Public Works and Services
Government of the Northwest Territories

Version 1.0 FINAL, September 2013

Office Accommodation Fit-up Technical Standards and Criteria

Government of the Northwest Territories

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Executive Summary

READING THIS DOCUMENT

The *GNWT Office Accommodation Fit-up Technical Standards and Criteria* (the *Technical Standards)* were developed for landlords and representatives of the GNWT who are participating in the delivery of interior office space to our territorial public servants. These stakeholders (including consultants, planners, designers, project managers, suppliers, and client department representatives) are encouraged to use this document as a checklist for design and project documentation. The *Technical Standards* incorporate basic office design principles and technical requirements that must be considered for all office interior projects.

Office interior projects include:

- fit-up of office accommodation in new GNWT-owned facilities;
- tenant improvements for new leased space;
- fit-up of existing leased and owned space for re-use by a different GNWT workgroup; and
- alterations to existing leased and owned space that are provided as a client or a tenant service.

Before interpreting the technical requirements of a *new office interior project*, it is recommend that readers become familiar with the document's introductory chapters, which provide an overview of both the scope and the development of the document. Project participants also should refer to the acronyms and definitions included in Appendix A of this document. These *Technical Standards* address design and construction requirements and align with the GNWT *Office Space Standards and Guidelines (*the *Office Space Standards)*.

The following list provides an overview of information included in the document:

- **Chapter 1** (this Executive Summary) summarizes the purpose and scope of the document.
- **Chapter 2** introduces the *Technical Standards* and provides a background to the document. It outlines: the purpose of the *Technical Standards*; reference documents; what is new to the standards, including new office space standards and exclusions; and, finally, how to read the document.
- **Chapter 3** outlines responsibilities and compliance/non-compliance issues and procedures.
- **Chapter 4** lists office design principles and records architectural and engineering requirements for materials and methods of construction/installation.
- **Chapter 5** addresses pre-manufactured workstation and panel systems and their integration with GNWT office workstation standards.
- **Chapter 6** outlines design requirements for general office support spaces such as meeting rooms, work/equipment areas, beverage counters, and filing/reference storage areas.
- **Appendix A** defines standard terms and acronyms referenced in the *Technical Standards*.
- **Appendix B** lists references used in the development of this document or referred to in its contents. It supplies details or hyperlinks on the various methodologies and touchstone standards upon which our own standards have been based.
- **Appendix C** includes carpet and carpet tile specifications.

- **Appendix D** specifies detailed mechanical requirements for office interior projects.
- **Appendix E** specifies detailed electrical requirements for office interior projects.
- **Appendix F** includes product information for the TV display system to be used in conference facilities.
- **Appendix G** provides the form to be used when requesting non-compliance fit-up/accommodation.

PURPOSE

PWS's mandate is to serve as an essential partner in the achievement of government goals through provision of high-quality services, expert support, and innovative leadership. Providing functional, affordable, and sustainable office accommodation falls under this mandate.

The Department of Public Works and Services (PWS) is responsible for developing and monitoring new and renovated office installations for the Government of the Northwest Territories (GNWT), and for ensuring office space allocation and tenant improvements/fit-ups are based on a consistent standard. In December 2012, PWS introduced the GNWT's new *Office Space Standards and Guidelines* (the *Office Space Standards*). To supplement its new space standards, PWS developed the *Office Accommodation Fit-up Technical Standards and Criteria* (the *Technical Standards*). This technical document reflects key principles PWS draws on to optimize space and resources whenever the GNWT provides office accommodation to its workgroups and staff.

- ***Functionality*** – meeting the needs of the employee and the program by providing suitable workstations and shared support facilities.
- ***Cost Effectiveness*** – maintaining consistency in design of office spaces by using equal office elements, thereby ensuring that PWS can develop reliable and reasonable budgets for new and renovated fit-up work.
- ***Flexibility*** – when developing the workplace, choosing components that are easily adapted to meet changes to programs and staff levels.
- ***Sustainability*** – adopting universal office and workstation footprints comprised of standardized and reusable components.
- ***Consistency*** – basing office components (workstations and support-function areas) on one standard and applying that standard to the design of all GNWT office installations.
- ***Equitability*** – providing every employee and GNWT workgroup throughout the organization with an equal level of workspace and support-function areas.

Figure 1.1: Collaborative workspaces with integrated technology

THE CHANGING WORKPLACE

Advancements in technology allow employees to use various types of media in locations other than their assigned workstations. The GNWT will be able to provide the best possible office accommodation for its staff and programs by being flexible and optimizing resources — staff, workspaces, and technology.

Past practices for design and development of office space included extended demolition and construction times to develop new space or reconfigure existing space, both of which often involved costly fit-up of temporary space. Incorporating standardized workstations into the design and development of office space allows "box moves," where staff can be relocated without expensive demolition, construction, or interim moves. By limiting the construction of permanent partitions, planners can reduce costs, allow flexibility in floor plan configurations, enable natural light to reach all workstations, and provide improved air flow and light levels throughout the work space. Introducing reusable components that support technology-intensive work environments significantly reduces the cost of "churn" — including downtime and disruption to GNWT staff — and reinforces principles of environment sustainability.

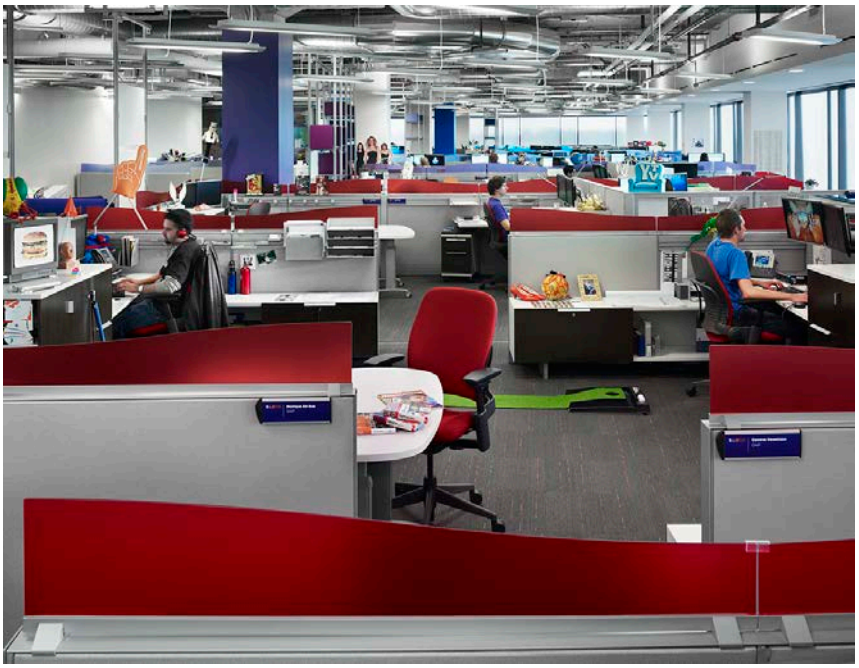


Figure 1.2: The new office

SUPPORTING TODAY'S TECHNOLOGY-INTENSIVE WORK ENVIRONMENT

How do both the *Office Space Standards* and the *Technical Standards* complement and support today's technology-intensive work environment? They address the way organizations work and the impacts new products and technology have made on the office workplace.

The *Office Space Standards* feature several key recommendations that contribute to the "flexible" office:

- Utilization of a base workstation allocation, with limited enclosed private offices and support functions.
  - WORKSTATIONS TYPE D/TYPE E (open-area, screened, 7.4 m²) will accommodate more than 90% of GNWT employees, including those occupying professional, technical, and administrative support positions.
  - Discretionary allocation of enclosed workstations and/or over-sized open workstations, based on case-by-case reviews. Enclosed WORKSTATIONS TYPE A (22 m²)/TYPE B (13.9 m²) will be restricted to upper management.
  - Restricted allocation of WORKSTATIONS TYPE C (9.3 m², enclosed) or TYPE C1 (9.3 m², semi- enclosed), based on the quantity and sensitivity of confidential conversations in which a particular position participates.
  - The reduced footprint of each workstation increases space utilization, but a portion of the space savings must be allocated to a variety of functional supports designed to serve multi-purpose needs — meetings, collaborative project work, training sessions, and informal gatherings. Beverage counters can be combined with work/equipment areas or with meeting/gathering spaces.
- Use of modular-manufactured components (including workstation panel systems) over construction of permanent elements and installation of custom built-in units.
  - Modular and mobile furniture and equipment (F&E) also contribute to multi-use options.
- High-density storage shelving, wherever structural floor loading allows.

At the same time as it promotes the efficient, effective use of space, office accommodation design must provide work spaces that allow privacy and that support workers who require concentration to complete their duties. Mindful planning and construction techniques, combined with the use of sound absorbing finishes and sound masking systems, can play a role in reducing sound levels. Enclosed quiet rooms provide acoustically secure private spaces for staff's intermittent use while meeting rooms accommodate group collaboration. Construction of these individual and multi-person enclosed spaces must address acoustic privacy while HVAC design must be developed to accommodate a variety of uses as well as a variable number of participants. And finally, electrical and image/voice/data services must be designed to meet a variety of multi-purpose, multi-location needs.

Chapter 2

Introduction

BACKGROUND

The Office Accommodation Fit-up Technical Standards and Criteria (the *Technical Standards*) apply to general administrative and public-contact office accommodation. The *Technical Standards* also pertain to office spaces located within specialized facilities, including buildings developed for educational, institutional, court, security, transport, and industrial use. For example, the GNWT has developed standards meeting the specific requirements of client-contact facilities used by the Department of Justice's Probation Services.

Objectives

The primary objective of the *GNWT Office Accommodation Fit-up Technical Standards and Criteria* is to provide a technical reference tool that can be used by planners, leasing personnel, designers, contractors, and building owners to understand office interior components and apply this knowledge to the development of best-value facilities.

The *Technical Standards* provide a benchmark of effective design choices that unite technical solutions to the intent of the functional program within GNWT owned and leased office space.

The *Technical Standards* were developed with the intent to address the changing demands on office work environments and to support the GNWT *Office Space Standards and Guidelines (*the *Office Space Standards)* that were issued by PWS in December, 2012. Both documents are intended to be "living documents" — ones that will be updated continually in order to meet the needs of the changing workforce while incorporating advancements in office technology, furniture systems, and building construction methods and materials.

The objective of standardized design components and methods is to reinforce a consistent, equitable approach to all GNWT office accommodation projects and also to ensure both cost-effective project delivery and best value through improved management of the GNWT's office facilities.

Scope

The *Technical Standards*:

- provide a reference for consistent office space requirements to GNWT departments, designers, and project managers, as well as to landlords who provide office space to the GNWT;
- communicate a consistent level of expectations regarding fit-up installations throughout GNWT office accommodations;
- offer a baseline requirement for fit-up projects, supported by the *Office Space Standards*;
- acknowledge advancements in technology, equipment, materials, installation techniques, and furnishings;

- present landlords with an opportunity to identify potential conflicts in tender documents and obtain clarification prior to tender; and
- ensure that the design of new office installations is based on sustainable design principles and supports barrier-free access.

The *Technical Standards* address base building finishes — including painted demising and building walls (core/window walls), flooring, suspended acoustical ceilings, lay-in fluorescent light fixtures, and suite entry doors — in GNWT-owned and GNWT-leased facilities. Base building finishes are usually included under a landlord's responsibilities; however, this varies depending on the negotiated terms of the lease and the type, size, location, and condition of the leased building. In both leased and owned scenarios, provision of these finishes may differ to a great extent.

Figure 2.1: A variety of collaborative spaces

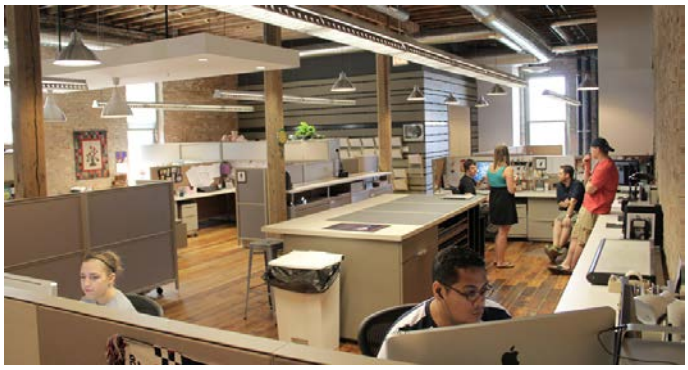


Figure 2.2: Providing a culture of team work and productivity

Exclusions

The following items and applications are not addressed in the *Technical Standards* document:

- freestanding furniture;
- plants;
- artwork;
- signage; and
- visual/voice/data line distribution.

WHAT'S NEW IN GNWT OFFICE SPACE STANDARDS AND GUIDELINES?

The *Technical Standards* reference a GNWT document named *Office Space Standards and Guidelines* (the *Office Space Standards*). The document, published in December 2012, chronicles the latest office space standards developed for the GNWT. The *Office Space Standards* prescribe the use of standardized, efficient, functional workstations and also propose a wider variety of support facilities, including spaces designed to sustain both collaboration and individual work styles.

The *Office Space Standards* present a variety of individual and collaborative workspaces; however, the options for workstation types and the space allocation associated with each type have been reduced from previous guidelines. With the exception of senior management workspaces, the *Office Space Standards* allocate minimal numbers of enclosed private offices.

A Focus on Sustainability

The *Technical Standards* advocate the use of fully reusable materials and environmentally friendly methods that contribute to the GNWT's sustainability efforts. Adaptability and flexibility in office use and assignment are direct results of adopting consistent office allocations and using standardized, reusable components.

Standardized Workstations

Workstation standardization encourages "box" moves and substantially reduces renovation work, down-time, telecommunication installation and moving costs, as well as project management fees and time requirements for planning, design, and installation phases.

The open-area workstations employed in new interior office installations will be assembled using pre-manufactured modular components (i.e., panels and panel-mounted work surfaces, overhead storage units). For more details on selection choices, refer to *Chapter 5, Systems Furniture (Workstations)]*.

Figure 2.3: Base workstation (7.4 m²)

Support Spaces

The new *Office Space Standards* promote flexible and adaptable meeting/gathering spaces. The electrical/visual/voice/data services that are incorporated into such support spaces allow staff to access their electronic files during meetings and collaborative work. These additional support spaces can be provided within the space allocation if the majority of dedicated workstations are accommodate in standard open-area workstations.

Reduced Macro Allotments

The *Office Space Standards* provide a sliding scale for office utilization rate, ranging from 22.0 m² per staff member (for a one-to-five-staff workgroup) up to 18.0 m² (for a 40-plus-staff workgroup). Offices with fewer employees will be developed on a reduced ratio in order to meet standard office requirements. The following chart (reproduced from the *Office Space Standards*) records changes in workgroup space footprint allowances from previous GNWT standards to those expressed in the Office Space Standards:

Workgroup Space Footprint Calculation Chart				
Number of Staff	Past Space Utilization (staff per useable space)		Current Space Utilization (staff per useable space)	
	m²	ft²	m²	ft²
1 to 5	22.9	246.5	**22.0**	236.8
6 to 10	20.5	220.7	**20.0**	215.3
11 to 20	18.9	203.4	**18.6**	200.3
21 to 40	18.0	193.8	**18.6**	200.3
40 plus	18.0	193.0	**18.0**	193.8

Workgroup Space Footprint Calculation Chart		
Number of Staff	Space Utilization (staff per useable space)	
	m²	ft²
1 to 5	**22.0**	236.8
6 to 10	**20.0**	215.3
11 to 20	**18.6**	200.3
21 to 40	**18.6**	200.3
40 plus	**18.0**	193.8

Chapter 3

Authorities

This chapter reviews both the rationale for office accommodation that is not in compliance with PWS standards and the process to request such accommodation.

Specific programs may require office accommodation that does not conform to PWS standards and criteria. In the *Office Space Standards*, **special purpose space** (SPS) is recognized as a function that is fundamental to the workgroup's program. For instance, the Department of Justice's Probation Offices have upgraded security requirements and PWS has developed standards and criteria for 1-FTE and 2-FTE Probation offices. Laboratories, security accommodation, and training rooms are additional examples of SPS functions.

The specialized planning, design, and construction associated with such SPS as well as customized support spaces invariably increases construction costs and extends project schedules. Because of this, the default starting point for all GNWT office accommodation projects is as **general purpose office space**, where design and construction are based on the *Office Space Standards* and this document, the *Technical Standards*. However, PWS recognizes the necessity for SPS and its associated "deviation from standards" under certain conditions and has developed a process to authorize and deliver those spaces, where appropriate.

AUTHORITY

PWS's mandate is to serve as an essential partner in the achievement of government goals though provision of high-quality services, expert support, and innovative leadership. Providing functional, affordable, and sustainable office accommodation falls under this mandate.

PWS holds responsibility for the GNWT's office space inventory. Part of this responsibility involves monitoring all office accommodation projects throughout all stages of their development in order to:

- confirm adherence to the relevant standards; and
- examine how the exemptions are affecting the project schedule, budget, and leasing requirements.

The GNWT office space inventory program has a main objective of acquiring and managing flexible and functional space for its present and future users. Deviation from PWS standards can have long-term repercussions in relation to the GNWT's space inventory. It can be difficult and expensive to convert non-standard office space back to functional office space for future workgroups.

NON-COMPLIANCE PROCESS

Ideally, SPS is identified during the planning phase of a project and should be added to the workgroup's macro allocation. PWS will consider a deviation from the *Technical Standards* for SPS or for identified functions that are included in the workgroup's standard macro allocation, *providing the function has specific and unique needs*.

Although minor adjustments to the standards can be incorporated into a project without a request submission, the client department must submit a request whenever an installation is designed to meet a level that is significantly below standard or above standard. When determining whether or not to retain an existing layout or component that does not comply with GNWT/PWS standards, the main concern is the functional requirements of the workgroup. The aim is to ensure that the existing layout or the new office configuration does not negatively impact the workgroup's ability to function.

Apply common sense when assessing options and identify solutions that demonstrate best value. Here are a few examples illustrating potential situations where existing non-compliant elements/facilities can be retained:

- Scenario A: An office space is being redeveloped for a new workgroup. Floor to ceiling partitioning forming enclosed offices is already in place; however, the GNWT space standards allow only systems (open area) workstations. The area and placement of the existing enclosed offices doe not interfere with the new group's functional requirements or increase the macro allotment of space to the workgroup. Retaining the partitioning makes sense in terms of savings to both the project cost, commitment of valuable project staff resources, and project schedule;
- Scenario B: An existing office space that will be redeveloped has upgraded doors installed throughout. The costs to replace the existing doors with PWS standard office doors is greater than the cost to match to and retain the existing doors; therefore, the most cost effective solution is to retain and match the existing doors.
- Scenario C: A GNWT tenant allocation includes one plumbed beverage station; however, the existing space being redeveloped for them includes two well located plumbed beverage stations, and the workgroup wishes to retain both. Accommodation of two beverage stations within the workgroup's office will not affect the group's overall functional requirements or impact the group's office utilization rate; therefore, the more economical solution is to retain both stations.
- Scenario D: After an office space project has been approved, the workgroup wishes to use space differently than was specified in their project request, which included an enclosed meeting room and a separate beverage station. Using the meeting room space allocation, the workgroup wishes to create an informal, open area meeting/gathering space in conjunction with the beverage counter. This change does not affect cost, project schedule, or the group's office utilization rate. If it meets the workgroup's functional requirements, it should be provided.

A client department requiring fit-up to an office space that will include a deviation from the *Technical Standards* can submit a request to PWS. The client request for an exemption from the *Space Standards* or the *Technical Standards* must be approved by the client department's Deputy Minister prior to submission to PWS. The application will be reviewed by the PWS project planner and project manager and, if approved, will be followed by final approval from the PWS Deputy Minister. Refer to Appendix G for the form: *Application for Non-Compliance Allocation and/or Fit-up*.

Criteria for Evaluating Requests for Non-Compliance

All PWS reviews assess: associated costs; changes to project schedules; existing building factors; whether workgroups and their programs are adequately accommodated; and the consequences of accepting or rejecting the request.

When evaluating requests for increased/upgraded support spaces including SPS along with associated fit-up costs, PWS considers the following criteria:

- Does the request address a health and safety issue or a security concern?
- Does the space serve a unique program purpose?
- Will the facility be used regularly throughout the week/month/year for the purpose intended?
- Have alternative solutions been considered? For instance, can the space accommodating the function be found elsewhere in the GNWT inventory and/or can the facility be shared with other workgroups?
- Will the application of non-standard fit-up components compromise flexibility and functional considerations relating to the office installation?
- Is the request based on sound economic planning?

RESPONSIBILITIES

PWS Responsibilities

- Develop and maintain space and fit-up standards that can be applied to all office accommodation throughout the GNWT.
- Assess requests for changes in current GNWT accommodation, including proposed major renovation projects and requests for new and additional space.
- Identify accommodation options that provide efficient, functional, and economical accommodation for GNWT departments.
- Monitor GNWT office space inventory (leased and owned) for:
  - efficient utilization of space;
  - suitability of function;
  - sustainability of the project and its materials;
  - level of maintenance; and
  - compliance with health and safety guidelines and with applicable building, fire, and municipal codes.

GNWT Workgroup (Department, Branch, Division, etc.) Responsibilities

- Identify space requirements and submit (to PWS) requests for renovation of existing space, addition of space, and/or acquisition of new space.
- Identify anticipated changes in staff numbers and/or program changes which provide a rationale for any additional special purpose spaces (SPS).
- Consider options to efficiently accommodate new and existing program requirements.

- Ensure that storage and reference materials not essential to daily operations are removed from site and that file management practices adhere to GNWT records retention schedules.

Chapter 4

Design Requirements

PERFORMANCE REQUIREMENTS

The *Technical Standards* provide a summary of basic technical requirements for office interior components and their application to new and existing GNWT office space (owned and leased). They identify construction requirements according to performance criteria.

GENERAL FIT-UP OBJECTIVES AND GOALS

Tenant improvements or fit-up requirements vary depending on the size of space, the quality of building, and the extent of the landlord's responsibilities (as agreed to during lease negotiations). In some cases, a space may require minimal or no modification.

The primary objective of the *Technical Standards* is to provide a technical reference tool that can be used by planners, leasing personnel, designers, project managers, contractors, and building owners to understand office interior components and apply this knowledge to the development of best-value facilities. The *Technical Standards* are based on the following goals:

- Incorporate proven methods and materials as well as new advancements in office design and technology;
- Promote sustainability and flexibility through standardization;
- Encourage the use of local resources;
- Ensure products and construction methods contribute to reduced maintenance requirements and extended installation life;
- Reduce energy costs;
- Address health and safety issues, including provision of a safe and secure work environment, and building code requirements including barrier free access; and
- Use and apply appropriate and current materials and technology, which involves following the principles of simplicity and efficiency, reliability, standardization, durability, and contribution to overall functional office accommodation.

DESIGN CONSIDERATIONS

An office interior accommodation progresses through various phases and tasks, from the initial planning stage through to move-in. Technical requirements can be identified in the "functional program," "space audit," and "conceptual design" phases. Detailed selection and specification of products and methods are finalized in design documentation. The objective of the *Technical Standards* is to provide a benchmark of technically effective design choices that realistically unite technical solutions to the intent of the functional program within any given office space.

Acoustic Requirements

Improvements in materials and equipment have reduced sound levels in the office; however, current trends in office planning support more collaborative work that occurs in a variety of spaces. New construction methods are needed to lower sound levels even further because workstations are being accommodated in open areas while meeting/project work spaces are being assigned to enclosed conference rooms or open gathering spaces. Designers use three methods in combination to address sound levels and provide a comfortable working environment: **absorb**, **block**, and **mask** noise emissions.

Application of specific interior office elements can contribute to reduced sound levels:

- absorptive materials (flooring, ceiling, walls, furnishings);
- wall assembly materials (STC ratings provided through application of fibrous glass or mineral wool batt or semi-rigid insulation in the wall cavity, GWB thickness including use of specialized acoustic board);
- wall assembly design and construction methods — wall thickness and stud placement, installation of insulation in the wall cavity, extending the partition through the plenum, ensuring service outlets are not installed back to back, isolating noise-generating activities from open work areas;
- suspended ceiling assembly (appropriate NRC and CAC ratings);
- floor construction (STC 52 for concrete);
- laminated sound baffles (designed to block sound — located above the suspended ceiling, in the plenum);
- doors and sound control hardware (automatic acoustic door bottoms, thresholds, weather stripping, closers);
- sealants and closed cell neoprene tape (applied to the partition top/bottom, where it abuts building elements, and around penetrations);
- acoustic treatment to building perimeter heating cabinets (where the partition meets the perimeter);
- vibration (refer to Division 23 - Mechanical - HVAC); and
- sound masking systems.

Noise reduction coefficient (NRC) is a rating that indicates the sound-absorbing properties of a material. (A rating of 0.50 is low and 0.70 is high.) Ceiling attenuation class (CAC) is a rating of the sound transmission through the suspended acoustical tile (SAT) ceiling via the plenum. (A higher number indicates that the ceiling provides a superior barrier to noise) Refer to 09 51 00 Acoustic Unit Ceilings for further information.

Sound transmission class (STC) is the rating achieved when the wall assembly is laboratory-tested. The composite STC rating compares the ability of an assembly to prevent sound from passing through it, with a higher number indicating a better barrier. STC ratings also apply to floor and ceiling construction and to doors and windows. (Generally, the higher the STC rating achieved for the partitioned space, the higher ceiling attenuation class (CAC) rating must be provided by the acoustic ceiling installation.)

Provide the following STC ratings for partitions enclosing typical office spaces.

- STC 35 (a lower level of confidentiality) – use where conversation is limited, such as file and storage rooms.
- STC 40 (a normal level of confidentiality) – apply to work/equipment areas, libraries, and meeting spaces.

- STC 45 (a higher level of confidentiality) – apply to office accommodation for deputy ministers, assistant deputy ministers, and directors; meeting spaces where audio equipment is regularly used; and interview rooms accommodating the public.
- STC 55 (a maximum level of confidentiality) – apply to public interview and therapy rooms and courtrooms.

A wall assembly rated STC 35 and STC 40 extends from above finished floor to the underside of an SAT ceiling. A wall assembly rated STC 45 and STC 55 is constructed from slab to underside of slab. For numerous reasons (cost, HVAC control and flow, limited flexibility, etc.) installation of partitions that require the SAT ceiling to be broken or cut must be limited. Consider other sound-masking elements and methods, such as partition construction that incorporates sound baffles installed above the SAT ceiling grid, and recent developments in sound damping ("QuietRock" panels and "ROXUL" insulation – rigid and semi-rigid stone wall content board), or sound masking. For existing partitions a second layer of GWB can be added to furring channels installed to the existing wall face, allowing the furring cavity to contribute to the sound absorption.

Wall assemblies designed to achieve the highest STC rating are constructed with off-set studs, laminated sheathing, increased insulation, and absorptive face finishes. All penetrations above and below the suspended ceiling must be filled and caulked. Partitions that meet the building perimeter wall must align with the window mullion. Apply acoustical seal or, if the space between the mullion and partition is not flush, fill the gap with gypsum board and gasket and apply neoprene tape between the window mullion and the edge of the partition. Do not puncture the window mullion.

Where a partition meets the perimeter heating radiator, remove the radiator cabinet's metal cover and then cut and alter it to create covers located flush to each side of the partition and allowing easily removal for servicing. Extend the partition to the building wall and around the heating piping. Pack the wall cavity with batt insulation and caulk all holes and gaps. (Remember to use high temperature caulking around heating piping.)

Use of wood studs lessens sound transmission; however, the standard for office interior partitions is steel stud construction. Consider using wood when wood studs are the standard for the particular building or office suite and code requirements permit. Specify solid-core wood or metal-insulated doors that are acoustically rated to achieve minimum STC 43, tested in accordance to ASTM E413 *Classification for Rating Sound Insulation* and ASTM E1408 *Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems*. If a high level of confidentiality is needed, apply perimeter gaskets, an automatic acoustic door bottom, and/or a threshold. Provide door closers to spaces where greater amounts of noise are generated, such as work and equipment rooms.

Locate enclosed spaces that require high levels of confidentiality along the building core and, where possible, isolate the room from areas of activity. Do not install service outlets back to back or in the same stud cavity. If, in order to meet this requirement, outlets cannot be located appropriately within a room (relate to furniture layout), consider stacking the outlets serving a room, thus allowing a stud separation between the outlets serving the adjacent room. Separate service penetrations by a *minimum width of one stud-centre*. Do not locate suspended light fixtures above or immediately adjacent to partitions.

Where partitions and baffles are present above an acoustically rated partition in the plenum, use an acoustically-lined elbow for air transfer between the common plenum and the plenum above the enclosed room.

SI Metric Requirements

Design documentation is developed using SI metric units as referenced in the current National Building Code of Canada (NBCC) and current National Fire Code of Canada (NFCC). Materials used may be designated in metric or imperial measurement; therefore, soft conversion to metric is accepted.

Examples of soft and hard conversion of dimensions

- Hard Conversion: physical size is changed; products are described in metric units
  i.e., 24" x 48" (Imperial) ceiling tile is 610 mm x 1220 mm (metric)
- Soft Conversion: physical size remains unchanged; products are described to the nearest metric unit
  i.e., 24" x 48" (Imperial) ceiling tile is changed to actual size 600 mm x 1200 mm (metric)

Sustainability and Environmental Requirements

Sustainability in office design aims to avoid wasteful use of resources and materials while creating a comfortable, safe, healthy, functional, and productive work environment. Sustainable office design incorporates a commitment to conservation, confirms responsibility for planning and management of resources (environmental stewardship), and sets a target for optimum balance of cost and environmental benefits while considering all phases of a facility's life cycle. Refer to ASTM E2432 - Standard Guide for the General Principles of Sustainability Relative to Buildings. Fundamentals of sustainability include:

- optimizing energy use;
- enhanced indoor environmental quality (IEQ) — including maximizing use of natural light, limiting the presence of high volatile organic component (VOC) emissions, and providing occupant control of lighting and temperature; and
- optimized operations and maintenance requirements through the use of materials that are durable and require less energy, water, and chemicals to maintain.

The GNWT is committed to providing:

- efficient and environmentally friendly buildings that are developed on sustainable environmental practices; and
- a framework for ecologically friendly building operations.

The GNWT/PWS document, *Good Building Practices for Northern Facilities* (*GNWT GBP*) [current edition] states, "Durability, practicality, ease of maintenance and simplicity are describable qualities in northern buildings, and are particularly applicable to obtain interior construction and finishes….Materials selected for interior finishes should be commonly available, expected to be available in future years for repair and replacement selection, and chosen for ensuring indoor air quality is not adversely influenced by VOCs [emitted] from paints, carpets, panel products and resilient flooring materials."

Building and office space layout and design contribute to reduction in energy usage through the following measures.

- Maximize use of natural light and provide night lighting so that full lighting is not needed during non-operational hours.
- Provide weather vestibules and ensure entrance doors are tight fitting.
- Include sensor control for lighting, washroom fans, and air supply to multipurpose functions, including meeting rooms.

Include environmental monitoring of an existing space to determine if the project scope must be expanded to incorporate control, containment, or removal of existing building materials such as asbestos and lead-based paint products. Refer to National Master Specification (NMS) *MasterFormat* standards:

- *02 82 00 – Asbestos Remediation*; and
- *02 83 33.13 – Lead Based Paint Removal and Disposal*.

Barrier-Free Design Requirements

New commercial office-use buildings are designed to meet current code requirements for barrier-free accessibility; however, existing buildings can present concerns regarding not only this requirement but also general safety and usability for staff and public visitors. **Safety for all building users takes priority over functional usage**.

Assess the existing building in order to determine what measures must be taken to provide barrier-free accessibility. Begin by performing a comprehensive code analysis, including:

- occupant load;
- fire-resistance ratings;
- corridor and stair widths;
- exits (ingress/egress); and
- washroom fixtures.

Review Section 3.8 of the current NBCC to determine minimum requirements for barrier-free accessibility and determine whether major work or only minimal renovations are needed. Determine and follow a sequence for planned work so that work undertaken to allow barrier-free access to a building or to a space is scheduled *prior* to renovating a specific space. (For example, if the work is planned and budgeted for separate projects, ensure barrier-free access is provided to the building before undertaking a washroom renovation within that building.)

Often barrier-free access is interpreted as applying only to those who are confined to a wheelchair; however, access must be provided for those who have reduced arm or leg mobility and those with reduced hearing or visual capabilities. Tactile and visual elements must be considered in addition to physical barriers/access. Review barrier-free (BF) access requirements for the following design elements.

- Site:
  - Site accessibility – identify BF parking, drop-off; curb ramps.
  - Lighting – provide along BF path of travel.
  - Signage – clearly indicate BF parking stalls; provide direction to BF entrance and ramps/curb cuts.
- Building access:
  - Access to the building entrance – provide ramps along with suitable and comfortable handrails and guardrails.
  - Building entrance – ensure the difference between the exterior walk and interior finished floor is not more than 13 mm; provide minimum 1500 mm x 1500 mm level surface in front of the building doorway; provide powered door operator with guardrails for doors swinging outwards into the path of travel; and adequate landings as required by NBCC.

- Accessibility of path of travel within the building's main level:
  - Access to building facilities – ensure objects or building components do not project into the corridor, reducing code-required width or impeding the visually impaired; if the difference between floor elevations is not more than 750 mm, provide a ramp or a mechanical lift that does not limit exit or corridor widths; clearly identify changes in elevation.
  - Flooring – apply slip-resistant flooring on ramps, complete with tactile warning strips located at top and bottom and indicating change of direction.
  - Door width and location – door width is to meet code requirements; locate doors to provide appropriate access.
  - Door hardware – provide clear swing hinges and levered handles to all lock and passages sets; adjust closers to allow safe passage.
- Personal Facilities:
  - Hygienic facilities (washrooms) – where existing public washrooms cannot be altered to provide BF requirements, provide a separate uni-sex BF washroom located adjacent to the building's washroom. (Provision of BF facilities within each male and female washroom is preferred.) Equip washrooms with accessories that can be used by the general public and also with accessories such as mirrors, grab bars (installed at BF toilet and urinal), and auxiliary door pull to the BF stall serving persons with disabilities.
  - Ensure washroom accessories are installed to prescribed BF height above finished floor (a.f.f.) and that sufficient backing is provided to resist loads as required by NBCC.
- Personal-Use Facilities:
  - Drinking fountains – provide one BF drinking fountain; the unit can be a two-spout design, fabricated at heights accommodating the general public and those persons with disabilities.
  - Public telephones – provide a public phone and install so that it does not reduce the required width of the corridor and does not protrude into the path of travel; install at a height able to be used by the general public as well as persons with disabilities; investigate voice display.
- Access to other building levels (vertical travel):
  - Stairwells and landings – when installing a chairlift, do not reduce the width of exit stairs to less than required by code; provide tactile strips of a contrasting colour (from the treads and risers) around landings and on stair nosings; provide slip-resistant finish on stair and landing surfaces; return handrails into the wall face and extend the sloped portion of the handrail one tread beyond the last nosing.
  - Chairlifts – when installing a chairlift, maintain the proper exit width required by code.
  - Platform lifts – use only for limited travel distance within a floor level; enclosed platforms require a shallow pit, a rated shaft, and a machine room.
  - Elevators – locate within close proximity to the building's main entrance and provide an elevator lobby on all floors; incorporate sensory issues in the unit's design.
- Accessibility of path of travel within other building levels:
  - Access to facilities – when BF access to other floors within the building is made available, provide BF accessibility to the same level as provided on the first BF floor, with the exception of the public telephone.
  - Personal-use facilities – when BF access to other floors within the building is made available, provide BF designed washrooms to the same level provided on the first BF floor.

- Emergency services:
  - Emergency and exit lighting – ensure these are upgraded to current code requirements.
  - Fire alarm – upgrade fire alarm to current code requirements; mount pull stations at 1200 mm above the finished floor, and incorporate visual signals to the fire alarm.
- Signage – provide signage designed with font size and type, and font and background colour recommended for the visually impaired; install signage at a consistent height that is able to be viewed by all persons (refer to *CAN/CSA-B651*.2-07(R2012) *Accessible Design for Self-Service Interactive Devices*).
- Building Security:
  - User-actuated systems – mount cell devices at 1400 mm height, measured from above finished floor to top of unit.
  - Remote-actuated systems – provide visual and audible signals for doors secured with electronic hardware.

Office Design Guidelines

Development of office accommodation design differs from design considerations for facilities serving other uses such as educational and institutional structures, where each interior space may be unique. In the field of office design, the key to achieving an efficient office plan is consistency of layout and components. In general terms, development of commercial office space is based on the following industry-standard design guidelines and building code requirements.

- Base building finishes usually include carpet flooring, lay-in fluorescent light fixtures, suspended acoustical ceiling (SAT), and painted window perimeter walls. Many landlords have distinctive building standards for each building that must be adhered to.
- Interior partitions extend from floor to underside (u/s) SAT so that the ceiling grid is continuous throughout the suite and the ceiling grid is, therefore, not centred in each room.
- Interior partitions generally follow the ceiling grid. This rule of thumb allows the partition to be secured to the ceiling grid, and it lessens the need to relocate base building ceiling-mounted or lay-in units such as fluorescent light fixtures and sprinklers.
- In most office buildings, ceiling grids are aligned with the building grid or module. The building grid is centred to the building columns and window mullions; therefore, a designer is able to plan an office layout where building columns can be embedded in partitions (not located within a room) and where partitions meet the window perimeter wall at the window mullion (and not at the glazing), allowing the partition to be fit snuggly to the perimeter wall assembly.
- For multi-floor tenants' spaces, the building corridor provides a common access to the floor's washrooms, elevators, service rooms, and two separate fire protected exits. Tenants must have access to <u>both</u> fire exits. The distance of a dead-end corridor is limited (refer to NBCC Part 3);
- Office suites accommodating a single-floor tenant may incorporate the building corridor into the suite layout; however, access to the floor must be controlled and access through the office space must be limited.
- Office suites greater in area than 200 m^2 (not sprinklered) and 300 m^2 (sprinklered) require more than one exit and the distance between exits must be at least half of the maximum diagonal dimension of the suite's floor area.

- Minimum corridor width within the office suite is 1100 mm, with 900 mm width allowed for pathways accessing a limited number of spaces (i.e. access into a workstation configuration). However, the most practical approach to the development of an office's interior corridor system is to follow the ceiling grid, generally 1220 mm or 1520 mm width. Ensure that the corridor is not encumbered by open file drawers.
- Eliminate maze-like spaces by providing direct access to suite exits.
- Locate enclosed spaces adjacent to the building core to offer enhanced speech privacy and security.
- Materials used in an office installation are designed for commercial use. Fire-rated elements and methods must be UL-tested, and specified materials must be of low-toxicity.
- Generally, select light colours for the majority of finishes.
- Where possible, extend rolled flooring continuous throughout the suite (under interior partitions).
- All doors (with the exception of doors accessing small storage spaces) must be 914 mm wide and 2134 mm high.
- Barrier-free requirements must be met, including access into spaces and provision of suitable surfaces.

GNWT Office Space Standards and Guidelines

In addition to the basic rules of office design*, the Office Space Standards* are based on the following planning requirements.

- Locate fully enclosed (partitioned) spaces on or near the building core. This allows natural light to penetrate into a greater portion of the office suite. Exceptions are for OFFICE TYPE A and B, and multi-use meeting and training facilities.
- Accommodate approximately 90% of staff in WORKSTATIONS TYPE D/E and, with the exception of furniture components, within workspace of the same dimensions and layout.
- Design and install support spaces to serve multiple purposes.
- Select materials that are of mid-range quality and offer the best value, based on a 10 – 15 year life costing.
- Where possible, ensure that installed components are able to be relocated and reused.

Existing Office Space

Apply a common-sense approach to existing office accommodation. If the office suites are comprised of enclosed spaces that are within 10-15% of GNWT-prescribed standards and if the rooms can be incorporated into the office layout, they can remain. If an office space is comprised of mostly enclosed private offices and the occupant of the existing office installation can be accommodated adequately, the existing layout can remain.

However, if the existing space includes a number of private offices and, therefore, its floor layout cannot meet the requirements of the occupant, replace the majority of enclosed rooms with workstation systems.

If a number of interior components are to be retained, match materials, components, and construction methods to the existing space.

Project Documents

At completion of the project, PWS will retain the following documents (to be provided by project designer, contractor, and/or building owner):

- Approved documentation developed during the conceptual/schematic design phase and for design development;
- Final design and construction drawings and specifications (issued for construction documents);
- As-Built or Final Record of drawings (AutoCAD format) and specifications; and
- Operation and Maintenance Manuals.

TECHNICAL STANDARDS

The technical standards recorded in this chapter are intended to be baseline requirements. The technical standards list the minimum requirements accepted by the GNWT for its office accommodation. When a specific program requires additional data, PWS will provide the information to the landlord.

The technical standards included below are listed by National Master Specification (NMS) *MasterFormat* divisions and sublevels.

Division 2 – Site Construction

02 41 19.6 Selective Interior Demolition

New space (not formerly occupied) obviously will not require demolition of interior components. Existing space, however, will require detailed planning and scheduling to determine: when or if the space will be vacated; if a temporary move to swing space is necessary; how the effects of demolition can be minimized for other building occupants; and, if the scope of renovation is limited, whether the work area can be isolated from occupied areas of the building floor. Take precautions to guard against damage to adjacent work. Be liable for any damage or injury caused, and ensure adjacent occupants are protected from contaminants. Ensure debris is removed daily from the site.

If, prior to demolition, it is known that any portion of the structure has known quantities of asbestos or if asbestos is found during the course of demolition, the portion of the building must be decontaminated of all asbestos materials, which may involve the following special procedures/requirements:

- isolation and preparation;
- special equipment requirements;
- special enclosure of area;
- sealing of material;
- removal of material; and
- clean-up of area prior to other work.

The GNWT supports sustainability and encourages project designers and contractors to salvage, reuse, and recycle all materials.

Carry out demolition in accordance with *CSA S350 - M1980(R2003) Code of Practice for Safety in Demolition of Structures*.

Division 6 – Woods and Plastic

06 20 00 Finish Carpentry

06 40 00 Architectural Woodwork

Finish Carpentry includes on-site fabricated and assembled wood items as well as other pre-manufactured items, such as: standard cabinets and shelving; wood bases; door casings; window casings (for custom wood or plastic windows); handrails; and closet rods not part of architectural woodwork. **Architectural Woodwork** includes shop-fabricated items. Materials and installation should be in accordance to the current standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC).

Incorporate freestanding storage and work units wherever possible; however, specific areas may require fixed cabinets in order to provide maximum storage capabilities. Cabinetry should be "custom grade," with clear birch or ash finish to all cabinet faces and doors. Laminated particle board with plastic laminate outer surfaces also can be specified. Provide melamine finish for interior faces.

Use standard-size modular, pre-manufactured, and prefinished cabinets. Consider use of cabinets with three finished sides so that components can be relocated easily. Install cabinet work surface to appropriate standing height:

- beverage counter – 914 mm height;
- work/equipment area storage cabinets – 914 mm to 965 mm height;
- equipment (such as printers) counters – 762 mm height;
- reception counters or ledges – 965 mm to 1067 mm; and
- all publicly accessed counters – 865 mm (barrier-free access height)

Design upper and lower cabinets with 19 mm-thick adjustable shelving, finished on all sides. Lower storage cabinets are to be closed and can be lockable. Upper cabinets used in beverage areas are closed, but upper cabinets in work/equipment areas are to be open unless items stored must be secured. Provide adequate concealed blocking and bracing, where required.

Cabinet hardware should be heavy-duty commercial grade, rated to *CAN/CGSB 69.25-M90/ANSI/BHMA A156.9-1982 Cabinet Hardware*. Provide heavy-duty door slides and shelf supports. Ensure hardware is specific to particle board or plywood construction. Provide continuous, matte-finished, high-pressure decorative laminate (HPDL) finished counter tops with finished self-edge or post-formed edges. Counter tops supporting a sink section are to be constructed with solid plywood tops.

Division 7 – Thermal and Moisture Protection (Acoustic Insulation)

07 21 13 Board Insulation

07 21 16 Blanket Insulation

Apply acoustic insulation (non-combustible fibreglass) in conjunction with acoustically rated partitions — gypsum or prefinished gypsum board on metal or wood stud partitions. Do not lay acoustic batt insulation above the SAT ceiling. (In the past, acoustic batt insulation has been installed above the SAT ceiling on either side of the partition in order to reduce sound transfer within the plenum area.)

Mineral wool insulation is installed in the wall cavity of a fire-rated partition; however, mineral wool does not have good acoustical insulating properties. Consider application of fire rated semi-rigid insulation for this assembly requirement.

Division 8 – Doors and Windows (Glazing)

08 11 0 Metal Doors and Frames

08 14 00 Wood Doors

08 70 00 Hardware

08 42 29 Automatic Entrances

08 81 00 Glass and Glazing

Specify commercial-quality **steel doors and frames** and **wood doors and frames** that are resistant to anticipated use and possible abuse. Products must be easily maintained and repairable. Fabricate with cut-outs and reinforcements, drill and tap to receive specified hardware, and prepare surfaces to receive appropriate finish. Doors and frames must comply with fire resistance requirements when installed to a fire-rated wall assembly and must be labelled. Wood doors having a fire rating greater than 20 minutes require a mineral core.

Specify **standard office doors** to be:

- Solid core, flush wood door to AWMAC standards;
- Paint grade high-density hardboard face, or clear birch, with all edges finished;
- 3-ply construction for hardboard face and 7-ply construction for standard use doors;
- 'A' edge profile, and
- Door size: 914 mm wide x 2134 mm height x 45 mm thick.

Hollow-core bi-fold doors often are installed to coat or storage closets; however, as bi-fold doors offer a limited opening width and height (2032 mm height), standard 2134 mm height solid core doors are recommended for these functions.

Specify 14-gauge, insulated, **metal doors** to the building exterior, rated assemblies, or secure areas. Install "storefront-type" aluminum frame and glazed doors to buildings and office suites that receive heavy public traffic. Design standard suite entry doors to meet fire-rated requirements for suite demising walls, and include a full height (2134 mm) and 305 mm-wide sidelight. For security purposes, do not install full-height sidelights in conjunction with the office suite's secondary exit/entry doors. (If a sight line is required, consider installation of a door light with security glazing.)

Ensure that doorframes are compatible with the selected door and the wall assembly into which they are to be installed (anchorage, fire protection, door weight).

Low-energy power-operated and power-open doors operate at slower speeds, need fewer safety devices, and are designed for lower frequency use. These doors are less costly than automatic entrance doors. They are designed to upgrade building or suite entrance to comply with current code requirements for barrier-free access. The most common installation of low-energy operators is a surface mount to a doorframe header. Power may be brought to operators from an existing power supply, either hard-wired or by plugging into a standard electrical outlet.

Provide standard/medium-duty grade commercial **hardware**: hinges, door stops, and latch and locksets to all interior doors, except as otherwise noted. Latch (passage) sets can be specified where specifically identified. Provide heavy duty commercial grade latch and locksets and hinges to doors accessing secure storage and equipment/service rooms or areas of high public use. All interior doors are to be equipped with full-return lever handles. Provide auxiliary locks such as latch bolts and deadbolts where required for security and safety purposes such as staff doors exiting public interview spaces. Master key all interior doors located within a suite. Key alike doors that serve one space. Also refer to *NMS Division 28, Electronic Security and Security* for card access applications and electronic strikes and frame mounted actuators specifications.

Specify door closers to rooms designed to accommodate equipment emitting noise, heat, or fumes. For doors designed for rooms such as conference or training functions, provide hardware designed to reduce sound transmission: automatic acoustic door bottom/seal and perimeter gaskets (rated as required by Code). Ensure door thickness is confirmed with the hardware manufacturer.

For exterior and vestibule doors, provide door perimeter gaskets and adjust catches to ensure the door closes tightly, and adjust closers' time-open to a minimum duration. Install power operated doors systems that are designed to allow adequate time-open cycle for persons with disabilities.

Supply private enclosed offices located in the suite interior (adjacent to the building core) with full-height **glazed sidelights** that can extend from 610 mm width to the full width of its partition. Although private offices generally are not to be located along the suite's perimeter window wall, in cases where they are, provide full-height glazing continuous to the open office area face. Accommodate all meeting, conference and interview rooms with full height glazed sidelights or glazed doors.

Assemblies requiring a fire-resistance rating or enhanced security may require **wired glass**, which is half the strength of annealed glass of the same thickness. Wired glass is economical compared to non-wire fire-tested glazing; however, wired glass is not recommended for security applications as it can be broken, causing permanent injury and in addition it can be used as a weapon. Generally **tempered glass** with a film finish layer to the inside of the room is specified for standard interior office doors, door sidelights, and full height glazed panels.

Division 9 – Finishes

09 21 16 Gypsum Board Assemblies

Gypsum wall board (GWB), or gypsum board, or drywall is a recycled product. An interior specification for GWB covers metal framing and furring systems for interior partitions and ceilings and includes related accessories and acoustic treatment materials. (Wood studs also can be used with GWB partitions; refer to "Acoustic Requirements" in this chapter) Ensure rated GWB with ULC design designation is used for partitions requiring a fire rating. Caulk and fill all holes and gaps. Indicate where **acoustically rated partition** forming rooms requiring acoustical control include the following applications:

- acoustic insulation – non-combustible mineral wool, un-faced batts friction fit to the wall cavity; fill spaces between the studs, full height walls, continuous over door frames and around openings and corners;
- acoustic sealants – apply sealant around the periphery of the partition where it meets fixed building components and around cut-outs:
- use compressed closed-cell foam tape where GWB partitions and ceilings abut prefinished components such as aluminium window mullions, the suspended ceiling grid, or the finished floor.

Limit the application of suspended GWB ceilings to only washroom, secure storage room, and reception bulkhead applications. Provide adequate support.

09 51 00 Acoustic Unit Ceilings

Base building finishes generally include **suspended acoustic tile ceilings (SAT)**, commercial grade with lay-in tile and suspended fluorescent light fixtures and mechanical units. Standard grid dimensions for SAT ceilings are:

- 610 mm x 1220 mm (24" x 48") or 600 mm x 1200 mm, and
- 1524 mm x 1524 mm (60" x 60") or 1500 mm by 1500 mm.

For planning purposes, a 1524 mm x 1524 mm grid is preferable; however, where there is an existing SAT, retain and/or repair the grid and module to match existing, ensuring that the SAT remains continuous throughout the suite. Where base building finishes do not include a SAT ceiling, match building standard.

Reuse existing ceiling tiles whenever possible, aiming for a minimum reuse of 10 to 20% of the existing product. Replace damaged and broken tiles and ensure that new or reused tiles are not soiled.

The SAT is to remain continuous throughout the suite, broken only by demising walls, which may be required to be fire rated. Other conditions that may require interruption of the SAT within a suite include the following:

- rooms that must be secured such as evidence rooms;
- washrooms;
- spaces accommodating equipment requiring a specific environment (such as LAN Rooms and laboratories);
- functions requiring stringent acoustic control (such as a recording studio and court rooms); and
- where fire-rated partitions extend from slab to slab/underside of roof.

Break through the SAT only to provide enhanced acoustic control for functions requiring acoustic containment to address confidentiality requirements. Application of sound masking systems that are able to mask conversation within the open area and contain conversation within a meeting space offers a more economical and flexible option.

Installation ceiling tiles suitable to specific functions:

- Open-plan office areas require ceiling tiles that provide a high noise reduction coefficient (NCR) rating greater than .70 is high performance (70% of the sound that strikes the surface is absorbed by the panel.) A ceiling panel with less than .50 is considered low performance. NCR is measured according to ASTM C423-09a - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- Where room-to-room sound transfer is a concern, use a ceiling product with a high ceiling attenuation class (CAC) rating that is greater or equal to 38 (high performance). CAC is a measurement of the performance of a ceiling system as a barrier to airborne sound transmission through a common plenum between adjacent enclosed spaces.) A ceiling panel rated equal to or less than 25 is classified as low performance. CAC is measured according to *E1414/E1414M-11a - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum*
- A product with a high CAC rating also helps to reduce sound emanating from within the room to adjacent spaces such as corridors. A product with a high performance CAC rating should be used in spaces that are enclosed with partitions designed to a minimum STC40 rating.

Ensure appropriate SAT components and materials are specified to meet required fire ratings. Specify products that are suitable for commercial office installations. Requirements to be addressed include the following:

- fire performance (*CAN/ULC Surface Burning Characteristics – Flame Spread Index and Smoke Developed Index*);
- sag resistance;
- high recycled content;
- low VOC emissions; and
- high light reflectance; and
- mold/mildew resistance.

FLOOR FINISHES

09 65 00 Resilient Flooring

09 68 13 Tile Carpeting

09 68 18 Sheet Carpeting

09 69 00 Access Flooring

The material most often specified for office-use base building floor finish for is a glued-down rolled carpet product. For office installations in new leased space, base building carpet finishes must be retained unless specific requirements dictate introduction of another product such as resilient flooring. Often floor finishes can be included in lease negotiations.

Owners and tenants can anticipate that a standard commercial **sheet carpeting** (**broadloom)** designed for office use will have a 10-year life expectancy. For new installations, rolled or broadloom carpet goods must be installed prior to construction of new interior partitions, which will allow future relocation of partitions without the need for carpet repair or replacement. However; the finished flooring must be protected throughout construction. Unlike carpet tile, the opportunities to introduce different colours or patterns to specific areas are limited.

Modular carpet tiles are a version of broadloom carpet; however, the carpet tile manufacturing process binds yarn to its backing, providing a more durable product. Carpet tile installation has two advantages to broadloom installation:

- Adhesive or Tac Tiles® (glue-free adhesive squares that adhere to the tile, creating a "floating floor and eliminating odor and VOC emissions) is reusable and allows easy removal and replacement of the tiles; and
- Uses the "grid system" for installation, ensuring a squared and straight final appearance.

Carpet tiles are modular and are manufactured in a variety of materials, finishes, colour and patterns. Ease of installation makes this product ideal for an existing space. Installation can be phased, allowing a schedule that can be designed around times when the space is unoccupied. Years after initial installation, the tiles can be lifted and relocated elsewhere. Commercial grade tiles can withstand high traffic levels, and the product's ability to be relocated and reused allows rotation of tiles between high and low-traffic areas. Because of its adaptability, superior maintenance properties, and its often renewable and recyclable content, selection of a carpet tile product will contribute to project sustainability.

Carpet is a composite product composed of four main components:

- Face fibre – typically nylon, a fibre that is economical, is resistant to stains and dirt, and has high durability;
- Primary backing – pre-formed, tear-resistant fabric, either woven jute or synthetic materials such as polypropylene, woven or non-woven. It is the matrix into which yarn is stitched/tufted and contributes to the dimensional stability of finished carpet
- Backing laminate/adhesive – typically consists mostly of mineral filler, mixed with a latex polymer. Its quality, quantity, and application affect yarn integrity, tuft bind, **delamination** strength between primary and secondary backings, carpet bulk and stiffness, and dimensional stability. Conductive and anti-microbial materials can be added to provide additional static and microbial control.
- Secondary backing – typically, a synthetic woven or non-woven fabric or jute, laminated to the primary backing. It provides dimensional stability to the carpet and improved bonding to substrates. Its stability is an important attribute in the removal of carpet.

Carefully consider the following carpet performance characteristics when specifying a broadloom carpet and carpet tile products:

- Tuft bind – affects resistance to yarn zippering/raveling of straight-stitched, and to a lesser extent, cross-stitched loop carpet, and tuft pull-out in cut pile carpet.
- Delamination – applicable to carpets with secondary backing fabrics.
- Colour fastness – CGSB requirements of L5 are standard. For intensive direct sunlight exposures, specify minimum L7 rating for colour fastness to light. Only solution-dyed fibres with quality pigments are likely to meet an L7 rating.
- Appearance retention – rating is based on changes to texture and fibre structure.

Commercial carpets are pre-dyed. In addition to stock and skein dyeing, there are two basic methods used to colour carpet fibre: solution and space dying. Each is used by manufacturers either singly or in combination. Space dyeing produces a tweed effect, where several colours are printed along a yarn length. Solution-dyeing results in the most uniform carpet lot colour and, depending on pigment quality, can provide the best colour retention, especially against aggressive cleaning agents, traffic, and ultraviolet light. However, many excellent carpet flooring products are produced using methods other than solution-dyed.

When selecting a carpet, consider colour, colour range, tone value, pattern, and soil-and-stain-hiding capability. Consider where the carpet is installed: if adjacent to an exterior access, it will require a colour and pattern with superior soil masking capability; if it is exposed to high levels of sunlight, a lighter colour maybe less likely to fade (although nylon fiber resists fading). Solution-dyeing allows stain removal with reduced risk of carpet discolouration. Protect against fading by incorporating sun-blocking window coverings. Be aware also that exposure to sunlight increases the disintegration process, including delamination.

Specify carpet flooring that provides ant-static and antimicrobial properties. Ensure the product includes a 10-year warranty covering wear, antistatic capability, light fastness, edge raveling and zippering, delamination, and — for carpet tile — dimensional stability.

Refer to Appendix C for recommended broadloom carpet and carpet tile specifications. For projects that are greater in area than 3,000 m², provide detailed performance verification; a cost for the laboratory testing must be included in the project budget and schedule.

Select **resilient flooring** products for areas that require daily maintenance such as washrooms, laboratories, and specialized equipment/work functions. Where the floor finish is exposed to elements that may contribute to slipping, a slip-resistant product is needed. Vinyl composite tile and vinyl sheet flooring contain petroleum products; more sustainable flooring materials are non-petroleum-based products such as sheet linoleum and linoleum floor tiles. These are made from natural ingredients, including jute, wood flour, resin cork flour, and linseed oil. Rubber flooring also contains some recycled content.

Application of **ceramic tile** and access flooring should be limited to specific requirements. Use ceramic tile for high-traffic areas serving the public. Install access flooring to areas where equipment is reconfigured regularly, such as a network room or specialized training rooms.

Ensure that all floor finishes and adhesives are developed using low VOCs and are manufactured with materials that are recyclable. Be attentive to flame spread and smoke development ratings. Refer to the following lists for recommendations regarding selection of floor finishes for general office functions.

- Broadloom carpet or carpet tile – open office areas, enclosed private offices, meeting and training facilities, break areas, reception areas/lobbies, in-office storage/file facilities.
- Sheet resilient flooring – telecommunication/LAN rooms, washrooms, janitor rooms, first aid rooms, beverage counters/lunch areas, lobbies, entrance vestibules, mail or print rooms.
- Sealed concrete – bulk storage rooms, service rooms, janitor rooms.
- Ceramic tile – entrance vestibules, main floor lobbies.
- Access (raised) flooring – training rooms, operation centres, LAN/network rooms – functions requiring various access points to power and visual/voice/data services. A more sustainable elevated, raised, or **access flooring** can be provided by specifying the manufacturer's metal grid and support system and, separate from the system, specifying carpet tile under *Section 09 68 18* to meet the Green Label performance standard.

WALL/PARTITION FINISHES

09 72 16 Vinyl Coated Fabric Wall Coverings

09 91 23 Interior Painting and Finishing

The landlord generally provides a **paint finish** to building perimeter walls and radiator cabinets as well as walls forming building core elements. Lease agreements indicate when those surfaces are to be refinished by the landlord; however, some projects may include refinishing of these surfaces (i.e., painting or application of other materials such as vinyl wall coverings) to create a feature wall suitable to a space's function. Limit refinishing of surfaces previously finished by the landlord.

Where installed, apply a suitable paint finish to new gypsum board on stud partitions. Use paint, stain, and transparent finishes and application methods that are suitable for commercial office use as well as for unfinished and previously finished surfaces.

Painting and finishing products are specified by the MPI product numbers, from the *MPI Approved Products Lists* contained in the following manuals, as required for the specific finishing systems:

- *Architectural Painting Specification Manual* (APS Manual) [current edition] for new, not previously painted or finished substrates, and
- *Maintenance Repainting Manual* (MR Manual) [current edition] for previously painted or finished substrates.

When possible, use products and methods that are environmentally friendly; however, ensure that products will meet required performance levels. The MPI Approved Product List includes MPI "E" (Environmental) levels to indicate ranges of VOC content (along with other factors), with E3 indicating the lowest VOC content, to E1 indicating the highest VOC content.

Ensure adequate protection and ventilation is provided for work within an occupied building.

Division 10 – Specialties

10 22 39 Folding Panel Partitions

10 22 19 Demountable Partitions

10 56 13 Metal Shelving Systems; 10 56 26.13 Manual Mobile Shelving Storage

Application of the following specialties in a larger office accommodation project contributes to flexibility in construction and reconfiguration of the office, increased utilization, and/or greater use of support spaces provided.

Consider installation of a **folding panel operable acoustic wall** in conference and training facilities with an area greater than 50 m². An operable partition allows a conference room to be more fully used, dividing the space into two separate spaces. Ensure that the folding partition is acoustically rated for STC 50 or greater. For optimum sound isolation meet Noise Isolation Class (NIC) to within 10 decibels (dB) of required STC rating when tested in accordance with current ASTM E336-11 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.

Moveable wall system consisting of panel partitions on a track suspension system, operated manually and equipped with an easy lock/release for closing. Provide perimeter gaskets to reduce sound transfer between the meeting spaces. Panels are prefinished. Ensure adequate suspension support is provided.

Mobile shelving systems consist of shelving mounted on wheeled carriages which ride on metal tracks. Tracks provide standard movement which is available in manual, mechanically assisted, and electrical operation. Tracks can be orientated either perpendicular or parallel to carriage lengths to provide standard (movement of back-to-back rows) or lateral movement (side to side movement of single storage units, available only in manual operation.) Systems are most often operated by cranks or wheels located at end panels. Mobile shelving systems include the following components.

- Tracks – typically are manufactured with a hard steel wearing surface on a base of softer steel or aluminum. For small systems, tracks are available in low profiles for installation directly on existing floors or on a levelled subfloor, or in higher profiles as an integral part of a levelled modular subfloor.
- Subfloors – raised subfloors are used when tracks cannot be recessed into the suite's floor and a level and flat platform for surface mounted tracks is needed. A subfloor and ramp will remove a tripping hazard presented by higher profile levelled tracks. The subfloor and ramp typically are provided by the storage system vendor and consist of wood product panels supported on metal framing; they are designed to permit levelling adjustment.
- Shelving – one of three types of shelving systems can be specified:
  - Four-post – most basic type of shelving system, commonly used for warehouse-type storage;
  - Metal case – superior appearance, also prevents documents from being wedged behind posts while providing rigidity equal to or greater than four post systems; and
  - Cantilever (bracket type) – often referred to as "library" shelving, offers easily adjustability of shelving and is suitable when properly reinforced for mobile systems, provides varying shelf depths able to accommodate different media. (Note that using existing cantilever shelving in a mobilized system may be difficult and costly.)

Mobile shelving or high-density (HD) systems offer an excellent tool to more effectively use office space by increasing storage density. However, designers must address a number of design considerations, including:

- Will use of the system offer an economical solution with respect to the cost of the system and its installation in comparison to the space saving over an identified time period?
- Are there structural limitations pertaining to the floor that is planned to accommodate the system? Many buildings do not provide adequate structural loading or may be able to accommodate a system only on a main floor.
- What area of a floor is most suitable for location of the system? Areas close to the building core offer less floor slope and more structural capabilities.
- Are there clearances that must be considered – lighting, sprinklers, and other mechanical and electrical items? Be aware of the distance separation required between the shelf top and sprinkler head.
- How many people will be accessing the system, and how frequently? If a number of staff members require access to the system at the same time, additional aisle access is needed. Consider also the possibility that the system does not meet the needs of the client. (High-density, freestanding storage units may be more suitable.)
- What media must the shelving support? Provide suitable shelving and accessories.

Standard unit shelf dimensions are:

- depths: 254 mm, 305 mm, 381 mm, 457 mm, 610 mm, 762 mm
- widths: 610 mm, 762 mm, 914 mm, 991 mm, 1067 mm, 1219 mm

For an office-use application, media typically stored within an HD system includes the following:

- letter files, (308 mm shelf depth, 255 mm height with clearance between shelves)
- legal files, (381 mm shelf depth, 255 mm height with clearance between shelves)
- binders, (305 mm shelf depth, 305 mm height with clearance between shelves)
- archive boxes, (457 mm shelf depth, 281 mm height with clearance between shelves)

For standard office use storage systems, specify 2135 mm (84") high shelving units/bays, where frequent access is needed. When infrequent access is anticipated, 2235 mm (88") height will increase storage but staff likely will require steps to access materials on the top shelf.

Demountable partition systems that can be erected or removed without using joint compound, sanding, and painting, are widely used in office installations. Demountable partition system costs are greater than installation of a drywall on stud partition; however, ease of installation and its prefinished characteristics provide the most cost-effective method of partitioning an interior space.

Demountable partitions are component-based, with the components designed to be reused. However, generally, it can be anticipated that less than 30% to 40% of an existing installation can be reused. Demountable partition installations often are considered to be preferable to the installation of standard drywall and stud partitions, as panels are prefinished, reducing the amount of air-borne contaminants (including drywall dust and finishing vapours).

Consider specifying a demountable partition system with a "power panel" component, developed to provide power and communication outlets within one panel and designed to serve adjacent (back-to-back) spaces. Application of a service component panel eliminates cut-out damage to the demountable panels and increases the reuse percentage.

A full partition system may be obtained from the system manufacturer, or proprietary components may be obtained from the manufacturer and then combined with components obtained elsewhere. There are two types of demountable partition systems:

- Progressive systems – are installed in a pre-determined sequence and can be taken down only in reverse sequence; and
- Non-progressive systems – are designed to allow wall panels to be removed at any location without regard to sequence.

Non-progressive systems allow future flexibility of floor layout where existing partitions can be easily altered. Renovations of cellular offices more often affect demising partitions than corridors. However, for some situations, progressive systems will serve as well as non-progressive systems and, therefore, a cost-effective installation could specify both types of systems.

Install demountable partitions to a finished shell with floor, finished ceiling and permanent walls (building perimeter, core, columns, and demising surfaces) applications completed. Install rolled-goods flooring below partitions.

Generally, demountable partitions are located so as to follow the suspended ceiling grid and are secured to the grid by means of specialized attachments (T-Bar clips) that are designed to reduce damage to the ceiling

grid. Fix base tracks to carpet flooring with hook fasteners. Ensure that damage to existing surfaces is minimal.

Demountable partitions systems include pre-manufactured ceiling trim and base. Application of a coved rubber or vinyl base can provide a continuous appearance and may be a more economical choice for the partition base.

Install fibrous glass batt insulation in all wall cavities to provide sound absorption. Partitions surrounding storage spaces that are not regularly visited by staff may not require this application. Install wood blocking in the wall cavity to provide reinforcement for wall-mounted fixtures such as cabinetry, shelving and shelving systems, and audio/visual equipment/boards.

Install compressed closed-cell foam tape where partitions abut building fixed components, as well as with acoustically rated partitions, the suspended ceiling grid, and finished floor. Refer to Design Considerations - Acoustic Requirements (located at the beginning of this chapter) for acoustic performance discussion.

Division 12 – Furnishings

WINDOW COVERINGS

12 21 13 Horizontal Louvre Blinds

12 24 13 Roller Window Shades

12-21-26 Black-Out Blinds

Window coverings typically are included in base building finishes. When window coverings are required or are to be replaced, provide fire-rated **roller window shades** or **horizontal louver blinds** that are economical, durable, cleanable, easily operated, and designed to provide adequate sun control. Roller shades are designed to reduce heat absorption and resist fading while providing a view to the exterior. The viny-coated polyester solar screen can be installed in combination with a heavy-duty aluminium frame mounted to the window frame with painted die-cast barrel clips.

Provide rotational control and full open/close operation for horizontal louver blinds. Select a common neutral colour for window coverings. Install to the building perimeter wall. Do not specify window coverings for application to interior glazing; instead, use a film application designed to provide privacy while allowing access to natural light.

Divisions 21, 22, 23 – Mechanical

Review central distributions systems when fit-up work calls for changes to existing components including ventilation, heating, plumbing, and fire sprinklers. Ensure that the building's control systems are addressed when changes are made to mechanical systems. Deliver air volumes that match occupant needs at specific times. Special purpose spaces (such as training and equipment rooms) may require dedicated mechanical systems to supplement existing building systems. This requirement often is addressed in lease negotiations and, therefore, must be identified during the project's functional programming phase.

Where possible, apply energy-saving measures and heat-recovery methods to the design of the mechanical system.

Division 21 – Mechanical – Fire Suppression

Fire Protection: for existing office installations, the landlord is to ensure that the sprinkler system is engineered to suit the new layout and that the sprinkler system/layout is approved by the Office of the Fire Marshall. Provide exit lighting to suit the planned office layout. Install smoke alarms to designated storage rooms. **Changes made to life-safety systems — fire sprinklers, fire extinguishers, fire hose cabinets, etc. — must meet current code requirements.**

Division 22 – Mechanical - Plumbing

Plumbing Systems: install in accordance with the National Plumbing Code of Canada (NPCC). Where it is possible and supported by the project budget, provide a plumbed double stainless steel sink unit with a gooseneck faucet and separate h/c taps to all approved beverage centres. Provide low automated faucets with laminator flow aerators to washroom sinks and low automated flush urinals and toilets.

Division 23 – Mechanical - HVAC

Heating and cooling systems are to be capable of maintaining the following indoor air conditions:

- Heating mode: 21°C or higher throughout the office suite, during hours of business /when occupied and 17° C throughout the suite during unoccupied hours; and
- Cooling mode: 26°C or lower throughout the office suite during occupied hours.
- Provide adequate zoning of heating, cooling, and ventilation systems:
  - Where possible, zoning of these systems is to coincide;
  - Open office areas and enclosed offices are not to be mixed in a common zone;
  - Ensure that the zone area is appropriate to the office function/area; and
  - For meeting and training facilities, adjust for occupancies throughout the day.
- Where specific noise levels must be met, provide acoustic treatment to ducting and equipment:
  - Install acoustic-lined ducting between an exhaust fan and intake grilles;
  - Do not install ceiling-mounted exhaust fans above meeting/conference spaces;
  - Provide vibration-isolated supports or floor isolators; and
  - Do not attach cooling units directly to access floor or wall systems.

Minimum indoor air relative humidity: maintain between 20% and 30% during the winter seasons.

Outdoor air requirements for ventilation: conform to *ASHRE Standard 62-2007 Ventilation for acceptable Indoor Air Quality*. When diffusers are located two metres or more above the floor, minimum supply air temperature in separate ventilation/cooling systems will be 13°C during hours when the office suite is occupied. When diffusers are located lower minimum supply air temperature will be 17°C.

Division 26 – Electrical

Refer to Appendix E for detailed electrical system requirements. The following information relates to office planning considerations.

26 50 00 Lighting

The importance of lighting in office accommodation has grown in the last decade, as open workstations have become the norm and sustainability and energy savings are highlighted. Prior to renovation of an existing space, assess the lighting to determine whether light fixtures can be reduced while maintaining appropriate Lux levels and distribution of light.

Provide suitable lighting system to serve workstations in the office open area. Consider low reflectance characteristics of some floor, partition, and furniture systems. Use LED or compact fluorescent light fixtures (not incandescent light fixtures) in office accommodation projects. Installation of LED light fixtures is limited to special purpose spaces such as conference and training facilities or other special purpose spaces identified by the client and approved by PWS. Provide rheostat control in conjunction with LED 3000k warm white lighting.

Efficient planning practices including employing a partition layout that follows the SAT grid, which will reduce the need to relocate fluorescent light fixtures. Take advantage of natural light. Provide separate light switch controls to enclosed spaces. Consider application of motion sensitive light control for shared support spaces such as conference/meeting spaces and lounge spaces. Design bank lighting control so that each switch controls a bank of lights relating to a specific workgroup or activity.

Division 27 – Communications

27 51 19 Sound Masking

27 40 00 Audio Visual Communication

Installation of a **sound masking system** offers an economical and flexible solution to mask speech and unwanted noise. It is described as a centralized electronic sound system, designed to generate masking sound from speaker assemblies strategically located above conventional suspended acoustic tile ceilings. Each speaker assembly generates a diffuse and unobtrusive sound with a spectrum shape designed to specific requirements. Sound masking is successful because we cannot distinguish and separate sounds of a similar volume.

Sound masking must be unnoticeable between zones. A zone can accommodate one to three speakers within an area of 21 m^2 to 63 m^2. The system is ramped up or increased during the initial period of occupancy so that staff can become accustomed to the level required. The system can include a time feature that matches the masking volume to expected activity levels. Without sound masking, speech can be heard easily over a distance of 15 meters; but with masking, speech is heard but it is not understandable. Provide sound masking systems that allow masking levels to be controlled, reduced, or turned off in the case

that video and teleconferencing is in use. Install the system throughout the office suite. Partial installations are effective only where there is a full physical barrier between the serviced area and adjacent spaces.

Sound masking systems can be added to existing office spaces, but early planning should include installation of the system so that other more costly and potentially disruptive acoustical treatments are not included in the fit-up project. A sound masking system can eliminate the need to extend partitioning through the SAT ceiling or installation of sound baffles and batt insulation in the plenum area. Systems components are reconfigured and adjusted easily and economically to meet requirements of a new floor layout. Ensure installation of a sound masking system includes testing, adjusting, and balancing, as well as demonstration and instruction for operation and maintenance of the system.

The term "noise cancellation" describes a system where microphones are used to detect noise, which in turn, signals a sound speaker to produce an equal and opposite sound wave. This system is not effective for a standard office application because the source and the listener always must be in the same position; thus, it does not address variable speech frequency and typical staff movement through the office space.

Refer to Appendix F for product information relating to TV display systems.

Chapter 5

Systems Furniture (Workstations)

The new *GNWT Office Space Standards and Guidelines* (*the Office Space Standards*) provide a consistent approach to office space allocation, ensuring space assignments are equitable and efficient and reflect functional work requirements. Application of the open area concept using workstation systems contributes to achieving this goal.

OVERVIEW

Workstation system panels form the open workstation and they support work surfaces and storage units. Panel-mounted components increase storage capacity within the workstation and allow the worker to move easily from one surface to another without encountering support obstruction. Modular panels are composed of stackable tile segments, allowing a combination of glazed, fabric or hard surface tiles surfaces to be applied to the panel. Systems include integrated bases and high-capacity lay-in cable/wire troughs. Lower panels (1065 mm to 1295 mm; 42" to 51"), placed parallel exterior windows, allow natural light into the office area, while taller panels (1675 mm; 66"), located perpendicular to the natural light source, can support overhead storage bins without fully impeding light access. Semi-enclosed WORKSTATIONS (TYPE C1) employ door height glazed panels and sliding or "barn" glazed doors.

Workstation Configurations

Enclosed workstations are furnished with freestanding desks and cabinets or shelving units, while open workstations are configured with screen-mounted work surfaces and storage cabinets. Standard panel height used with WORKSTATION Type D is 1295 mm (51") to 1676 mm (66"). WORKSTATIONS Type D and F are configured using 1067 mm (42") to 1295 mm height panels. Placement of screen-mounted overheads, requiring a minimum 1320 mm panel height must be considered carefully so that natural light is not blocked to interior workstations. Use of primarily lower storage is recommended.

Installation of lower height (1067 mm – 1295 mm) screens:

- allows natural light to reach all workstations;
- reduces the perception of a "confined cubical" appearance prevalent in past open area office layouts; and
- encourages an open, collaborative environment.

Workstations can be configured as:

- an enclosed freestanding station ;
- a configuration comprised of up to six workstations that share common panels, or
- part of a two, four, or six-person pod with common storage or layout space.

WORKSTATION ALLOCATIONS

The *Office Space Standards* include seven workstation types (TYPES A through F), each developed to meet the functional needs of GNWT employees. The seven types fall within either the "enclosed" or "open" category and represent five standard sizes.

Workstation Allocation Chart

Workstation Type	Workstation Description		Functional Assignment	Space Allocation	
	Enclosed	Open		m^2	ft^2
A	√		Resident: typical assignment to a Deputy Minister or equivalent	22.5	240
B	√		Resident: typical assignment to an Assistant Deputy Minister, Director, or Regional Superintendent	13.9	150
C	√		Resident: typical assignment to staff responsible for a district office or a department included within a regional or district office, senior management or positions dealing with sensitive or confidential issues [**refer to notes**]	9.3	100
C1		√	Resident: restrictive assignment to staff regularly requiring space for unscheduled meetings, or professional and technical positions needing increased layout and storage space	9.3	100
D		√	Resident: typical assignment to professional and technical positions; can be assigned to casual/term/part time positions if the workstation is occupied throughout the year and for more than 50% of the work day [**refer to notes**]	7.4	80
E		√	Resident: typical assignment to administrative support (AS) positions with a job function not requiring unscheduled meeting space but needing layout surface; the workstation is occupied throughout the year and for more than 50% of the work day ; [**refer to notes**]	7.4	80
F		√	Touch-down: typical assignment for staff who use their workstations less than 50% of their work day, and for casual, part-time, and seasonal work assignments [**refer to notes**]	3.9	42

Resident Staff	Term refers to staff using their workstations more than 50% of their workday.
Touch-down or Rover Staff	Term refers to staff using their workstations for less than 50% of their work day. Their duties could include site inspections or site work, or they may work under an alternative work program (AWA), working from home or at two separate sites. Casual, term, part-time and seasonal positions are included in this category.
Resident Casual/Term/ Part-Time Staff	Non-FTE positions are assigned either (1) TYPE D or E, if the station is occupied throughout the year by one or more staff members and the staff use their workstations more than 50% of the work day, or (2) TYPE F, if the staff use the workstation less than 50% of their work day and the workstation is occupied intermittently throughout the year.
TYPE C Enclosed	FTE staff can be allocated an enclosed workstation if the position deals with sensitive issues (telephone or person-to-person meetings that cannot be conducted in a meeting or quiet room) regularly throughout the day.

The advantage to screened workstations is that they can be configured in a wider array of formations and locations. Unlike full-height gypsum-board-on-steel-stud interior partitions, screened spaces need not adhere to the building grid and/or the suspended ceiling grid. Panels are provided with troughs through which electrical/voice/data cables are run to each workstation. Services are brought to the panel configuration through either a "power-in" cable or an indoor service pole (a pacpole).

Effective work areas involve careful consideration not only of the layout but also of how and where to apply sound-absorbing materials and office sound masking. Enclosed spaces that require acoustical privacy are constructed with solid-core wood doors, complete with soundproofing applications, to meet a sound transmission co-efficient (STC) rating of 40 to 45. They also can be provided with specialized sound masking systems that confine noise within the enclosed space.

Enclosed Workstations

Enclosed workstations are assigned only to resident employees who occupy their workstations more than 50% of the day, on average, throughout the year. All enclosed private offices are situated adjacent to office interior perimeter walls, allowing an open and flexible floor space located between the natural light source and partitioned rooms.

Three types of enclosed workstations or private offices (TYPES A through C) accommodate resident staff. WORKSTATIONS TYPES A and B are restrictive and are limited to senior management. WORKSTATIONS TYPE C (enclosed) and C1 (semi-enclosed) are discretionary and are based on job function. WORKSTATIONS TYPE C/C1 are assembled using door-height mobile partitions and can be assigned only to resident staff who have frequent unscheduled meetings within their offices and require acoustical privacy. The *Office Space Standards* recommend limited assignment of this workstation type.

Open (Systems) Workstations

The Office Space Standards include four types of open workstations developed to accommodate both resident and touch-down/rover staff. The base workstation that will serve more than 90% of all GNWT employees is TYPE D/TYPE E — a 7.4 m² screened, open-area workstation. Open TYPE C1 or TYPE D/TYPE E workstations are assigned to full-time staff as well as to full-time casual or term positions. Touch-down workstations are designed to accommodate seasonal, part-time, and full-time workers who occupy the workstation for less than 50% of their workday.

Unlike enclosed offices, open workstations are developed without restrictions pertaining to the building grid (columns, ceiling grid, and window mullions). This characteristic frees the designer to develop fully the office area available, which in turn allows more efficient and flexible use of floor space. The space savings allow additional support functions to be provided within the workgroup's total area allocation.

Figure 4.1: Let the light in!

Semi-Enclosed Management/Supervisory Workstation

WORKSTATION TYPE C1 provides a transition between a fully enclosed private office and an open workstation, which can be easily relocated and altered without extensive renovations to HVAC and electrical/communication services. It is a workstation designed to a 9.3 m² area (equal to Type C enclosed private office) and is allocated to staff that require collaborative meeting and team space within the workstation and/or additional layout space.

The workstation can be configured with 1676 mm (66") height panel modules or with 2057 mm (81") height panels, which will incorporates taller, a pull-across "barn" type door to "enclose" the workstation. Sound will travel over the modular panels; however, with application of sound masking systems, the occupant and visitor will perceive that they are within an enclosed space. Conversation will travel less than within the standard open area stations, and with the barn door in a closed position, a passersby will perceive that privacy is required for a meeting, telephone conversation, or work requiring concentration.

A Type C1 workstation configured with 2057 mm (81”) to 2438 mm (96”) height panels and “barn”, slide-across door.

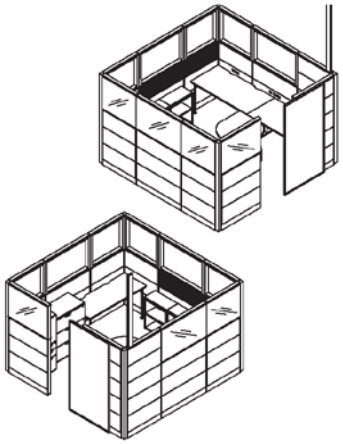


Figure 4.2: WORKSTATION TYPE C1 with “barn door

A Type C1 station configured with 1295 mm (51”) to 1676 mm (66”) height panels, which is not provided with a door.

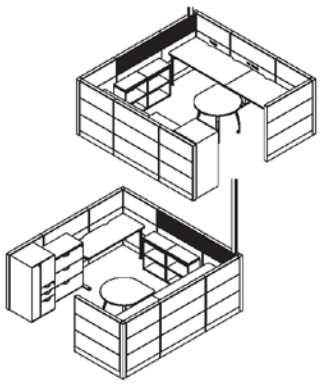


Figure 4.3: WORKSTATION TYPE C1, standard-height panels

TYPE C1 workstation can be configured to meet the needs of the occupant. These views illustrate a workstation that incorporates the following furniture items:

- 2- work surfaces
- 1- layout surface
- Two 2-shelf bookcase
- Coat storage cabinet
- Mobile 1-box/1-file drawer mobile pedestal, with an upholstered seating to accommodate an additional visitor
- 3-drawer lateral file cabinet
- Quarter-round mobile meeting table
- Task chair, fully adjustable
- Visitor chair

Base Workstation

The GNWT base work station, which will accommodate more than 90% of government staff, is an open-system workstation designed to be 7.4 m² area. The *Office Space Standards* include two base work stations types:

- Type D – management and supervisory, professional, and technical – it can be reconfigured to provide a two-person meeting space or additional layout or filing space, and is configured with 1295 mm (51") height panel modules;
- Type E – technical and administrative – provides more layout and filing space and is configured with 1067 mm (42") to 1295 mm (51") height panel modules.

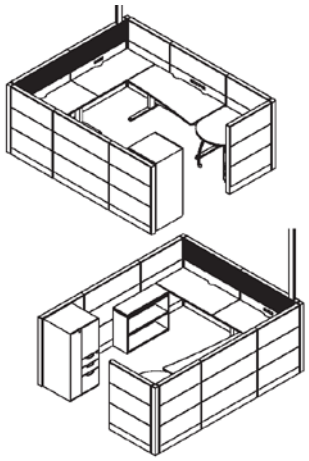
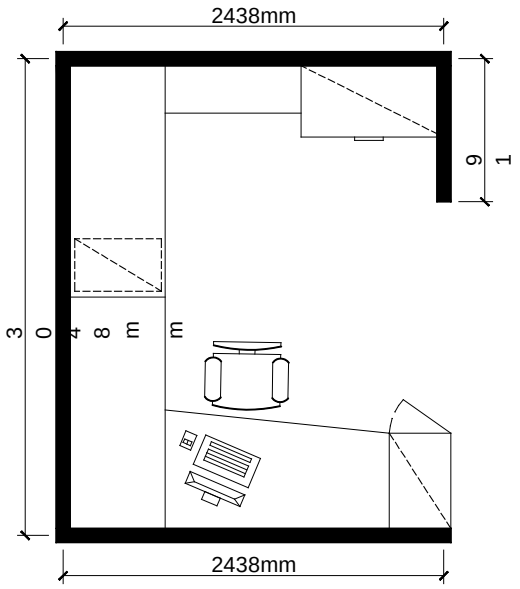


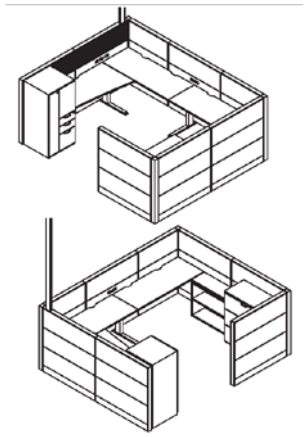
Figure 4.4: Base WORKSTATION TYPE D/E

TYPE D and E workstations can be configured to meet the needs of the occupant. These views illustrate a workstation that incorporates the following furniture items:

- Angled primary work surface
- 2- side layout surfaces
- 2-shelf bookcase
- Storage unit incorporating coat, file, and shelf storage
- Mobile 1-box/1-file drawer mobile pedestal, with an upholstered seating to accommodate an additional visitor
- Quarter-round mobile meeting table
- Task chair
- Visitor chair



OPEN WORKSTATION TYPE 'E'
80 ft2, 7.4 m2
- RESIDENT STAFF
- ADMIN SUPPORT



WORKSTATION TYPE E is recommended as accommodation for primarily support staff. Professional and technical staff also may prefer the layout which provides:

- additional layout space able to support equipment; and
- file cabinet(s) and/or bookcase(s).
- Include also a
- coat storage cabinet;
- angled work surface; and
- mobile 1-box/1-file drawer pedestal with upholstered seat top, accommodating visitors; and
- tilter arm chair, fully adjustable.

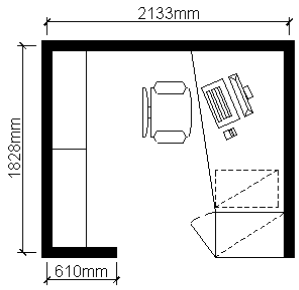
The workstation is configured with 1295mm (51") height panels. Overhead storage bins can be added to 1295 mm height panels. Coordinate application of the taller panels so that they align with other panels of similar height, and are located perpendicular to a natural light source.

Figure 4.5: WORKSTATION TYPE E, open

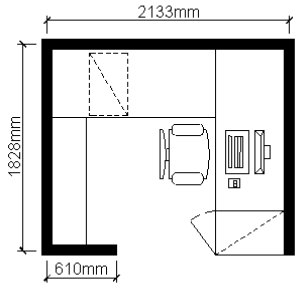
Touchdown Workstation TYPE F

Type F workstation configuration is developed on a 3.9 m² area allocation, use 1295 mm height panels, and accommodates the following workers:

- staff that use their workstation less than 50% of their work days; or
- casual or tem employees, or
- visitors.



OPEN WORKSTATION TYPE 'F'
42 ft2, 3.9 m2
- ROVER STAFF
- OCCASIONAL WORKER



OPEN WORKSTATION TYPE 'F'
42 ft2, 3.9 m2
- ROVER STAFF
- OCCASIONAL WORKER

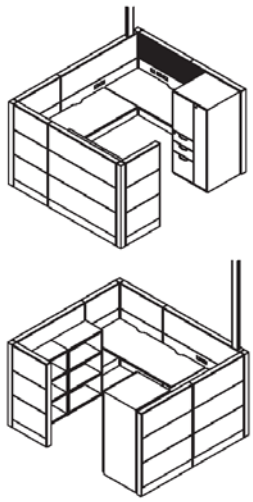


Figure 4.6: WORKSTATION TYPE F, open

WORKSTATION TYPE F can be furnished with a variety of components. In the first layout the following furniture is incorporated:

- Angled primary work surface;
- Two 2-shelf bookcases;
- Coat storage cabinet;
- mobile 1-box/1-file drawer pedestal with upholstered seat top, accommodating visitors; and
- tilter armchair, fully adjustable.

The second Type F layout incorporates the following furniture items:

- standard primary work surface;
- side layout table;
- one 2-shelf bookcase;
- coat storage cabinet;
- mobile 1-box/1-file drawer pedestal with upholstered seat top, accommodating visitors; and
- tilter armchair, fully adjustable.

PANEL COMPONENTS

Load-bearing panel frames are the structural foundation for panel supported work surfaces. A panel is approximately 75 mm (3") thick, is non-progressive (non-sequential components can be changed or added on to without affecting adjacent panels), fully constructed, and fully assembled and unitized. They can be stacked to 915 mm (36") to 2438 mm (96") overall height and are designed to a minimum requirement for NRC .65 and STR 25. There are three panel types:

- standard, (one-piece)
- semi-segmented (tiles and standard panel); and
- segmented (panel consisting of independent tiles).

Following are standard panel dimensions:

- base heights: 762 mm (30" – work surface height), 915 mm (36" – beverage counter height), 1067 mm (42" – service counter height), 1295 mm (51" – 4-drawer file cabinet height), and 1676 mm (66" – eyelevel height;
- add-on components can increase panel height to 2057 mm (81" – door height) or 2438 mm (96" height); and
- widths: 610 mm (24"), 762 mm (30"), 914 mm (36"), 1067 mm (42"), 1219 mm (48"), 1371 mm (54"), and (60"); and
- depth: 75 mm (3") – must be capable of being installed flush to a partition.

Panel frames design and construction includes the following requirements:

- constructed with 20 gauge cold rolled steel welded to form a rigid structure;
- All exposed metal components are electrostatic powder coated and interior metal components are epoxy painted finish;
- installed without the need for special anchors or fasteners;
- leveling glides that allow up to a 64 mm height adjustment;
- panel to panel connectors;
- design allows panels to be connected off-modular;
- connecting fittings for attachment of skin surfaces;
- continuous top cap, panel end trims and finished trim at the end of a panel run;
- fibreglass center panel filler;
- 25 mm (1") incremental slots designed to accept cantilevers and overhead components) for vertical hanging of 75 mm (3") increments;
- allows add-on of stacking modules in a lay-in trough (to increase panel height);
- allows finished components (finished face) to be removable on both sides of the frame;
- allows field modification of a standard panel to a semi-segmented or fully segmented panel; and
- permits distribution of fiber optic and communication cables, including capacity and protection for goof loops and connectors

Panel elements (face or “skin”)include:

- fabric-finished (polyester blend);
- whiteboard;
- accessory (signage, personal organizers, shelves, and bins);
- patterned metal; and
- clear or patterned glass; and
- Metal to metal connectors.

Work surfaces should be able to be adjusted to accommodate various tasks, and should:

- fully panel mounted or semi-supported (with a front and a side panel);
- a 2438 mm maximum width, with a 1524 mm free-span capability;
- customized or modifies for a specific installation;
- mounted off-module;
- constructed of 45 lb. Core density Particle board or OSB board with surface tip and backing;
- total work surface thickness of 27 mm (11-1/16”);
- seamless, high pressure laminate with non-user edges finished with bonded, impact-resistant “t” molding;
- scalloped or fitted with grommets, allowing access to service outlets.

Storage units can be freestanding or panel mounted and include the following features:

- ability to panel-mount overhead storage bins off-module;
- open and closed overhead storage bins (require a minimum 1295 (51”) panel height , floor standing storage, and bookcases;
- pedestals and shelving units are interchangeable (within a cabinet shell);
- storage pedestals are finished on all sides and can be provided with an upholstered seat top; and
- pedestal drawers are fully extendable.

Other workstation systems add-on components include lamps (mounted below storage bins), task lighting, keyboards, and other ergonomic computer-use accessories. A standard workstation does not include a keyboard; provide only if requested by the user.

WORKSTATION ELECTRICAL AND COMMUNICATION SERVICES

Power/data/voice services are provided to workstation configuration via floor outlets (raised access floor system – "plug and play" application), service pacpoles, or power-in cables from service cabling install to partitions to the workstations. Ensure service pacpoles are of adequate dimension and provide separate chanels able to accommodate modular power and LAN/Teland cabling. Provide each workstation with service outlets and horizontal wiring. Systems workstations are to include modular outlets, and provide the following:

- workstation circuits shall contain a maximum of four outlets per circuit, (one circuitcan be shared between two workstations);
- allow a minimum of two outlets for each workstation;
- provide Cat 6 cabling for standard use workstations and Cat 6A for workstations supporting intensive applications such as a data centre;
- each outlet with one 2 m long, straight through patch cord of cable identical to the horizontal wiring;
- each outlet with two female RJ 45 jacks, one each for voice and data – data jacks to be keyed;
- RJ 45 Jack pin out configuration in accordance with CSA Standards; The systems workstation's electronics systems consist of:
- Shielded in-feeds;
- Jumper harness (distributes cables vertically or horizontally to a locations in a panel) ; and
- power boxes (single or double width, single or double sided).

Power access locations are located on either corner of a panel. A 75 mm (3") lay-in cable trough, located on the top rail. The trough is configured to provide separate channels, each accommodating either power or LAN/Tel cabling and is designed for distribution within the workstation configuration. Base trims are an integral part of a steel base raceway and does not require additional trim.

The system design allows an option for both panel base and workstation height access to the service outlets; this means multiple outlets can be installed at different height, within a single panel. Panel connections are sealed to conceal wiring.

Chapter 6

Office Support Spaces

SUPPORT SPACES

By providing more and a greater variety of collaborative spaces, *the Office Space Standards* meet the needs of today's workforce while taking advantage of technology that allows staff to work from many locations. The macro allotment includes area both for workstations and for typical office support space, including collaborative (meeting), equipment, layout, and storage functional components.

The *Office Space Standards* describe typical office support spaces and it recommends that a range of meeting and work areas be incorporated into an office layout.

Meeting Spaces

The planning template includes a selection of three types of meeting facilities:

- small (9.3 m² to 13.9 m²), seating 4 to 7 persons;
- medium (26 m² to 27.9 m²), seating 14 to 15 persons; and
- large (55.7 m²), seating 30 to 32 persons.

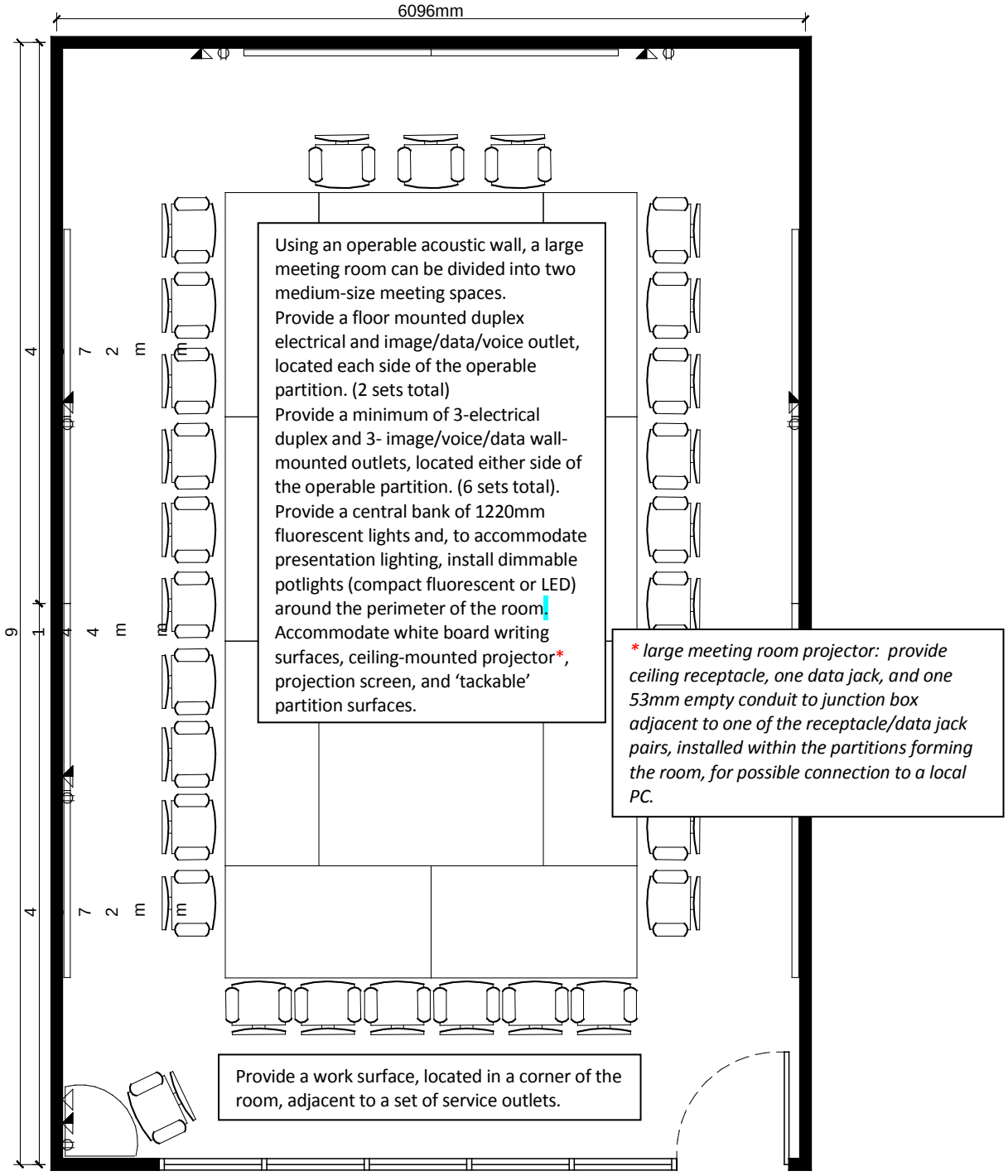
The rooms are developed on a module, allowing flexibility in space planning: the area of two medium meeting rooms equals that of one large meeting room; a medium meeting room can be divided into two small meeting rooms. If a medium meeting room is under-utilized, then its space can be converted to two small meeting rooms or as a small meeting room and an office or other function.

The *Office Space Standards* recommend that the large meeting room be designed with an acoustical mobile room divider, allowing temporary division into two medium-sized meeting rooms. As well all meeting rooms are provided with multiple telecommunication service outlets and be equipped with modular furniture, allowing the table layout to be reconfigured.

When a sound masking system is provided, construct meeting rooms to STC 40. Construct partitions using sound dampened panels ("QuietRock") and stone wool content, dense insulation ("ROXUL" rigid and semi-rigid board product).

Provide separate light control with motion detection (separate switching to each side of a meeting room that can be divided into two spaces). Design the lighting layout to support possible table configurations. Include perimeter lighting able to support presentation and include separate switch control. Provide separate thermostat control, and an HVAC system designed to meet various numbers of occupants.

Furnish the room with modular, folding or stackable tables and armchairs with gas lifts.



LARGE MEETING ROOM
600 ft2, 55.7 m2
- SEATS 30 - 32
- SUITABLE FOR 600mm x 1200mm (2' x 4') AND 1500mm x 1500mm (5' x 5') CEILING GRID
- CAN BE DIVIDED TO CREATE TWO MEDIUM MEETING ROOMS

Figure 5.1: Large meeting room

Figure 5.2: Meeting space with modular tables

Quiet Rooms

Quiet rooms are intended to serve as unscheduled meeting or workspaces, accommodating private telephone calls or teleconferences. Two types of quiet rooms are included in the planning template:

- a two-person meeting room, equipped with lounge-type chairs; and
- a space suitable for use on work requiring temporary, focused concentration.

It is important to note that staff must be able to access electronic files wherever they work; therefore, the rooms must be developed with standard telecommunication services and staff must have access to portable devices.

Figure 5.3: Quiet rooms provide space for privacy

Provide one-duplex electrical outlet and a duplex data/voice outlet and suitable HVAC to accommodate up to two persons. Install fluorescent lighting with motion control.

Construct the room with STC 40 partitioning and equip with a standard door or a "barn" slide across door to maximize space.

Furnish with either:

- a freestanding work surface, a mobile storage pedestal, and a fully adjustable task chair; or
- 2- lounge type chairs with attached tablet/lap top surface, and a small side table

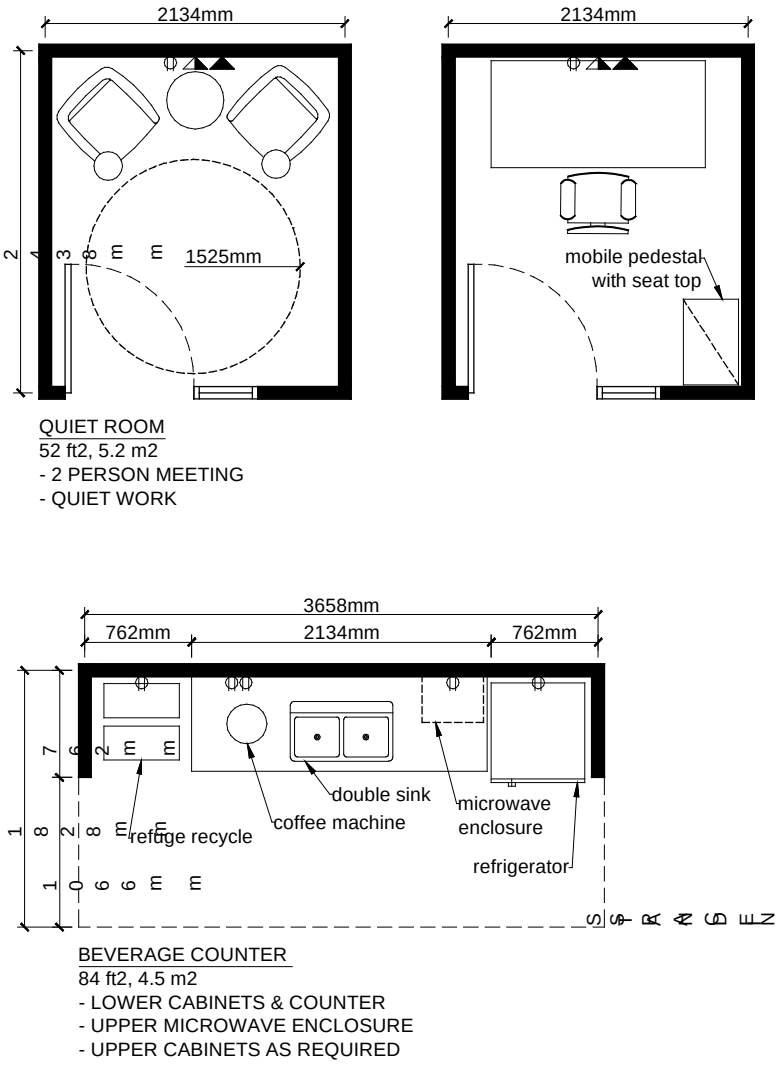


Figure 5.4: Quiet rooms and beverage Counter

Beverage Counters, Kitchenettes

The *Office Space Standards* increase the area allocation for this function in order to incorporate a code requirement for a double sink as well as space for a refrigerator, microwave self-enclosure, water cooler, and refuge/recycle containers. In many offices, the beverage counter function has evolved into an informal meeting place where staff exchange information and generate ideas. Larger office installations are allocated with more than one beverage station, which can be combined to create an office hub with a counter and seating. Another option is to include the station with a meeting space allotment, creating a free-flow open-area function space. To reduce noise disruption for workers, the *Office Space Standards* recommend that planners separate beverage counters from workstations and locate them near other support spaces (specifically, collaborative facilities).

Accommodate refuge and recycling containers and water cooler, and consider installation of a dishwasher.

Provide 3-electrical duplex outlets installed above counter height, each served via 20 amp receptacle, GFI protected where required by code. If applicable, provide at standard installation height, an outlet to serve the refrigerator and the dishwasher.

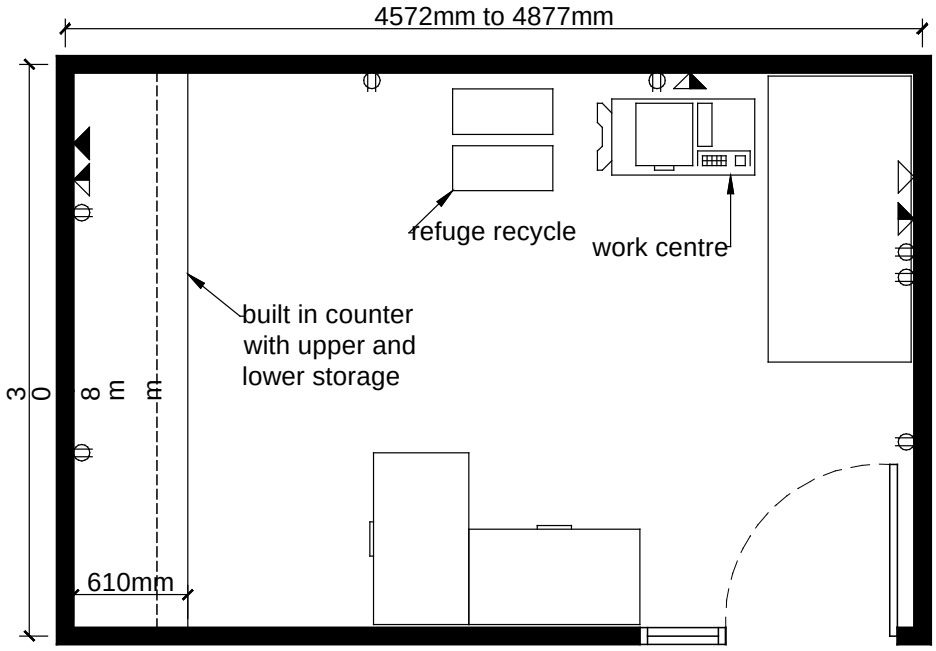
Locate resilient flooring to 1220 mm depth in front of the counter.

Figure 5.5: Friendly gathering places

Equipment/Work Centres

The Standards recommend a 13.9 m² (1500 mm x 1500 mm grid) to a 14.9 m² (600 mm x 1200 mm grid) module for equipment/work centres. A smaller workgroup is allotted half of this area. For larger offices, an allotment also is included for auxiliary equipment stations needed to reduce congestion and travel time within the office. These spaces can be located throughout the office or combined with the equipment/work centre.

Figure 5.6: Equipment work centres



EQUIPMENT / WORK CENTRE
160 ft2, 14.9 m2
- SUITABLE FOR 600mm x 1200mm
(2' x 4') CEILING GRID

150 ft2, 13.9 m2
- SUITABLE FOR 1500mm x 1500mm
(5' x 5') CEILING GRID

Provide 20 Amp-duplex receptacles, installed a minimum of 1200mm apart where located above the work counter, and elsewhere in the space, where required to serve equipment.

Figure 5.7: Equipment / work centre

Storage

An allocation for storage space needed to accommodate stationery, forms, IT equipment, and general bulk storage is incorporated into the planning template. Space for either a freestanding or an enclosed closet also is provided for visitor coat storage.

Consider use of high density storage systems. (Refer to Chapter 4.)

File Storage

The planning template allots one (lateral) file cabinet area (1 m²) per staff member. Workgroups are encouraged to use high-density storage if their location has suitable floor loading. Three-drawer-high lateral cabinets will meet all floor-loading requirements within the GNWT's property inventory. Adding a countertop to a grouping of these cabinets provides layout for informal meeting and teamwork surfaces. If a workgroup finds that it requires less paper files, then the area allocation can be applied to other functions.

Figure 5.8: File storage tops provide layout and workspace

Figure 5.9: File storage supports shared layout and workspaces

Reception Areas

All stand-alone office suites require an entry and reception function. The planning template includes a selection of open-area reception facilities:

- small (4.2 m²), seating 1 to 2 persons;
- medium (8.6 m²), seating 3 to 4 persons; and
- large (13.4 m²), seating 5 to 6 persons.

Locate 1-duplex electrical and 1-voice/data outlet in the reception area.

Provide internal wall support for display or brochure storage.

Appendices

Appendix A

Acronyms and Definitions

a.f.f.	above finished floor
AWMAC	Architectural Woodwork Manufacturers Association of Canada
AS	administrative support
ASTM	ASTM International – formerly known as the American Society for Testing and Materials
AWA	alternative work arrangement
BAS	building automation system
BF	barrier-free
BMCS	Building Monitoring and Control System
CAC	ceiling attenuation class
CAN/CSA	national standard published by the Canadian Standards Association (CSA)
CAN/CGSB	Canadian General Standards Board – published standards
CAN/ULC	national standards published by Underwriters laboratories of Canada (ULC)
CCTV	closed circuit television
CSI	Construction Specifications Institute
CSM	Canadian Master Specification
DM	Deputy Minister
ft²	square feet
F&E	furniture and equipment
FMB	Financial Management Board
FTE	full-time equivalent
GB	gypsum board (aka “drywall” or “gyprock”)
GFA	gross floor area
GFI	Ground fault interrupter (protection - electrical circuit)
GNWT	Government of the Northwest Territories
GNWT GBP	*GNWT/PWS’s Good Building Practices for Northern Facilities*
HPDL	high pressure decorative laminate
HR	Human Resources
HVAC	heating, ventilation and air conditioning systems
IEQ	indoor environmental quality
IT	information technology
LAN	local area network
m²	square metres
MF	MasterFormat specifications, published by CSI
NBCC	National Building Code of Canada
NECB	National Energy Code of Canada for Buildings
NFCC	National Fire Code of Canada
NGO	non-government organization
NGU	non-government user
NMS	National Master Specifications

NIC	noise isolation class
NRC	noise reduction coefficient
OHS	Occupational Health and Safety
O&M	operations and maintenance
PWS	(Department of) Public Works & Services
SAT	suspended acoustical tile
SPS	special purpose space
STC	sound transmission co-efficient
TI	tenant improvement
TBD	to be discussed
u/s	underside
um²	useable area in square metres
ULC	Underwriters Laboratories of Canada
VOC	volatile organic components
WAN	wide area network

DEFINITIONS – TERMINOLOGY

Sources referenced:

1. Government of NWT, PWS
   Office Space Standards and Guidelines [December 2012]
2. Government of Canada
   2a – PWGSC Workplace 2.0 Fit-up Standards [April 2012]
   2b – PWGSC Fit-up Standards: Technical Reference Manual
3. CFI, your Facility Management Technology http://www.gocfi.com
4. WBDG – Whole Building Design Guide (a program of the National Institute of Building Sciences), www.wbdg.org
5. Government of Alberta, Infrastructure, Capital Planning Initiative
6. City of Edmonton – Edmonton City Council's Infrastructure Strategy
7. ASTM Standards, Whole Earth Functionality and Serviceability, 2nd edition
8. Province of British Columbia, Government Office Space Standards [December 10, 2008]
9. Building Owners and Managers Association – Building Environmental Standards, www.bomabest.com

Term	Definition	Source #
Agencies	Government and government bodies. These include: ministries, taxpayer supported and commercial Crown corporations and their subsidiaries, and local agencies such.	
Alteration	Alteration is the worth to change the function of an existing facility or any of its components. The capacity of the facility is not expanded.	
Asset	An economic resource controlled by an entity as a result of past transactions or events and from which future economic benefits may be obtained. An asset can be any item that has value to an organization over time (e.g., buildings, equipment, and computer software.	
ASTM International	An international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.	
Base Building	The building shell including finishes, exterior walls, interior core and demising walls, finished ceilings complete with lighting and other building systems consistent with the designed function and planned general use of the building. In the case of office accommodation, the base building includes the exterior window coverings and primary identification signage.	2a
Benchmarking	A process for measuring "best practice" performance and comparing the results to corporate performance in order to identify opportunities for improvement. The comparison to "best practice," often called a GAP analysis, leads to a prioritized array of optimizing changes directed to gaining "best practice" levels of effectiveness. We often compare our client's facilities to IFMA or BOMA benchmark information.	3

Term	Definition	Source #
Building Environmental Standards (BESt)	A national program launched in 2005 by BOMA Canada to address an industry need for realistic standards for energy and environmental performance of existing buildings based on accurate, independently verified information.	12
Budget	A summary or plan of the intended revenues and expenditures.	
Building Common Spaces	A space allowance for support facilities that are shared by all groups within the facility. These include such areas as Main Building Reception, Security Room, Mailroom, large meeting facilities and training rooms, etc. Building common spaces may be located on any floor of the building. (May be referred to as Building Common Areas)	8
Building Owners and Managers Association (BOMA)	BOMA International is a primary source of information on office building development, leasing, building operating costs, energy consumption patterns, local and national building codes, legislation, occupancy statistics and technological developments.	3
Closed Circuit Television (CCTV)	Video cameras used to transmit a signal to a specific place, on a limited set of monitors.	
Circulation Area	Space allowances for the areas between landscaped office workstations, semi-enclosed areas, enclosed areas, other enclosed spaces, open work areas, and support spaces. This area is a derived from the space requirements.	8
Churn Rate	The rate at which changes in the layout or location of individual workstations occur in an organization, calculated as the number of occasions during the year in which the location at which an individual works is changed, or a workstation was relocated including realignments or moves within a building, and moves in or out of the facility, with the total being divided by the total number of occupants at the end of the year and expressed as a percentage.	7
Collaborative Spaces	Spaces where two or more staff and visitors gather to meet or work. Such spaces include formal meeting rooms or informal spaces such as beverage/lunch and lounge areas.	1
Commissioning	Commissioning is a comprehensive and systematic process to verify that the building systems perform as designed to meet the Owner's requirements.	4
Common Support Space	Space devoted to common support services. Common support space is a portion of the facility assignable area that is not attributed to any one occupant, but provides support for several or all occupant groups. Examples include cafeterias, conference rooms, storage areas, auditoriums, fitness facilities, training rooms and computer rooms.	3

Term	Definition	Source #
Components	Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectantly maintenance regimes, risk or criticality.	
Conceptual Design	Initiation of a project vision/strategy where user needs and other elements, described in the facility program, are applied to preliminary development of a design solution.	
Construction Documents	Final drawings and specifications that set forth the detailed requirements for construction.	
Dedicated Support Space	A space allowance for files, equipment, storage, etc., that is shared with and/or for the benefit of others and must be located adjacent to the individual's workplace.	8
Deficiency	A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents, does not perform properly or is not complying with the Owner's Project Requirements.	4
Design	This activity is project specific; the ultimate outcome is design documents for the enhancement of physical infrastructure.	5
Design Development	Includes dimensioned drawings and outline specifications	
Element	A major component common to most buildings which usually performs the same function or functions irrespective of its design, construction or specification. The (six) major elements consist of: (1) Substructure (2) Shell, (3) Interiors, (4) Services, (5) Site & Ancillary Work, and (6) General Requirements & Allowances.	
Enclosed Area	(EA) Enclosed areas with full height partitions, floor to ceiling (suspended or structural), used for an office, secure file room, meeting room, etc.	8
Environmental Sustainability	Environmental Sustainability is about addressing the economic, environmental and social responsibilities and managing them accordingly towards the attainment of a desired level of sustainability performance.	3
Facility	Is a purchased or constructed roofed or walled structure that is built, installed, or established.	
Facility Assignable Area (Assignable Area)	Calculated by measuring the portions of the floor used to house personnel, furniture, support areas and common support areas. Each assignable area is measured to the outside of the enclosing wall or furniture panel except in the case where a wall or furniture panel is common to more than one assignable area. In this case, measurements are taken to the center of the wall or furniture panel.	3
Facility Rentable Area (Rentable Area)	Calculated by subtracting major vertical penetrations, interior parking space and void areas from facility interior gross area.	3

Term	Definition	Source #
Facility Useable Area (Useable Area)	Calculated by subtracting the primary circulation and the building core and service areas from the facility rentable area. It is area that can be assigned to occupant groups.	3
Final Design	A report that includes the selected scheme and detailed drawings, specifications, cost assessments, and special design requirements.	
Fit-up for Initial Occupancy	Preparation to provide accommodation for initial GNWT occupancy in accordance with PWS's *Technical Standards*. A fit-up may include alterations or improvements to the base building and/or base building systems, including demolition.	
Fit-up of Existing Space for Reuse (Refit)	Work required to alter space previously occupied by a GNWT workgroup or non-GNWT entity to meet requirements for a new GNWT occupant. The new user's functional requirements, existing conditions of the previously occupied space, and the planned duration of the new occupancy is considered.	
Fire-resistance Rating	The time in hours or fraction thereof that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria or as determined by extension or interpretation of information derived there from as described in the building codes.	2b
Fire Separation	A construction assembly that acts as a barrier against the spread of fire. A fire separation may or may not have a fire-resistance rating.	2b
Floor Common Support Space	A space allowance for support facilities that are shared by all groups on the floor(s).	8
Function	An end or purpose that an item or activity is intended to perform, expressed in a verb-noun form. The natural or characteristic action performed by a product / service / project. A required performance action of a product / service / project described in two words using an active verb and a measurable noun (e.g., contain heat, resist deterioration, receive power)	
Functional Program	A functional program is developed with the purpose to ensure the collection of sufficient information needed to analyze the customer department's current and future functional requirements, examine the planning alternatives and identify deviations from the GNWT *Office Space Standards* and *Technical Standards*.	2b
Functionality	The ability of an infrastructure element to meet program delivery requirements (e.g. whether or not a recreation facility meets user expectations).	6
Floor Plate	The size and shape of the floor of a particular building.	2

Term	Definition	Source #
General Administrative Offices	Offices that accommodate general office functions and activities that do not require special security or other special features. General administrative offices do not have high interface with the public. (The majority of GNWT office space occupied by client departments and agencies falls within this category.)	2b
General Support Space	Also known as support area, these spaces are common to all general-purpose office environments and include meeting rooms, quiet rooms, [beverage stations], shared equipment areas, printer stations, reception/waiting areas, and other areas.	2b
Greening	A goal to operate in a more sustainable manner to create a sustainable environment	
Gross Floor Area	Total constructed area of a building measured from exterior walls.	
Health and Safety Risk	Failure to provide a safe working environment for its workers exposes the workers to physical or emotional risk, and the organization to compensation liabilities, loss of business reputation and other costs.	
Heating, Ventilation and Air Conditioning (HVAC) Systems	Mechanical systems that supply or remove heat, supply or remove humidity, and supply outdoor air as required.	2a
Hotelling	Work spaces that are developed for mobile workers who require office space for a specific time.	
Integrated Technology	Design process [includes] a thorough understanding of technological requirements of the space, including anticipated future needs.	13
Lease	A conveyance by a lessor to a lessee of the right to use a tangible asset, usually for a specified period of time, in return for rent. An operating lease is a lease in which the lessor retains substantially all the risks and benefits related to the asset's ownership. A capital lease transfers substantially all the risks and benefits of ownership to the lessee and is a form of alternative financing.	
Life Cycle	The cycle of activities that an asset goes through while it retains an identity as a particular asset from planning and design to decommissioning or disposal.	
Maintenance	All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal. Fixed interval maintenance is used to express the maximum interval between maintenance tasks. On-condition maintenance is where the maintenance action depends upon the item reaching some predetermined condition.	

Term	Definition	Source #
Multi- Use	Describes facilities with two or more primary uses, such as a single a site that encompasses a conference facility as well as a training centre.	
Needs Analysis or Gap Analysis	A method of assessing the gap between an organization's current accommodation and its required accommodation meeting its functional needs.	
Office Space	Includes office/workstation areas, general support space and circulation for all four generic office types.	2
Open Area	An open area workspace developed to serve knowledge work that is based on mobile technology. Areas can be furnished with workstation systems that include low height panels and panel-hung work surfaces and storage.	
Open Landscape	Office planning that integrates function, aesthetics, acoustics, lighting, and workstations and support spaces characterized by moveable panels and systems furniture.	
Physical Condition	Refers to the condition of the asset that enables it to meet the intended service level	6
Planning	The process of setting goals and objectives and determining the actions required to attain them. This involves examining current physical infrastructure conditions, forecasting future demands and recommending the staging of necessary projects over a period of 6 years or more.	5
Preliminary Functional Design/Functional Programming	The process of determining the type and quality of space requirements for design work required to address the functional and operational needs of a particular project. This may include detailed investigative studies directed to resolving a specific problem, need, or deficiency.	5
Primary Circulation	The portion of a building that is a public corridor or lobby. It is further defined as space required for access by all occupants on a floor to stairs, elevators, restrooms and building entrances or tenant space entry points on multitenant floors.	3
Private Office	A fully enclosed office space (with door) designed to accommodate an employee.	
Procurement	Acquisition of supplies (furniture and equipment) and services (contractor), which includes development of contractual requirements and the tender process	
Project Management	Project management is the process of planning, organizing and managing tasks and resources to accomplish a well-defined objective, usually within constraints on time, resources or cost.	

Term	Definition	Source #
Project Requirements	Include project objectives, parameters and budget, lines of communication, governance for approval, submission requirements and timelines.	2b
Program Area	The area determined by the GNWT *Office Space Standards and Guidelines*, December, 2012, to functionally accommodate a workgroup's accommodation requirements.	
Public Contact Offices	Offices accommodating functions that provide face-to-face services to the public. Functions and operations may include, but are not limited to: inquiries from walk-in customers; training/testing/meetings; and application/form processing.	2
Rehabilitation	Works to rebuild or replace parts or components of an asset, to restore it to a required functional condition and extend its life, which (may incorporate some modification). Generally involves repairing the asset to deliver its original level of service without resorting to significant upgrading or renewal, using available techniques and standards.	
Renewal	Investment in existing infrastructure to restore to its former condition and may extend its service life, which may include replacement of individual components as they age or become obsolete. Capital investment in renewal extends the period of service potential but does not change the replacement value, and so does not increase the size of the infrastructure asset portfolio	
Repair	Action to restore an item to its previous condition after failure or damage.	
Replacement	The complete replacement of an asset that has reached the end of its life, so as to provide a similar or agreed alternative, level of service.	
Repurposed	Building products such as fibreglass, vinyl flooring, concrete and insulation are commonly disposed of but can be reused regardless of the amount you have left. Another option may be to donate slightly damaged, but reusable items to salvage companies that accept building materials.	
Schedule	A time display of the milestone events and activities of a program or project.	
Schematic Design	A design submission that includes a preliminary cost estimate, drawings and other documents illustrating the scale and relationships of project components for approval by Owner or Client	
Scope	A definition of how, when, where, and what a project is expected to include and accomplish.	

Term	Definition	Source #
Secure Administrative Offices	Offices accommodating activities which require "enhanced levels of security. Functions and operations may include, but are not limited to: the review and storage of sensitive files; and little or no public contact.	2
Semi-Enclosed Area or Office	An area enclosed with tall moveable panels or constructed partitions that do not extend to the suspended acoustical ceiling.	
Site	A physical location that the GNWT owns or did own, leases, or otherwise possesses.	
Space Allocation	Allocation of floor area to accommodate individual staff or workgroups, or support space in order that an identified function can be performed.	
Space Optimization	Space adjustments in accommodation undertaken with the objective of reducing the inefficient utilization of space in a manner that permits space recapture, improves the work environment and reduces the demand for lease dollars.	2b
Special Purpose Space (SPS)	A specialized support space designed to accommodate equipment, storage, and/or public accessed-functions floor that are not considered to be a general-purpose office space component. SPS can be located on floor or off. Generally, staffs meeting spaces are not classified as SPS; however, specialized training or hearing spaces can be. Typically these spaces are unique and nonrecurring, and often are not suitable for conversion to office accommodation.	
Support Space	A space allowance for files, equipment, storage, enclosed rooms, meeting areas, etc., which is shared by a group of workers.	8
Strategic Facility Plan	Two-to-five year facility plan encompassing an entire portfolio of owned and/or leased space that sets strategic facility goals based on the organization's strategic objectives. The strategic facilities goals, in turn, determine short-term tactical plans, including the prioritization of, and funding for, annual facility related projects.	
Sustainability	The capacity to endure. The three pillars of sustainability are social, economic, and environmental.	
Specifications	Documents prepared to ensure correct supply and installation of all materials used for the construction project.	2b
Systems Furniture	Modular workstations, components, and panels comprise systems furniture, which is used in the development of open office environments.	
Swing Space	Temporary office space used to accommodate client departments while their long term office space is under renovations or until new office space is available. Minimal fit-up is required for swing space.	2a

Term	Definition	Source #
Task Lighting	Lighting oriented to or located at a task position is generally called "task lighting." Task lights located at the task area are usually used in conjunction with ambient or general lighting and are client funded.	2
Tenant Improvements (TI)	Tenant improvements refer to alterations or improvements made to leased office space.	
Tenant Improvements (TI) to Initial Occupancy	Tenant improvements are alterations or improvements to the base building and/or base building systems, and include demolition.	2
Tenant Improvements (TI) to Existing Space for Reuse (Refit)	Work required to alter space previously occupied by a GNWT organization, to meet the requirements of a different GNWT organization. The scope of the TI for re-use is determined by taking into consideration the life cycle approach, the functional requirements of the new tenant, existing conditions of the previously occupied space, and the duration of the new occupancy.	2
Tenant Services	Alterations to existing accommodation requested and funded by a client and carried out during the term of occupancy.	2
Tender	The process in which bids are solicited from contractors for the construction of an office accommodation project or manufacture and installation of a component such as furniture.	
Touchdown Workstation	Workstation designed to accommodate employees who work in a number of settings including off-site. The station can be assigned to a specific employee or be used on a drop-in basis by a number of GNWT staff and consultants.	
Upgrades	Investment in added or enhanced components in existing systems and assets designed to improve its functionality.	5
Utilization	Percentage of physical infrastructure for which utilization level is within targeted capacity. Objective is to determine the number of facilities that are relatively fully utilized.	5
Useful Life	May be expressed as either: (a) The period over which a depreciable asset is expected to be used) or (b) The number of production or similar units (i.e. intervals, cycles) that is expected to be obtained from the asset.	
Warranty Period	Warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.	4
Workstation	Workspace provided for an individual employee and his/her directly associated furniture and equipment.	2

Appendix B References

The *Technical Standards* will reference the following GNWT documents:

- GNWT *Office Space Standards and Guidelines* [December 2012]
  www.pws.gov.nt.ca/pdf/publications/OfficeSpaceStdsGuidelines.pdf
- GNWT *Good Building Practice for Northern Facilities (GBP)* [3rd edition, 2011; update October 18, 2012]
  www.pws.gov.nt.ca/pdf/GBP/GBP%202011%20-%20Oct%2018%20Update.pdf

  All northern buildings providing access to the general public must adhere to NBC Division B Section 3.8, "Barrier-Free Design."

The *Technical Standards* will reference the following codes and standards:

- National Building Code of Canada 2010 (NBC)
- National Fire Code of Canada 2010 (NFC)
- National Plumbing Code of Canada
- National Energy Code of Canada for Buildings 2011 (NECB)
- ASHRAE Standard 62-2007 - Ventilation for Acceptable Indoor Air Quality
- Canadian Electrical Code
- *Fire Prevention Act and Regulations*: www.justice.gov.nt.ca
- Bulletins from the Office of the Fire Marshal: www.maca.gov.nt.ca
- Municipal Bylaws

As well, this document incorporates information gathered from the following sources:

- Government of Canada
  - PWGSC Workplace 2.0 Fit-up Standards *[April 2012]*
  - PWGSC Fit-up Standards: Technical Reference Manual
  - Fit-up Standards: Technical Reference manual (PWGSC) [October 17, 2005
- CFI, your Facility Management Technology website – www.gocfi.com
- WBDG – Whole Building Design Guide (a program of the National Institute of Building Sciences), www.wbdg.org
- Government of Alberta, Infrastructure, Capital Planning Initiative
  Consultant Guide for Accommodation and Tenant Improvements (AB Infra) {2007-09]
- City of Edmonton – Edmonton City Council's Infrastructure Strategy
- Province of British Columbia, Government Office Space Standards *[December 10, 2008]*
  - Shared Services British Columbia (SSBC)Technical Standards for Offices – 2012 – Tenant Improvements, December 05, 2012
    http://accommodationandrealestate.gov.bc.ca/Doing_Business_With_Us/Technical_Manuals/files/SSBC_Technical_Standards_for_Offices.pdf

- Building Owners and Managers Association – Building Environmental Standard: www.bomabest.com
- ASTM International (formerly, the American Society for Testing and Materials) standards: www.astm.org
    - *ASTM C423-09a - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method*
    - *ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials*
    - *ASTM E336-11 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings*
    - *ASTM E2432 - Standard Guide for the General Principles of Sustainability Relative to Buildings*
    - *ASTM E1414/E1414M-11a Standard Test Method for Airborne Sound Attenuation between Rooms Sharing a Common Ceiling Plenum*
    - *ASTM Standards, Whole Earth Functionality and Serviceability, 2nd edition*
- Sandia National Laboratories – Facilities Management and Operations Centre, Wood Doors Specifications: www.sandia.gov/engstds/ConstSpecs/Div_08/08210_Wood_Doors.pdf
- Armstrong Commercial Ceilings and Walls website: www.armstrong.com/commceilingsna
- *BUILDINGS: Smarter Facility Management* magazine "Carpet Tile 101" (07/01/2007): www.buildings.com/article-details/articleid/4868/title/carpet-tile-101.aspx
- Product Information Brochure: *Achieving Effective Office Acoustics* (LogiSon Acoustic Network®©)
- Product Information Brochure: *Tecknion Leverage*™

Appendix C Carpet and Carpet Tile Specifications

The following schedules outlining minimum specification for Broadloom Carpet and is reproduced from *SSBC Technical Standards for Offices – 2012 – Tenant Improvements, December 05, 2012*.

BROADLOOM CARPET CONSTRUCTION SPECIFICATION	
Fibre	100% bulked continuous filament (BCF) nylon 6 or nylon 6.6 built-in anti-static fibre
Style	Level loop
Pattern	directional
Pile weight	Minimum 949 g/m³ (28 oz/yd²)
Dyeing Process	Manufacturer's recommended method
Appearance Retention	Carpet and Rug Institute CRI TM-101, minimum 4 APR
Static level	Not to exceed 3.5kV – AATCC134
Warranties	Ten year maximum 10% wear (by weight Lifetime antistatic Ten year light fastness Ten year no edge ravel and no zippering Ten year no delimitation – chair pads not required
Product Availability	Product available for no less than 10 years in regards to pattern and colour
Indoor Air Quality	Carpet and Rug Institute CRI Green Label Plus ™ Indoor Air Quality Carpet Testing Program requirements (Maximum 0.5 mg/m²/hr TVOC) after installation
Carpet Flammability	≥ 0.45 watts/cm², Class 1 (*ASTM E648*)
Smoke Density	≤ 450 Flaming Mode (*ASTM E662*)

The following schedules outlining minimum specification for Carpet Tile and is reproduced from *SSBC Technical Standards for Offices – 2012 – Tenant Improvements, December 05, 2012*.

CARPET TILE CONSTRUCTION SPECIFICATION	
Fiber	Nylon 6 or nylon 6.6, Modification ratio of 2.5 or less
Style	Level loop, textured loop, or cut & loop acceptable
Pattern	Non-directional patterns preferred
Tile Size	Minimum 45 mm x 45 mm (18" x 18"), maximum 1000 mm x 1000 mm (3'3" x 3'3")
Pile Height	Minimum 2.7 mm (0.105"), maximum 3.8 mm (0.149")
Pile Weight	
Dyeing Process	No less than 80% solution dyed
Appearance Retention	Minimum rating of 4.0 using CRI TM-101 Reference Scale
Antimicrobial	Built in; to AATCC 174 Parts 2 & 3, 90% reduction, 0% growth
Static level	Not to exceed 3.5kV – AATCC134
Warranties	Ten year dimensional stability (Aachen Method DIN 54318) ≤ 0.1% change or ISO 2551 ≤ 0.2% change Ten year maximum 10% wear (by weight Lifetime antistatic Ten year light fastness Ten year no edge ravel and no zippering Ten year no delimitation – chair pads not required
Product Availability	Product available for no less than 10 years in regards to pattern and colour
Indoor Air Quality	Carpet and Rug Institute CRI Green Label Plus ™ Indoor Air Quality Carpet Testing Program requirements (Maximum 0.5 mg/m²/hr TVOC) after installation
Carpet Flammability	≥ 0.45 watts/cm², Class 1 (*ASTM E648*)
Smoke Density	≤ 450 Flaming Mode (*ASTM E662*)

Appendix D

Mechanical Systems

D.1. Performance Criteria

Mechanical systems to [shall] be designed and installed to meet the requirements of PWS *Good Building Practices for Northern Facilities*, latest edition.

D.1.1 Outdoor Design Temperatures

D.1.1.1 Use 1% January and 2 1/2% July design temperatures as listed in Appendix C of the National Building Code (NBC), latest edition.

D.1.2 Interior Temperatures

D.1.2.1 The HVAC systems should be capable of maintaining the indoor space temperatures at the values in Table 1 when the outdoor temperature is at the relevant design value as listed in D.1.1.1. In addition the systems should have the capacity to restore the building from the unoccupied temperature to the occupied temperature prior to the occupied hour start time.

Table D.1.2.1 – Interior Temperatures

	Occupied Hours	Unoccupied Hours
Heating	22 °C	17 °C
Cooling	23 °C DB	not to exceed 27 °C

D.1.2.2 A naturally cooled building that meets the criteria in D.1.2.2.1 is not required to meet the indoor temperatures for cooling listed in Table D.1.2.1 is acceptable.

.1 At a minimum, the design of a naturally cooled building and its intended occupancy must include the following characteristics:

a) The building's design incorporates features that will minimize space cooling loads during occupied hours. Such features include, but are not limited to, use of thermal mass, minimizing solar and all lighting and other internal heat gains, maximizing the effectiveness of natural ventilation, and considering use of "night flushing" to pre-cool space.

b) No mechanical cooling, except for process spaces (e.g. telecom closets, computer rooms); however, mechanical ventilation with unconditioned air would be permitted.

c) Building is designed so occupants are located in reasonable proximity to windows or other deliberate sources of outside air for ventilation.

d) Operable windows that open to the outdoors and can be easily opened and adjusted by the building occupants.

e) Building occupants are engaged in near sedentary physical activities (e.g. office work).

f) Building occupants are free to adapt their clothing to the indoor and/or outdoor thermal conditions, within reasonable limits.

.2 In a naturally cooled building, the heating systems should be capable of meeting the heating requirements listed in D.1.2.1 and Table D.1.2.1.

.3 In a naturally cooled building, the building should be designed to maintain indoor space temperatures within the upper and lower limits shown in Table D.1.2.2. Mean monthly outdoor air temperature is the arithmetic average of the mean daily minimum and mean daily maximum for the month in question. This means that different indoor temperature limits will apply in different months.

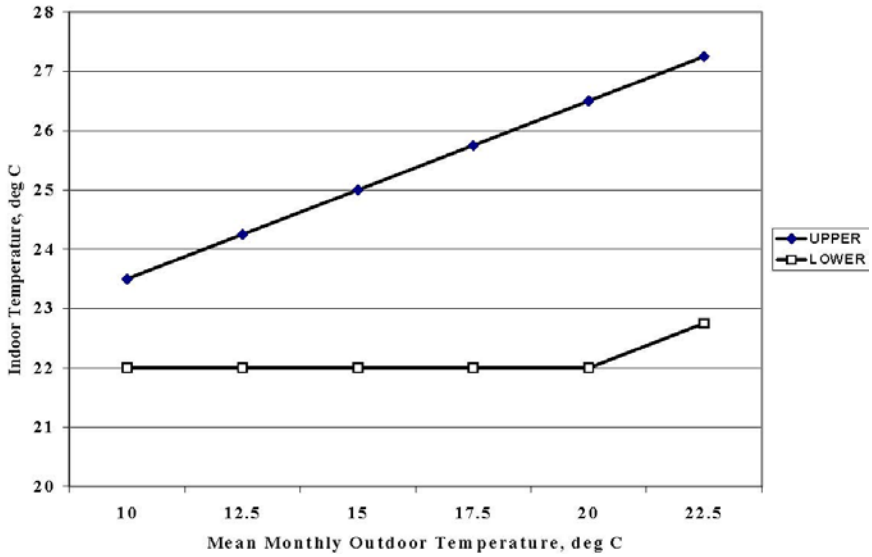
.4 A building may have some areas which are mechanically cooled and some which are naturally cooled, subject to the following conditions:

a) The mechanically cooled and naturally cooled portions of the building are physically separated from each other and are served by entirely independent space conditioning systems.

b) The naturally cooled portion complies with all requirements of this Section D.1.2.2 plus all other applicable requirements herein.

c) The mechanically cooled portion complies with all applicable requirements herein.

Table D.1.2.2 – Indoor Temperature Limits for Naturally Cooled Buildings



D.1.3 Thermal Variations During Occupied Hours

D.1.3.1 The temperature fluctuation should not exceed ±1°Celsius degree from setpoint.

D.1.3.2 The vertical temperature gradient between 200 mm and 1700 mm above the floor at any point more than 300 mm from the exterior wall should not exceed 3°C.

D.1.3.3 The air velocity should not exceed 0.15 m/s when heating and 0.25 m/s when cooling.

D.1.4 Ventilation

D.1.4.1 The requirements herein are minimum requirements and should not be taken to reduce the requirements of applicable codes, authorities having jurisdiction, or the functional needs of the facility.

D.1.4.2 Ventilation system design and documentation should be in accordance with ASHRAE Standard 62.1, latest edition except as noted herein. Duct sealing to be in accordance with ANSI/SMACNA 006 HVAC *Duct Construction Standards – Metal and Flexible*, latest edition.

D.1.4.3 No supply or return air system ducts (installed or not) are to be run in a cold attic. If exhaust ducts have to be run through a cold attic, they must be sealed and insulated and provided with a vapour barrier.

D.1.4.4 Minimum Outdoor Air Ventilation Rates

.1 All central air handling units except for 100% O/A units will be complete with economisers to, provide outdoor air ventilation in the breathing zone of all occupied spaces of no less than the supply ventilation rates in Table 6-1 ASHRAE Standard 62-1, ventilation for acceptable indoor air quality, latest edition. For 100% outdoor air supply units, provide outdoor air ventilation in the breathing zone of all occupied spaces of no less than 100% the supply ventilation rates in ASHRAE Standard 62-1. This outdoor air may be comprised of any combination of: outdoor air delivered directly to the space from a dedicated 100% outdoor air system; outdoor air that is mixed with air recirculated from the building before delivery to the space; and outdoor air that is contained in recirculated or transferred air.

D.1.4.5 Minimum Exhaust Air Rates

.1 Provide exhaust air ventilation of no less than the exhaust ventilation rates in Table 6-4 of ASHRAE Standard 62.1, latest edition.

D.1.4.6 Outdoor Air Ventilation Calculations

.1 Calculate the outdoor air intake requirements for systems that serve and recirculate air from multiple spaces using the method in ASHRAE Standard 62.1, latest edition.

.2 For each air-handling system, including unitary systems, document the results of these calculations in the form of Table D.1.4.5, and include it on each floor plan showing areas served by the system. Multiple systems, each serving the same space types whose characteristics in the lower portion of Table D.1.4.5 are identical, may be documented in one table.

Table D.1.4.5 – Ventilation Data Table

System Name	Insert Name	Insert Name	Insert Name	Insert Name	
System Design Occupant Density	Note 1	Note 1	Note 1	Note 1	m^2/person
Min. OA fraction in primary SA	Note 2	Note 2	Note 2	Note 2	%
Min. OA intake fraction in primary SA	Note 3	Note 3	Note 3	Note 3	%
Min. OA intake	Note 4	Note 4	Note 4	Note 4	L/s/m^2
Space Type	Open Plan	Perim. Office	Int. Office	Mtg. / Conf.	
Design maximum occupant density	Note 5	Note 5	Note 5	Note 5	m^2/person
Design minimum OA/person	Note 6	Note 6	Note 6	Note 6	L/s/pers
Min. primary SA / Unit Area	Note 7	Note 7	Note 7	Note 7	L/s/m^2
Min. total SA / unit area	Note 8	Note 8	Note 8	Note 8	L/s/m^2

NOTES to Table D.1.4.5

1. Peak simultaneous occupant density averaged over the ventilated area served by system.

2. This is the OA fraction in the primary supply air to each zone. It includes both airflow through the outdoor air intake and unused OA recirculated from spaces where the OA supplied is greater than that used by the occupants present at the time. It is NOT the airflow through the outdoor air intake divided by the design supply airflow.

3. This is the minimum required airflow through the outdoor air intake, expressed as a fraction of the primary air to each zone.

4. This is the system's airflow through the outdoor air intake expressed in flow/unit of floor area.

5. Design peak occupant density for a typical space or room of the type listed.

6. From ASHRAE Std. 62.1, latest edition.

7. Minimum SA delivered to the space from the primary supply air system per unit of floor area in the space. Applies at design occupancy of the space.

8. The minimum total SA delivered to the space, equal to the sum of primary SA and separately recirculated secondary supply air, per unit of floor area in the space. Applies at design occupancy of the space. If this value is the same as the minimum SA from the primary supply air system, then a secondary air supply is not required.

D.1.4.6 Outdoor Air Ventilation Intakes

.1 Particular attention should be paid to position outside air intakes away from all sources of noxious odours and must be provided with intake hoods as shown in *Good Building Practices for Northern Facilities*.

.2 Design the air handling system so that the required minimum outdoor air flow at intakes is provided under all operating conditions. Refer also to section D.2.2.1.

D.1.4.7 Demand Control Ventilation (DCV)

.1 For rooms designed to accommodate more than 20 people (e.g. a meeting room of 40 m^2 or larger), control the minimum outdoor air supply to the space based on space CO_2 concentration.

D.1.5 Acoustic Criteria

D.1.5.1 Background noise in the occupied space from any component of the HVAC systems should not exceed the values in Table D.1.5.1.

Table D.1.5.1 – Allowable Background Noise Levels, HVAC System

SPACE	MAX. SOUND POWER LEVEL, RC MARK II METHOD, DB
Open office/reception areas	RC 40(N)
Private offices	RC 35(N)
Conference, interview & meeting rooms	RC 30(N)
Circulation and lobbies	RC 45(N)
Washrooms, service and storage areas	RC 50(N)
NOTE: (N) refers to a neutral sound spectrum	

D.1.5.2 Design documentation proving acoustical compliance should be produced upon request.

D.1.5.3 Mechanical system penetrations of acoustic separations should not degrade their specified ratings.

D.2. Prescriptive Requirements

D.2.1 Perimeter Heating Systems

D.2.1.1 Allowable perimeter heating systems are defined as follows:

.1 **Type A** – Heating from modular radiant ceiling panels. Modulating control of heating output is mandatory. If the heating medium is water, controls should schedule the water supply temperature with outdoor air temperature.

.2 **Type B** – Heating from convectors/radiators installed at floor level under the windows. Modulating control, either from a local sensor/ thermostat or scheduled from outdoor air temperature is mandatory.

D.2.2 Conditioned Air Supply Systems

D.2.2.1 Central Air Handling Units

.1 Includes all air-handling units that mix outside and return air, filter it and condition it by heating and/or cooling before delivery to the space. Scope includes packaged rooftop units, packaged and built-up indoor air-handling units, and furnaces. It includes AHUs serving both single-zone or multiple-zone conditioned air supply systems.

.2 Units may be constant or variable air volume type. Variable volume units should incorporate adjustable speed drives (ASDs) to vary the speed of the supply fan, and, if applicable and required, the speed of a return/relief fan. Motors and ASDs should meet the requirements of D.2.8 and D.2.9 respectively.

.3 Airflows delivered to various spaces should meet the requirements of ASHRAE 62.1, latest edition.

.4 Control dampers should be selected and sized in accordance with ASHRAE Guideline 16-2003.

.5 Where a single economizer outdoor air damper is used (as shown in ASHRAE Guideline 16, Figure 3), ensure there are provisions for measuring outdoor airflow rate and controlling the outdoor air damper to meet the requirements of D.1.4.

.6 Design the system and controls so the minimum outdoor air flow through the intake, and/or the outdoor air fraction in the system total primary supply air can be measured easily and accurately, set up during commissioning, and verified during the operating life of the system.

.7 Air handling systems serving multiple zones should be designed to provide:

a) simultaneous heating and cooling if, at any time the system is operating, some zones will require cooling while others require heating, and

b) the required ventilation air to every zone in accordance with the requirements in D.1.4.

.8 Rooftop Units are permitted only if provided with integral service corridors accessed from within the building.

.9 Indoor units are mandatory except as noted in item 7 above. Attic spaces are acceptable for locating indoor units subject to acoustic requirements (see D.1.5) being met and adequate access for operations and maintenance being provided (see D.2.5).

.10 Provision of heating in air-handling equipment (includes rooftop units, packaged and built-up air-handling units, furnaces, and unitary equipment) should conform to the following:

a) For both rooftop and indoor units, where a fossil-fuel-fired burner provides heating, conform to Table D.2.2.1 requirements.

b) For rooftop units where a hot water coil provides heating, use an industrial quality, inhibited anti-freeze solution that is rated for the winter design temperature.

c) For rooftop units located where the 1% winter design temperature is colder than -15°C, hot water (i.e. anti-freeze solution) coils to provide heat are not permitted.

d) For indoor units, where a hot water coil provides heating, use an industrial quality, inhibited, anti-freeze solution in the coil if there is a risk of coil freezing either when the unit is operating or when it is shut-off.

Table D.2.2.1 - Fossil-Fuel-Fired Equipment Characteristics

1% WINTER DESIGN TEMP.	MINIMUM FOSSIL-FUEL FIRED EQUIPMENT CHARACTERISTICS
≥ -25°C	modulating burners (100% to 25% modulation) and stainless steel heat exchangers.
< -25°C	modulating burners +(100% to 10 % modulation) and stainless steel heat exchangers.

11 Rooftop units in locations with a 1/50 ground snow load (S_S) greater than 2.5 kPa (as listed in NBC, latest edition) should be mounted on a minimum 450 mm high roof curb.

D.2.2.2 100% Outside Air Supply Units

.1 Includes all air-handling units that always supply 100% outdoor air to the conditioned space when they are operating. Scope includes packaged rooftop units and packaged or built-up indoor air-handling units.

.2 Typical applications of these units include:

a) Units providing make-up air to offset air exhausted from the building (e.g. kitchen or process exhaust).

b) Units providing outdoor ventilation air to spaces served by terminal unit systems (see D.2.2.4)

.3 Rooftop units are only permitted as described in D.2.2.1.7. Indoor units are mandatory except as described in D.2.2.1.7.

.4 Where heating is provided by a fossil-fuel-fired burner, the heating section should have a stainless steel heat exchanger and a modulating burner (from 100% to 10% design output).

.5 Where a hot water coil provides heating, use an industrial quality, inhibited anti-freeze solution that is rated for the winter design temperature.

.6 Note that the distribution effectiveness factor in ASHRAE Standard 62.1, latest edition (table 6-2) may increase the size of a 100% outdoor air supply unit and the associated ventilation ductwork through-out the building (e.g. water-loop heat pump systems).

.7 Design the system and controls so the outdoor airflow through the intake can be measured easily and accurately, set up during commissioning, and verified during the operating life of the system.

.8 Exhaust air energy recovery to preheat (or pre-cool) air entering a 100% outdoor air supply unit should be provided as required in Table D.2.2.2.

Table D.2.2.2 – Requirements for Exhaust Air Energy Recovery

Energy recovery should be provided under the conditions listed in this table, or any exhaust system whose sensible heat content exceeds 150 kW, whivhever is the lesser		
Design Outdoor Airflow	Annual Operating Time	1% Winter Design Temperature
≥ 2,800 L/s	≥ 1,000 hours	< -15°C
≥ 700 L/s	≥ 2,000 hours	< -15°C
≥ 700 L/s	≥ 2,500 hours	any
≥ 350 L/s	≥ 2,500 hours	< -15°C
≥ 350 L/s	≥ 3,000 hours	any

D.2.2.3 Reheat In Conditioned Supply Air Systems

.1 Hot water distribution systems serving reheat coils should meet the requirements in D.2.12.3.

.2 Electric reheat circuits are not acceptable.

D.2.2.4 Terminal Unit Systems

.1 Terminal unit systems comprise unitary heating/cooling units, each conditioning the air in a single thermostatic control zone. Inlet air will be drawn from the indoor space at the unit's location. Common types of terminal unit systems include:

a) Fan-coil units using hot water and chilled water coils.

b) Water-loop heat pump systems, whose terminal units are water-to-air heat pumps.

c) Air-to-air split system heat pumps, whose terminal units are refrigerant-to-air fan-coil units.

.2 Terminal unit selection and installation should meet the following criteria:

a) Units installed in ceiling plenums should be located above corridors.

b) Acoustic requirements (see D.1.6) should be met, considering unit selection and mounting location.

c) Maximum nominal cooling capacity for a single unit should be 3 tons.

.3 Outside air ventilation should be supplied by an independent 100% outside air supply system, refer to D.2.2.2.

a) Ventilation air should be delivered directly into each space served or ducted to within 300 mm of the air inlets of zone terminal units and discharged directly towards the inlet of the terminal unit

.4 The design of water-loop heat pump systems should include:

a) Freeze protection for the heat rejecter and its piping loop, effective in the case of a power failure.

b) A stand-by water-loop circulating pump

c) The compressor enclosure in water-loop heat pumps should be a minimum thickness of 16 gauge sheet metal.

.5 The design of hot/chilled water fan-coil systems should include:

a) Capability to provide heating and cooling simultaneously to different zones whenever, and to the extent, such demand will exist at any time during the year 3 The use of three-pipe systems is prohibited.

b) Stand-by circulating pumps for both hot and chilled water distribution piping circuits.

D.2.3 Thermostatically Controlled Zones

D.2.3.1 Spaces should be grouped into thermal control zones in accordance with the following criteria:

.1 Perimeter and interior spaces should be in separate zones.

.2 Perimeter spaces having different exposures (>45° difference) should be in separate zones.

.3 Spaces with substantially different, or unpredictable, occupancy schedules, should be in separate zones, except as permitted in item 5 below.

.4 An enclosed, perimeter, corner room (office, interview room, meeting room, etc.) with windows on two exposures, should be in a separate thermostatically controlled zone.

.5 One or more adjacent enclosed offices, interview rooms, meeting rooms, etc. (each smaller than 17.5 m²), may be in a single zone, or may be in the same zone as adjacent open office space, provided that all of the following criteria are met:

a) At any given time, all spaces in the zone require heating or require cooling.

b) The zone's thermostat (or temperature sensor) should be located in the open office space if there is any in the zone.

c) The zone ventilation air supply should be constant volume.5

d) Subject to items (e) and (f), each enclosed room in the zone is fitted with its own thermostatically controlled VAV diffuser (or comparable device) controlled from a wall-mounted thermostat, so that the delivery of heating or cooling may be modulated to maintain indoor temperatures within the required limits, refer to D.1.2.

e) The operation of the VAV devices should not reduce the total zone supply airflow across the terminal unit (e.g. consider by-pass type diffuser).

f) Outdoor air requirements (refer to section D.1.5) for these enclosed spaces should be determined for the minimum airflow of the VAV device.

g) If any enclosed space will require heating at some times and cooling at others, its thermostatically controlled VAV diffuser should have "changeover" capability.

.6 Maximum zone floor areas should be in accordance with Table D.2.3.1:

Table D.2.3.1 - Thermostatically Controlled Zone Sizes

ZONE TYPE	MAXIMUM FLOOR AREA
Perimeter zones	100m² for open space 50 m² for enclosed spaces
Interior zones	200 m² for open space 50 m² for enclosed spaces
NOTE: If a zone contains any enclosed space, the enclosed space floor area limit applies.	

D.2.3.2 Conference / meeting/training / break rooms and private offices larger than 17.5 m² with variable occupancy rates:

.1 Each such room should be a separate, thermostatically controlled zone.

.2 For outdoor air ventilation requirements refer to D.1.4. Provide secondary air through a local transfer fan with local control, or through an alternative pathway as described in D.1.4.

D.2.4 Telecommunication Closets

D.2.4.1 Required environmental conditions should be maintained 24 hours/day, seven days/week, independent of the building system.

D.2.4.2 Maintain room dry bulb temperature within a range of 18°C to 26°C. Each room should have a high temperature alarm that will be active 24 hours per day. These alarms should be integrated into the tenant intrusion alarm system.

D.2.4.3 Individual vent openings should be a maximum size of 4"x16". All vents should be steel construction. Provide a sufficient number of vents for the required airflow.

D.2.4.4 All vents to be securely fastened from within the room (no bolts or screws protruding on the outside of the room).

D.2.4.5 Designer should finalize the equipment loads with the user group and WTS during design.

D.2.4.6 For cooling loads of less than 1.465 kW, provide cooling for the telecommunication closet from the building conditioning system. For unoccupied hours, provide a thermostatically controlled exhaust fan drawing air in through a door grille and discharging into the ceiling space to cool the room.

D.2.4.7 For cooling loads in excess of 1.465 kW, provide an independent cooling unit for the telecommunication room/closet that can operate 24 hours per day independently of the building systems. The independent cooling unit should conform to the requirements of D.2.11.

D.2.5 Maintenance Access

D.2.5.1. All catwalks, stairways, ladders, roof hatches and other means of access should be designed, constructed and installed in compliance with the applicable WSCC Regulation.

D.2.5.2 Locate equipment so that required maintenance access points are not blocked by ducts, pipes, conduits, other equipment, walls, columns, or other parts of the building.

D.2.5.3 The design layout of HVAC equipment and distribution systems should provide for the access required in order to measure and adjust air and water flows as part of the system balancing process – refer to section D.3.3.

D.2.5.4. Provide catwalks, located adjacent to maintenance points, at all refrigeration, combustion and supply/makeup air handling equipment located more than 3.0 m above a floor, a roof, or the ground.

D.2.5.5 Provide access to mezzanine, attic or roof-mounted refrigeration, combustion or supply/make-up air handling equipment as follows:

.1 by means of a stairway or by “ships ladder” complete with handrails and a maximum slope of 60o above horizontal and a roof hatch (if required).

.2 by means of a stairway or by “ships ladder” complete with handrails and a maximum slope of 60o above horizontal and a roof hatch (if required) or by means of an indoor vertical ladder and a roof hatch (if required).

D.2.6 Exhaust Air Systems

D.2.6.1 Washrooms should not use door grills for air entry. Use acoustically treated transfer ducts taking air from the ceiling plenum, or other acceptable means, for make-up air.

D.2.6.2 In all new buildings 3 storeys and higher, with a floorplate larger than 750 m², provide one 400 mm diameter tenant exhaust riser duct from the ceiling of the lowest occupied floor through the roof. Provide a 300 mm capped duct connection at each floor level.

D.2.6.3 In all new buildings 3 storeys and higher, with a floorplate larger than 1,250 m², provide one duct riser as described in D.2.6.2 for each 750 m², or portion, of floor plate area.

D.2.7 Air Filtration

D.2.7.1 Filter efficiencies should be tested and rated in accordance with the procedure in ASHRAE Std. 52.2.

D.2.7.2 Filters for air handling equipment (including packaged and built-up air-handling units, rooftop units, furnaces, water-loop heat pumps, fan-coil units, and other unitary equipment) up to 1,000L/s design supply air flow should be panel filters at least 50 mm deep, with high capacity pleated media and a minimum efficiency rating of MERV 8. Exception – Unitary equipment that is not able to accommodate 50 mm deep panel filters may use filters as described but that are 25 mm deep.

D.2.7.3 Filters for air handling equipment, including rooftop units, larger than 1,000 L/s should be panel filters at least 50 mm deep, with high capacity pleated media and a minimum efficiency rating of MERV 11. Where the air-handling equipment selected can accommodate filters that are 100 mm deep, such filters should be used.

D.2.8 Electric Motor Requirements for Adjustable Speed Drive Application (ASD)

D.2.8.1 All motors connected to adjustable-speed drives (ASDs) should be Definite-Purpose Inverter Fed Motors complying with NEMA MG-1 Part 31. If an existing motor does not meet these requirements, it should be replaced with one that does.

D.2.8.2 Winding insulation should be rated for a Class B temperature rise (80ºC by resistance) with a minimum of class F insulation.

D.2.8.3 Service factor should be 1.0.

D.2.8.4 Motor insulation should withstand repetitive voltage peaks at motor terminals equal to 3.1 times motor rated rms voltage with a rise time not less than 0.1 microseconds.

D.2.8.5 Motors should be appropriately sized to optimize motor efficiency at normal load.

D.2.9 Adjustable Speed Drives (ASD's)

D.2.9.1 Provide adjustable speed drives for variable air volume fan systems. Do not employ variable speed drives for heating and cooling water pumps unless large capacity and extended hours of operation result in a payback of three years or less.

D.2.9.2 Variable speed drives should be pulse width modulated IGBT.

D.2.9.3 Install 5% line reactor (manufacturer to confirm size for application).

D.2.9.4 Drives should be selected and installed to ensure the equipment/installation complies with a Category 1 (as per NEMA Application Guide to AC Adjustable Speed Drives) installation as follows:

.1 Carrier frequency should be selected to satisfy audible noise and temperature requirements of area where drive/motor are installed.

.2 Use a dedicated drive for each motor (no operation of motors in parallel from one drive)

.3 Minimize cable length.

.4 Limit rise time to .1 microseconds.

.5 Minimize time between pulses (> 3 times resonant period of cable).

.6 Single transition.

D.2.9.5 Ensure all drives have CE mark indicating compliance with EMC Radiated and Conducted Emissions. EMI Filters, or other acceptable solution, should be installed to eliminate any interference caused by drives (and associated wiring) on other systems installed in the facility.

D.2.9.6 Each drive should be solidly grounded to the main system ground supplying the drive. Use a dedicated, insulated ground wire installed in its conduit (daisy chaining ground wire is not acceptable). Also, install insulated ground wire, in same conduit as motor circuit, between the drive and motor (conduit should be continuous).

D.2.10 Control Systems

D.2.10.1 Regardless of the type of controls used, the construction documents should include a comprehensive and logically consistent sequence of operations for all HVAC systems and equipment, detailing the designer's requirements for normal occupied hours operation, unoccupied operation, normal start-up and shut-down sequences, all specified automatic responses to emergency or abnormal conditions, and any other provisions that may be included in the design.

D.2.10.2 Direct Digital Control (DDC) System

.1 Provide a DDC system to control HVAC and if applicable, lighting systems and equipment. The DDC system should apply down to and including the terminal zone units. Local hardwired controls may also be used for safety controls, local exhaust fans and unit heaters.

D.2.10.3 HVAC Controls, (non-DDC)

.1 Provide fully automatic temperature controls for all HVAC systems and equipment.

.2 Controls should have a set back feature for unoccupied hours including a timer-operated manual override.

.3 Thermostats should permit occupant adjustment within the following limits:

a) at any given time, cooling setpoint cannot be lower than heating setpoint

b) maximum heating setpoint 23ºC and,

c) minimum cooling setpoint 22ºC.

D.2.11 Refrigeration Equipment

D.2.11.1 Refrigeration equipment serving DX cooling coils in air-handling units should be air-cooled. This applies to all types of air-handling units and cooling equipment, including: single-zone or multiple zone, packaged rooftop units, packaged or built-up indoor AHUs, split-system unitary cooling equipment, fan-coil units, and cooling units for tenant equipment. Water or evaporatively cooled refrigeration equipment is not permitted for DX units. Exception – Water-source heat pumps.

D.2.11.2 Chillers in chilled water plants should conform to the following.

.1 Plant capacity less than 200 tons: chillers should be packaged air-cooled units. They may be located inside a chiller room, or outside the building, as determined by the designer.

.2 Plant capacity from 200 to 300 tons: chillers may be packaged air-cooled units or water-cooled units, as determined by the designer.

.3 Plant capacity above 300 tons: chillers should be water-cooled units.

.4 Individual chillers should conform to Table D.2.11.2.

Table D.2.11.2 Requirements for Individual Chillers

Chiller Capacity, tons	Compressor Type
Less than 100	Screw or scroll
100 to less than 200	Screw
200 to 300	Screw or centrifugal
Above 300	Centrifugal

D.2.11.3 The use of once-through water-cooled refrigeration equipment, of any capacity and for any application, is not permitted.

D.2.12 Hot Water Boiler Plants

D.2.12.1 Hot water heating boiler plants serving any building that is larger than 3,000m² and is in a location with a 1% winter design temperature colder than -25°C should be designed with provision for N + 1 boiler capacity redundancy. "N + 1 redundancy" means the design heating capacity can be met by the boiler plant when the largest single boiler or module is out of service.

D.2.12.2 The primary hot water piping loop that provides circulation through the hot water boilers should be designed to have a minimum system volume such that the burner may fire at minimum firing rate for at least 5 minutes without being shut down on operating high water temperature setting.

D.2.12.3 Hot water distribution systems serving reheat coils should meet the following design criteria:

.1 If non-condensing boiler(s) are used, the water temperature returning to the boiler should be maintained at no less than 65°C during system operation.

.2 If condensing boilers are used, the water temperature returning to the boiler(s) should be as low as is practical.

.3 The design should provide fully modulating control of reheat coil output.

D.2.12.4 Hot water distribution systems serving perimeter heating elements (radiators, convectors, or baseboard units) must have water supply temperature scheduled with changing outside air temperature. Exception: A one-pipe distribution system with individual zone pumps controlled by the zone thermostat may have a constant hot water supply temperature.

D.2.12.5 To facilitate energy-efficient heating plant, hot water heating systems should have lower than conventional design supply water temperature (i.e. < 82°C) and/or higher than conventional design delta-T (i.e. > 11°C.)

D.2.12.6 All heating systems should have 40% propylene glycol/60% water, pre-mixed Dowfrost HD.

D.3. Other Requirements

D.3.1 Commissioning

D.3.1.1 Where requested, commissioning — or, more correctly, Performance Verification Testing — shall cover the following items, dependant of size and scope of the project:

- mechanical ventilation systems air volumes and balancing verification and/or adjustments;
- systems control verifications and/or adjustments to meet design operating requirements;
- airstream tempering verification and/or adjustments (heating and, where provided, air conditioning);
- ventilation systems being clean prior to start of use;
- proper filters installed prior to ventilation system start up;
- CO2 levels throughout the facility;
- Code compliancy;
- variable frequency drives verification (where provided);
- Heating system cleaning and flushing prior to Dowfrost heating fluid being pumped into the system;
- Heating system balance verification and/or adjustments by flow, pressure, and temperature readings;
- systems control verifications and/or adjustments to meet design operating requirements;
- Fire Protection system operating verification (where provided);
- review of sprinkler system to confirm discharge obstructions have not been created by equipment installed after the sprinklers;
- identification of alarm system devices, fire extinguisher type and location, required identification on sprinkler controls;
- Power system verification;
- Energy Audit;
- generator testing, including Transfer Switch operation, load shedding etc. (where provided);
- Lighting systems verification;
- Communication systems verification;
- structural integrity of the facility, if applicable;
- air and vapour barrier verification by building pressure testing; and
- thermo-scanning of building envelopes.

D.3.1.2 Performance Verification Testing will occur as part of the Substantial Completion for the subject facility, while the Consultants, Contractors and controls sub-contractor are on site, and is a pre-requisite for granting Substantial Completion.

D.3.1.3 A report detailing the findings, including any changes made, will be generated and passed to the Project Officer for onward transmittal to the Consultant for action resolution by the Contractor or themselves.

D.3.1.4 Performance Verification Testing should not mean that PW&S is in any way assuming the responsibility for the building, which must remain with the Design Consultants and Contractors.

D.3.1.5 Subsequent to the Initial Performance Verification Testing process, the testing team should return to the facility to perform any testing of seasonal equipment of systems not tested in the first exercise. Relevant Consultants, contractors and controls sub-contractor are again required to be in attendance for seasonal testing.

D.3.2 Building Operator Manuals

D.3.2.1 As an integral part of the Performance Verification Testing, a "Building Operators Manual" would be provided on-site for maintainers use. As per requirements of Good Building Practices for Northern Facilities, these manuals are to meet the requirements of ASHRAE Guideline 4.

D.3.3 Air and Hydronic System Balancing

D.3.3.1 The construction documents should require that fluid flows in the HVAC systems be balanced in accordance with generally accepted engineering standards.

D.3.3.2 The construction documents should require that the results of the balancing process be documented in a written balancing report, and be delivered to the building owner.

Appendix E

Electrical Systems

E.1 General

E.1.1 Electrical systems should be designed to comply with the current National Building Code and Canadian Electrical Code and to meet requirements of the *GNWT's Good Building Practices for Northern Facilities*.

E.1.2 Electrical systems should be designed to facilitate change and future renovation at a minimal cost.

E.2 Lighting

E.2.1 Fixtures should be recessed and laid in T-Bar Ceiling and utilize energy efficient fluorescent tubes of nominal 4' length, T8 32W, 4100K CCT, 80+ CRI with compatible ballasts. Rapid start ballasts are recommended for motion sensor controlled fixtures.

E.2.2 If direct / indirect fixtures are used, they should be a minimum of 40% down light and provided with at least 450 mm suspension length from ceiling with minimum ceiling height of 2600 mm.

E.2.3 In addition to general area lighting, dimmable LED or compact fluorescent fixtures should be used around the perimeter of meeting rooms for presentation purposes. Manufacturer's recommended burn time should be observed for any compact fluorescent lamp changes. Incandescent lighting is not acceptable for interior usage.

E.2.4 Individual switching for each enclosed area should be required. Multiple switching for open areas should be at the entry. In general allow one (1) switch for every 55 square metres of floor area. A master switch should be available at the entry of each floor of the premises which allows all lights to be turned off. Low voltage switches should be used where practical. Timer controls in conjunction with occupancy or light sensors should be used to control open area lighting. Meeting rooms to be provided with multi-level switching or dimming capability for presentation purposes.

E.2.5 *Lighting levels* to conform to average minimums in the following table:

Task	Lux
General Office Work (Desk top level)	450-600
Map tables or detail task work	1000
Workroom / Print Areas	300-500
Washrooms / Storage	250
Circulation (within work area)	250
Storage / Hallways / Stairs / Corridors	150-250

E.2.6 *Exterior*: Building perimeter lighting should be provided via LED or Metal Halide lighting controlled by photo-electric sensor and timer with hand/off/auto switch. Illumination should be 50 lux at entrances and along public pathways.

E.2.7 *Reflective Values*:

Ceiling Finishes	Min. 70	Max. 90
Walls	Min. 40	Max. 60
Floors	Min. 15	Max. 30

E.3 Power Systems

E.3.1 Separate service or sub-meter should be required for the GNWT space.

E.3.2 Electrical devices in common walls should not share the same stud space.

E.3.3 *Parking Stall Outlets*: Energized parking stalls to be controlled with a programmable timer / and thermostat capable of adjustable settings for a range of temperatures and on/off times. Allow one duplex outlet per 2 parking stalls fed from two separate 15 amp circuits.

E.3.4 *Interior Outlets*

E.3.1 *Ceiling Grid*: An electric distribution grid above the ceiling should be provided such that no junction box is more than 2.5 metres from a perimeter wall with a maximum grid spacing of 5 metres between interior junction boxes.

E.3.1.1 *Standard Circuits*: Service to open area workstations, where no interior demountable partition forms a part of the workstation should be through power/communication service poles (pacpoles). In other areas, and where possible, outlets should be provided in the demountable partitions.

E.3.1.2 *Workstation Circuits*: Workstation circuits should contain a maximum of four outlets per circuit. Allow a minimum of two outlets for each workstation.

E.3.1.3 *Equipment Circuits*: Provide dedicated 20 amp circuits for laser printers, photocopiers, and other specialized office equipment via 20 Amp T-Slot receptacles.

E.3.1.4 *Kitchenette / Coffee Area Receptacles*: Provide dedicated 20 amp receptacles, GFI protected circuits for each outlet.

E.4 Communications

E.4.1 Telecommunication service to the tenant space must be to the applicable utility standards.

E.4.2 Provide a minimum of two x 50 mm conduit from building demarcation to tenant communication backboard for telephone and data service connections.

E.4.3 Communication closets should be provided with minimum 1m clear in front of termination points for access. Ventilation to be provided as required by tenant's equipment.

E.4.4 Central interior distribution to be provided via cable tray with conduit or j-hook support for final work station drops.

E.4.5 *Workstation Services*: Generally allow one telephone and one data cable for each workstation with conduit size or raceway suitable for up to 4 total communication cables for possible additions. Data and telephone services should be provided via the same box.

E.4.6 *Office Services*: For offices over 10 m^2 provide two combination telephone / data outlets on opposite walls.

E.4.7 Sound or other systems to be per tenant requirements.

E.5 Security Systems:
Requirements for security system to be per tenant requirements

E.6 Exit and Emergency Lighting

E.6.1 Battery powered emergency lighting with 30 minute battery backup time should be provided in stairwells and washrooms regardless of whether an emergency generator has been provided.

E.6.2 Emergency lighting (battery or generator fed) should be provided in corridors per code requirements.

E.6.3 All other exit and emergency lighting to be per code requirements.

E.7 Fire Alarm System:
Requirements for fire alarm system to be per code requirements.

END OF ELECTRICAL SYSTEMS SECTION

Appendix F

TV Display System & SMART Board

PWS aims to accommodate all main conference/training facilities and identified smaller capacity meeting spaces with TV display systems and SMART Board visual digital recording devices.

Following are brochures for display and interactive systems :

- 2012 Viera X5 Series Plasma TV display system. PWS engineers recommend 1080p resolution. (The brochure lists a 720p resolution.) The recommended 1080p resolution will display all modes including 1080i and 720p; and
- SMART Room System for Microsoft® Lync® by SMART Boards Canada.

For both product brochures included in this appendix, click on embedded Adobe document to see 2nd page – if you wish to insert the 2nd page, use Adobe Acrobat or Distiller to separate the pages and create two separate inserts.]

2012 VIERA®
X5 Series Plasma

Available Models:
TC-P50X5
TC-P42X5

Screen image simulated.

720P HD
Enjoy 720p HD resolution for vivid, lifelike images.

600 HZ SUB-FIELD DRIVE
Experience fast-moving action with minimal ghosting effect.

MEDIA PLAYER (MOVIE & PHOTO-CAPABLE)
Enjoy your photos and video clips on the big screen.

- 2 HDMI
- 2 USB
- Game Mode
- Mercury and Lead-free Panel
- Long Panel Life (up to 100,000 hours)

Panasonic Ideas for life | VIERA

SMART Room System™ for Microsoft® Lync®

A more effective way to collaborate using Microsoft Lync

Transform your meetings with the SMART Room System, an integrated hardware solution that combines touch-enabled displays with an HD video camera, microphones and speakers to enable rich audio, video and data collaboration.

Meeting participants can contribute ideas in more creative ways and collaborate in a more inspired way – all within the Microsoft Lync software they already know.

Commercial-grade, touch-enabled flat panel display
A durable, high-definition LCD interactive flat panel that enables an unrivalled touch experience

Video camera
The HD camera displays the entire room, adapts to any lighting condition and gives the feeling of making direct eye contact

Immediate startup
The display uses proximity detection to turn on when you walk into the room. And you can start your meeting by pressing one button.

Optional floor stand
Avoid the need for wall reinforcement and manage table wiring with the integrated raceway

Administrative console
Switch between presenters, change the configuration of data and video and move between presentation and whiteboard content

Microphones and integrated audio
Up to 4 tabletop microphones can be connected, ensuring effective coverage and integrated speakers offer high quality sound.

Inspired Collaboration™ | SMART.

Appendix G

Form: Request for Non-Compliance Fit-Up/Accommodation

APPLICATION FOR NON-COMPLIANCE FIT-UP/ACCOMMODATION

DATE	APPROVALS	NAME, POSITION
	Submitted by (Project Rep)	
		(Signature)
	Approved by (Client Dept's DM)	
		(Signature)

WORKGROUP IDENTIFICATION		POSITION IDENTIFICATION	
Department		Program	
Division		Function	
Branch		Purpose	
Workgroup		No. of staff & public using the facility	
Office location :			

DESCRIPTION OF CURRENT FACILITY	Current m² Allocated	DESCRIPTION OF NON-COMPLIANCE	m² Requested

RATIONALE for Exemption from Technical Standards		
Provide a brief discussion relating to the project background information, justification for the exemption, and how the exemption differs from the allocations mandated by the GNWT *Office Space Standards* and *Technical Standards*.		
QUESTION	YES / NO	COMMENTS
How does the request relate to the Department's mandate and business plan?		
What is the existing situation? Is the function needed to meet new program requirements?		
How does the request differ from the GNWT/PWS standards for space allocation and fit-up?		
What is the current project phase? (planning, leasing, design development, contract documents, tender, and construction)		
Will this request affect the project schedule?		
To what extent will anticipated direct and indirect costs associated with exemption affect the project budget and O&M costs?		
Will this request affect the functional accommodation of the workgroup? Will staff workstations and basic office support spaces be adequately accommodated?		

RISKS / BENEFITS	
Risk(s) if the exemption is not incorporated into the project:	
Benefit(s) if the exemption is incorporated into the project:	
Risk(s) if an alternate solution is proposed:	

REQUESTOR'S ADDITIONAL COMMENTS

This section for PWS use only.

ASSESSMENT OUTCOME