided to allow safe and fast connection of a portable load bank to test the generator full load.

The emergency system status and alarms must be transmitted to the building automation and fire alarm systems.

7.7.9.2 Emergency Power Loads

As a minimum, emergency electrical power supply must be provided for the following loads (other loads may be added as required):

- Life-safety load:
  - exit lighting
  - emergency lighting
  - fire alarm system
  - fire control centre
  - smoke control systems
  - fire pumps and suppression system
  - high-rise stairway pressurization fans
  - elevators
  - generator auxiliaries (fuel pump, control power etc.)
- Essential building load:
  - Lighting:
    - security perimeter lighting
    - lighting for main electrical room, electrical closets, security rooms, fire control centre, telecommunications rooms, and generator room
  - Mechanical:
    - mechanical control systems
    - sump pumps
    - sewage pumps
    - exhaust fans removing toxic, explosive, or flammable fumes
    - hydronic heating system (if applicable)
  - Telecommunications:
    - telecommunications room emergency receptacles
    - telecommunications rooms back-up power system (UPS)
  - Building controls:
    - building automation system
    - advanced metering system
    - security systems
  - Electrical:
    - emergency power receptacles
  - Miscellaneous:
    - horizontal sliding doors in public spaces
    - other associated equipment designated by code
  - Essential client load:
    - 12 W/m^2 of the gross floor client area

7.7.9.3 Automatic Transfer Switch (ATS)

All automatic transfer switches (ATS) supplied and installed for the base building and/or tenant must be provided in accordance with CSA C282: *Emergency Electrical Power Supply for Buildings* and must have the following features:

- both automatic and manual operation;
- network connection to the building automation system;
- dedicated ATS for:
  - life-safety loads;

- essential buildings loads
- manual bypass isolation switch to permit electrical bypass and isolation of ATS without interrupting the load (to either the normal or emergency power).

7.7.9.4 Uninterruptible Power Supply System

Uninterruptible power supply (UPS) systems generally do not form part of the base building but are tenant-owned and -operated. Tenant requirements for UPS systems must be considered in the base building design.

UPS installations that may adversely affect the power quality in the building must include forms of mitigation such as filtering, isolation transformers, and active filtering.

Rooms containing UPS batteries must have sufficient ventilation in order to prevent the accumulation of any vented hydrogen from reaching hazardous levels as per section □ *ups battery* . Hydrogen detection sensors must be installed in areas where hydrogen is most likely to accumulate, and be networked to the building automation system.

Base building UPS systems (non-client-owned), if required, must meet the following requirements:

- have an input power factor of above 0.8;
- have an output power factor of above 0.8;
- have an efficiency of above 90%;
- include maintenance bypass switch; and
- be interconnected to the building automation system for monitoring status, voltages, and currents.

7.7.10 Lighting

Lighting goals include meeting health, safety, and security requirements as well as meeting the multiple task requirements of the functional program. Default lighting levels for exterior and interior spaces are listed in Table 2 and Table 3 at the end of this section.

7.7.10.1 Lighting Design Requirements

Lighting design must provide appropriate levels of illumination for performing tasks easily and comfortably. Lighting must satisfy both quantity and quality aspects demanded by the work environment, by providing the following:

- visual comfort to promote workers' well-being;
- visual performance to promote high levels of visual task execution; and
- visual safety to permit safe movement within the work environment.

The following requirements must be adhered to in terms of illuminance, luminance ratio, and colour rendering.

7.7.10.1.1 Illuminance and Luminance Ratio

Light levels must comply with the illuminance and luminance ratio requirements outlined in Table 2 and Table 3 at the end of this section. For specific areas not found in these tables, and for applications other than typical office environments, refer to the *Canada Labour Code*, *the National Building Code of Canada (*NBC), and *The Lighting Handbook* published by the

Illuminating Engineering Society (IES). When there are discrepancies between any of the three sources, the *Canada Labour Code* takes precedence.

7.7.10.1.2 Colour Rendering and Temperature

For all lighting, lamps must be selected with a colour rendering index (CRI) not less than 80 and a correlated colour temperature (CCT) less than or equal to 4100°K.

7.7.10.2 Lighting Power Density

Lighting power densities (W/m^2) must comply with the requirements contained in the latest edition of the *National Energy Code of Canada for Buildings* (NECB) or the ASHRAE 90.1*: Energy Standard for Buildings Except Low-Rise Residential Buildings,* whichever is more stringent. This applies to new and existing buildings where the base building lighting system is being physically replaced.

While individual areas may deviate in power loading from the recommended values, the total power budget for lighting for the building or overall space must not be exceeded unless justified by the client's operational requirements. The total power budget for the project must be documented in the investment analysis report (IAR), and a demonstration must be provided showing that implementation of the proposed design will not exceed the budget.

7.7.10.3 Day Lighting

Day lighting (also called daylight harvesting) must be considered for all new construction and major retrofits. The IAR must identify whether day lighting is to be implemented. If implementation is not feasible, the report must include a justification for not implementing day lighting.

Day lighting systems in work areas must utilize dimming rather than simple ON/OFF operation to minimize distraction to workers.

7.7.10.4 Flexibility and Servicing Accessibility

The lighting design must allow easy servicing of the luminaries and replacement of lamps and ballasts. It must also be possible to economically modify the lighting system post occupancy to meet the required lighting levels.

7.7.10.5 General Luminaires Criteria

Luminaires and associated fittings must be of standard commercial design. Designers must use components that are proven (capable of demonstrating the required performance in relevant projects), readily available, technologically current, and user-friendly components that provide convenient operation, ease of maintenance, and energy efficiency. Custom-designed fixtures should only be installed to meet heritage requirements.

Ballasts, when used, must have a sound rating of "A" for all areas occupied by personnel, and must conform to the CSA C654: *Fluorescent Lamp Ballast Efficacy Measurements* standard and local electrical authority requirements. Ensure that all voltage drops are within the manufacturer's specification for the lamps being controlled. Ballasts must be electronic, energy-efficient with a minimum power factor of 0.95, and have a maximum total harmonic distortion (THD) of 10%.

Exit signs must be of the LED type and meet the requirements of the CAN/CSA C860: *Performance of Internally Lighted Exit Signs* standard. Location and symbols must be in accordance with the *National Building Code of Canada*.

LED light sources must have a rated life of 50,000 hours at 70 % lumen maintenance (L70). All other light sources used must have a rated life of at least 24,000 hours at 3 hours per start.

7.7.10.5.1 Specific Lighting Applications

Emergency lighting must be installed and meet the performance requirements of the *National Building Code of Canada* and the *Canada Occupational Health and Safety Regulations* (COHSR) *Part VI*. In addition to these requirements, emergency battery-powered lighting must also be provided in main mechanical and electrical rooms, generator rooms, and automatic transfer switches rooms.

Equipment room light fixtures must be located so that lighting is not obstructed by tall or suspended pieces of equipment.

Lighting fixtures must be provided at all building entrances and exits. Exterior lighting fixtures must be connected to the emergency lighting circuit.

Luminaires in parking areas must be placed so that they maintain the required vehicle clearance.

7.7.10.5.2 Light Pollution Reduction

The exterior lighting design must comply with the light pollution reduction requirements listed in the latest version of the Leadership in Energy and Environmental Design (LEED) building certification program. This requires defining lighting zones as per the Illuminating Engineering Society and International Dark-Sky Association (IES/IDA) *Model Lighting Ordinance (MLO)*, and selecting luminaires with an appropriate luminance, shielding, and orientation so that backlight, uplight, and glare (BUG) are in compliance with LEED requirements.

7.7.10.6 Lighting Controls

7.7.10.6.1 Lighting Controls Requirements

Lighting controls in office spaces must be designed to meet the latest *National Energy Code of Canada for Buildings* (NECB). Lighting control zones must not exceed the maximum requirements of NECB or one 15 A circuit, whichever is smallest.

The selection of manual control, localized automatic control, microprocessor lighting control, networked control, or any combination of the four is a fundamental design choice and is dependent on a number of space factors: frequency of use, available day lighting, normal and extended work hours, and the use of open or closed office plans. The designer must provide descriptions and a rationale for the chosen scheme. A local means of override must be provided in every area to ensure continuing operations when required.

7.7.10.6.2 Microprocessor and Networked Lighting Controls

Lighting control systems must function on an open protocol to avoid vendor lock-in, and must be able to integrate with other systems such as HVAC, building automation, and security systems.

7.7.10.6.3 Lighting Controls for Specific Applications

Building entrance lighting and wall-mounted access security lighting must be controlled by an ON/OFF photocell sensor to activate the lights from dusk to dawn.

All exterior lighting not designated to operate from dusk to dawn must be controlled by a photocell and a time switch, or by the networked lighting control system.

Interior garage lighting should be reduced during off building hours when motion sensors do not detect movement, as an energy saving measure. Security lighting must stay ON at all times.

7.7.10.7 Base Building Light Levels

Base building light levels must meet the more stringent of the minimum levels outlined in the *Canada Labour Code* (CLC), the *National Building Code of Canada*, and those provided in the tables at the end of this section. If specific areas are not found in the tables, then refer to the IES publication *The Lighting Handbook*, latest edition.

7.7.10.7.1 Illumination Levels for General Office Spaces

General office spaces must be provided with base building lighting as outlined in Table 1.

Table 1: Nominal lighting in general office spaces

Nominal Average Illumination	500 lux
Maximum Uniformity Ratio (average : minimum) measured over task area	1.5:1
Maximum Uniformity Ratio (maximum : minimum) measured over the entire room	5:1

This lighting level complies with CLC requirements for minimum lighting levels for most desk work, as well as the maximum lighting levels for visual display terminal (VDT) work. This allows for maximum flexibility for fit-up workstation arrangement while minimizing the need for client departments to provide task lighting.

7.7.10.7.2 Illumination Levels for Interior Spaces

Light levels for spaces other than general office spaces are listed in Table 2.

7.7.10.7.3 Interior Lighting Calculation Parameters

Typical default parameters to be used in interior lighting calculations are as follows:

- luminaire ambient temperature: 1.0
- voltage to luminaire (electronic ballast): 1.0
- ballast factor: 0.9, manufacturer's data takes precedence
- burnouts: 1.0
- lamp lumen depreciation: 0.9, manufacturer's data takes precedence
- luminaire dirt depreciation: 0.9 for office spaces
- light reflectance values (ceiling, walls, and floor respectively, assuming light colours): 90-60-20

Table 2: Base Building Interior Illumination Levels (Other Than General Office Space)

Location	Minimum Average Illumination (lx)[a]	Maximum Uniformity Ratio (avg : min)[b]
Meeting rooms, boardrooms, conference rooms, file storage areas, training rooms, reception areas	300	1.5:1
Library, general lighting	300	2:1
Common areas (public spaces, lounges, lobbies, atriums, washrooms, elevator lobbies)	150	2:1
Food preparation areas	500	1.5:1
Lunchrooms and cafeterias	150	3:1
Electrical and mechanical rooms	200	3:1
Telecommunications rooms	500	3:1
Frequently used corridors, and stairways, and elevators	100	2:1
Infrequently used corridors and stairways	50	2:1

Notes:

[a] Illumination levels for interior office spaces are expressed as the minimum acceptable values of average maintained horizontal illuminance level (lx) over the working plane at each workstation or at floor level for support spaces (based on carpeted areas).

To ensure a uniform approach and yield consistent results, lighting levels measurement must be made in accordance with the document *Measurement of Lighting Levels in the Workplace – Canada Occupational Health and Safety Regulations, Part VI, 928-1-IPG-039*.

[b] The uniformity ratio is given at a task plane height over an entire room or large area except for food preparation areas and meeting rooms where it is over the task area or desk.

7.7.10.7.4 Illumination Levels for Exterior Spaces

Base building exterior light levels must meet the more stringent of the minimum levels outlined in the *Canada Labour Code* and those provided in the exterior lighting level table below. Lighting levels must also meet security requirements as determined by performing a threat and risk assessment as per *the Policy on Government Security* published by the Treasury Board Secretariat and RCMP guidelines as outlined in the security section of this document.

Table 3: Exterior Illumination Levels

Location	Minimum Average Illumination (lx)[a]	Maximum Uniformity Ratio (avg : min)	Maximum Uniformity Ratio (max : min)
Grounds			10:1
Pedestrian walkways	10	4:1	
Pedestrian walkways and vehicular intersection	30	3:1	
Vehicular traffic	10	4:1	
Vehicular intersections	30	3:1	
Building Entrances and Exits			
Frequently used building entrances and exits	100	2:1	
Infrequently used building entrances and exits	50	2:1	
Open Parking			
Vehicular traffic	10	4:1	
Vehicular intersections	30	3:1	
Vehicular parking	10	4:1	
Pedestrian walkways	10	4:1	
Covered Parking			
General parking and pedestrian areas	50	4:1	
Ramps and corners during daytime	100	4:1	
Ramps and corners during nightime	50	4:1	
Entrance areas[b] during daytime	500	4:1	
Entrance areas[b] during nighttime	50	4:1	

Notes:

[a] Illumination levels for exterior commercial office building spaces are expressed as the minimum acceptable values of average maintained horizontal illuminance levels (lx) over usable area at pavement level.

To ensure a uniform approach and yield consistent results, lighting levels measurement must be made in accordance with the document *Measurement of Lighting Levels in the Workplace – Canada Occupational Health and Safety Regulations, part VI, 928-1-IPG-039*.

[b] The entrance area is defined as the portal or physical entrance to the covered portion of the parking structure and 15 m beyond the edge of the covering into the structure.

7.8 Telecommunications Systems

7.8.1 Design Objectives

Telecommunication systems must support the functional requirements of building management and tenant operations within the building. Systems must meet or exceed the requirements of the latest edition of the codes and standards listed in Annex B.

7.8.2 Telecommunication Spaces

Telecommunication spaces must meet the following requirements:

- be stacked vertically to the greatest extent possible;
- be serviced from electrical panels supplying only telecommunication systems;
- have conditions maintained as per 7.5.11.3 Mechanical, Electrical, and Telecommunication Equipment Rooms;
- be located in dry spaces not subject to flooding from natural sources or building water sources such as washrooms or janitor closets; and
- include required architectural features outlined in Telecommunications Industry Association (TIA) standard TIA 569L *Telecommunications Pathways and Spaces,* such as backboards, ceiling heights, door sizes, etc.

7.8.2.1 Telecommunication Entrance Facility

The entrance facility must be within a dedicated enclosed room. However, the room may also serve as a service provider space or access provider (PWGSC or contractor) space if the access provider equipment is kept secure with a locked barrier such as a wire mesh to prevent unauthorized access.

The entrance facility must be powered by at least two dedicated 20A, 120 V duplex receptacles on emergency power, if an emergency power system is available.

7.8.2.2 Telecommunication/Distributor Room

Telecommunication rooms, also referred to as distributor rooms, must be dedicated and not contain electrical equipment for power distribution, other than panels supplying the room or related equipment. A minimum of one telecommunication room must be provided per building floor, with additional distributor rooms as required should be provided in accordance with *ANSI/TIA 569.*

Each room must contain at least two dedicated 20A, 120 V duplex receptacles on emergency power if an emergency power system is available, and must provide convenience receptacles on the perimeter of the room every 1.8 meters.

7.8.3 Telecommunication Raceway System

Backbone and horizontal telecommunications raceways must meet the requirements of ANSI/TIA-569: Telecommunications Pathways and Spaces and be installed with sufficient separation distance from power raceways to mitigate the effects of electromagnetic interference (EMI) as per ANSI/TIA-569.

7.8.4 Service Entrance Pathway

Service entrance pathways must meet the requirements of ANSI/TIA-758: *Customer-Owned Outside Plant Telecommunications Infrastructure Standard*.

7.8.5 Telecommunication Grounding and Bonding System

Telecommunication equipment must have a dedicated grounding and bonding system as per *ANSI/TIA-607: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises* (and addenda). The system must be bonded to the building grounding system.

The telecommunication room must be fitted with a copper bonding bus connections interconnected with the building's grounding system with a minimum 25% spare capacity for future bonding. Telecommunication grounding and bonding conductors must be copper.

7.9 Security

The security requirements of the Base Building Standard are aligned with the Treasury Board of Canada Secretariat *Policy on Government Security*. The intent is to support the objectives of safeguarding employees and assets and assuring the continued delivery of services.

Office buildings may either be occupied solely by PWGSC employees or have multiple federal government tenants. Leased buildings may have both public servants and private sector tenants. Both must address the challenges associated with providing for the security of operational zones.

A Threat and Risk Assessment is not carried out for the base building under normal conditions. The need for a Threat and Risk Assessment is determined by the tenants. Furthermore, the tenants are responsible for funding additional building-specific security.

7.9.1 Design Objectives

The security design objective is to identify the minimum physical security required for the base building to reasonably protect the asset.

7.9.2 Site and Building Security Requirements

Physical security must generally be divided into three zones of protection, each with its own requirements:

- **perimeter security** (site design, parking, and outdoor amenities);
- **entry point security** (access control and monitoring, building envelope, etc.); and
- **interior security** (zoning, building systems, etc.).

Base building designs must include provision for mechanical and electrical rough-ins associated with security equipment as well as spatial enclosures and security devices associated with the simple monitoring and protection of the following:

- the perimeter of the building;
- activities in the main lobby;
- access to elevator lobbies, public areas on typical office floors, and tenant spaces; and
- activities in the loading dock and parking garage.

7.9.3 Perimeter Security

Control of the site perimeter must be addressed through integrated, low-key passive security measures. Follow the guidelines for passive security techniques in the *Crime Prevention Through Environmental Design* (CPTED) approach. http://www.rcmp-grc.gc.ca/pubs/ccaps-spcca/safecomm-seccollect-eng.htm.

Site development must integrate planting in and around building nd prking area o promote visual surveillance for safety and security. Site design and lighting must provide a balance good visibility, meeting security concerns while respecting the character of a site, streetscape or neighborhood.

7.9.4 Entry Point Security

Building Entrances which provide Common Area access to the public and employees must be secured at grade level. Requirements include the following:

- all perimeter doors and access to the parking garage and other types of entry points must be equipped with high-quality commercial locks to meet ANSI/ BHMA A156 Series standards, specifically Grade 1 heavy-duty mortise locks, in solid stainless steel or bronze, and including weatherstripping with self-closers. Entrances identified as part of the accessible path of travel must be equipped with automated door operators;
- frames and doors for perimeter doors and other types of entry points must meet the following requirements:
    - For metal doors, the door must be made of Level 4 (1.7 mm) galvanized metal, and the frame must be made of Level 4 (1.7 mm) welded hollow metal and be galvanized and filled solid with grout. The door and frame must meet the requirements of ANSI A250.4: *Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings*. The door and frame must also be prepared for the installation of a mortice lockset as well as electronically controlled access, and must have high-quality ball-bearing hinges with secured pins;
    - For aluminum doors, the construction must be of 3 mm extruded aluminum with a Class 1 anodic or fluoropolymer paint finish, and must meet the requirements of AAMA 101/I.S.2/A440: *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*. Aluminum doors must also be prepared for lockset installation and have offset pivot hinges that meet the ANSI/BHMA A156 Series Grade 1 standard;
- the building must be equipped with a controlled keying system;
- the building must be provided with roughed-in steel conduit for future exterior and interior video cameras and intercoms at all exterior entrances. The systems and equipment must be integrated with the building security system. The conduits must run from entrance points to the security/reception desk area and the building security command centre;
- the building must be provided with rough-in steel conduit for an intercom system at all entry points;
- the building must have security measures in place at all service and utility entrance and exit points such as those related to air intakes, mechanical ducts, roof hatches, and water supply lines. Provide roughed-in steel conduits for all security systems routed back to the security/reception desk area and the building security control room.

7.9.5 Interior Security

Operational zones must be separated from public zones by a secure enclosure with secure access points.

The building is assumed to be locked after regular work hours. Access must be controlled by either a key system or card system.

7.9.5.1 Entry Lobbies and Lobby Areas

The building must be equipped with security systems to ensure secure access to the entry lobby and lobby areas, including the following:

- intercom and rough-in conduits for card access at exterior entries;
- keyed locks to control access, provide rough-in conduits for card access; and
- rough-in conduits for digital closed-circuit surveillance systems at exterior entries and in vestibules and lobbies.

PWGSC lobby design accommodates the client requirements for a reception or security desk in the main lobby and a separate, adjacent security command centre.

- security desks are around 24 m2 not including attendant badging areas;
- security command centre area is approximately 20 m2. It is room directly adjacent to the main lobby;
- rough-in for steel conduit to meet requirements for services to be located in the ceiling and floor slabs are to be provided for workstations in both areas;
- rough-in for steel conduit to meet requirements for security measures used to separate main lobby from the elevator lobbies;
- rough-ins for steel conduit must be provided for the BAS, panic alarm system and for the secondary link to the fire alarm annunciator panel. Refer to RCMP G1-103 Security Control Space Requirements.

Rough-in of conduit for the monitoring and control equipment as well as the emergency or standby power needed for the systems are required. Detailed requirements are identified in the functional program and include the following systems:

- intercoms;
- card readers or keyed locks to control access to operational areas; and,
- digital closed-circuit surveillance systems at exterior entries and in interior public areas and secured areas.

Provide emergency or standby power system for a minimum of 48 hours of continuous duration for security systems such as electronic door locks, digital closed-circuit surveillance systems, and alarms.

Elevator lobbies on office floors are considered to be public zones (common areas) and fall under base building surveillance requirements. These areas must have rough-in conduiting installed for video surveillance.

7.9.5.2 Elevator Control

There are no security-related requirements for base building elevator controls. Provision of rough-in conduits are needed for card access controls. Elevator controls must be able to accept security control systems, refer to elevator section for requirements .

7.9.5.3 Washroom Control

Base building washrooms in public areas must have conduit roughed-in for video surveillance outside the entrances.

7.9.5.4 Loading Dock and Shipping and Receiving Area

PWGSC must have access to loading dock and shipping and receiving areas, and the following must be provided in these areas;

- door locks and conduit for card readers to control access;
- rough-in conduits for digital closed-circuit surveillance systems; and
- rough-in conduits for intercom systems.

7.9.5.5 Building Parking Level Security Control

- PWGSC will have access to underground parking areas managed by others. The following must be provided at access points:
- rough-in conduits for card readers to control access;
  - rough-in conduits for digital closed-circuit surveillance cameras at the sides of entrances and exits;
  - rough-in conduits for panic alarm system and
  - rough-in conduits for intercom systems.

Provide door locks for amenities such as bicycle storage, washrooms, and showers which will not be controlled by PWGSC.

Roof hatch access, provided with locking, must be located in a common area that is within a secure zone, not in a tenant-occupied area.

8 Annual Regional Reporting

Annual Reporting is required is required to ensure compliance to this standard. The standard will be reviewed and updated in compliance with Real Property Branch requirements for the typical life-cycle of a policy instrument. This is usually 5 years. The appendices will be reviewed and updated as necessary on a yearly basis.

9 Definitions and Abbreviations

Refer to Annex A

10 Enquiries

Enquiries about this standard should be directed to Real Property Branch, Public Works and Government Services Canada.

Annex A Definitions and Abbreviations

A1 Definitions

Advanced Metering System	A system that collects time stamped data from meters via a communications network. The system provides useful data for energy use management, procurement and operations.
Advanced Meters	Advanced meters have the capability to measure and record data at least hourly, and can relay the information to an advanced metering system.
BACnet or BACnet Standard	A data communications protocol for building automation and control networks that allows devices from different vendors to interoperate, or work together, on the same network. It is an ISO global standard and was developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). BACnet communication requirements are defined by the *ANSI/ASHRAE 135* standard and all current addenda and annexes.
Building Automation System	A modern building control system that optimizes the start-up and performance of building system. It controls mechanical systems, including heating, ventilation, and air-conditioning (HVAC); energy monitoring; lighting; alarm; security; and other building systems. A BAS greatly increases the interaction between the subsystems of a building, improves occupant comfort, lowers energy use, and allows off-site building control.
Commissioning	A process of ensuring that systems are installed, functionally tested, and capable of being operated and maintained to perform in conformity with design intent. Control system commissioning requires a point-to-point check and detailed documentation of each parameter. Commissioning includes a complete functional test of the sequence of operation for each piece of equipment.
Duct Bank	Two or more conduits (ducts) routed together.
Extra Low Voltage	Voltage below 30 V
Handhole	A below grade enclosure, which personnel reach into but not enter used for operating, installing and maintaining electrical cables.
High Voltage	Voltage above 750 V
Low Voltage	Voltage between 30 V and 750 V
Major Rehabilitation	Substantial changes to a building, involving building envelope, major systems and structural

Main Lobby	Part of the Building Service Areas**,** that portion of a building that provides services that enables occupants to work in the building. It includes the main lobby typically the primary entrance to a building.
Manhole	A below grade enclosure which personnel may enter, used for operating, installing and maintaining electrical cables.
Base Building	The base building is the building shell, and structure, including finished floors, exterior walls, interior core and demising walls, finished ceiling complete with lighting, and other building systems consistent with the designated function and planned general use of a building. In office accommodation, base building includes window coverings and primary identification signage.
Primary Distribution	Primary power distribution systems consist of transformers, cables, switchgear and associated equipment and operates at high voltage (over 750 V). It is used to distribute power in large buildings or campus locations.
Secondary Distribution	Secondary power distribution systems consists of transformers, cables, switchgear and associated equipment and operates at 600/347, 208/120V or for small building at single phase 240/120V.

A2 Acronyms and Abbreviations

AABC	Associated Air Balance Council
ADM	Assistant Deputy Minister
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATS	Automatic Transfer Switch
BAS	Building Automation System
BOMA	Building Owners and Managers Association
BEP	Best Efficiency Point
BUG	Backlight, Uplight, and Glare
CEC	Canadian Electrical Code
COE	Centre of Expertise
COHSR	Canada Occupational Health and Safety Regulations
CRI	Colour Rendering Index
CRN	Canadian Registry Number
CCT	Correlated Colour Temperature
CSA	Canadian Standards Association
DALI	Digital Addressable Lighting Interface
DCWS	Domestic Cold Water Supply
DDC	Direct Digital Control
DHWS	Domestic Hot Water Supply
FIPP	Federal Identity Program Policy
FSDS	Federal Sustainability Development Strategy

HMI	Human Machine Interface
HVAC	Heating, Ventilation, and Air-Conditioning
IAR	Investment Analysis Report
IAQ	Indoor Air Quality
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
EnMS	Energy Management System
FAR	Floor-Area Ratio
LCC	Life-Cycle Costing
LED	Light Emitting Diodes
NBC	National Building Code of Canada
NEBB	National Environmental Balance Bureau
NECB	National Energy Code of Canada for Buildings
NFPA	National Fire Protection Association
OPC	Open Protocol Connectivity
OWS	Operator Work Station
PWGSC	Public Works and Government Services Canada
RPB	Real Property Branch
STC	Sound Transmission Class
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
TAB	Testing Adjusting Balancing
THD	Total Harmonic Distortion
ULC	Underwriters Laboratories of Canada
UPS	Uninterrupted Power Supplies
VFD	Variable Frequency Drives

VOC	Volatile Organic Compounds
WHIMIS	Workplace Hazardous Materials Information System

Annex B References

General, Codes Standards and Legislation

- CAN/CSA B651: Accessible Design for the Built Environment
- CAN/CSA C282: Emergency Electrical Power Supply for Buildings
- CAN/CSA Z431: Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators
- *Canada Labour Code, Part II Occupational Health and Safety*
- *Canada Occupational Health and Safety Regulations Canadian Environmental Assessment Act*
- *Canadian Environmental Protection Act*
- CSA B355: Lifts for Persons with Physical Disabilities
- CSA B44: Safety Code for Elevators and Escalators
- *Government of Canada Workplace 2.0 Fit-up Standards*
- Municipal/Local Utility Regulations
- National Building Code of Canada and supplements
- National Energy Code of Canada for Buildings
- National Fire Code of Canada
- National Plumbing Code of Canada
- *Official Languages Act*
- Regulations for Construction Projects
- *Treasury Board Accessibility Standard for Real Property*
- *Treasury Board Fire Protection Standard*

Architectural, Codes Standards and Legislation

- Skylights and Space Enclosures, AAMA/WDMA Standard 1600/I.S.7-00
- *Standards and Guidelines for Historic Properties in Canada*

Window Washing Standards

- ASME A120.1 Safety Requirements for Powered Platforms and Traveling Ladders and Gantries for Building Maintenance,
- CAN/CSA Z91-2002 most recent revision: : Health and Safety Code for Suspended Equipment Operations,
- ANSI A39.1: Safety Requirements for Window Cleaning
- ANSI/IWCA I-14.1: Window Cleaning Safety Standard.

National Building Code of Canada.

Structural Codes, Standards and Legislation

CAN/CSA S413: Parking Structures

CAN/CSA S832: Standard for Seismic Risk Reduction of Operational and Functional Components (OFC)

PWGSC Doing Business with Real Property Branch (RPB)

Real Property Services Policy *Seismic Resistance of PWGSC Buildings*

S478-95 Guideline on Durability in Buildings.

Parks Canada's *Standards and Guidelines for the Conservation of Historic Places in Canada*

Civil Codes, Standards and Legislation

- Site services follow Provincial and Municipal Standards.

Mechanical Codes, Standards and Legislation

- Air Movement and Control Association (AMCA) Standard 210: Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating
- Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 880: Performance Rating of Air Terminals
- American Society of Mechanical Engineers (ASME) Code for Unfired Pressure Vessels
- ASHRAE Guideline 4: Preparation of Operating and Maintenance Documentation for Building Systems
- ASHRAE handbooks (Handbook—HVAC Systems and Equipment, Handbook—HVAC Applications, Handbook—Refrigeration, Handbook—Fundamentals)
- ASHRAE Standard 100: Energy Conservation in Existing Buildings
- ASHRAE Standard 105: Standard Method of Measuring, Expressing, and Comparing Building Energy Performance
- ASHRAE Standard 111: Measurement, Testing, Adjusting and Balancing of Building HVAC Systems
- ASHRAE Standard 114: Energy Management Control Systems Instrumentation
- ASHRAE Standard 135: BACnet – A Data Communication Protocol for Building Automation and Control Networks
- ASHRAE Standard 15: Safety Standard for Refrigeration Systems
- ASHRAE Standard 180: Practice for Inspection and Maintenance of Commercial Buildings HVAC Systems
- ASHRAE Standard 52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size
- ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy
- ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings
- Associated Air Balance Council (AABC) National Standards for Total System Balance
- CAN/CSA B139: Installation Code for Oil-Burning Equipment
- CAN/CSA B149.1: Natural Gas and Propane Installation Code
- CAN/CSA B149.2: Propane Storage and Handling Code
- CAN/CSA B52: Mechanical Refrigeration Code
- CAN/CSA B64: Backflow Preventers and Vacuum Breakers
- CAN/CSA Z204 Guideline for Managing Indoor Air Quality in Office Buildings
- Federal Halocarbon Regulations
- MD 15000 – Mechanical Environmental Standard for Federal Office Buildings
- MD 15161 – Control of Legionella in Mechanical Systems

- National Fire Protection Association (NFPA) 13: Standard for the Installation of Sprinkler Systems
- National Joint Council Occupational Health and Safety Directive
- NFPA 14: Standard for the Installation of Standpipe and Hose Systems
- NFPA 20: Standard for the Installation of Stationary Fire Pumps for Fire Protection
- NFPA 211: Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
- NFPA 214: Standard on Water-Cooling Towers
- NFPA 231: Standard for General Storage
- NFPA 231C: Standard for Rack Storage of Materials
- NFPA 30: Flammable and Combustible Liquids Code
- NFPA 54: National Fuel Gas Code
- NFPA 75: Standard for the Fire Protection of Information Technology Equipment
- NFPA 96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
- Ozone-Depleting Substances Regulation, Canadian Environmental Protection Act
- Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) HVAC Air Duct Leakage Test Manual
- Standards Association (ANSI) Z223.1: National Fuel Gas Code
- Telecommunications Industry Association (TIA)/Electronics Industries Alliance (EIA)-569: Telecommunications Pathways and Spaces;
- CSA standards for commissioning

Electrical Codes, Standards and Legislation

- CAN/CSA C654: Fluorescent Lamp Ballast Efficacy Measurements
- CAN/CSA C802.1: Minimum efficiency values for liquid-filled distribution transformers
- CAN/CSA C802.2: Minimum efficiency values for dry-type transformers
- CAN/CSA C802.3: Maximum Losses for Power Transformers
- CAN/CSA B72-M87: Installation Code for Lightning Protection Systems
- CAN/CSA C860: Performance of Internally Lighted Exit Signs
- CAN/ULC S524: Installation of Fire Alarm Systems
- CAN/ULC S536: Inspection and Testing of Fire Alarm Systems
- CAN/ULC S537: Verification of Fire Alarm Systems
- CSA C22.1: Canadian Electrical Code, Part I
- CSA C22.2: Canadian Electrical Code, Part II
- CSA C22.3: Canadian Electrical Code, Part III
- CSA Z462: Workplace Electrical Safety
- *Measurement of Lighting Levels in the Workplace – Canada Occupational Health and Safety Regulations*
- Provincial Electrical Codes and Regulations
- UL 1449: Surge Protective Devices
- IEEE Standard 81: Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System

Telecommunication Codes, Standards and Legislation

- ANSI/TIA-568.1: Commercial Building Telecommunications Cabling Standard (and addenda)
- ANSI/TIA-569:Telecommunications Pathways and Spaces (and addenda)
- ANSI/TIA-606: Administration Standard for Commercial Telecommunications Infrastructure (and addenda)
- ANSI/TIA-607: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises (and addenda)
- ANSI/TIA-758: Customer-owned Outside Plant Telecommunications Infrastructure Standard

Security Codes Standards and Legislation

- Treasury Board Secretariat:
    - *Policy on Government Security*
    - *Operational Security Standard on Physical Security*
    - Operational Security Standard - Readiness Levels for Federal Government Facilities
    - Security Organization and Administration Standard
    - Security and Contracting Management Standard
    - Standard for Fire Safety Planning and Fire Emergency Organization
- Royal Canadian Mounted Police:
- Harmonized Threat and Risk Assessment Methodology
- Guide to the Preparation of Physical Security Briefs
- G1-103 Security Control Space Requirements
- G1-028 - Security Use of Mobile Shelving
- PWGSC Departmental Security Program
- PWGSC Policy of Funding Physical Security
- PWGSC Corporate Security Program

Annex C Non-Compliance Process

General Intent

The intent of the Base Building Standard is to set out the Government of Canada Standards for Office Buildings. The Base Building Standard is the core document which is a companion document to Workplace 2.0 which is the Government of Canada Standard for office space fit-up.

Both these documents have an non-compliance process which accommodates the non-standard situations of existing crown owned office buildings and leased office spaces across Canada. It also allows for the complexity of office space fit-ups within heritage office buildings.

Submission Process

There is a process with submissions explaining the reasons for the exemptions requested. To aid the Evaluation Committee the attached format is requested. The details should include drawings, photographs or other graphic materials as well as the analysis to aid in the deliberations of the committee.

Submittal Forms

Depending upon the non-compliance required, there are several templates available. A general form for issues running across all disciplines is the compliance checklist found in Annex E.

FORM 1: General Business Case Template

1. **Typical Cover Page**
   [Name of department or agency]

   Business case

   For

   [Project-specific non-compliant base building requirements or program-specific requirements]

   [Title]

   Submitted by:

   [Name, title, section and branch]

   Submitted to:

   Assistant Deputy Minister, Real Property Branch,

   Public Works and Government Services Canada

   Date: [day/month/year]

Business Case General Instructions:
It is important that the business case be clear, concise and complete. Include only relevant information and avoid duplication. A maximum of 3 pages per item being requested, not including appendices, should be sufficient for most submissions.

Outline Table of Contents

Purpose

Provide a brief statement on the purpose of the business case (i.e., the non-compliant item(s) or national special purpose space for which approval is being requested).

Background or Context

Provide background information as it relates to the request. Normally, this section requires two to three paragraphs only and may include, for example:

- Mandate of the department or agency and/or the specific group or program to which the request applies;
- Existing building conditions that create the considerations for a variance, for example project costs, heritage values;

Request(s) for Non-compliant Fit-up

For each non-compliant fit-up item being requested, provide the following information.

- The non-compliant item, and
- The Issue: Describe the main issue(s) or problem(s) driving the request and any impact(s) on the department's or agency's operations.

Options Analysis:

Provide an analysis of all options considered for addressing the issue(s). (NB: The Base Building Standards must be considered as one of the options.) For each option, include the following:

- 1. Brief description of the option
- 2. The impact on cost in terms of construction and ongoing operation and maintenance. Short term and where appropriate long term impacts considered. Details are to be provided in the Appendix to the document as required;
- 3. Benefits and risks in relation to, for example;
- .1 Operational requirements and/or program delivery;
- .2 Government objectives and priorities;
- .3 Security;
- .4 Health and Safety;
- .5 Sustainability;
- .6 Project Delivery and Schedules, and,
- .7 Other issues.

-

Recommendation and Justification:
Provide a clear statement of the solution being recommended for approval and the basis for the justification.

- When the recommendation is based on legislation, Treasury Board policies or approvals, reports or studies; the justification must include specific reference to the relevant text within the document. Anticipated cost savings must be provided.
- When the recommendation is based on security, the justification must include:
    - Reference to text within a third-party (RCMP?)Threat and Risk Assessment,
    - Security Design Brief or Security Site Brief that specifically supports the request.
    - If these documents are not available, they must be developed before the business case is submitted.

Funding
Include the following statement(s) to confirm the department's or agency's accountability for associated costs:

- For non-compliant base building requests: "[client department or agency] is responsible for the cost of all items associated with this non-compliance request that exceed the approved base line costs."
-

Approvals and Governance

The Base Building Standards for Office Buildings are supported by PWGSC Real Proberty Branch. It is the responsibility of all PWGSC employees to work with the standards.
Non-Compliance

Non-compliance requests are anticipated for existing buildings and requests are subject to an approval process.

Common Sense and Best Value\The BBS are the baseline for identification of non-compliance; however the project team should exercise sound judgement and common sense. Benefits to the taxpayers will take precedence over the interests of specific SME in the assessment of compliance and solutions.

Approval Committee

Each region is responsible to set up an approval committee to review non-compliance submissions to review the merit of each request and approve or deny the submissions.

Appendix

- Include as an appendix, the completed *Base Building Standards Compliance Monitoring Form* and/or detailed summary of variances requested and rationale based on existing systems or other key factors.

Annex D Scorecards LEED and Green Globes

Note: LEED and Green Globes scorecards are separate documents to be developed later.