PROJECT MANAGEMENT & DESIGN ADMINISTRATION MANUAL

Department of

Transportation & Works

Prepared By

Design & Construction Division

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6th Edition

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1. INTRODUCTION

The Project Management & Design Administration (PMDA) manual is developed and maintained by the Design & Construction Division with input from professional and technical staff of the Works Branch. It is provided for the purpose of presenting standards, guidelines and instructions for delivery of projects.

Programming, design and construction of a major building is complex and requires a well-defined process to achieve a positive result. The aim is to achieve high quality buildings delivered on time, within budget and to the client's satisfaction. "High quality" is defined as a building that is functional, affordable, durable, comfortable and safe in which to live and work. Cultural and aesthetic appeal is also a mandatory attribute of a high quality building.

Without a documented process and defined accountabilities, projects lose control and/or compromises are made during construction that reduces the effectiveness and overall value of the building. The procedures contained in this manual are not intended to limit the judgment and creativity of the Project Team.

The manual reflects differences in project management/design administration practices between major projects and minor capital/maintenance projects. The terms "major projects" and "minor projects" are used in specific articles to highlight a unique requirement for the project category. Otherwise, the guidelines and practices shall be applied universally on all projects.

This document describes the project delivery procedures required by TW.

Adherence to the "Build Better Buildings" (BBB) policy is a requirement for buildings which fall under the umbrella of TW projects. This manual will briefly describe the implications of the BBB and its major component, Leadership in Energy and Environmental Design (LEED®). The most current edition of LEED® Canada documents shall be used on TW projects.

2. ACRONYMS AND DEFINITIONS

2.1 ACRONYMS

AHJ – Authority Having Jurisdiction

BBB – Build Better Buildings Policy

CENL – Consulting Engineers of Newfoundland and Labrador

Cx – Commissioning

CxA – Commissioning Authority

CM – Construction Manager

CO – Change Order

DM – Design Manager

FCA – Facility Condition Assessment

LEED® – Leadership in Energy and Environmental Design

NAA – Newfoundland Association of Architects

NBCC – National Building Code of Canada

OGD – Other Government Departments

OPR – Owner Project Requirements

PAD – Program Adjustment Document

PARTS – Project Analysis Reporting Tracking System

PCA – Prime Consultant Agreement

PCO – Proposed Change Order

PEGNL – Professional Engineers and Geoscientists of NL

PPE – Personal Protective Equipment

REOI – Request for Expression of Interest

RFI – Request for Information

SWP – Safe Work Procedure

SC – Substantial Completion

TB – Treasury Board

TRIM – Tower Records and Information Management

TSI – Technical Services Inspector

TW – Department of Transportation and Works

2.2 DEFINITIONS

Authority Having Jurisdiction - The governmental body with authority to administer and enforce the applicable codes and standards or the local by-laws.

Client Partner – Representative of any client department (e.g. Department of Education, Department of Health & Community Services)

Commissioning - the documentation and verification necessary so that the system will function to meet design intent to meet the Owner's operational requirements.

Commissioning Authority – TW's representative or designate charged with the responsibility to prepare the commissioning manual and ensure that the commissioning process is followed. Also, witnesses the commissioning activities and generally guides the process.

Commissioning Check List – The forms used to tabulate the checks, tests, etc., performed during the commissioning procedures.

Commissioning Manual – The overall document, prepared by the Commissioning Authority that outlines the organization, documentation, etc., pertaining to the overall commissioning process.

Commissioning Team – Includes the Commissioning Authority, Consultants, Design Manager, Construction Manager, Contractors, Equipment Suppliers, and the Client Representatives.

Construction Manager –The Construction Manager is TW's team leader during the construction phase.

Design Concept – The Operating conditions/parameters on which the designer has based decisions and the method by which the functional requirements are to be met. It is a master plan for the system in question.

Design Engineers or Architect of Record - The Professional Engineers or Architect who produce and are responsible for the design documents which are issued for construction, for example, the Structural Engineer of Record, the Electrical Engineer of Record, etc.

Design Manager – The Design Manager is TW's project team leader during the design stages of the project, provides support to the Construction Manager during the construction stage, and may participate in certain commissioning and post completion activities.

Design Management – The internal processes followed by TW to ensure that the 4 stage approval process is followed, contracts are in place, PMDA, LEED®, Codes, Standards and Regulations are followed throughout the design process.

Facility Start-up – The initial activation of all building systems, including start-up, verification, performance testing, and fine tuning activities.

Inspection – A service provided by the Owner's project team. It includes a review of the building systems and equipment, or part(s) thereof.

Maintenance Manual - A binder containing all the necessary technical information on building systems for the Owner to carry out maintenance and operation of the equipment installed under the contract.

Performance Testing – The full range of checks and tests carried out to determine whether or not components, subsystems, systems, and interfaces between systems function. It includes modes and sequences of control operation, interlocks and conditional control responses, and specified responses to emergency conditions.

Prime Consultant - The individual or firm that is registered with PEG-NL or the Newfoundland Association of Architects, and who or which has the responsibility to coordinate the design and the field reviews of the various design professionals (such as structural, mechanical, electrical, geotechnical, architectural) for the project.

Professional Architect – The person who holds a certificate of registration to engage in the practice of engineering under the Architects Act.

Professional Engineer – The person who holds a certificate of registration to engage in the practice of engineering under the Engineer and Geoscientists Act.

Project Consultant - The individual or firm that, is registered with PEG-NL and delivers the design solution, provides contract administration services during construction, and as directed by the TW manager assists in the commissioning process, as required by the terms of the Prime Consultant Services Agreement and as directed by the TW manager.

Project Coordinator - TW's project coordinator assigned to a project to coordinate, monitor and document the progress the work.

Start-up – A service normally provided by the Contractor as part of the normal scope of work detailed in the construction contract. It includes building systems and equipment, or part(s) thereof.

Specification – The specific purpose/use for which the system/facility/equipment is intended to serve. It is a functional plan/program for the system and provides a complete description of the system's operation and performance.

Technical Service Inspectors – TW's site inspectors assigned to a project to monitor and document the technical progress of a specific discipline.

TW Design Professionals - Staff of the Design and Construction Division are the authority on design standards, design quality and life cycle asset management principles and commissioning. They exercise their judgment in the development of the final design solution.

User – The final occupant or occupants of the facility.

3. GENERAL

3.1 BUILDINGS CAPITAL PROJECT DELIVERY

The project delivery process for building capital projects has four (4) distinct phases as follows:

1. Phase 1 – Programming / Pre-Design
2. Phase 2 – Design
3. Phase 3 – Construction
4. Phase 4 – Post Completion

Within each phase there are several steps in a logical sequence to achieve a quality end product.

3.1.1 PHASE 1 - PROGRAMMING/PRE-DESIGN PHASE

Step 1 Needs Assessment Role Study

Step 2 Owner's Project Requirements

Step 3 Master Program

Step 4 Site Evaluations and Selection

Step 5 Existing Facility Condition Assessment

Step 6 Master Plan

Step 7 Functional Program

Step 8 Furniture and Equipment Selection

Step 9 Pre-Design

Step 10 LEED®

3.1.2 PHASE 2 - DESIGN PHASE

Step 1 Concept Design

Step 2 Design Development

Step 3 Detailed Design

Step 4 Contract Documents

Step 5 Tendering and Contract Award

Step 6 Design Manager to Construction Manager Handover

3.1.3 Phase 3 - Construction Phase

Step 1 Contract Administration

Step 2 Commissioning

Step 3 Training and Education

Step 4 Warranties

Step 5 Operation and Maintenance Manual

Step 6 Substantial Completion

Step 7 Final Completion

3.1.4 Phase 4 - Post Completion Phase

Step 1 Contract Close-out Documentation

Step 2 Contractor Performance Evaluation

Step 3 Handover

Step 4 Completion of Work under Warranty

Step 5 Post Occupancy Evaluation

The programming phase is often led by the Owner in consultation with the facility end user. Input from TW is limited to certain topics including site selection and development of project budget forecasts. Since this phase is generally managed by a client partner, this manual only highlights some aspects of the programming process, and does not provide specific requirements and responsibilities by the Project Team.

TW is the lead partner during the design, construction and post completion phases of the project. This manual describes specific requirements and responsibilities by the Project Team during these phases of the project.

3.2 PROJECT PARTNERS

In most projects there are three partners; (1) the funding authority (e.g. Health, Education and Justice), (2) the operating agency (e.g. School Districts, Health Corporations) and (3) TW as the design and construction management authority. Each of these partners has a separate mandate on the project and therefore a different focus when taking on new building construction or redevelopment of an existing building.

3.2.1 FUNDING AUTHORITY

The funding authority provides financial support for the project and has a vested interest in the overall financial planning and schedule for the project. They may, in some cases be the Operating Agency/Department, and may have an interest in program development.

3.2.2 OPERATING AGENCY / DEPARTMENT

The operating agency/department is heavily involved in the programming and planning stages, it is at that time they provide the Owner Project Requirements. Through the process of design, construction and commissioning, they also play a role, which is described further in this document.

3.2.3 TRANSPORTATION & WORKS

TW is the managing partner during the design, construction and post completion phases of the project.

3.2.4 CLIENT PARTNERS

Clients provide their design requirements through a program or project scope document referred to as the "Owner's Project Requirements" to the Design Manager who communicates them to the Consultant. Client partners are represented at meetings, to facilitate discussion on their requirements with the Consultant.

3.3 PROJECT TEAM

The project delivery model adopted by TW includes both TW and Consultant team members. TW provides project management and directs as necessary, the Consultant's work during all stages of the project.

The project team consists of the (1) Design Manager, (2) Construction Manager, (3) Consultant, (4) TW Design Professionals, (5) other TW personnel and (6) Contractors. The project team leader is either the Design Manager or the Construction Manager depending on the stage of the project.

3.3.1 DESIGN MANAGER (DM)

1. The Design Manager (DM) is the project team leader during the design stages of the project, provides backup support to the Construction Manager on design related issues during the construction stage, and may participate in certain commissioning and post completion activities.
2. The DM is TW's representative directly responsible for the design management of the project and reporting on project status to clients. The DM will be the liaison between the Consultant, TW staff and the client partners during the design phase.
3. The DM assembles the project design brief for the benefit of the Consultant which is to describe the scope of the project in relation to client program requirements, establishes initial cost plan and identify project deliver milestones.
4. The DM should not permit design to commence on the project until a client approved facility program is in place and sufficient project finding has been established.
5. The DM is responsible for obtaining all design submission and associated cost estimate approvals. The Design Manager is further responsible to ensure that the design and/or costs are modified by the Consultant if submissions do not conform to the project requirements.

6. The DM is to coordinate and screen input from various sources to ensure clear, non-conflicting direction is provided to the Consultant.
7. During tendering the DM is responsible for ensuring clarity of the contract documents, and conformity to tendering and contracting regulations. The DM is further responsible to Government for bid compliance on the low bid in accordance with the Public Tender Act.
8. The DM is responsible for ensuring the signed construction contract documents have been prepared and distributed by Tendering and Contracts Division.
9. The DM is responsible to advise the Consultant upon external relationships and incorporate client and TW professionals into the project organization chart.

3.3.2 Construction Manager (CM)

1. The Construction Manager (CM) is the main contact for the Client and the Contractor during construction.
2. The CM is responsible for the delivery of construction on time, within budget, and to the quality standard set out in the construction contract. The CM is given the authority of the Engineer/Architect under the construction contract.
3. The CM is the liaison between the Consultant, Contractor, project staff, and TW's Technical Service Inspectors during the construction phase.
4. The CM assumes the project team leadership and responsibility for the project documentation once a signed construction contract is in place.

3.3.3 Project Consultant / Prime Consultant

1. The Project Consultant acts as an agent or as an extension of the staff of TW's project team in servicing its clients. The Project Consultant delivers the design solution, provides contract administration services during construction, and assists in the commissioning process, as required by the terms of the "Agreement between Owner and Prime Consultant" and as directed by the TW Design or Construction Manager. A sample of the agreement can be found at www.tw.gov.nl.ca/works .
2. The Consultant shall provide a project organization chart including the following information at the start of the project:
    a. Sub-Consultants and their responsible disciplines

b. Senior key professionals being assigned to the project having acquired at least ten (10) years relevant professional experience
c. Coordination and reporting relationships
d. Who is responsible for the quality assurance in addition to the design discipline leader
e. Contact information for all responsible persons

3. Tabular listing of all project personnel to be engaged on the project and required to meet the design delivery schedule. The listing should identify the individual's name, design specialty and years of experience.
4. Separate listing providing hourly rates for personnel engaged on the project. The DM is to treat personnel financial data with confidentiality.

3.3.3.1 Consultant Selection Process

1. Consultants are to be selected from a Consultant registry maintained by the Works Branch or by a REOI process.
2. Consultants are selected by the Minister or by Cabinet Committee of Ministers in accordance with Treasury Board Guidelines.
3. A standard letter of appointment is sent to the Consultant by the ADM (Works) advising them to contact the Design Manager and prepare a proposal that would detail the scope of work, provide a design schedule, and produce a cost breakdown for a consulting services contract. Where possible, the Design Manager will assemble and provide the Consultant with a project brief.

3.3.3.2 Prime Consultant Agreement (PCA)

1. On agreement of scope and fees with the Consultant, the Design Manger will prepare the "Standard Form of Agreement between Owner and Prime Consultant" for signature by the Consultant, using the accepted proposal of fees, expenses and scope as the basis of the agreement.
2. After the signed agreement is returned from the Consultant it will be sent to TW Executive for signature.
3. Copies of the agreement are distributed or saved as follows:

a. An original copy of the agreement is to be kept within TW Registry
b. An original copy is sent to the Consultant
c. Scanned/electronic copy is sent to the Design & Construction Division (TRIM)
d. A copy may also be retained for Regional files

4. The Design Manager will ensure that the necessary encumbrance for the current fiscal year for the consulting contract is prepared. This is updated annually.
5. The Design Manager will ensure that the necessary steps to set up the contract in PARTS are completed.

3.3.3.3 Determination of Consultant Fees

1. Consultant fees and rates may be based upon those published by Newfoundland Association of Architects and the Consulting Engineers of Newfoundland and Labrador (CENL), "Guidelines and Recommended Minimum Fees for Architectural and Engineering Projects", previously published by Association of Professional Engineers and Geoscientists of Newfoundland (APEGN) in 2003. This document can currently be found online at http://www.consultingengineersofnl.ca/images/PEGNL_Fee_Guidelines.pdf .
2. Estimates of travel expenses are to be based upon the Government of Newfoundland & Labrador Treasury Board Travel Rules which can be found on line, at the following link http://www.exec.gov.nl.ca/exec/hrs/working_with_us/transportation.html
3. Reimbursement of expenses will be at the rates stipulated in the Government of Newfoundland & Labrador Treasury Board Travel Rules at the time incurred expense. Information backing up expenses must be submitted for audit by TW with the submission of invoices including such costs. Expenses not identified in the Treasury Board Travel Rules shall be at cost. Visa receipts are not acceptable; an itemized receipt must be submitted.
4. Items not reimbursable are:
    a. Alcohol
    b. Personal entertainment
    c. Gratuities
5. Travel outside the schedule agreed to in the "Standard Form of Agreement between Owner and Prime Consultant" must be pre-approved by the TW Design Manager or Construction Manager. Without approval, reimbursement may not be possible.

6. Consultants shall ensure that vehicle insurance for both personal vehicle use and rental vehicle use is provided to their employees while conducting work on government funded projects. Consultant claims of rental company insurances will not be reimbursed.
7. For projects less than $400,000, a fixed contract price may be negotiated with the Consultant to cover all fees and expenses associated with the investigation, design and contract administration of the project. This amount can only be changed with the prior written authorization of the Design Manager. In general, such authorization shall be granted if it becomes necessary to substantially modify the scope of work from that outlined in the Consultant's proposal.
8. Payments based upon per diem rates or unit prices shall be only entertained when the preparation of a fixed price is not practical or deemed desirable.
9. For projects greater than $400,000, the percentage rate in the Fees Guideline normally would apply. Expenses and fees not covered by the percentage rate will be negotiated wherever possible as a fixed contract amount. In the absence of a fixed contract amount, an allowance for the additional services is to be provided.
10. Additional services, excluded from the percentage fee schedule should be identified as lump sum line item fees. These services include:
    a. predesign site investigations, including facility condition assessments
    b. programming & advisory services, including preparation of room data sheets when required by the client
    c. segregated construction contract packages
    d. preparation of designs for future implementation not incorporated in the construction contract
    e. resident engineering services during construction
    f. preparation of as-found drawings documents for remodelling and renovating
    g. LEED®
    h. field services other than construction review and meeting
    i. provision of full time or part time inspection
    j. extended construction administration costs arising from circumstances outside the control of the Consultant
    k. provision of contract administration and advisory services to the Construction Manager in the case of contractual default by the Contractor

l. commissioning activities as identified in the TW Commissioning Guideline

11. The Prime Consultant Agreement Schedule II – Basis and Other Additional Service Fees provides a breakdown of how the Total Consultant Fee is to be divided over the project. The following table depicts the breakdown TW will accept, note this is different than that listed in the "Guidelines and Recommended Minimum Fees for Architect and Engineering Projects", published by Newfoundland Association of Architects and the Consulting Engineers of Newfoundland and Labrador,

BASIC AND OTHER ADDITIONAL SERVICES FEES	
Programming Advisory Services	
Basic Services	
Concept Design	15%
Design Development	20%
Detailed Design / Contract Documents / Tender	35%
Contract Administration	20%
Project Completion Phase and Project Record Drawing	10%
Other Additional Services:	
Commissioning	Fixed Fee
LEED	Fixed Fee
Resident Services during Construction	
Design Services - Segregated Construction Contracts	
Construction Management - Multiple Contracts	
Prime Consultant Project Expenses for Above Services	Allowance
TOTAL BASIC AND OTHER SERVICES FEES	
TOTAL ADDITIONAL REIMBURSABLE ALLOWANCE	

3.3.3.4 Payment of Consultant's Invoices

1. It is the Design Manager's responsibility to ensure that the invoice charges are fair and reasonable for the work performed and are in accordance with the consulting services contract. Backup documentation for the invoice is to be provided if no fixed amount has been negotiated for the service to be provided.
2. Consultants are to be advised that their invoices must be presented in a format consistent with the breakdown of the consulting contract, identifying task and percentage complete to date. Invoices should also indicate previously billed amounts for each task.

3. If deemed necessary to modify a Consultant's invoice, a copy of the modified invoice shall be sent back to the Consultant for re-submittal. The modified invoice may continue to be processed without delay. Best practice is to process revised invoices when received.
4. After handover of the project to the Construction Manager for the construction phase, the Construction Manager will normally assume responsibility for certification of further progress payments to the Consultant.

3.3.3.5 Consultant Change in Scope

1. Revisions to the consulting services contract scope of work resulting in an increase or decrease in the contract amount will be documented by a Consulting Services Contract Change Order prior to payment. Change orders increasing the contract amount can only be approved on the basis of sufficient project funding being in place.
2. Change order descriptions must clearly identify the scope change, reason for the change, and the time period if applicable.

3.3.3.6 Other Consultants

1. Other Consultants utilized on building projects are commonly land surveyors and geotechnical Consultants. The Design Manager, or the Consultant on behalf of the Design Manager, obtains proposals for these services.
2. Where legal property or topographical site surveys are required, the request for the surveying Consultants will consider level of expertise, technical resources, and proximity to the work site. Further guidelines for procurement of surveying services and required deliverables are given in this manual.
3. Subsurface soils investigations are imperative for new buildings and extensions to existing buildings including the project site.
4. Further guidelines on geotechnical services are given in this manual.
5. The manner in which agreements are put in place will establish the liabilities between the parties.
6. If TW engages a Consultant directly a contractual relationship is established between TW and the Consultant.

7. If the Prime Consultant engages the Consultant, TW has no contractual relationship other than the agreement with the Prime Consultant.
8. The process of engaging and directing land survey and geotechnical Consultants are considered to be a pre-design site investigation phase activity. If the Prime Consultant is directed by the Design Manager to perform engagement and direction, the Prime Consultant is entitled to be paid at cost for professional fees and expenses incurred. Along with such payment, the Prime Consultant assumes legal liability to TW for quality control of the work performed by other Consultants under its direction.
9. Project technical requirements may require the services of specialists, beyond the scope of experience and expertise of the Project Consultant team. Specialists have been used for:
    a. acoustical considerations
    b. food service design
    c. high speed, high rise elevators
    d. wind and snow modeling of the building and site configuration
    e. hazardous material assessments (hazmat)
    f. fire protection engineering
    g. way finding
    h. environmental impact assessment
    i. historic construction and restoration
    j. ergonomics
    k. laboratory design
    l. LEED®
    m. durability

3.3.3.7 Consultant Performance Evaluation System

3.3.3.7.1 General

1. The Consultants Performance Evaluation System is a process designed to maintain an acceptable level of performance from Consultants carrying out work for TW.
2. Evaluations are to be completed for all design contracts. The evaluation will be started by the Design Manager after the construction contract is awarded and then it will be turned over to the Construction Manager for completion.

3. Once the evaluation is completed after construction, the evaluation shall be returned to the Design and Construction Division.
4. A copy of the completed evaluation will be forwarded to the Design & Construction Division to be incorporated into the Consultant Registry Database.
5. Information compiled through the Consultant Performance Evaluation System is intended solely for internal use by TW. Evaluation information related to a particular Consultant will not be released to outside parties.

3.3.3.7.2 Performance Rating Methodology

1. Consultant's performance will be evaluated on a points rating system based on a weighted score from following categories:
    a. Design Phase (75% of weighted average)
    b. Knowledge of the clients need
    c. Quality of documents
    d. Providing oversight and coordination of the sub-Consultants work
    e. Ensuring code requirements are met and well documented
    f. Maintaining budget during various design stages
    g. Providing innovation in design
    h. Schedules met for all deliverables
2. Contract Administration (20% of weighted average)
    a. Shop drawing review was thorough and timely
    b. Change orders were issued with appropriate documentation
    c. Regular attendance of job meeting
    d. Responded in timely manner to requests for information
    e. Provided solutions that were appropriate, creative and cost effective during conflict resolution
3. Contract Close-out (5% of weighted average)
    a. Regularly checked construction progress and monitored the status of defective work
    b. Provided all required documentation at turn-over (shop drawings, LEED® documentation etc.)

3.3.4 TW Design Professionals

The TW design professionals (e.g. Design & Construction Division) are the authority on design standards, design quality and life cycle asset management principles and commissioning. They exercise their judgment in accepting the development of the final design solution.

3.3.5 Other TW Personnel

There are other TW personnel who typically provide support to the Construction Manager during the construction stage but may provide support during the design phase as well. These individuals include Technical Services Inspectors, Project Coordinators, Building Managers, Area Managers and the Commissioning Coordinator.

3.3.6 Contractor

The Contractor is responsible for meeting the contractual requirements set forth in the Tender Document package in accordance with the General Terms and Conditions agreed to in the contract.

3.4 Correspondence

1. Unless otherwise arranged with the Design Manager, the Consultant shall communicate with the Design or Construction Manager only, depending on the phase of the project. The Consultant's contact during the design and commissioning phases of the work is the Design Manager. During construction it is with the Construction Manager.
2. There shall be no direct official communication between the Client/Operating Agency/Department/Funding Authority and the Consultant. If either of these project partners requires copies of project documents or other action directly from the Consultant, the matter must be referred to the Design Manager for decision. This will ensure a consistent manner in dealing with matters, and also consistency in the message sent to the Consultant on design decisions.
3. During the tender call, Tendering and Contracts Division conducts all correspondence with bidders and makes the contract award.
4. If a bidder contacts the Design Manager, Client, Construction Manager, or Consultant, they shall be referred to Tendering and Contracts Division to place a formal query. If the answer

is not generally known, an addendum to all plan takers shall be issued. All queries shall be routed through Tendering and Contracts.

5. Following award, the Consultant may be responsible for administration of the construction contract in whole or in part. Where the Consultant is responsible, they shall undertake all technical correspondence with the Contractor and forward all such correspondence to the TW Construction Manager, including:
    a. copies of letters
    b. minutes of meetings
    c. design intent directions
    d. responses to Request for Information
    e. change Order descriptions/scope and estimates
6. Correspondence affecting the terms and conditions of the construction contract, and in particular having financial or schedule implications remains the Construction Manager's responsibility.

3.5 MEETINGS

1. The Design Manager shall arrange meetings as frequently as necessary, throughout the entire project development of all members of the project team, including:
    a. client partners
    b. consultants
    c. TW Design Professionals
    d. construction management staff
    e. specialists engaged by TW
2. During the construction phase, project review meetings with the client partners will occur at least monthly, and are normally in addition to construction review meetings held with the Contractors.
3. All meetings are to be recorded and minutes circulated to the attendees, and others as deemed necessary.

3.6 MEDIA AND PUBLIC COMMUNICATIONS

1. Any inquiries from the media should be forwarded to the Director of Communications.

2. General inquiries from the public should be referred to the appropriate operating agency.
3. In no case, shall the Consultant or Contractors speak to media concerning the development of any project.

3.7 INFRASTRUCTURE APPROVAL PROCESS

1. All projects require approvals according to TW's Infrastructure Approval Process. The approvals include:
    a. Stage 1 – Approval in Principle
    b. Stage 2 – Approval to Design
    c. Stage 2A – Approval of Concept Design and move to Design Development
    d. Stage 2B – Approval of Design Development and move to Detailed Design
    e. Stage 3 – Approval to Tender
    f. Stage 4 – Approval to Award

3.8 CAPITAL BUDGET FORECASTS

1. The Consultant shall carry out cost planning and control services to monitor the project during the facility design process. Cost planning and control services are included under the scope of basic design services in the Consultant Agreement.
2. Effective cost planning and control is of prime importance and requires the use of a costing specialist in this discipline (e.g. Quantity Surveyor), either on the Consultant's staff or engaged as a sub-Consultant.
3. TW Design Manager will be responsible for the finalized budget which includes but is not limited to:
    a. costing supplied by the Consultant for the construction of the facility
    b. consultant fees
    c. land purchase
    d. furniture and Equipment
    e. TW project costs
    f. contingencies
    g. location factors

3.8.1 PROJECT ESTIMATES

1. The Consultant shall make the following submissions:
    a. Project Estimate – with concept design report
    b. Project Estimate – with design development report
    c. Final Project Estimate – updated at time of tender package submission
    d. Elemental Cost Breakdown – with all phases of submissions
    e. Post Project Estimate evaluation at the completion of construction
2. The Construction Manager is responsible for Project Estimate submissions after award of the primary construction contract.
3. The Project Estimate must be within the authorized budget. Intermediate and final estimates shall remain within the Project Estimate, unless changes due to revised client requirements, etc., are authorized by TW. The Consultant is to advise TW immediately if such changes occur.
4. Submit project estimate information during the design process following recognized formats such as “Hanscomb Yardsticks for Costing” or “RS Means”.
5. The Final Project Estimate brings together all project costs, including construction, contingencies, separate contracts, land costs TW project services costs, and Consultants’ fees, to arrive at the ultimate cost of the entire project.
6. The Elemental Building Cost Breakdown provides a breakdown of cost by construction element for analysis purposes. Initially, elemental costs shall be based on assumption, historical data and calculation. Subsequent submissions must be based on quantity take-off as information becomes available during the development of design.

3.8.2 CONSTRUCTION PROGRESS BREAKDOWN

1. Construction progress breakdown, used for progress billings, will be supplied by the Contractor at the onset of the construction contract and approved by the Construction Manager.

4. PHASE 1 - PROGRAMMING / PRE-DESIGN PHASE

1. Programming refers to master planning, and functional requirements to deliver the client's program. Programming is considered complete once specific floor area requirements are defined, along with proximity relationships, planned usage and physical characteristics of the individual spaces and specialized equipment requirements.
2. Programming services are often performed by specialist Consultants, other than the Project Consultant team, and are completed in advance of the Consultant's engagement.
3. Pre-design site investigations and programming services are deemed to be additional services, outside the scope of the basic services fee. Pre-design site investigations are normally focused on investigating, assembling and evaluating existing building conditions and ancillary site infrastructure, where such information has not been compiled by TW.

4.1 PHASE 1, STEP 1 - NEEDS ASSESSMENT ROLE STUDY

1. This is the first step to project initiation and is completed internally by the Government of Newfoundland and Labrador's Owner, Funding Department and user groups. In some cases, specialty consultants are engaged to assist in the assessment.

4.2 PHASE 1, STEP 2 – OWNER'S PROJECT REQUIREMENTS

1. The Owner's Project Requirements (OPR) must be developed by the Owner, and submitted to the Design Manager prior to the start of design. The purpose of this document is to clearly document the functional requirements and expectations of the Owner for the project and serves as a touchstone for all subsequent commissioning activities. Updates during the design and construction process are the responsibility of the Owner.
2. The OPR document should address the following issues, as applicable to the project:
    a. owner and user requirements
    b. environmental and sustainability goals
    c. energy efficiency goals
    d. indoor environmental quality requirements
    e. equipment and system expectations

3. Building occupant and operations/maintenance personnel requirements
4. The level of detail in the OPR can vary depending on the size and function of the facility, the Owner's preferences, and the design team experience. A template table of contents for the OPR can be found in Section 15. This can be modified to be project specific.

4.3 PHASE 1, STEP 3 - MASTER PROGRAM

4.3.1 SPATIAL PROGRAM

1. Office standards for government offices and workstations are outlined in the Government's "Office Accommodations Guidelines". The Space allocation Table from this document can be found in Section 15.
2. Special areas and office support areas have to be designed to achieve the Client's needs, based on general design principles.
3. Specific room sizing and details may be influenced by Owner requirements, predefined regulations, codes and standards. It is up to the designer to interpret all requirements and propose the best solution possible for consideration by the Owner, and TW design professionals.

4.3.2 ROOM DATA SHEETS

1. Preparation of room data sheets is deemed to be a programming activity.
2. The data sheets are a method of recording decisions on the individual spaces. Each data sheet represents a typical space.
3. Where spaces differ slightly from one another it is sufficient to refer to the prototype space for typical requirements noting the special requirements of the space.
4. The Consultant is encouraged to develop their own data sheets for recording required performance criteria for both general systems and specified areas.
5. Typical data sheets are also available in Section 15, and may be modified on a per project basis as necessary.

4.4 PHASE 1, STEP 4 - SITE EVALUATION AND SELECTION

1. Potential sites for a proposed facility are short listed and the merits of each are evaluated by the Consultant.
2. The completed evaluation is used as a resource for the final site selection process by TW and the client department.
3. Life cycle cost analysis shall be completed for each site to assist in the decision process.

4.5 PHASE 1, STEP 5 - EXISTING FACILITY CONDITION ASSESSMENT

1. The redevelopment of an existing building may encounter physical plant concerns which will impact the final project budget. To ensure all potential concerns are identified early in the project planning, a Facility Condition Assessment is to be performed prior to the end of the concept phase.
2. Experience reveals that most public buildings have incurred a high value of deferred maintenance. The cost of this deferred maintenance needs to be identified as it applies to the project.
3. The completion of a Facility Condition Assessment will minimize surprises during construction. Unexpected conditions can lead to costly change orders, as well as the potential for legitimate delay claims from the Contractor.
4. A Facility Condition Assessment (FCA) report must be prepared describing defective building systems and components, providing recommendations for renewal, identifying the associated costs, and its timing.
5. It should be noted that for certain TW buildings an existing ReCAPP Facility Condition Assessment report may be available.

4.6 PHASE 1, STEP 6 - MASTER PLAN

1. The majority of activities in the programming phase are generally led by the facility end User. The master plan is typically developed by the client group and delivered to TW. In certain cases the master planning can be included as a deliverable in the Consultant Service Agreement with the Project Consultant.

4.7 PHASE 1, STEP 7 - FUNCTIONAL PROGRAM

1. The Functional Program contains specific needs of the Client based on program delivery requirements. The functional program may be carried out by a Consultant.
2. The building layout and the layout within interior spaces will depend on functional requirements of the client as outlined in the program.
3. The design will acknowledge the need to provide space that treats public sector employees fairly and consistently, while providing a safe and healthy workspace. Reference Government of Newfoundland and Labrador Office Accommodations Guidelines for space allocations. The space allocation table from this document can be found in Section 15,
4. Considerations must be made for Barrier-Free construction of all facilities.

4.8 PHASE 1, STEP 8 - FURNITURE AND EQUIPMENT SELECTION

1. For major projects, furnishings and special equipment are normally included in the project budget. These may be included in the construction contract, a separate contract or supplied by the Client. Furniture and equipment selection is typically completed in consultation with the end user group. It is important to complete the furniture and equipment selection early in the design process to allow the Project Consultant to make any necessary design provisions to accommodate the selected equipment.

4.9 PHASE 1, STEP 9 - PRE-DESIGN

1. The Consultant team shall:
    a. review the spatial and functional program, and other information supplied by TW or the Client
    b. advise the Design Manager of:
        i. additional professional service activities to be included beyond basic services
        ii. delegation and authority respecting project design and quality assurance
    c. study the characteristics of the site, record the data including information on existing structures, and carry out the following:

i. produce measured drawings (as-found) for structures that will be affected by the construction program
ii. provide advice on cost factors or risks in proceeding with the site as selected at this stage
iii. provide advice on potential environmental concerns affecting the project

2. TW shall select an appropriate Environmental Consultant to carry out environmental assessments, with emphasis on existing hazardous materials, and co-ordinate execution of the environmental review program with the consulting team

4.10 PHASE 1, STEP 10 – LEED

1. A preliminary LEED® Score Card shall be completed to assess the viability of committing the design and financial efforts required for a LEED® project as defined by the Build Better Buildings Policy. In cases where LEED® is deemed to not be viable, an exemption must be requested to exclude the project from the requirements of the BBB. The exemption is to be written by the Client Department and submitted to the Build Better Buildings Assessment Committee.

5. PHASE 2 – DESIGN PHASE

5.1 DESIGN PERIOD PROCEDURES

5.1.1 GENERAL

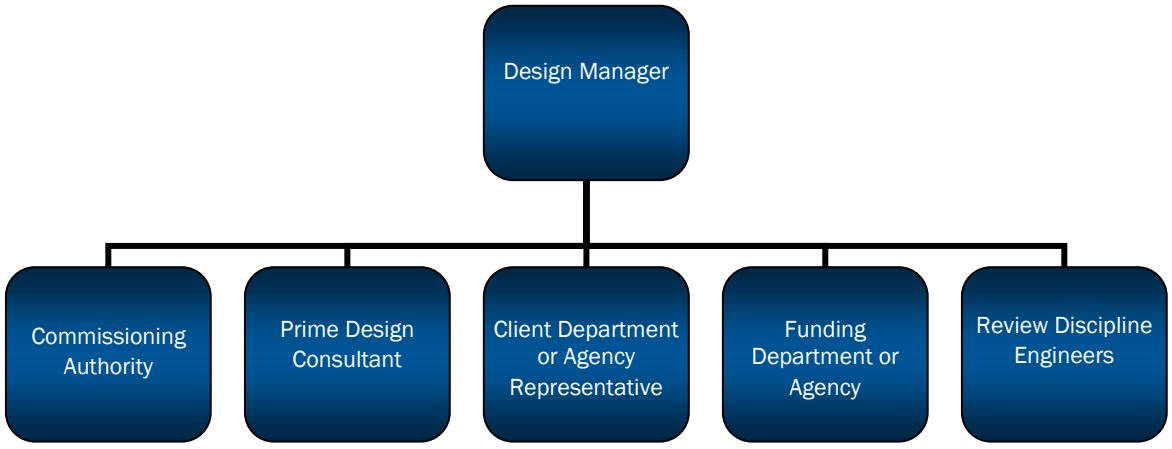
1. The Consultant project team, accompanied by TW professionals shall visit the site as soon as possible after receiving a project briefing from the Design Manager. The site visit is intended for the Consultant to appraise site characteristics and any external factors affecting the design.
2. A design briefing meeting is to be convened following the completion of the site visit and the Consultant's review of the client's functional program study. The purpose of this meeting is

to and to introduce all parties involved in the project and facilitate group discussion of the program to ensure that all requirements in it are fully understood.

3. The redevelopment of an existing building will necessitate completion of a detailed Facility Condition Assessment.
4. The basic service fee for Consultant Services incorporates four design stages:
    a. Concept Design
    b. Design Development
    c. Detailed Design
    d. Contract Documents

5.1.2 Design Phase Communications

1. Maintaining effective communication with the client department or agency is an essential part of the responsibilities of both the Design and Construction Managers. This includes regular reports, correspondence and meetings to provide information related to a project's financial and physical status and the identification of any areas of concern. It is crucial that a high level of client satisfaction is achieved.
2. Approval from the client requested by the Design Manager and shall be obtained in writing on any capital or maintenance projects affecting floor layouts, work disruptions, scheduling, or other relevant matters prior to start of work.
3. All communications during the design phase shall be routed through the Design Manager. For example, the Consultant should not contact the Client Department directly. This will alleviate the sometimes misdirection and erroneous decisions by those not managing the project.



5.1.3 SCHEDULE

1. The Design Manager is to establish a project schedule in consultation with the Consultant following the design briefing meeting. The schedule shall establish the elapsed time from start of the design process to the award of the construction contract(s) and incorporate client design reviews. This schedule shall also detail the expected deliverables for the project.
2. Schedule should be developed using Microsoft Project. The schedule should contain the following information:
    a. Task definitions (technical, meetings, review periods, etc.)
    b. Task start date, finish date and duration
    c. Task resources
    d. Linked tasks
    e. Identification of Critical Path

5.1.4 COST CONTROL

1. The Consultant is responsible for monitoring construction costs during preparation of contract documents and advising the Design Manager of any significant deviation as a result of client or TW requested design changes. Ensure that the probable cost increases do not exceed the design contingency allowance provided for in the cost plan. The pre-tender estimates are to be provided in accordance with this manual.
2. Estimates are to be provided with each submission and provide detailed costs of systems included for each discipline.
3. Where alternative technologies are proposed or evaluated, estimates shall be provided for each alternative comparing initial capital and life cycle costs

5.1.5 DESIGN ERRORS AND OMISSIONS

1. An error is an item in the drawings and specifications that results in extra costs or delay due to the correction of a design or other deficiency (e.g. co-ordination).
2. An omission is an item missing from the drawings and specifications which must be added outside the competitive bidding process.

3. Design errors and omissions can be minimized through the implementation of a design quality assurance plan by the Consultant team and complying with the design procedures and guidelines contained in this manual. The Consultant is to exercise the skill, care and diligence that may reasonably be expected of other professionals of ordinary competence.
4. The Consultant shall complete all internal design checks and inter-discipline reviews prior to submitting to TW's project team for review. Shall it become evident that this review has not been completed by the Consultant; the document package will be returned without comment and the expectation that the Consultant will complete the work prior to further submission. Delays in the project will not be accepted, it is expected that the Consultant will assign appropriate resources to maintain the schedule as agreed.
5. Correction of errors and omissions shall be completed in a reasonable time frame so that the overall project schedule is not affected. During construction phase this time shall be 10 days or less for non-critical items and three (3) days or less for those deemed critical.
6. The cost of design errors on the part of the Project Consultant team is the responsibility of the Consultant. The Consultant shall undertake immediately to correct the error, in consultation with the Construction Manager. The correction may include, but not necessarily be limited to, provision of design drawings and specifications, preparation of a change order for the Contractor, coordination of on-site inspections, and payment to the Owner (credit change order to the contract). Under no circumstance shall the Consultant be reimbursed for efforts expended to overcome the errors or omissions.
7. The construction cost of design omissions on the part of the Project Consultant team may be paid, in part or in full, by TW provided:
    a. the cost of such omissions does not entail removing material or equipment already installed
    b. the costs of such omissions are within the construction contingency allowance provided for in the cost plan

5.1.6 Approval Requirements

5.1.6.1 General

1. The Design Manager is responsible for ensuring that the Consultant obtains all necessary approvals. This includes the approval of client partners and the approval of any regulatory

agencies. The major regulatory agencies are noted in the following sections; however the specifics of the project may necessitate several other regulatory approvals. In some limited cases, the Design Manager will facilitate the receipt of approvals.

5.1.6.2 Fire Commissioner's Office

1. Submissions for review should be made by the Consultant for any contracts related to the construction or alterations of buildings as defined in National Building Code of Canada (latest revision). This would generally include contracts involving changes to the layout of buildings or the installation of fire protection systems, but would not include maintenance related projects such as roof repairs.

5.1.6.3 Municipal Building Permits

1. Plans are to be submitted for approval and the Contractor will be required to obtain and pay for a municipal building permit where applicable, in accordance with TW policy, for new buildings and extensions to existing buildings. Discussions will be held during the preliminary design stage with municipal authorities to identify and resolve any concerns and maintain compliance with any applicable municipal regulations. This is intended to ensure that the Contractor will not experience undue delay in obtaining a building permit.
2. Building alteration projects involving an occupancy classification change will be submitted to the municipality for agreement in principal to ensure any municipal zoning regulations, bylaws, and ordinances are incorporated into the design.

5.1.6.4 Building Accessibility Regulations

1. Plans and specifications shall be submitted by the Consultant to Service NL in accordance with the design registration procedures established under the "Building Accessibility Act and Regulations".
2. The Contractor shall be obliged to obtain and pay for any inspection permit fees levied by Service NL.

5.2 PHASE 2, STEP 1 - CONCEPT DESIGN

5.2.1 GENERAL

1. The Concept Design process documents and reports on the building systems proposed (or alternatives under evaluation), taking into consideration the client's program needs, economy, durability, capital cost, and requirements of relevant codes and authorities.
2. The Concept Design documentation shall be assembled in such a way to facilitate its updating and expansion to incorporate:
    a. the requirements of the project design report at the conclusion of the design development stage
    b. the systems description and operating principles required in the preparation of system operation manuals
    c. LEED® requirements or recommendations in order to achieve the certification level required for the project. Projects will require the LEED® certification striving for LEED® Silver unless otherwise notified. The LEED® score card shall be included in submittals
    d. Format of the document shall be in follow the table of contents as outlined in http://www.tw.gov.nl.ca/works/ddr_model_index.pdf
3. Review comments made by TW team and client partners will be assembled and consolidated by the Design Manager and forwarded to the Consultant, for incorporation into the facility Concept Design report.
4. The Design Manager will arrange design review meetings or other communications as may be required to conclude this stage of the design process.
5. The Design Manager will confirm that the project is within the approved budget prior to proceeding with the design development stage.
6. At each submission, inter-disciplinary review by the Consultant team must be evident. This indicates to TW that there is constant communication between the design team members, and will avoid major coordination issues at the final stages of design.

5.2.2 PRIME CONSULTANT

1. The Consultant shall:
    a. Identify information required from TW, client and other design disciplines before setting a design schedule
    b. Review the building performance criteria with the client
    c. Review applicable codes, regulations, restrictions, insurance requirements, and other factors affecting the design and review with authority having jurisdiction, as necessary. Identify codes and standards to which the design will follow.
    d. Meet with the Project Team to compile information concerning
    e. Determine mechanical and electrical requirements other than specified standards
    f. Equipment and furnishings, including built-ins, for each space and the associated services required by the equipment and Owner supplied items
    g. Review the Department's project budget
    h. Prepare a project cost plan including TW's project services costs
    i. Develop a schedule for the preparation, and client and regulatory approvals of the project design
2. Advise the Design Manager of:
    a. additional professional service activities to be included beyond basic services
    b. delegation and authority respecting project design and quality assurance

5.2.3 SITE SURVEYS

5.2.3.1 General

1. Carry out existing conditions survey for proposed construction of installations and structures, and provide drawings depicting existing conditions for design and construction purposes.
2. Preliminary layouts and concept planning under development by the Prime Consultant. Work shall be coordinated with other disciplines and sub-Consultants, in particular the Geotechnical Consultant.

3. The Consultant will be supplied with or can obtain access to all existing relevant drawings for areas to be surveyed; however, completeness and accuracy of this information are to be verified.
4. Before the Consultant enters the site, clearance shall be obtained from the Design Manager or Owner.
5. Obtain maps, record drawings or other available information which may show location of utilities, benchmarks, ground contours and other existing site facilities such as buildings, access roads, parking areas, drainage features, etc.
6. All data supplied to the Consultant is to be returned on completion of the project. A copy of all field notes, control data and all data obtained or compiled by the Consultant (level, and field data books, sketches) shall be turned over to the Design Manager.

5.2.3.2 Guidelines

1. Information provided shall be verified, except that a GSC monument providing benchmark information and exact latitude and longitude will be accepted as valid, and needs no verification. Information shown shall be sufficiently detailed to permit any point on any survey line to be accurately located in the field.
2. Building sites will be mapped at a scale of not less than 1:500. Corridors for access roads and utilities outside property limits are to be mapped at a scale of 1:500. Mapping for corridors to be 60 m wide unless otherwise noted.
3. Place permanent monuments on the site as required, enabling the work to be sited and built as designed.
4. If aerial photography is utilized for mapping purposes, sufficient temporary monuments shall be placed and targeted to enable adequate horizontal and vertical control.
5. A minimum of two (2) benchmarks and two (2) monuments are to be established at the project site as indicated by the Design Manager.

5.2.3.3 Accuracies

5.2.3.3.1 Vertical

1. Benchmarks will be accurate to 5mm.

2. Building floor elevations and inverts, if any, will be accurate to within 25 mm. Spot elevation on roadways and similar surfaces will be accurate to 25 mm.
3. Contours on 1:500 mapping will be identified at 1m intervals, with intermediate contours of 0.5 m also indicated.

5.2.3.3.2 Horizontal

1. Control traverses shall be such as to ensure a closure accuracy of 1 to 5000 or better. Plotting accuracy of identifiable features to be within 250 mm.

5.2.3.4 Survey Requirements

1. Determine surface elevations on 5.0 m grid patterns or by photogrammetry over the property and adjacent areas to tolerances compatible with usage of information for design and construction purposes. Grids may be smaller, as may be dictated by surface irregularities to give an accurate representation. Flag perimeter boundaries of the survey area.
2. Take surface elevations of lakes and water courses and observe on high-low level marks. Also measure depth of fresh water lakes and streams which impact the project site. Determine direction of flow for all watercourses.
3. Determine elevations and cross sections of existing drainage channels where such will be used for drainage of new work.
4. Take invert and top elevations as well as pipe sizes of existing culverts and drainage structures in areas affected by new work.
5. Take invert and top elevations of existing sanitary and stormwater manholes which may service the site. Obtain pipe size, and determine grade of sanitary/storm sewers.
6. Obtain information on water distribution mains, appurtenances, and fire hydrants available to service the site from field survey data and review of project record drawings.
7. Obtain information on and locate all overhead power utilities and underground power supply/distribution from field work and review of construction records.
8. Obtain road centerline, shoulder, and ditch elevations on existing public roads for a distance to be determined by the Design or Construction Manager on either side of proposed site access location(s).

9. Determine outline of rock outcrop and distinct terrain features. Outline wet or swampy areas. Record depths to firm bottom. Outline tree clusters as may be required by the Project Consultant for preservation during construction. Do not cut survey lines through tree cluster without prior authorization from the Design Manager.
10. Locate and indicate results of any test pits/borings.

5.2.3.5 Drawing Requirements

1. Show all pipe sizes in mm.
2. Identify the exact longitude and latitude of each control monument to the nearest second.
3. Show all existing buildings, utilities, services and topographical details to accurately illustrate existing conditions on the site.
4. Drawings will be related to known survey benchmark which will be described.
5. Show the location and elevation of all soil test borings. Show and number test pits or probe holes in accordance with that shown in soils report.
6. Place a North arrow in the upper right hand corner of the Site Plan. Draw the Site Plan so as to be viewed either in an East to West, or a South to North direction.
7. Provide stamped drawings with the seal of the respective professional engineer or licensed land surveyor supervising the survey work, and the permit to practice of the Consultant firm.

5.2.4 GEOTECHNICAL

1. During the conceptual planning of a project, a preliminary geotechnical investigation is to be carried out. The geotechnical sub-Consultant is to attend periodic meetings with the Design Manager and the Consultant team to obtain the instructions regarding project requirements. In the preliminary investigation stage, provide air photo interpretation, literature search, site reconnaissance, and preliminary investigation report.

5.2.4.1 Air Photo Interpretation

1. Where air photographs are available, map the site and surrounding area terrain to indicate some or all of the following:
    a. general drainage patterns
    b. general slopes and ranges or gradient

c. bedrock outcrops, where present
d. general surficial soil types
e. poorly drained or bog areas (peat or muskeg)
f. erosion features
g. old or potential slope failure areas

5.2.4.2 Literature Search

1. Review the geology of the area from known data, either to supplement the air photo interpretation, or to replace it where air photos are not available.
2. Search all available physiographical data and previous site investigation data, along with any available well water records.

5.2.4.3 Site Reconnaissance

1. Following air photo interpretation and/or literature search carry out a preliminary site reconnaissance to physically examine land forms, drainage, erosion features, etc. In addition, hand auger holes or rod soundings may be put down, or shallow test pits excavated to confirm the general surficial soil, bedrock and groundwater conditions.
2. Present the findings of the work in the preliminary investigation report. Present the data in a form that enables the client to assess the economic effect which the soil, bedrock and groundwater may have on the viability of the project.

5.2.5 Structural

1. Provide TW with the overall structural engineering design intent for the proposed facility.
2. Review applicable code, regulations, restrictions, insurance requirements, and other factors affecting the design and review with authority having jurisdiction, as necessary. Identify codes and standards to which the design will follow.
3. Establish the structural design criteria for the primary structural system based on the latest NBCC edition and TW.
4. Develop the structural scheme for the primary structural system detailing each significant component and material, and providing alternates where applicable.
5. Conduct field reviews and review existing drawings as appropriate.

6. In consultation with the site design Consultant, describe and oversee the program to be performed by the geotechnical Consultant as required.
7. The report shall include:
    a. Brief description of the chosen structural system using sketches, including comparison of up to three (3) alternative structural systems.
    b. Development of structural framing plan for architectural concept being examined, to establish the viability of the structural system.
    c. Evaluation of loads including determination of type, magnitude, and possible combination of design loads including their locations, and directions of application on the main components of the structure. Design loads shall include dead, live, environmental, liquid/earth pressures, differential ground displacements, etc.
    d. Identify the various load combinations.
    e. Determination of quality, strength and specification of materials used in design.
    f. Relevant design/construction parameters/constraints from the geotechnical report that are used in the design.
    g. Method of design and analyses.
    h. Method of transfer of lateral loads in both orthogonal directions to transfer loads from roof to foundations using sketches and narratives.
    i. Detail of any computer software used in the analysis and design.
    j. Description of provision to accommodate movements in the structural components due to thermal variations between different types of structures. Coordinate with architectural. Account for creep and moisture movements, foundations movements and dynamic movements.
    k. Prescribed construction procedures and sequence of work, if this is critical to the functioning of the finished structure and integrity of the structure during construction.
8. Prepare a conceptual cost estimate for structural components/systems or assist in the completion of the project estimate.

5.2.6 ARCHITECTURAL

1. Review the spatial and functional program, and other information given by TW or the Client.
2. Study the characteristics of the site, record the data including information on existing structures, and carry out the following:
    a. produce measured drawings (as-found) for structures that will be affected by the construction program
    b. provide advice on cost factors or risks in proceeding with the site as selected at this stage
3. Provide advice on potential environmental concerns affecting the project. TW shall select an appropriate environmental Consultant to carry out environmental assessments, with emphasis on existing hazardous materials, and co-ordinate execution of the environmental review program with the consulting team
4. Prepare Concept Design documents to describe:
    a. the general architectural design intent of the building
    b. the massing, fenestration, and materials selected for the exterior
    c. a description of the envelope system, illustrating the approach to meet energy performance requirements
    d. the spatial plan and the functional relationships including:
        i. major program areas and spatial plans showing the functional relationships inside these areas
        ii. summary of deviations from the program areas, identifying the differences in net and gross building area
        iii. complete system performance outline with environmental requirements, equipment, furnishings and special considerations
        iv. provision of adequate space for layout and servicing of mechanical installations
        v. enlarged concept layouts for circulation areas
        vi. proposed materials for interior finishes
        vii. a list of all regulatory authorities
5. Interior Design discussion including:
    a. general presentation of the color scheme and furnishings

b. brief description of the objective of the color scheme and how they can be achieved
c. a color board showing the general color scheme and the schemes of any special area are required
d. sample of draperies
e. catalogue cuts of special furnishings

6. Estimates of materials in the overall cost plan.

5.2.7 CIVIL

1. Provide TW with the overall civil design intent for the proposed facility.
2. Describe each of the civil components of the project such as:
    a. site grading and layout
    b. domestic water supply
    c. sanitary sewers and existing capacity
    d. storm sewer and existing capacity
    e. traffic control
    f. paving
    g. landscaping
3. Review applicable codes, regulations, restrictions, insurance requirements, and other factors affecting the design and review with authority having jurisdiction, as necessary. Identify codes and standards to which the design will follow.
4. Where appropriate, provide comparative information to be used in the selection of various systems for the project.
5. Provide or co-operate in the completion of preliminary costs estimate for the civil work for the project.
6. Identify design criteria proposed for site utilities – storm water, sanitary sewer and water distribution
7. Identify parking and vehicular circulation requirements to accommodate facility users
8. Describe proposal for site development incorporating grading, surface runoff channeling and embankment erosion control

9. Describe features of existing vegetation and topsoil, and the preservation and reuse of these in the development of the site.
10. Outline proposals for soft landscaping – trees, shrubs, flowers and grassed areas.
11. Describe operational and maintenance aspects of site design and landscaping with particular attention to snow removal and storage, ease of maintenance of landscaped areas, and durability characteristics of proposed materials and products.
12. Identify environmental issues in connection with the construction and operation of the site.
13. Show planned parking areas, along with allotted parking spaces and roadways.
14. Show planned routing of site utilities, water, sanitary sewer and storm sewer.
15. Identify on site plans proposed measures for storm water management, which minimized the negative impacts upon the local hydrology.
16. Prepare concept site plans to depict existing conditions and proposed site design. Develop site sections necessary to illustrate extent of excavation, backfill and grading.
17. Identify location for site furnishing and structures.
18. Provide initial cost estimate of site work and services.

5.2.8 MECHANICAL

1. Provide TW with the overall mechanical engineering design intent for the proposed facility. Support with occupancy profiles, single line system schematics, overall heating and cooling loads, and total outdoor air and supply air flow figures for the facility.
2. Review applicable codes, regulations, restrictions, insurance requirements, and other factors affecting the design and review with authority having jurisdiction, as necessary. Identify codes and standards to which the design will follow.
3. Describe each of the proposed mechanical systems to be utilized in the facility including heating:
    a. HVAC and controls
    b. plumbing
    c. fire protection
    d. other required specialized mechanical systems
4. Describe viable alternative mechanical system concepts (for the preceding systems) being considered. Criteria to be considered are:

a. energy conservation
b. efficiency
c. maintainability
d. reliable performance (local parts and service availability)
e. capital cost

5. Analyze the energy consumption of three alternative heating systems on a monthly and hourly basis for one year using total life cycle cost method.
6. Describe function of each mechanical system as it would operate in the proposed facility and its effect on the gross size of the building.
7. Identify the location of the service connections to the building for all mechanical services. Comment on the availability of these services and describe how these services will be provided.
8. Identify recommended locations for mechanical rooms in the building and their approximate size (area and height).
9. Provide an initial cost estimate for the mechanical systems.

5.2.9 ELECTRICAL

1. Provide TW with the overall electrical engineering design intent for the proposed facility.
2. Describe viable alternative electrical system concepts being considered. Criteria to be considered are:
    a. energy conservation
    b. efficiency
    c. maintainability
    d. reliable performance, (local parts and service availability)
    e. capital cost
3. Identify codes and standards to which the design will follow.
4. Describe function of each electrical system as it would operate in the proposed facility and its effect on the gross size of the building. Include analysis of the client's functional requirements and describe how these systems meet those requirements.
5. Submit sketches illustrating the concept.

6. The location of the service connections to the building for all electrical services. Comment on the availability of these services and describe how these services will be provided.
7. Identify recommended locations for electrical and data rooms in the building and their approximate size (area and height).
8. Distribution single line diagram showing metering arrangement, transformers, and power supply feeders to distribution centers. Indicate the anticipated size of service entrance.
9. Lighting layouts and levels for typical spaces and a description of the proposed lighting strategy.
10. List of anticipated building systems and concept riser diagrams to be incorporated into the design documents. Coordinate systems requirements with the Prime Consultant for approval by the Design Manager.
11. Indicate proposed voltage level and number of phases for the power distribution system in the facility.
12. Indicate anticipated amperage of electrical service entrance.
13. Provide information to the mechanical Consultant and allow the mechanical Consultant to evaluate the best suited heating system for the building.
14. Provide an initial cost estimate for the electrical systems.

5.2.10 LEED®

1. Provide TW with a preliminary LEED® scorecard identifying points to be targeted, points which will not be pursued and those points which need to be explored further.
2. Describe each of the proposed systems to be utilized in the facility.
3. Describe viable alternative electrical system concepts being considered. Criteria to be considered are: energy conservation, efficiency, maintainability, reliable performance, (local parts and service availability), and capital cost.
4. At this stage, a decision will be made by TW to continue or discontinue the efforts towards LEED® certification.
5. The Consultant shall provide updates to TW on a regular basis, which shall include at a minimum:
    a. status of credits/points achieved
    b. factors limiting the achievement of any points planned for the project

c. issues with documentation submittal from all parties

5.2.11 COMMISSIONING

1. The Commissioning spec sections of the NL Master Specification Guide for Public Funded Buildings and the TW Commissioning Guidelines cover project aspects in detail. This section is an overview of the general process of Facility Commissioning.
2. The process of commissioning starts at the design phase and continues during construction phase. The following are commissioning activities carried out during the Concept Design stage of the project:
    a. identification of Commissioning Authority
    b. identify building systems to be commissioned
    c. identify the documentation requirements
    d. review and sign off on design concept for identified building systems
    e. identification of responsibilities of all parties involved with commissioning
    f. present design concept for identification of building systems

5.3 PHASE 2, STEP 2 – DESIGN DEVELOPMENT

5.3.1 GENERAL

1. The Design Manager will confirm that the project is within the approved budget prior to proceeding with the design development stage.
2. The design development process is crucial to the long term success of the project. It is this stage that final design solutions become thoroughly defined and documented for acceptance by the client in achieving program requirements, and by TW in relation to capital costs, long term maintenance and compliance with departmental design criteria.
3. The Design Manager is responsible for overall direction and co-ordination of the Consultant and ensuring client and departmental requirements are met prior to proceeding in earnest. Elements of the work which have been accepted may be released for the next stage of the design process, the contract document stage.
4. On minor capital and maintenance projects, Concept Design and Design Development often converge as a single activity, and culminate in the presentation of a brief technical design report. Design sketches are provided to clearly show the design intent. The report contents shall be analytical in its assessment of the problem, the options examined, and the reasons for the design solution selected.
5. The Design Development documentation shall be assembled in such a way to facilitate its updating and expansion to incorporate:
    a. the requirements of the project detailed design
    b. the systems description and operating principles required in the preparation of system operation manuals and commissioning manuals
    c. LEED® requirements or recommendations in order to achieve the certification level required for the project. Note, projects will require LEED® Silver unless otherwise notified.
    d. LEED® score card shall be included in submittals
    e. Format of the document shall be in conformance with the table of contents as outlined in http://www.tw.gov.nl.ca/works/ddr_model_index.pdf

f. During this stage of the design process, the Consultant is required to submit a tabular deliverables list (including specifications and drawings), indicating percentage complete. This schedule is to accompany all progress payment requests.

6. A final Design Report is to be prepared by the Consultant at the conclusion of this stage.
7. The Final Design Report may be considered as an extension of the Concept Design Report, and reuse of sections of the Concept Report is encouraged. However, revisions and updating is anticipated to reflect the final design solutions selected for the project.
8. In addition, the submission shall incorporate:
    a. a full listing of anticipated drawings
    b. a listing of applicable discipline technical specifications and new spec sections to be developed specifically for the project
    c. a listing of furnishings, furniture and client dedicated equipment to be procured under the capital cost of the project
    d. separate binders providing product/equipment literature for client and departmental acceptance, organized and referenced by NMS divisional and sectional specification sections
    e. LEED® Scorecard revision and comments with respect to achievement of credits
9. Review comments by the Project Team partners will be assembled and consolidated by the Design Manager. The Divisional Director will resolve any conflicts on technical matters. The Consultant shall revise and resubmit the Final Design Report as required to obtain the final approval of the Project Team.
10. The Design Manager will arrange design review meetings or other communications as may be required to conclude this stage of the design process.
11. On major projects, a final perspective should be prepared on the project. At this stage only a sketch perspective is normally provided.
12. At each submission, inter-disciplinary review by the Consultant team must be evident. This indicates to TW that there is constant communication between the design team members, and will avoid major coordination issues at the final stages of design.

5.3.2 GEOTECHNICAL

1. Upon completion of the preliminary investigation, the geo-technical sub-Consultant is to meet with the Design Manager and the Consultant team to review other relevant planning Concept Design information. The detailed geotechnical investigation shall include work as described in the following sections.

5.3.2.1 Field Exploration

1. The pattern of borehole drilling and/or test pit excavation should be agreed between the geotechnical Consultant and the Consultant's design engineers. The nature of the project to be designed and the known subsurface conditions of the area usually dictate the location, spacing and depth of the test holes.
2. The drilling of boreholes is to be carried out by an experienced drill crew using the type of equipment best suited for the terrain and anticipated soil conditions. Boreholes may be advanced by wash boring, with or without driven casing, solid stem augers or hollow stem augers. Test pits may be hand or mechanically excavated.

5.3.2.2 Field Sampling

1. Carry out exploration and field sampling work in accordance with recognized practice, such as recommended in the latest edition of the Canadian Foundation Engineering Manual, and by ASTM.
2. The frequency and type of sampling may be varied by the requirements of the project, but should be under the control of the geotechnical Consultant. Normally, standard sampling is carried out at 0.75 m intervals initially, with a spacing often increased to 1.5 m intervals below the 4.5 m or 6.0 m depth if conditions warrant such increase. Types of samples normally used include split spoons and thin wall Shelby tubes. Other types of samplers which may be required in certain types of soil are piston and Oesterberg samplers and foil samplers.
3. In test pit excavations, representative bulk samples may be recovered from the different stratigraphy units as necessary.

5.3.2.3 Field Testing

1. Carry out field testing in accordance with recognized practice such as recommended in the latest edition of the Canadian Foundation Engineering Manual, and by ASTM or in accordance with special instructions set out by the equipment manufacturers. Types of tests normally include in-situ vane, standard penetration, dynamic cone penetration, pressure meter and pumping tests. Other tests depending on soil conditions may include static cone penetrometer, flat dilatometer, plate load tests, etc.

5.3.2.4 Groundwater Records

1. Fluctuations in the elevation of the groundwater occur over a period of time. The existing groundwater level shall be monitored by piezometers or other methods as a routine part of any investigation. The installation of such equipment shall be in accordance with recognized standards. Such installations usually require additional visits to the site to make field observations until conditions have reached equilibrium.
2. Record all observations of the encountering of seepage water or initial water percolation into test pits. Record the rate of inflow and rise of water levels at the time of the initial observations in order to assess correctly the apparent influence which the water condition may have on the design project as well as on construction procedures.

5.3.2.5 Laboratory Testing of Samples

1. Test representative samples from the detailed site investigation in the laboratory for the determination of soil properties essential to the preparation of the geotechnical report. Determine natural moisture content of samples at the time of the investigation. Base the report and recommendations on the laboratory results obtained.

5.3.2.6 Classification Tests

1. Classification testing of samples is frequently carried out to identify soil type. Such classification tests include grain size analysis, Atterberg limits, moisture content determinations and is to be carried out in accordance with recognized practice such as recommended by ASTM.

5.3.2.7 Strength Tests

1. Strength and consolidation tests should be carried out on undisturbed samples if conditions warrant such testing. Such tests may be carried out in a variety of ways, depending upon the parameters required and the soil type being examined, but all such tests are to be carried out in accordance with recognized practice, such as recommended in relevant CSA Standards, the National Building Code of Canada, and by ASTM.

5.3.2.8 Geotechnical Report

1. The Geotechnical Report shall outline the terms of reference of the investigation, summarize the findings of the field investigation and the supplementary laboratory testing, and then present the conclusions and recommendations based on these findings.

5.3.2.8.1 Factual Data

1. The factual data comprises the terms of reference, the details of the field investigation procedures, the results of the field investigation, the results of the field testing, records of groundwater observations, laboratory test results, site plan and inferred soil stratigraphy, etc.

5.3.2.8.2 Report Recommendations

1. Recommendations may cover a variety of activities, such as alternative founding depths/elevations with recommended design bearing values, pile design considerations, estimates of potential settlements, recommended safe slopes of banks or excavation walls, earth pressures for shoring design, dewatering requirements, soil stabilization, etc.
2. Make the recommendations with due consideration to the construction proposed by the user, in order to provide the most economic viable alternatives available for consideration.
3. The report is a necessary tool for the, designer and for those Contractors who specialize in dewatering, excavation and foundations. Incorporate the part of the report containing factual information in the contract documents.

5.3.3 STRUCTURAL

1. Describe the structural design program with respect to comments provided as a result of TW and the Client's review of the Concept report.
2. Identify desired standards of quality and the effect of such standards on serviceability requirements such as:
    a. Deflection of slabs and beams and the effect of deflection on non-structural items such as curtain walls and glazing
    b. Control or advise of potential vibration induced by footfall or machinery
    c. Lateral drift of the structure
    d. Crack control in concrete and masonry structure elements
    e. Foundation settlement
    f. Soil-structure interaction
    g. Seismic deformation and movements
3. Prepare the preliminary structural analysis and design calculations.
4. Prepare preliminary foundation drawings based on recommendations from the geotechnical Consultant.
5. Prepare preliminary framing design showing layout of typical areas.
6. Coordinate structural design with deflection and lateral movement criteria to meet the requirement of the other design disciplines.
7. Provide product catalogue cuts of specialized materials appended to the design development submission.
8. Identify coating systems for structural elements with particular emphasis on corrosion protection where necessary.
9. Provide an elemental cost plan for the work appropriate for the level of information known at each submission stage.
10. Provide specification index.
11. Provide drawing deliverable list.

5.3.4 ARCHITECTURAL

1. Finalize review of codes and standards applicable to the project, with regulatory authorities.
2. Prepare drawings and other documents from the approved Concept Design showing:

a. fire separations and fire compartments and ratings
b. occupant load and exit path (route) calculations
c. architectural, mechanical, electrical and structural systems
d. environmental and energy performance criteria
e. rendering of the exterior of the project showing the materials and the colors selected

3. Provide a design building area analysis comparing the designed area to the programmed area.
4. Provide furniture layouts for typical interior spaces.
5. Provide an ergonomic review of casework and mill work.
6. Provide drawings to show:
    a. building floor to floor heights, identifying mechanical and other horizontal service space requirements
    b. exterior wall performance criteria, and components including typical details of major interfaces such as: wall/roof, wall/foundation, wall/intermediate floors, wall/window
    c. roof assembly, drainage provisions and waterproofing roof penetrations
7. Provide color schemes for discussion with the client, including colors for special finishes.
8. Update description of color scheme, provide updated color board
9. Identify if any color selected for a particular element of the project will affect the delivery date and project schedule
10. Provide information on areas that require special treatments
11. Catalogue cuts for furnishings, samples of draperies and other finishes
12. Provide an elemental cost plan for the work appropriate for the level of information known at each submission stage.
13. Provide specification index.
14. Provide drawing deliverable list.

5.3.5 CIVIL

1. Provide detail on the selected systems to allow the start of the final design and construction documents.

2. Review the reports from specialty Consultants and tests completed such as geotechnical, fire protection, flow rates, storm and sanitary capacity, etc.
3. Provide preliminary design drawings.
4. Provide product catalogue cuts of proposed materials, equipment and furnishings, appended to the Concept Design development submission.
5. Provide further developed site plans, site section and typical details of appurtenances and structures to fully explain final design for site grading, services and planting including:
    a. Location, orientation and finish floor elevation of the building, access from interior to exterior space and impacts on existing environment
    b. Water piping network with fire hydrant location and maximum fire flow rates
    c. Sanitary sewer network with pipe sizes and slopes, calculated pipe capacity and design peak flow, location of manholes
    d. Storm sewer network with pipe sized and slopes, calculate pipe capacity, design storm flows, location of manholes, catch basins inlet and outlet structures
    e. Routing and geometry of open drainage courses
    f. Proposed finished and existing site grades, geometry of cut and fill embankments, limits of landscaping
    g. Layout and proposed grades or roadways and parking areas, number of parking stalls, locations for snow storage, walkways and curbs, pedestrian and vehicle access points to the building
    h. Areas designated for trees, shrubs, planters, and site furniture
    i. Location of vehicle and pedestrian signage, fencing and flag posts
6. Provide an elemental cost plan for the work appropriate for the level of information known at each submission stage.
7. Provide specification index.
8. Provide drawing deliverable list.

5.3.6 MECHANICAL

1. Update design synopsis describing the mechanical work with respect to the comments and discussion from the Concept Design Submission.

2. Update information on description of operation of mechanical systems, including flow diagrams, and system schematics.
3. Submit Design Development drawings showing:
    a. mechanical service connections indicating sizes and inverts
    b. location of major mechanical equipment
    c. ventilation distribution with preliminary sizing
    d. cooling and heating systems
    e. controls schematics and sequence of operations for all systems
    f. fire protection system, showing major components
    g. plumbing layout, showing routing and sizing of major lines and location of pumping and other equipment as required
4. Provide catalogue cuts of proposed equipment.
5. Provide an elemental cost plan for the work appropriate for the level of information known at each submission stage.
6. Provide specification index.
7. Provide drawing deliverable list.

5.3.7 ELECTRICAL

1. Update design synopsis describing the electrical work with respect to the comments and discussion from the Concept Design Submission.
2. Update information on description of operation of electrical systems, and system schematics.
3. Submit Design Development drawings showing:
    a. legends and lighting/heating fixture schedules with manufactures catalogue numbers, lamps and remarks
    b. service equipment, and connections indicating sizes
    c. location of major electrical equipment
    d. distribution with preliminary sizing
    e. control equipment
    f. conduit and conductor layouts and sizes
    g. MCC & PF controls

h. grounding
i. proposed special loads
j. lighting layouts, include list of maintained lighting levels to be designed for throughout all spaces
k. indicate size of service entrance complete with connected and demand loads indicated on a single line riser diagram
l. drawings of typical lighting, power, heating and communication layouts and riser diagrams

4. Drawings of exterior electrical services showing:
    a. supply locations and size
    b. sub-station size and locations
    c. service routing
    d. street and area lighting layouts
    e. building and entrance locations
    f. cable types, sizes and electrical ratings
    g. characteristics of all electrical equipment and devices
    h. fire alarm system, showing major components
5. All proposed L.V systems including:
    a. telephone
    b. CCTV
    c. clock and program
    d. data
    e. public address
    f. fire alarm
    g. security
    h. nurse call
6. Provide catalogue cuts of proposed equipment.
7. Provide an elemental cost plan for the work appropriate for the level of information known at each submission stage.
8. Provide drawing deliverable list.
9. Provide specification list.

5.3.8 LEED®

1. Provide TW with an updated LEED® scorecard identifying points to be targeted, points which will not be pursued and those points which need to be explored further.
2. Describe in detail, each of the proposed systems to be utilized in the facility.
3. Any points which are not attainable at this stage, and were intended to be sought shall be accompanied with an explanation why the intent will not be met.
4. Update plan for document control and list of deliverables required from each discipline Consultant and Contractor in order to achieve the credits planned for.
5. At this stage a decision will be made within TW to continue or discontinue the efforts towards LEED® certification.

5.3.9 COMMISSIONING

1. Incorporate into the Final Design Report, a complete description of the design and system operation.
2. Include documentation on:
    a. building occupancy
    b. required physical areas for systems(s) and equipment
    c. air quality requirements
    d. energy performance
3. Preliminary Commissioning Manual shall be prepared by the Commissioning Authority at this time and shall be reviewed by the Consultant for comments.
4. Identify specific requirements and contractual responsibilities of:
    a. The Consultant
    b. The Contractor
    c. Transportation and Works
    d. The Client department
5. The Consultant shall identify building systems to be commissioned and submit updated systems descriptions to the Commissioning Authority for incorporation into the Commissioning Documents which will be "Issued for Tender" with all other tender documents.

5.4 PHASE 2, STEP 3 - DETAILED DESIGN

5.4.1 GENERAL

1. Submissions of working drawings and specifications shall be made at the 33%, 66% and 99% (Pre-Tender) stages of detailed design development. Various levels of review will be performed by TW at each stage. Comments will be returned to the Consultant for incorporation into the design.
2. For LEED® projects each submission shall include an updated LEED® scorecard accompanied by a justification of changes from the previous submittal.

3. At each submission, inter-disciplinary review by the Consultant team must be evident. This indicates to TW that there is constant communication between the design team members, and will avoid major coordination issues at the final stages of design.
4. Provide a pre-tender cost estimate for the work (all disciplines).
5. 99% design submission should represent complete working documents, all design is complete, interdisciplinary reviews completed, coordination of all systems, interference checks completed.

5.4.2 STRUCTURAL

1. Structural notes on drawings to indicate:
    a. Design criteria indicating all superimposed vertical and horizontal loads used in the design including live, snow, earthquake, wind, and dead loads, not shown on the structural drawings. These loads should be designed as unfactored.
    b. Reference to the geotechnical report on which the foundation design is based
    c. Brief material specification of structural elements
    d. Absolute or relative deflection criteria for structural members
    e. Where forces are shown, the forces should be clearly identified as factored or un-factored.
    f. Design standards
    g. Reference to drawings and specifications prepared by other disciplines
2. Foundation Plans:
    a. Allowable soil bearing capacity, pile capacities and lateral earth pressures for retaining structure
    b. Size, location, dimension and details of all foundations
    c. Assumed bearing strata or elevations
    d. Estimated pile lengths, or source for this information
    e. Location of known existing underground services and or structures
    f. If underpinning or temporary shoring is specified to be designed by others, indication on the drawings of the areas designated to be shored or

underpinned. If underpinning is designed by the structural Consultant, indication of all details and construction sequences.

3. Prepare floor and roof framing plans and details which show:
    a. General gridline dimension and overall building dimensions
    b. Sizes, location, dimension and details of structural elements
    c. Elevations, including slopes and depressions
    d. Lateral load resisting system
    e. Wind uplift system
    f. Governing forces, moments, shears or torsion required for the preparation of shop drawings and detail drawings
    g. Reinforcing bar sizes and details with fabrication and placing criteria
    h. Location and detail of control, construction, contraction and expansion joints
    i. Locations, sizes and details of all openings requiring reinforcement
    j. Provision for future extensions
    k. Location and magnitude of any additional superimposed loads, which are not part of the normal dead and/or live load
4. Prepare schedule and details for columns, beams and walls, indicating:
    a. Element size
    b. Elevation of bottom of columns
    c. Reinforcing steel and splice details for concrete columns
    d. Details of structural masonry or reinforced concrete walls including lintels and reinforcing or significant openings
    e. Stiffeners, lateral bracing an local reinforcement
    f. Type and location of splices for structural steel columns
    g. Show on structural drawings the location, sizes, reinforcing and connections of the structural elements in sufficient scale and detail to enable fabrication, installation and connection of the members in a reasonable sequence.
5. Connections:
    a. Design all connections or specify which connections are to be designed by others
    b. For structural steel projects wherein CSA W47.1 certified fabricators are specified, clearly state who is responsible to do connection design

c. Where connections are specified to be designed by others, indicate on the contract drawings all required information and governing forces. In such cases, the designing Engineer shall seal, sign and date the fabrication and erection drawings
d. Show all dimensions and comprehensive connection details requiring no further engineering input
e. Show general arrangement and details at intersections of different structural materials

6. Sequence of construction, if this is critical to the functioning of the finished structure.

5.4.3 ARCHITECTURAL

1. Prepare contract drawings and specification from the approved Design Development Report showing:
    a. floor plans
    b. elevations
    c. cross sections
    d. wall construction details
    e. window details
    f. roofing details
    g. component details
    h. case work and mill work details
    i. fire separations and fire compartments and ratings
    j. occupant load and exit path (route) calculations / way finding
    k. accessibility requirements
    l. rendering of the exterior of the project showing the materials and the colors selected
    m. Reflected ceiling plans
    n. building floor to floor heights, identifying mechanical and other horizontal service space requirements

o. exterior wall performance criteria, and components including typical details of major interfaces such as: wall/roof, wall/foundation, wall/intermediate floors, wall/window
p. roof assembly, drainage provisions and waterproofing roof penetrations

2. Provide color schemes
3. Provide information on areas that require special treatments
4. Catalogue cuts for furnishings, samples of draperies and other finishes

5.4.4 CIVIL

1. Provide product catalogue cuts of proposed materials, equipment and furnishings.
2. Provide site plans, site section and typical details of appurtenances and structures to fully explain final design for site grading, services and planting including:
    a. Location, orientation and finish floor elevation of the building, access from interior to exterior space and impacts on existing environment
    b. Water piping network with fire hydrant location and maximum fire flow rates
    c. Sanitary sewer network with pipe sizes and slopes, calculated pipe capacity and design peak flow, location of manholes
    d. Storm sewer network with pipe sized and slopes, calculate pipe capacity, design storm flows, location of manholes, catch basins inlet and outlet structures
    e. Routing and geometry of open drainage courses
    f. Proposed finished and existing site grades, geometry of cut and fill embankments, limits of landscaping
    g. Layout and proposed grades or roadways and parking areas, number of parking stalls, locations for snow storage, walkways and curbs, pedestrian and vehicle access points to the building
    h. Areas designated for trees, shrubs, planters, and site furniture
    i. Location of vehicle and pedestrian signage, fencing and flag posts

5.4.5 MECHANICAL

1. Prepare contract drawings. In the case of buildings, these drawings should be made, where possible, to the same scale as that of the building layout drawings and should define the work.
2. Where scale of drawings or complexity of work make drawing difficult to be read and interpreted, separate drawings should be provided for such areas of the work as:
    a. plumbing drainage
    b. heating, ventilating and air conditioning
    c. fire protection
    d. process piping and equipment
    e. other special systems as necessary
3. Provide schematics and diagrams as required for all major systems with notes to describe the function of control, flow and operation
4. Include plot plans and/or site plans showing water supply, gas supply, sanitary and drainage arrangements and connections to public utility services as required, complete with invert elevations
5. Include symbol lists and typical details should be included, where required, for all equipment, accessories, piping and duct systems
6. Provide floor plan layouts for all piping and duct systems. Show complete duct and pipe sizing on these documents. Show sizes, types, locations and capacities of all supply and exhaust air terminals together with type and location of valves.
7. To avoid conflicts, provide supplementary details for boiler, equipment and fan rooms and congested areas.
8. Piping and duct work can be shown in single line, except where necessary to show arrangements and clearance for piping or duct work in ceiling spaces, shafts, header trenches, pipe chases and for tight or close-coupled equipment. Show piping and duct work in double-line detail with appropriate valves, fittings and accessories
9. Include schedules to provide capacities and details of performance of fans, air-handling units, pumps, etc.
10. All drawings as well as details, elevations and sections are to be properly cross-referenced.

5.4.6 ELECTRICAL

1. Plot plan showing incoming power and communication services
2. Floor plans showing:
    a. detailed system layout of all electrical systems, showing sizes, locations, and quantities
    b. Room identification
    c. Legend of all symbols
    d. Circuit number at outlet and motors
    e. All conduit and wire sizes
    f. For each panel, a panel schedule with loadings
    g. all equipment locations
    h. relevant details and sections
    i. schedules
    j. detailed control schematics including sequence of operation
3. Single line diagrams of the power circuits with their metering and protection including:
    a. Complete rating of equipment
    b. STs and PTs
    c. Maximum short circuit levels on which design is based
    d. Identification and size of services
    e. Connected load and estimated maximum demand on each load center
4. Provide riser diagrams for power, communications (data, telephone), fire alarm and other systems. Riser diagrams are to be complete showing all devices, locations by room number, conduit risers and sizes, wire type and size.
5. Provide motor control diagrams for each system.
6. Provide equipment schedule for motor and controls.
7. Provide electrical heating layout and schedule.
8. Provide control drawing details of electric heating.
9. Provide complete lighting layout and fixture schedule clearly indicating circuiting, switching, fixture types and mounting methods.
10. Submit a computer analysis of the lighting for typical spaces showing point-by-point lighting level values.

11. Provide the following design data:
    a. Total connected load
    b. Maximum demand and diversity factors
    c. Sizing of standby power load if applicable
12. Short–circuit requirements and calculations showing the required ratings of equipment used. Verify that beakers and fuses are correct types and ratings to handle anticipated fault currents and will facilitate protective co-ordination of the whole system. This item will be considered a requirement for the electrical distribution equipment supplier and would normally be stated in the contract specification.
13. Provide edited Master Specification with track changes on at pre-tender submission. Make changes required by TW and accept changes for tender documents.
14. Provide detailed equipment list with the following information:
    a. identification number
    b. location
    c. type, proposed manufacturer, make, model
    d. operating parameter (max, normal, min)
    e. electrical requirements
    f. control comments
    g. other pertinent information

5.4.7 LEED®

1. Provide TW with an updated LEED® scorecard identifying points to be targeted, points which will not be pursued and those points which need to be explored further. The score card will be issued with the Tender Package and will form part of the contract.
2. Describe in detail, each of the proposed systems to be utilized in the facility.
3. Any points which are not attainable at this stage, and were intended to be sought shall be accompanied with an explanation why the intent will not be met.
4. Update plan for document control and list of deliverables required from each discipline Consultant and Contractor in order to achieve the credits planned for.
5. At this stage a decision will be made within TW to continue or discontinue the efforts towards LEED® certification.

5.4.8 COMMISSIONING

1. The Consultant shall identify building systems to be commissioned and submit updated systems descriptions to the Commissioning Authority for incorporation into the Commissioning Documents.
2. The commissioning specifications as posted on TW's website shall be included in the tender specification, the intent is that these specifications should not be modified, however the Consultant should review and discuss with the CxA any requirements specific to a project.

5.5 PHASE 2, STEP 4 - CONTRACT DOCUMENTS

5.5.1 GENERAL

1. During this stage of the design process, the Consultant is required to submit a tabular drawing and specification list, indicating percentage complete achieved to date with respect to each working drawing. This schedule is to accompany any progress payment request.
2. Commonly accepted progress submissions occur at 33%, 66%, and 99% completion.
3. On minor capital and maintenance projects, it is common to have only a single submission of the contract documents for review purposes at completion and prior to tendering. Review input by the inspection group is standard practice for all regional projects.
4. Working drawings are to be prepared and in accordance with this manual.
5. Technical specifications are to be prepared using the latest editions of the "NL Master Specification Guide for Public Funded Buildings" where applicable. If a required section does not exist, the Consultant is responsible for creating that section in a format consistent with the Department of Transportation & Works specifications. Request specification number from TW.
6. The submissions are subject to review by the TW Project Team and Regional Inspection group. The Design Manager shall ensure the necessary approvals are in place prior to calling tenders, and the tender documents accurately reflect the revisions and changes arising from the review/approval process.
7. The Consultant is responsible for design quality assurance to ensure accurate, coordinated and complete contract documents are prepared for construction purposes. TW requires a formalized interference design check, and a constructability review performed by Consultant's staff who:
    a. was not directly involved in design preparation
    b. have at least ten (10) years design experience
    c. have similar experience in administering and managing construction change orders
8. Under certain authorized project delivery schedules, there is no alternative but to conduct the design checks and constructability review during the tendering period. The Design

Manager, in consultation with the Construction Manager, will direct the Consultant on how the conflict between the project schedule and quality control will be addressed. Addenda are not an avenue for completion of design tasks. The use of addenda to complete the design process will be reflected poorly in the Consultant review process.

9. Contract drawings and specifications will be provided by the Consultant for calling tenders in accordance with this manual.
10. Where requested by the Design Manager, the Consultant will arrange for the preparation and submittal of a final, colored rendering of the project.
11. The contract documents are to fully address commissioning requirements appropriate for the project and departmental requirements. Edit the NL Master Specification Guide for Public Funded Buildings on Commissioning to suit the project.
12. The contract documents are to fully address LEED® requirements appropriate for the project and TW requirements.
13. Pretender estimates are to be prepared and submitted with the 99% progress submission. The Consultant is responsible for monitoring construction costs during the preparation of contract documents and advising the Design Manager of any significant deviation as a result of client or TW requested design changes. The Design Manager is to ensure that the probable cost increases do not exceed the design contingency allowance provided for in the cost plan.
14. The Design Manager may require that design calculations be submitted by the Consultant for review by departmental professional staff. The Consultant shall be responsible that design calculations are maintained and presentable in a clear and organized manner.
15. The Design Manager shall ensure that the Final Design Report, accepted subsequent to the design development stage, be updated by the Consultant to reflect material changes and revisions in the facility systems design, which occurred during the production of contract documents.

5.5.2 Standard Front End Documents

1. Standard front end documents consist of the Instructions to Bidders, Supplementary Instructions to Bidders, General Conditions, Supplementary General Conditions, Certificate

of Insurance, the Tender Form and the Agreement Between Owner and Contractor Form. These documents are available from TW's internet site.

2. Modifications to the standard front end documents are not permitted for legislative reasons, without the prior approval of the Deputy Minister. Project specific requirements are to be accommodated in the Technical Specifications.

5.5.3 Specification of Equipment & Products

1. Through the application of generic product specifications the use of local manufactured products of equivalent quality is to be promoted.
2. Material and equipment shall be specified by:
    a. reference to a relevant Standard
    b. by reference to an accepted product evaluation publication
    c. by prescriptive or performance criteria
3. Trade names may be used if the foregoing methods cannot be reasonably or fully applied. In case of named products, where possible specify at least three "Acceptable Products" or include "or approved equal".

5.5.4 Scheduling of Construction Work

1. Projects involving renovations while remaining occupied or multi phased projects require a project implementation strategy. This strategy shall be clearly presented in the technical specifications to guide the Contractor in planning and scheduling his work methods. Key milestone dates shall also be identified. Typical issues which shall be addressed are:
    a. normal business hours for work and exceptions such as noise or dust producing work
    b. payment for extended security costs
    c. responsibility and sequencing for furniture moving and relocation
    d. maintenance of fully functional entrances and exits at all times
    e. specific client requirements to ensure continuity of operations
2. The time period permitted for completion of construction must be stipulated directly on the Tender Form or the Tender/Contract Form.

3. A reasonable substantial completion date shall be stipulated in the tender documents with a clause outlining any late completion assessments. The Design Manager will check that the completion date submitted with the Contractor's tender is within the stipulated completion time prior to recommending award.

5.5.5 LIQUIDATED DAMAGES

1. The standard clause for liquidated damages forms part of the Supplementary General Conditions.
2. Liquidated damages are intended to cover reasonable costs estimated to be incurred by the Owner due to late completion by the Contractor. This would normally include such items as additional leasing costs, consulting fees and expenses, salary and traveling costs of the Construction Manager, and Inspectors, resident project staff, etc.
3. In addition to late completion, the Department has incurred extra expense arising from untimely requests for inspection by the Contractor. If the Contractor requests for inspection or special testing, and the work is not ready upon arrival of the Inspection Team, then the Contractor is to be held responsible for the cost of future inspections for the same purpose.

5.5.6 SEPARATE CONTRACTS

1. TW promotes separate contract packages for certain facility installations based on life cycle principles. Standardized contract documents are currently available for:
    a. passenger elevators
    b. controls
    c. intrusion alarm systems
    d. medical gas inspector
2. The Design Manager shall co-ordinate Division 1 - General Requirements regarding the Contractor's responsibilities in dealing with other Contractors engaged by TW.
3. Life cycle contracts require the initial capital cost and the maintenance service cost to be identified. It is common practice to assign the capital portion of the separate contract to the General Contractor, while TW enters into a direct contract with the successful sub-Contractor for the maintenance service portion.

5.5.7 FURNISHINGS & SPECIAL EQUIPMENT

1. For major projects, furnishings and special equipment are normally included in the project budget. The Design Manager, in consultation with the client, shall decide if such furnishings and equipment shall be included in the construction contract, a separate contract, or supplied by other means.

5.5.8 PROJECT RECORDS SYSTEM

1. On major projects it is important that a standardized project records system be set up and maintained at the location of the Design Manager, the Construction Manager, and the Field Office on the construction site.
2. With rapid advancement in technology and communications, and computer equipped field offices, a fully interactive high speed communications, project document control, and records system is possible.
3. An electronic document management system has been set up and is in use by the Design & Construction Division for the management, storage and retrieval of divisional and project communications. This system is available for implementation on a project specific basis or regional office operations.

5.5.9 CASH ALLOWANCES

1. When Cash Allowances are required, they are to be identified in the Tender Price Table – Appendix-C of the Tender Form and shall be clearly identified in section 01 21 00 – Allowances of the specifications.
2. Cash allowances are specified net amounts, with the overhead and profit of the General Contractor to be included in the base tender price.
3. Cash allowances may be used, at the discretion of the Design Manager, to cover specific materials, work or services that cannot reasonably be quantified in the tender documents.
4. Payment against cash allowance shall normally be supported by the Contractor's time sheets, supplier's invoices, or other documentation, and would not provide for any overhead or profit.
5. Cash allowances shall be kept to a minimum, and applied to specified items of work such as testing and inspection, door hardware.

6. Cash allowances shall not be used for contingency provisions or unspecified uses such as unforeseen site conditions.
7. Contingency allowances shall be budgeted and allocated in the project budget, and not the construction tender.
8. When work related to the cash allowance is completed, the Construction Manager shall adjust the contract amount with a change order equal to the difference between the cash allowance and the final cost of the specified materials, work or services.

5.5.10 Separate Prices

1. Separate Prices are included in the total value of tender. They identify the premiums for optional quality of materials, systems, etc.
2. Tender to be awarded for full bid price and change orders issued during the construction period for separate price items.
3. Separate prices shall be used cautiously.
4. Separate prices for credits to delete items should be avoided.

5.5.11 Unit Prices

1. Unit Prices are used when there are elements of work that have unknown quantities and therefore cannot be priced with a lump sum contract. Examples include excavation, rock removal and disposal of contaminated soil.
2. Estimates of quantities and unit shall be listed in Appendix C of the Tender Form in the Unit Price section. Bidders are expected to fill in their unit prices in that table. The value of unit price work is included in the total tender amount.

5.5.12 Tender Documents

1. The Design Manager shall submit final documents to the Tendering & Contracts Division.
2. Final documents shall be a single print ready Adobe (.pdf) document containing the cover page, index, front end, technical specifications and drawings.

5.5.13 ARCHITECTURAL

1. This submission comprises complete contract documents ready for tender call, with all corrections and comments from previous submissions incorporated. Provide contract drawings and specifications in accordance with this manual.
2. Incorporate product colors into the contract documents in accordance with the approved color scheme.
3. Provide finish schedule on drawings.
4. Provide finalized color boards.
5. List status of submissions to regulatory authorities, and include regulatory forms submitted for the project. Pay all application fees charged by the regulatory authority.
6. Provide a pretender estimate and updated cost plan for the work.
7. Provide edited Master Specification with track changes on at pre-tender submission. Make changes required by TW and resubmit with the accepted changes to be included in the tender documents.
8. Complete technical review of the architectural documents by the architect of record must be completed prior to the submission of document for review by TW. Indication of such will be by a wet ink initial on all documents submitted to TW.
9. Inter-disciplinary review by the architect of all other disciplines must be completed prior to the submission of document for review by TW. The goal is to eliminate coordination issues. Indication of such will be by a wet ink initial on all documents submitted to TW.
10. For LEED® projects the following shall be submitted with the tender package:
    a. TO BE DEVELOPED

5.5.14 CIVIL

1. This submission comprises complete contract documents ready for tender call, with all corrections and comments from previous submissions included. Provide contract drawings and specifications in accordance with this manual.
2. Provide edited Master Specification with track changes on at pre-tender submission. Make changes required by TW and accept changes for tender documents.
3. Coordinate with Authorities Having Jurisdiction as required and provide copies of correspondence respecting regulatory approvals of the proposed work.

4. In conjunction with the Transportation & Works staff, establish testing and inspection requirements.
5. Provide a pretender estimate and updated cost plan for the work.
6. Provide specified product literature manual prior to tender call.
7. Complete technical review by the engineer of record must be completed prior to the submission of document for review by TW. Indication of such will be by a wet ink initial on all documents submitted to TW.
8. Inter-disciplinary review by the engineer of all other disciplines must be completed prior to the submission of document for review by TW. The goal is to eliminate coordination issues. Indication of such will be by a wet ink initial on all documents submitted to TW.
9. For LEED ® projects the following shall be submitted with the tender package:
    a. TO BE DEVELOPED

5.5.15 STRUCTURAL

1. This submission comprises complete contract documents ready for tender call, with all corrections and comments from previous submissions included. Provide contract drawings and specifications in accordance with this manual.
2. Tender documents shall be completed and include the following:
    a. structural notes
    b. typical details
    c. foundation plans and schedules
    d. floor and roofing plans and details
    e. schedules and details for columns, beams and walls
    f. connections
    g. sequence of construction if critical to the function of the finished structure
3. Coordinate structural system compliance with fire assembly resistance ratings.
4. Provide product catalogue cuts of specialized materials appended to the design development submission.
5. Provide a pretender estimate and updated cost plan for the work.

6. Complete technical review by the engineer of record must be completed prior to the submission of document for review by TW. Indication of such will be by a wet ink initial on all documents submitted to TW.
7. Inter-disciplinary review by the engineer of all other disciplines must be completed prior to the submission of document for review by TW. The goal is to eliminate coordination issues. Indication of such will be by a wet ink initial on all documents submitted to TW.
8. For LEED ® projects the following shall be submitted with the tender package:
    a. TO BE DEVELOPED

5.5.16 MECHANICAL

1. This submission comprises complete contract documents ready for tender call, with all corrections and comments from previous submissions included. Provide contract drawings and specifications in accordance with this manual.
2. Tender drawings shall be complete and include the following:
    a. Floor plans showing detailed system layout of all mechanical systems, showing sizes, locations, and flow quantities
    b. All equipment locations
    c. Relevant details and sections
    d. Schedules
    e. Detailed control schematics including sequence of operation
    f. Air handling equipment sections showing all components, fans, spacers, access doors, vibration isolation and mounting. Dimension each component section length, and the unit width, length and height.
3. Provide final cost estimate.
4. Provide edited Master Specification with track changes on at pre-tender submission. Make changes required by TW and accept changes for tender documents.
5. Provided detailed equipment list with the following information:
    a. Identification number
    b. Location
    c. Type, proposed manufacturer, make, model
    d. Operating parameter (max, normal, min)

e. Electrical requirements
f. Control comments
g. Other pertinent information

6. Complete technical review by the engineer of record must be completed prior to the submission of document for review by TW. Indication of such will be by a wet ink initial on all documents submitted to TW.
7. Inter-disciplinary review by the engineer of all other disciplines must be completed prior to the submission of document for review by TW. The goal is to eliminate coordination issues. Indication of such will be by a wet ink initial on all documents submitted to TW.
8. For LEED® projects the following shall be submitted with the tender package:
    a. CAD drawings indicating all zones used in the HVAC design. Both electronic and hard copy shall be submitted in accordance with this manual
    b. Signed Model National Energy Code for Buildings or the ASHRAE mandatory requirement checklists
    c. Calculations for workarounds and renewable energy credits performed outside of the energy modeling software. Calculations shall be detailed enough so that the reviewer can follow the thought process and assess applicability
    d. Support for all utility rates used in the energy model
    e. The energy simulation package
    f. Narrative explaining modeling techniques so the reviewer can follow the logic used to generate the energy models
    g. Base building electronic simulation file
    h. Proposed building electronic simulation file

5.5.17 ELECTRICAL

1. This submission comprises complete contract documents ready for tender call, with all corrections and comments from previous submissions included. Provide contract drawings and specifications in accordance with this manual.
2. Tender drawings shall be a completion of the design development drawings and include all comments from TW and TW representatives.
3. Drawings showing:

   a. Detailed system layout of all electrical systems, showing sizes, locations, and quantities
   b. All equipment locations
   c. Relevant details and sections
   d. Schedules
   e. Detailed control schematics including sequence of operation
4. Provide final cost estimate.
5. Provide edited Master Specification with track changes on at pre-tender submission. Make changes required by TW and accept changes for tender documents.
6. Complete technical review by the engineer of record must be completed prior to the submission of document for review by TW. Indication of such will be by a wet ink initial on all documents submitted to TW.
7. Inter-disciplinary review by the engineer of all other disciplines must be completed prior to the submission of document for review by TW. The goal is to eliminate coordination issues. Indication of such will be by a wet ink initial on all documents submitted to TW.
8. For LEED ® projects the following shall be submitted with the tender package:
   a. TO BE DEVELOPED

5.5.18 Constructability Review

1. In an effort to reduce the incidence of change orders due to errors or omissions exceeding stated benchmarks, the following is a guide for a constructability review to be completed by the Consultant prior to issue of tender documents.
2. This guide should be used for reviews of both in-house design and work contract to external Consultants.
3. Review the front end documents regarding:
   a. contract award conditions
   b. project duration and progress requirements
   c. measurements for payment clauses as applicable
   d. site operations, safety and security
   e. exculpatory language
4. confirm that the Tender Form includes:

a. correct project number
b. correct project title
c. correct mailing address
d. Article 2 – reasonable period of time for substantial completion: (X months from award)
e. Article 9 – indicate if the Bid Depository is to be used

5. Check Certificate of Insurance, add Environmental Impairment Liability ($2 M) if required (e.g. Abatement Projects)
6. Review the drawings for:
    a. discrepancies
    b. poor or vague details
    c. insufficient as built information reflecting existing conditions
    d. differences between specified and actual dimensions of specified equipment
    e. conflicting dimensions
    f. undersized mechanical rooms
    g. access for moving equipment around during installation of equipment
    h. LEED® requirements where applicable
    i. safety in constructability and operation of the facility
    j. access for proper regular maintenance
7. Review technical specifications for:
    a. non- specificity of references
    b. missing or duplicated drawing notes and specification sections
    c. conflict between drawing and technical specifications
    d. subsurface conditions report
    e. clarity in scope and payment of site works and services
    f. requirements of full-time vs. part time site safety officers
8. Review Utilities in relation to:
    a. availability of temporary utilities
    b. relocation of utilities by others
    c. description and location of existing utilities
    d. deteriorated condition of existing utilities
    e. unmarked existing utility lines

9. Perform an interdisciplinary interference check to identify:
    a. insufficient space to accommodate systems
    b. inadequate ceiling space particularly to accommodate HVAC ductwork
    c. inadequate mechanical rooms
    d. inadequate structural support
    e. conflict between sewer lines and other items
    f. conflict in reflected ceiling plans

5.5.19 LEED®

1. The finalized LEED® scorecard forms part of the contract documents. Throughout the construction phase, the Contractor, Consultant, and Project LEED® AP, and TW Staff shall ensure that their respective responsibilities are fulfilled to meet the requirements of each credit sought.
2. All documentation is to be turned into the LEED® AP for the project for monitoring, and organization in preparation for submittal to the CaGBC.
3. Portions of the contract costs for each line item of the contract break-down, for the Contractor and Consultants, shall be held to cover the LEED® documentation process unless specific line items are identified.

5.5.20 COMMISSIONING

1. The Consultant shall provide to the Commissioning Authority a complete list of equipment with the following information:
    a. identification number
    b. location
    c. type, proposed manufacturer, make, model
    d. operating parameter (max, normal, min)
    e. electrical requirements
    f. control comments
    g. other pertinent information
2. Finalized Commissioning Manual will be prepared by the Commissioning Authority and issued with the contract documents. Including:

3. Commissioning tests and documentation forms
4. Training and instruction requirements
5. The Consultant shall include complete commissioning specifications which shall provide sufficient information to bidding Contractors to properly evaluate and bid the cost of facility commissioning.
6. The appropriate sub-Contractors shall be responsible for carrying out the physical activities required for checking and operating components and systems during the commissioning process. The Contractor shall be responsible for coordinating manufacturer's representative on site with the Commissioning team as required.
7. Portions of the contract costs for each line item of the contract break-down, for the Contractor and Consultants, shall be held to cover the commissioning process unless specific line items are identified.

5.5.21 Safety Specification

1. The safety specifications found on TW's website, should be modified with respect to the full time on site contractor safety officer. The consultant is responsible for obtaining from the Design Manager the decision to include or not include the full time on site contractor safety officer.

5.6 Phase 2, Step 5 – Tendering and Contract Award

5.6.1 Public Tenders

1. Procedures covering tenders are covered under the "Public Tender Act", "Public Tender Regulations", and "The Atlantic Procurement Agreement".
2. A Public Tender is required for work estimated to cost $20,000 or greater.
3. Tenders that are advertised shall allow reasonable time for industry to respond. The Tender period is fifteen (15) calendar days. Depending on the complexity and if a site briefing is required, a longer period may be necessary and are assessed on a per project basis.

5.6.2 Invited Prices

1. Public service work with an estimate less than $20,000 may be tendered by invitation:

a. Written quotations should be obtained where practical. Where, for good reason, written quotations cannot be obtained, telephone quotations may be used.
b. A minimum of three companies must be invited to submit pricing.
c. Invited prices are to be written in sufficient detail to precisely identify the requirements of the contract and permit the work to be independently inspected. Specifications, scope of work and drawings shall be attached to invite letter as required.
d. The letter of invite shall indicate, the following documentation is required to be submitted prior to the start of work:

2. Letter of good standing with the Newfoundland and Labrador Construction Safety Association's Certificate of Recognition Program
3. Certificate of good standing with Workplace Health, Safety and Compensation Commission
4. Certificate of Insurance
5. The required completion date is to be clearly specified.

5.6.3 Site Briefings / Viewings

1. Normally, site briefings / viewings shall be used when the preparation of detailed plans and specifications will adversely affect the schedule of the work, or site clarification is required.
2. Attendance at site briefings should be strongly encouraged but not mandatory.

5.6.4 Inquiries from Prospective Bidders

1. Inquiries may be received by the Tendering & Contracts Division, who will then forward to the appropriate person for review, usually the Design Manager.
2. Inquiries may also be received directly by the Design Manager or others involved in the project, including the Consultant. The Design Manager is responsible for ensuring appropriate responses are provided.
3. Reponses to inquiries may result in the requirement to issue an addendum. No directions or changes to the tender documents shall be made verbally.
4. Responses to any inquiry shall be disseminated to all prospective bidders.
5. Pretender estimates are not to be released.

5.6.5 PREPARATION OF ADDENDA

1. Addenda shall be issued to notify bidders of changes to the tender documents, to clarify and/or correct portions of the tender documents, and to identify products as acceptable substitutes.
2. Addenda shall be issued no later than five (5) days prior to tender closing.
3. If an addendum is necessary with five (5) days prior to the tender closing, the tender closing date shall be extended accordingly.

5.6.6 SUBSTITUTION OF MATERIAL

1. Material may be substituted during the tender period or after contract award, in accordance with the procedures as outlined in the NL Master Specification Guide for Public Funded Buildings, Section 01 61 00 – Common Product Requirements.

5.6.7 BID DEPOSITORY

1. Contracts which include substantial amounts of subtrade work may use the Bid Depository operated by Newfoundland and Labrador Construction Association.
2. Where the Bid Depository is being used, the Design Manager will:
    a. Notify the Consultant and Tendering & Contracts Division accordingly
    b. Ensure appropriate Appendix is listed in Article 9, USE OF BID DEPOSITORY, in Instructions to Bidders

5.6.8 LISTING OF MAJOR SUB-CONTRACTORS AND SUPPLIERS

1. The Design Manager and the Consultant may establish a listing of all major Sub-Contractors, and equipment suppliers required for the work.
2. The finalization of who the major Sub-Contractors and suppliers will be on the project is important:
    a. to discourage shopping of prices indefinitely
    b. to facilitate early shop drawing submissions
    c. to avoid construction delays due to late arrival of major equipment or product items

3. The listing shall form part of Appendix-A to the Tender Form, and be completed prior to the contract award.
4. As per the Supplementary Instructions to Bidders Item 6, Appendix A does not have to be completed at time of tender close. Bidders are given 72 hours following request by Owner to submit completed appendices.

5.6.9 Requests for Tender Withdrawal

1. Approval for a Contractor to withdraw their tender after the tender closing date will be, subject to the approval of the Executive, based on recommendation of the Design Manager.
2. Approval may be granted without prejudice, if the Contractor can demonstrate that an error was made in the preparation of the bid arising from errors or contradictions within the tender documents. Errors made by the bidder in the preparation of the bid may not be an acceptable cause to grant withdrawal.
3. If a request is denied, a contract may be awarded and immediate action will be taken by the Construction Manager to obtain the bonding and insurance. If the necessary documents are not submitted, the Construction Manager will cause the contract to be terminated and Tendering & Contracts will be notified to make the necessary claim against the bid bond.

5.6.10 Tender Exceeding Project Budget

1. Changes in the project scope related to negotiations aimed at reducing the amount of the tender to meet a predetermined budget are not permitted. In such instances the reduced contract amount would be equivalent to an untendered contract, as defined by the “Public Tender Act”.
2. If the tender is not awarded at the price submitted by low bidder, the tender documents may be revised to reflect a change in the scope of work to comply with the predetermined budget. A new tender call may be issued.
3. The Consultant is responsible for the preparation of contract documents within the predetermined budget. If the tender exceeds the project budget for reasons within the control of the Consultant, the Consultant shall provide redesign services at no additional expense.

5.6.11 Tender Analysis, Approval and Award

1. Once Tendering & Contracts Division confirms that the tenders from eligible bidders are submitted in accordance with the requirements (signed, sealed, bid security in order etc.) they forward the tender docket to the designated Design Manager for analysis and recommendation.
2. If the work is to proceed (funding in place, and with client approval), the Design Manager will recommend that the tender be awarded to the low bidder. The Design Manager prepares a recommendation in PARTS, initials the docket and returns it to Tendering & Contracts. The recommendation in PARTS, includes the Review of Tender Form, Contractor Evaluation, Cost Comparison and Project Budget.
3. A copy of the low bid is retained by the Design Manager. The second and lowest bid may also be retained for regional files.
4. If the contract value is less than $100,000, the Regional Director may approve the contract award. Request for approval to award the contract for bids greater than $100,000 are forwarded to TW executive for approval, as well as client executive as applicable.
5. Tendering & Contracts Division prepares the contract award letter following notification of approval.

5.6.12 Contract Agreement

1. Tendering & Contracts Division shall prepare the Agreement between Owner and Contractor.
2. The signed agreement is sent to the Contractor with an original retained by the Tendering & Contracts Division. A copy is sent to the Construction Manager.

5.6.13 Construction Document Package

1. The Consultant shall provide complete “Issued for Construction” document package incorporating all addenda no later than 5 days after the tender close.
2. This package shall include all:
    a. Drawings
    b. Specifications
    c. LEED® documentation from the design phases if the project is to follow the LEED® requirements

d. Issued for construction Commissioning Manual
e. A finalized construction estimate, including the addenda

3. The issuance of IFC documents to reflect revisions made to the contract drawings and specifications by addenda is a requirement and is to be included in the Consultant basic services. IFC drawings shall be prepared by the Consultant and delivered to TW five (5) days after tender close. When there is a scope change, a change order from the Consultant will be considered.
4. Issued for Construction Drawings are to be issued with the appropriate revisions noted in accordance with documentation standards outlined in this manual in reproducible, full size paper copy and electronic Adobe Acrobat (.pdf) format as well as AutoCAD (.dwg) file format.
5. Specifications are to be re-issued with addenda changes incorporated in each specification section.
6. Specifications are to be provided in reproducible paper copy (unbound) as well as electronically in Adobe Acrobat (.pdf) and WORD (.DOC) formats.
7. The Consultant may be required to prepare additional drawings to properly clarify and interpret the contract drawings. This service is included in the Consultant's basic services fee, under the category of contract administration services. Sketches are not acceptable.

5.7 PHASE 2, STEP 6 - DESIGN MANAGER TO CONSTRUCTION MANAGER HANDOVER

1. Once the construction contract is awarded, the Construction Manager assumes responsibility for the implementation of the project, and administration of the contract(s) in the construction phase.
2. The Design Manager is to ensure the Construction Manager has all necessary documentation for a smooth transition to the construction phase including the Prime Consultant Agreement with associated change orders and payment certificates, commissioning manual, LEED® scorecard and Consultant evaluation.

6. PHASE 3 - CONSTRUCTION PHASE

6.1 CONSTRUCTION PHASE PROCEDURES

6.1.1 SAFETY

1. The entire project team shall ensure that safe work practices are followed and deficiencies in safe work practices will be immediately reported to the Contractor's designated representative and TW's Construction Manager.
2. In some cases, a full time on Contractor's Site Safety Supervisor is required.
3. Requirements for site safety are described in the NL Master Specification Guide for Public Funded Buildings.
4. The Contractor shall develop and submit to the Construction Manager a Site Specific Safety Plan, which shall include but not limited to:
    a. Detailed hazard assessment of the project detailing methodologies for addressing site specific safety issues that will arise in individual phases of the project.
    b. Hazard assessment results.
    c. Engineering and administrative demonstrative controls (work-practices and procedures) to be implemented for managing identified and potential hazards, and comply with applicable federal and provincial legislation and more stringent requirements that have been specified in these specifications.

d. An organizational structure which shall establish the specific chain of command and specify the overall responsibilities of Contractor's employees at the work site.
e. Define work tasks and objectives of site activities/operations and the logistics and resources required to reach these tasks and objectives.
f. Accident incident investigation model and process.
g. Identification of company safe work practices, both generic and project specific.
h. If required, fall protection and confined space entry plans complete with assessments, safe work practices and rescue plans.
i. Training and planning surrounding disposal and handling of waste, hazardous and contaminated materials.
j. Housekeeping policies and requirements for site and Sub-Contractors.
k. Site security and public access, along with, a site orientation program.
l. Identification and planning of persons responsible for site safety compliance, documentations, non-compliances, and sub-Contractor safety coordination and management and overall site supervision
m. Smoke-Free site policy
n. establish personnel requirements for implementing the plan
o. A personal protected equipment (PPE) Program which shall detail PPE:
    i. Selection criteria based on site hazards.
    ii. Use, maintenance, inspection and storage requirements and procedures.
    iii. Decontamination and disposal procedures.
p. Inspection procedures prior to during and after use, and other appropriate medical considerations.
q. Limitations during temperature extremes, heat stress and other appropriate medical consideration.
r. An emergency response procedure, refer to the specification for Supervision and Emergency Response Procedure for requirements.
s. A hazard communication program for informing workers, visitors and individuals outside of the work area as required. This will include but not be

limited to a visitor safety and orientation policy and program that will include education on hazards, required PPE and accompaniment while on site.

t. A hearing conservation program in accordance with the OHS Regulations.

u. A recent (current year) inspection form for all powered mobile equipment that will be used in fulfilling the terms of the contract. The inspection form shall, at a minimum, state that the equipment is in a safe operating condition.

v. A complete listing of employee names, their driver's license classification, expiry date, endorsements and the type of equipment that they are qualified to operate for the complete scope of work for this project. The Driver's License Number should not be provided as this is confidential information. Provision of the License Number may breach PIPEDA - the Personal Information Protection and Electronic Documents Act. (Federal Act) or ATIPPA - Access to Information and Protection of Privacy Act - Part IV. (Provincial Act of Newfoundland and Labrador). This shall also include documentation where required of certification in power line hazards.

w. An acceptable parking policy for all powered mobile equipment to be used on this project. The policy shall, at a minimum, be based on a hazard assessment that considers factors such as equipment type, potential for roll over, load capacity of the parking area, pedestrian and vehicular traffic, and potential for equipment tampering, equipment energy, and equipment contact with power lines.

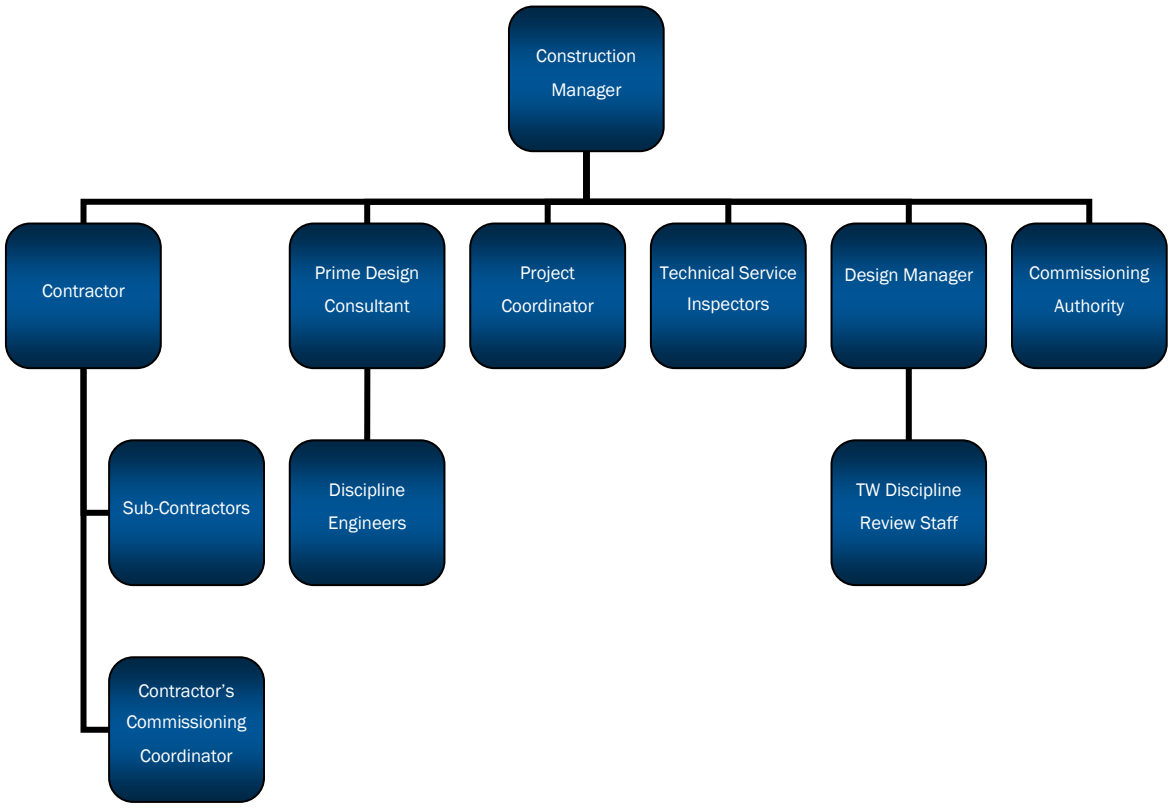
x. A diving program which shall contain standard operating procedures to be followed in the diving operation.

y. A health and safety training program which includes a safety training matrix.

5. The Construction Manager is to provide the Project Coordinator and others as necessary with a copy of the Contactor's Site Specific Health and Safety Plan.
6. All TW staff is to be familiar with TW's Occupational Health and Safety Program Manual.
7. Safety is to be included on the agenda of all construction progress meetings, both to review any incidents or changes and high light safety concerns on the site.
8. Project Coordinator shall take a lead role in monitoring compliance with safe work practices in accordance with the Contractor's and TW's safety manual.

6.1.2 CONSTRUCTION PHASE COMMUNICATIONS

1. Maintaining effective communication with the client department or agency is an essential part of the responsibilities of both the Design and Construction Managers. This includes regular reports, correspondence and meetings to provide information related to a project's financial and physical status and the identification of any areas of concern. It is crucial that a high level of client satisfaction is achieved.
2. Approval from the client shall be obtained in writing on any capital or maintenance projects affecting floor layouts, work disruptions, scheduling, or other relevant matters prior to start of work.
3. All communications during the design phase shall be routed through the Construction Manager. For example, the Contractor should not contact the Client Department directly. This will alleviate the sometimes misdirection and erroneous decisions by those not managing the project.



6.1.3 Requirements Prior To Start Of Work

1. Insurances, bonding and other documents in accordance with the contract documents and contract award letter are required to be in place prior to start of construction.
2. A complete Health and Safety Risk Assessment and Management Plan, including a Site Specific Health and Safety Plan must be submitted at least five (5) working days prior to commencing any work on site. Refer to Section 01 35 29.06 Health and Safety Requirements for further details.
3. Submission requirements for Consultants are outlined in the Prime Consultant's Agreement.
4. For projects in existing buildings, confirmation of a hazardous materials survey / management plan is required. This should be identified in the design stage and checked again prior to the start of construction. Contractors and Consultants will require access to relevant portions of the hazardous materials management plan.

6.1.4 Pre-Construction Meeting

1. Pre-construction meeting should occur before any work starts on the project convened by the Construction Manager. The designated building representative and inspectors shall attend the meeting. Client partners should be extended an invitation to attend.
2. A typical format for the meeting includes:
    a. Present the administrative requirements for the project and contact authorities of TW
    b. Discuss roles of Department's Technical Service Inspectors
    c. Discuss requirements for any special inspections, testing, mock up, and authority of inspections, etc.
    d. The schedule/frequency for project meetings
    e. Review change order management procedures
    f. Review progress claim and payment procedure
    g. Review scheduling reporting procedures, including scheduling coordination,
    h. Review site specific construction hazards and safety measures
    i. Review requirements for temporary facilities on site (e.g. materials storage, temporary power, water & sanitary sewer)

j. Review project documentation management procedures such as project record drawings, shop drawings, samples, color selections, etc.
k. Communication matrix and decision making authorities identified
l. Location of project signs
m. Review environmental considerations applicable during construction
n. Timely co-ordination and scheduling for performing tests, inspections and commissioning activities by the Owner and their agents
o. Review listing of approved Sub-Contractors and major suppliers (cannot be changed without approval from the Construction Manager.)
p. Review LEED® requirements for construction process and documentation

3. TW will record and distribute meeting minutes; this task may be reassigned if necessary.

6.1.5 Project Status Reporting

1. On major projects the Construction Manager will prepare weekly project status reports in the prescribed format required by the Director of Design and Construction.
2. Quarterly updates to the Capital Project Status Report are required to be submitted in the prescribed format. This submission is led by the Design & Construction Division.

6.1.6 Request for Information

1. The Contractor may request interpretation or clarification of the design intent. This Request for Information (RFI) shall be made in writing, and appropriately identified with a unique RFI number and date of submittal.
2. A response to the Request For Information (RFI) shall be documented in writing by the Engineer/Architect, following the same identification system or as otherwise agreed by the contracting parties.
3. Urgent work considered as a change to the contract may be authorized by the Construction Manager using a Field Instruction. This procedure shall be used where the value of the change order cannot be readily established, and the work must be performed on an urgent basis. A written Change Order will be issued as soon as practical. Field Instructions are not recognized in the GC's refer to CG 19.5.

4. Directives may also be used to instruct the Contractor to comply with a particular aspect of the construction contract. The Contractor's response to the Instruction will be noted regarding whether or not acceptable performance has been attained. Refer to GC7 Engineer/Architect's Decisions.

6.1.6.1 Request for Information Log

1. On all projects, the Consultant will maintain, unless otherwise directed by the Construction Manager, a RFI log for each construction contract which shall summarize in a spreadsheet the following:
    a. Numerical assignment of all RFIs
    b. A brief summary description
    c. Date submitted
    d. Date response sent
    e. Brief description of the response
2. RFI Log shall be reviewed at each construction meeting

6.1.7 Change Orders

6.1.7.1 General

1. During the performance of a contract, it may be necessary to deviate from the drawings or specifications. Any change from the original contract documents will constitute a cause for the initiation of a change order.

6.1.7.2 Requirements

1. Any change in the contract amount shall be documented with a change order in accordance with the Contract General Conditions, GC 18 Changes in the Work, and GC 19 Valuation and Certification of Changes in the Work.
2. Change orders cannot be approved unless sufficient contract funding is available. Once approved, an encumbrance adjustment is required to add the value of the change to the contract.

3. Change orders should only be issued for necessary work within the established scope of the project. The Construction Manager should be satisfied that the issuance of a change order is the preferable method of having the work completed, that the price for the additional work is reasonable, and in accordance with the contract.
4. Change orders required are typically recommended by the Construction Manager in PARTS and approved by either the Regional Engineer or Regional or Divisional Director. Approval to exceed the Public Tender Act change order limit is to be submitted to the Director for referral to the Executive. Approval should be requested when the Construction Manager anticipates that the limit will be exceeded. This approval should be sought well in advance of the specific change order that would cause the limit to be exceeded.
5. A Proposed Change Order form may be used to initiate the need and reason for a change order. The approved Change Order form is required to modify the contract amount and process payment on change order work. Copies of the approved Change Order will be distributed to the Contractor and Consultant.
6. In the case of a change which has no cost impact, a change order will be issued to document the occurrence of the change, and what, if any impact, the change will have on the construction schedule. These changes shall also be recorded by the Contractor for inclusion in the project record drawings.

6.1.7.3 Change Order Log

1. On all projects, the Consultant will maintain, unless otherwise directed by the Construction Manager, a change order log for each construction contract which shall summarize in a spreadsheet the following:
    a. Numerical assignment of all change orders (and proposed change orders)
    b. A brief summary description of the change requested
    c. The final value or estimated value of the change requested
    d. The total anticipated financial impact on the project
    e. The category of change
    f. Identification of changes in dispute with the Contractor
    g. Date the change order was requested
    h. Date the change order was approved

i. Impact on schedule if any

2. Change Order Log shall be reviewed at each construction meeting

6.1.7.4 Change Order Category

1. Category of change for each change order line item is to be identified under one of the following and indicated as such in PARTS:
    a. Category "A" - Additional Requirements
    b. Category "B" - Design Related
    c. Category "C" - Site Conditions
    d. Category "D" - Regulatory Requirements
    e. Category "E" - Additional Requirements – TW

6.1.8 SHOP DRAWINGS

1. The Contractor is required to provide shop drawings for approval in accordance with the technical specifications.
2. All shop drawings, whether prepared by the Contractor or Sub-Contractors, must be approved by the Contractor and stamped accordingly before submission to the Consultant. This ensures that the Contractor has checked and coordinated the work between trades before submission to the Consultant.
3. Approval of shop drawings by the Consultant does not relieve the Contractor of his responsibility for accuracy or quantities involved or for meeting the requirements of contract documents.
4. The Consultant is to review and stamp shop drawings to assess that the technical requirements and intent of the contract documents have been met. No substitution is to be considered without TW's approval.
5. TW may review shop drawings submitted by the Consultant and require changes to be made.
6. The Consultant may issue acceptances of shop drawings directly to the Contractor and copy TW at the same time. TW has the right to alter such acceptances if they are contrary to the contract at the discretion of the Construction Manager.
7. The turnaround time for each shop drawing shall be in accordance with technical specifications, typically ten (10) calendar days.

6.1.8.1 Shop Drawing Log

1. The Consultant shall maintain a shop drawing log for each construction contract on the project; this shall be discussed at monthly construction meetings. The log shall incorporate the following as a minimum:
    a. Specification Section reference
    b. Products Section Reference
    c. Product Description
    d. Reviewed By
    e. Review Status
    f. Planned Submittal Date
    g. Actual Submittal Date
    h. Planned Return Date
    i. Actual Return Date

6.1.9 Payment of Contractor's Invoices

6.1.9.1 Construction Cost Breakdown

1. Construction cost breakdown will be supplied by the Contractor and approved by the Construction Manager applying TW's construction cost template contained within TW's PARTS application as appropriate.
2. Review of the Contractor's submitted contract cost breakdown by each discipline is recommended prior to acceptance by the Construction Manager.
3. Once accepted, a contract price breakdown shall be prepared, and entered into PARTS. Care is to be exercised to ensure reasonable costs are allocated to Division 1 - General Requirements, Commissioning and LEED®.

6.1.9.2 Payment of Invoices

1. Contractor's invoices shall to be processed in accordance with Contract General Conditions GC-21 Certificates and Payments.

2. The Construction Manager is to check that required contract documentation is in place and sufficient funding is encumbered before recommending certification of Contractor payments.
3. Once the Construction Manager certifies that the claim represents the true value of work completed, the claim is entered into PARTS and sent to their manager for approval.

6.1.9.3 Materials on Site Payment

1. The contract provides for payment of materials delivered to the site, but not yet incorporated into the work.
2. The Construction Manager shall ensure the following conditions are met with respect to such certification of payment:
    a. The material is secured
    b. An inventory of materials must be supplied with the request for payment
    c. Supporting invoices from the supply source are provided pertaining to the inventory on hand
    d. No markups for Contractor's overhead and profit are included in the payment request

6.1.9.4 Payment for Materials Off Site

1. In exceptional circumstances, a payment request for materials stored off site may be considered.
2. In order for such a request to be entertained, the Contractor shall provide satisfactory evidence of meeting the following conditions:
    a. all the conditions for a "Materials On Site Payment" request are to be met
    b. a letter from the Contractor's surety acknowledging its agreement to allow payment for materials stored offsite
    c. proof of insurance against material loss or damage
    d. leased space for storage of project materials shall be prepaid and proof of such provided

6.1.10 Owner's Right To Do Work

1. In the event of unacceptable performance or default by the Contractor, the Construction Manager should apply Contract General Condition "GC 9 – Owner's Right to Do Work".
2. A copy of all relevant correspondence should be forwarded to the bonding company.
3. Notice shall be sent by registered mail, request signature on delivery.

6.1.11 Owner's Right To Terminate the Contract

1. The Owner's right to terminate or stop work is described in Contract General Condition GC 10 – " Owner's Right to Stop or Terminate Contract".
2. Notice shall be sent by registered mail, request signature on delivery.
3. The Director, upon the advice of legal counsel will write the bonding company to invoke the terms of the bond and begin negotiations to have them complete the contract.
4. A copy of relevant correspondence should be forwarded to the bonding company and Tendering and Contracts.
5. The Department of Justice should be consulted when extenuating circumstance exist.
6. The Construction Manager will write the bonding company to invoke the terms of the bond, and begin negotiations to have the contract completed.

6.1.12 Environmental Considerations During Construction

1. Common environmental issues include:
    a. surface water runoff control and silt sediment transport
    b. soil erosion of embankments and siltation impacts
    c. site fires
    d. construction debris collection, storage and disposal
    e. sanitation facilities
    f. excavation and disposal of hydrocarbon impacted soils
    g. accidental fuel spills
    h. storage, handling and disposal of hazardous substances
    i. dust control
    j. fuel fired temporary heat and ventilation requirements

2. The Construction Manager will liaise with environmental authorities as may be required to identify environmental concerns.
3. The Construction Manager will issue instructions to the Contractor to mitigate environmental impacts which may arise during construction.

6.1.13 Dispute Resolution and Management

1. Disputes on the project may arise between the contracting parties. The Design and Construction Managers are expected to manage the resolution of disputes and claims in an equitable and professional manner.
2. A cooperative approach is encouraged whereby the Contractor's position is clearly presented in writing.
3. Design and Construction Managers should recognize the overall objective of sound project management is to quality complete the work in a timely manner.
4. If the dispute cannot be resolved, it is to be documented by the Design or Construction Manager, with reference to the specific sections of the relevant construction contract or Consultant agreement, and forwarded to their Manager who will then discuss with the applicable Director.
5. In conjunction with the Assistant Deputy Minister (Works) and TW's legal counsel, a final settlement offer may be developed.
6. If the final offer is rejected, three options remain for settlement:
    a. Mediation (mutual settlement negotiated with assistance of an independent party)
    b. Litigation
    c. Arbitration (decision rendered by an independent party)
7. In general, the preferred option is mediation. A mediation conference would normally proceed with:
    a. the selection of a mutually acceptable mediator
    b. agreement on the sharing and payment of the mediation costs, including those associated with witness travel and accommodations
    c. agreement on representation by legal counsel

d. both TW and the disputing party shall be represented by a member with sufficient authority to sign a binding agreement, should the mediation conference result in a settlement being reached

6.1.14 CONSULTANT SERVICES - ADDITIONAL SERVICES

1. The following additional services are outside the basic services fees recommended by PEGNL & NAA Joint Fee Guideline:
    a. field services other than monthly construction review and meeting
    b. provision of full time or part time inspection
    c. facility commissioning services
    d. extended construction administration costs arising from circumstances outside the control of the Consultant
    e. provision of contract administration and advisory services to the Construction Manager in the case of contractual default by the Contractor
    f. provision of record drawings showing Owner requested changes
2. The Consultant Agreement shall specify the services to be provided, and the applicable fee.
3. LEED® certification duties as required for the project.
4. All documentation shall be completed, complied, and submitted in a timely manner. A copy of the final submittal shall be supplied to TW in paper and Adobe (.pdf) formats. The (.pdf) copy shall be bound so that only one file is to be transmitted.
5. The Consultant shall provide updates to TW on a bi-weekly basis, which shall include at a minimum:
    a. status of credits/points achieved
    b. factors limiting the achievement of any points planned for the project
    c. issues with documentation submittal from all parties

6.1.15 QUALITY CONTROL & INSPECTION SERVICES

6.1.15.1 Building in Quality

1. TW is in the business of building and managing quality public buildings on behalf of its clients. During the design process, the Consultant plays a key role in establishing the quality

of the building systems selected, as well as the quality of design drawings and specifications prepared for the project. The Contractor is responsible for the quality of the construction and to ensure the standards and specifications presented in the contract documents are achieved.

2. The goal should be to achieve "zero" recalls during the statutory warranty period, arising either from the design of the systems or its installation. While such a goal is particularly difficult to achieve in practice, substantial strides towards the reduction of warranty period defects can be achieved by:
    a. a cohesive teamwork approach to design and construction
    b. advance planning during construction
    c. timely inspections of workmanship and material (prior to being covered up)
    d. a thorough facility commissioning program

6.1.15.2 Inspection Services

1. The Construction Manager will discuss the inspection requirements of the contract with the TSIs and ensure a sufficient number of inspections are undertaken. On major projects inspections should be performed at least twice monthly, with one inspection scheduled at the monthly construction review meeting.
2. Where Consultants perform monthly construction reviews, joint inspections with the inspection group shall be arranged where practical. In particular, a single deficiency list should be issued at the Substantial Completion stage. This list shall be managed by the Construction Manager.
3. A final inspection is to be completed before a Total Performance Certificate is issued and the Contractor's final invoice is processed.
4. A warranty inspection should be conducted prior to the end of the one year warranty period and reported to the Construction Manager for appropriate action. This should be scheduled 10 months following start of warranty period.
5. Facility users and building management personnel should be notified in advance of the warranty inspection.
6. Field inspections are intended to assess the quality of work and report in writing to the Construction Manager all defects and deficiencies observed at time of such inspection.

Where applicable use predefined test inspection reports as contained in Commissioning Manuals.

7. Inspection reports are to be filed electronically with the Construction Manager within three (3) days of the inspection. It is recommended that the Inspection Report be copied to the full inspection team and others as may be required.
8. Progress photographs should be taken and appended to the inspection report. Photographs are to be dated, along with a description of the photograph.
9. Where applicable, code and specification references are to be included in the inspection report.
10. Report on the status of materials delivered to the site, and the value of work performed when requested. Typically, each inspector will receive a copy of the applicable portion of the monthly progress claim and will identify whether they are in agreement that the Contractor is entitled to receive the amounts claimed for each item.
11. The Construction Manager will review with the Consultant prior to issuing clarifications or changes to the contract documents to ensure the design intent and quality is not compromised.
12. The Inspector is to report on observations regarding construction safety and take appropriate action as necessary which may include stop work directions where necessary. The Owner's representative may stop work if non-compliance of health and safety regulations are not corrected.
13. The Technical Service Inspector and Project Coordinator shall have access to all shop drawings for review and comparison of materials on site. It is the Construction Manager's responsibility to ensure TSIs and Project Coordinators have shop drawings.

6.1.15.3 Consultant Design Team Services

1. The responsibility for design intent interpretation and design integrity rests with the Consultant. The Construction Manager may contact the Consultant to obtain an opinion whenever a variance observed on the project requires professional judgment with respect to design intent or interpretation. The Construction Manager as Engineer/Architect has the authority to make design, quality and cost decisions, independent of the Consultant, and assumes the liability of such professional authority.

2. The Consultant is expected to provide timely service to the Construction Manager whenever a clarification regarding design intent or interpretation is needed. An initial response to a Construction Manager request should be acknowledged within 48 hours by the Consultant. A time frame provided by the Construction Manager to resolve an issue or concern shall be met, otherwise the Construction Manager may refer the matter to another professional for direction and decision. The additional costs for such professional services may be charged to the Consultant.
3. Reviews by the Consultant during key stages of construction may be established by the Construction Manager.
4. On major projects the Consultant is expected to attend monthly construction review meetings, at which time a general assessment of the work with respect to the conformance of the contract documents will be performed and reported in writing to the Construction Manager. Monthly Consultant invoices will not be processed if these reports are not submitted, either in part or in full.
5. Additional periodic reviews by the Consultant during key stages of construction may be established by the Construction Manager.
6. Consultant Design Team shall participate in Substantial Completion and Total Performance inspections.
7. The Consultant shall be responsible for carrying out Shop Drawing Reviews within the time frame indicated in the specifications. The Construction Manager shall ensure that the reviewed shop drawings are in place before installation of the work is started.

6.1.15.4 Project Coordinators

1. A Project Coordinator may be engaged based on an assessment of the project by the Regional Office.
2. The duties of the Project Coordinator include:
    a. inspection, co-ordination, and administration of construction within the limits of authority assigned by the Construction Manager
    b. monitoring compliance with the site safety plan and regulatory requirements
    c. ensuring that the intent of the plans and specifications are carried out
    d. ensuring adherence to contract terms

e. maintenance of complete job site records (e.g. shop drawings, change orders, inventory of materials on site, contract progress claims, quantity measurements for unit price work)
f. initiation of action and required follow up to ensure prompt decision making to permit normal progress of work
g. preparation of daily construction reports or daily journal in a format required by the Construction Manager
h. preparation of reports and other documents as established by the Construction Manager specific for the project
i. co-ordination of the client's and department's activities on the work site during construction

6.1.15.5 Inspections by Regulatory Agencies

1. The Contractor is obliged to have the work inspected by regulatory agencies as required by law and/or the contract technical specifications on a timely basis.
2. The Construction Manager shall be advised two (2) weeks in advance of the requested regulatory inspections.
3. The Construction Manager should obtain a copy of the inspection report, prepared by regulatory agencies, from the Contractor.
4. Acceptance by regulatory agencies will not relieve the responsibility of the Contractor in meeting the contract documents with respect to quality of materials, workmanship, or operation.

6.1.15.6 Deficiencies

1. Construction Manager when considering deficiencies shall include in addition to construction items the following:
    a. O&M Manuals
    b. LEED®
    c. Commissioning
    d. Permits
    e. As-Builts

f. Warranties
g. Spare parts

6.1.16 PERMITS

6.1.16.1 Electrical Permits

1. Contractors shall be obliged to obtain and pay electrical permits from the applicable regulatory body.
2. The Construction Manager should advise Contractors that electrical inspections by the applicable regulatory body will be in addition to those conducted by TW staff.

6.1.16.2 Building Accessibility Regulations

1. The Contractor will be obliged to obtain and pay for any inspection permit fees levied by Service NL.

6.2 PHASE 3, STEP 1 - CONTRACT ADMINISTRATION

6.2.1 CONSULTANTS ROLE IN CONTRACT ADMINISTRATION

1. Normally the negotiated basic service fee includes contract administration services as follows:
    a. Site Meetings and Inspections
    b. Attendance at construction site meetings as required, typically these occur monthly, however may be bi-weekly. Prior to submittal of proposal, Consultant is to clarify with the Design or Construction Manager frequency of meetings.
    c. Prepare construction review reports, commenting on compliance with design and status of deficiencies
    d. Submittals
        i. Perform shop drawing reviews for compliance with technical specifications
        ii. Maintain a shop drawing review log

iii. Review operation and maintenance data manuals compiled by Contractor

iv. Review reports from testing/inspection agencies and initiate any required corrective action

e. Advise Construction Manager on maintenance materials and spare parts to be turned over at project completion. A table format referencing specification section number, required materials descriptions, quantity and space for receipt sign off shall be submitted to the Construction Manager on start of construction

f. Provide additional instructions as per "GC-3 Additional Instructions and Schedule of Work", as required

g. Progress Payments review

i. Review format and price breakdown structure submitted by the Contractor certification of construction progress payments

ii. Comment on the Contractor's applications for progress payments, including evaluation of materials on site and completion of work according to the terms of the construction contract

iii. Undertake field reviews to assist Construction Manager to certify payment requests, substantial completion and final completion requests.

h. Requests for Information and Change Orders

i. Advise on the interpretation of drawings and specification, and if required issue supplementary details and instructions

ii. Comment on requested changes to the contract and prepare appropriate change orders

iii. Respond to "Request for Information" from the Contractor with formal supplementary details and instructions within a reasonable time period. It is expected that this should be less than 10 days on most requests.

i. Commissioning

i. Attend startup of systems and report on any operational difficulties

ii. Provide advice during the normal construction one (1) year warranty period

iii. Conduct 10 month warranty inspection in conjunction with the Commissioning Authority and TW

j. Obtain from the Contractor a declaration signed and sealed by a professional engineer, stating that all structural work is in accordance with the drawings and specifications.

k. Review record drawings prepared and submitted by the Contractor to reflect condition of the project as turned over to the client.

2. Provide record drawings to TW in hardcopy (3 sets) and electronic AutoCAD (.dwg) and Adobe (.pdf) formats

6.2.1.1 Geotechnical Services During Construction

1. Further to the carrying out of a geotechnical investigation and report, various additional activities to be performed by the geotechnical Consultant shall be considered during the construction phase.

6.2.1.1.1 Foundation Subgrade Inspection

1. The geotechnical engineer responsible for the original site investigation shall visit the site during construction and conduct an inspection of the foundation bearing material.
2. The geotechnical engineer shall be given the opportunity to verify the conditions at the bottom of the excavated site are consistent with what was expected during the design stage; and that no part of the excavation shows soil conditions which are substantially different than those which were anticipated.

6.2.1.1.2 Load Test Supervision

1. Where load tests of foundations are deemed necessary, the details of the load application and settlement under each increment are to be recorded as the work proceeds.
2. Load tests are to be carried out in accordance with recognized practice such as recommended by ASTM.
3. A report is to be submitted providing details of the work and the results obtained. Include graphs representing the Load/Time/Settlement curves for the footing tested.

6.2.1.1.3 Fill Compaction Testing

1. Where fill placement is a requirement of the contract, the geotechnical Consultant shall conduct inspection and testing for approval of soils (site borrow material or granular fills). Report indicating acceptance or rejection of the work is to be submitted as the work is performed.

6.2.1.1.4 Pavement Subgrade Testing

1. Road subgrades shall be tested for the eventual pavement design. Such tests may involve laboratory testing of samples recovered from the site or may involve in-situ testing of the subgrade in its prepared condition.

6.2.1.1.5 Slope Stability Monitoring

1. The installation of, and the monitoring of, slope indicators prior to, during and following construction of civil engineering works may be essential to the safety of the facility.

6.3 PHASE 2, STEP 2 - COMMISSIONING

1. The Contractor shall be responsible for completion of all commissioning, installation and performance verification activities, proving that the installed equipment and systems are correctly installed and operate according to project specifications.
2. Any cost incurred by TW or the Consultant associated with retesting caused by the Contractors failure to perform commissioning as specified will be charged to the Contractor.
3. The Commissioning Authority shall be called to site when the Contractor is ready to provide Performance Verification.
4. The Contractor shall ensure that all systems are ready to be verified prior to the Commissioning Authority arriving on site. It is not intended that the Commissioning Authority observe the Contractor troubleshooting or completing work.
5. The Contractor may be penalized for extra costs associated with calling the Commissioning Authority and related commissioning team members to site prior to all systems and equipment being ready for Performance Verification.
6. The Contractor shall utilize the Commissioning Manual provided by the Commissioning Authority. The intent is that all projects be treated as if they should achieve the intentions of the “Enhanced Commissioning Credit” in the LEED® rating system.

7. For a more in depth description of the commissioning process, reference the TW Guideline for Commissioning.

*Note: Recent projects have had a number of concerns with structural failures with the connections of various finish items. As such, the connections for the following items need to be reviewed during the commissioning process:

- Gym Diffusers
- Gym Light Grilles
- Gym Heaters
- Basketball Backstops
- Stage Lighting
- Curtain and Tracks
- Score clocks
- Cord Reels
- Uni-Strut Track Systems
- Speakers
- Intercom Equipment
- De-Stratification Fans
- TV Monitors
- Stair Lift System
- Light Pole Bases
- Flagpoles
- Chimney Supports
- Ladders/Alternating Stairs
- Folding Partitions
- Light Fixtures (Clipped or Chained)
- Overbed Lighting
- Examination Lighting
- Surgical Lighting
- Patient Lift Systems
- Patient Monitor Mounts
- Ceiling Mounted Diagnostic Equipment
- Bariatric Equipment
- Cantilevered Diagnostic Equipment
- Washroom Grab Bars
- Ceiling Hung Washroom Partitions
- Wall Mounted Baby Change Tables

Special care needs to be exercised during the design, construction and the commissioning of these items. Final documentation of the checks will be completed as part of the "Architectural Installation Verification Checklist".

6.3.1 INSTALLATION VERIFICATION

1. Installation Verification includes all checks and balances required by the Contractor to ensure that all equipment and systems are installed properly, and operate according to contract technical documentation.
2. Prior to the performance testing of each system, the Contractor shall ensure that all physical installation of components and systems being tested are installed in accordance with the contract documents. This should include but not limited to:
    a. Hydrostatic testing
    b. Flushing
    c. Alignments, leveling, etc.
    d. Lubrication, priming, etc.
    e. Cleaning
    f. Start-up
    g. Completion of Testing Adjusting and Balancing
    h. Calibration and testing of automatic controls

3. The Commissioning Manual includes Installation Verification checklists which are to be completed by the Contractor and submitted for review by the Commissioning Authority prior to start of Performance Verification.
4. The Commissioning Authority is not required to be on site during Installation Verification, however if possible, will attend and witness. In most cases, TW's TSI's or Project Coordinators will attend and witness where possible.

6.3.2 PERFORMANCE VERIFICATION

1. Performance testing includes checks and tests to be carried out by the commissioning team assembled for the project. There may be, other Authorities Having Jurisdiction that may mandate third party verification.

2. The result of the testing can be expected to confirm the design intent as expressed in the contract documents has been met. However, the commissioning testing may identify variations between the design intent expectations and/or design specification and the system/equipment performance as outlined in the contract documents.
3. It is recognized that the Contractor(s) are only responsible for work which they have contracted to perform or deliver.
4. For specific performance tests refer issued for construction Commissioning Manual.
5. Prior to the start of Performance Verification of each system, the Contractor shall ensure that all Installation Verification checks are completed.
6. The Commissioning Authority is required to witness all Performance Verification

6.3.3 Facility Start-up

1. Equipment supplied under the construction contract is to remain under the control of the Contractor, until it is turned over to the Owner.
2. Equipment supplied by the Owner that is installed by the Contractor remains the Owner's. In this case a specific agreement for the startup responsibilities of the Contractor and the Owner needs to be established between the contracting parties.

6.4 Phase 3, Step 3 - Training and Education

1. Refer to the "issued" contract specifications forming part of the Contract Documents as well as the Commissioning Manual for training requirements, and forms.

6.5 Phase 3, Step 4 - Warranties

1. Products and installation warranties require close co-ordination given the policy of the listing of all products where extended warranties are commonly available. The duration of warranties will be established by TW staff in conjunction with the Design Manager. The Consultant is responsible for ensuring this information is contained in the specifications.
2. Warranties are to be issued to the Owner under the name of the product manufacturer, and shall warrant both product and installation.
3. Warranties issued in the name of the General Contractor or Sub-Contractor should be limited to the common one (1) or two (2) year warranty,

6.6 PHASE 3, STEP 5 – OPERATION AND MAINTENANCE MANUAL

1. The Contractor shall submit one copy in final form fifteen (15) days prior to final inspection to the Contract Manager.
2. To be organized and contain all information per contract specifications.
3. Shall be separated by tabs for each piece of equipment, complete with table of contents.
4. The Commissioning Guideline details the requirement for the Maintenance Manual.

6.7 PHASE 3, STEP 6 - SUBSTANTIAL COMPLETION

1. The requirement of substantial completion as is defined in the Mechanics Lien Act Paragraph 2.2.a "…when the work or substantial part of the work is ready for use or is being used for the purpose intended" Commissioning is the test that will prove that the work is ready for use, therefore until commissioning is completed the work is not "ready".
2. Specification Section 01 91 13 – Commissioning (Cx) Requirements, paragraph 1.4.6 "The Substantial Completion Certificate will not be issued until the commissioning process is completed and the final reports and commissioning documentation are received." This is in our standard specification found online. The specification writer/Consultant should never remove this line item.
3. Substantial Completion is defined in Contract General Condition GC 21. Substantial Completion milestone represents the beneficial occupancy of the facility and the start of the one (1) year warranty period.
4. Client partners may be involved with the determination of substantial completion.
5. The Construction Manager shall issue a Certificate of Substantial Completion with a listing of incomplete work and deficiencies. The Construction Manager may withhold issuance of a certificate if facility commissioning as defined by the Contract is incomplete. A copy of the listing of incomplete work and deficiencies will be forwarded to the client partners.
6. In order to beneficially occupy a facility, most critical systems must be performance tested, verified and fully operational, for example:
    a. fire alarm system
    b. fire protection system
    c. emergency & exit lighting
    d. heating systems
    e. mechanical ventilation systems
    f. accessibility requirements including power assist door openers
    g. Service NL accessibilities inspection
7. Payment due to the Contractor at Substantial Completion shall be final contract value at that date less an amount to cover uncompleted or defective work, which shall be calculated as twice the cost of completing the work as estimated by the Construction Manager.

8. Tendering & Contracts Division shall be notified of the Contractor's date of Substantial Completion so that the Labor and Materials Bond may be released.
9. The Contractor is entitled to payment of the holdback amount thirty (30) days after the date of Substantial completion subject to the following:
    a. Notification that all sub-Contractors and suppliers have been paid in full expect holdback
    b. Letter of Good standing from the Workers Compensation Commission
    c. Satisfactory performance being made in the completion of deficiencies
    d. Outstanding Commissioning activities have been completed and accepted in accordance with the Mechanics Lien Act
10. Prior to issuance of Substantial Completion, the Construction Manager will confirm that:
    a. All commissioning documentation have been received
    b. Project record drawings have been received
    c. All deficiencies have been completed
    d. All spare parts and tools have been received
    e. All maintenance materials and special tools have been received
    f. All LEED® documentation have been received
    g. All O&M Manuals have been received
    h. Permits have been received
    i. As-Builts have been received
    j. Warranties have been received

6.8 Phase 3, Step 7 - Final Completion

6.8.1 Issuance of Total Performance Certificate

1. The Total Performance milestone represents the completion of the construction contract period and is covered under Contract General Condition GC 21-Certificates and Payments.
2. Prior to issuance of final payments, the Construction Manager will confirm that all commissioning documentation, LEED® documentation and project record drawings have been received.

3. The Construction Manager will send a copy of commissioning documentation and project record drawings to the facility's management for placement in the affected building or other appropriate location, and a copy to be retained by the Region.

7. PHASE 4 - POST COMPLETION PHASE

7.1 PHASE 4, STEP 1 - CONTRACT CLOSE OUT DOCUMENTATION

7.1.1 PROJECT RECORD DRAWINGS

1. Preparation of Record Drawings is part of the Consultant's basic service fee and shall be submitted in three formats:
    a. full size reproducible copies
    b. AutoCAD (.dwg)
    c. Adobe (.pdf)
2. Where the Consultant is not contracted to provide contract administration services, Record Drawings will be checked by Construction Managers and transferred to AutoCAD files by the TW staff. Record Drawings will be forwarded electronically to the Design & Construction Division for inclusion in TW's Drawing Management System.
3. Project Record Drawings are to be prepared by the Consultant to reflect changes in the contract drawings arising from:
    a. the issuance of tender addenda
    b. the issuance of design clarification drawings during construction
    c. the issuance of change orders to the construction contract
    d. field changes performed must be recorded on the as-built drawings as completed by the Contractor and marked on the Contractor's set of project record drawings
4. The Consultant shall clearly identify the revisions on the drawings in order to facilitate checking and review by the Construction Manager.
5. Project Record Drawings are to be prepared in accordance with documentation standards outlined in this manual. The Consultant shall submit these drawings fifteen (15) days prior to the Total Performance Certificate being issued.
6. Preparation of Record Drawings is part of the Consultant's basic service fee. Additional compensation will be made for those changes classified other than Category "B" – Design Related.

7. On regional projects, where the Consultant is not contracted to provide contract administration services, Record Drawings will be checked by Construction Managers and transferred to AutoCAD files by the regional drafting technician. Record Drawings will be forwarded electronically to the Design & Construction Division for inclusion in TW's Drawing Management System.

7.1.2 PROJECT FACTSHEET

1. The Design Manager shall prepare a project factsheet for reference by departmental staff. This task may be assigned to the Consultant.
2. The factsheet should be no more than a single page and incorporate an external (and optional internal) view of the completed facility.
3. Provide a concise summary of:
    a. facility function
    b. building floor area(s)
    c. major building systems provided
    d. duration of planning and construction
    e. project budget forecast vs. actual costs incurred
    f. recognition of Client partners, Consultant and Contractor
    g. any special unique characteristics
    h. LEED® certification level achieved
4. The factsheet will be updated at the conclusion of the project and submitted to the Construction Manager and the Design Manager for distribution to internal stakeholders.

7.1.3 INSURANCE PREAMBLE

1. Department of Finance, Insurance Division of the Government of Newfoundland & Labrador requires that TW compile and maintain a Building Inventory Record of Government owned facilities for insurance purposes.
2. In general, most Government owned facilities are under the jurisdiction of TW which has title to these facilities and are responsible for their maintenance. The Department of Finance is responsible for administering property insurance on all these facilities. However, there are cases that require special consideration, which are noted below:

3. Schools (K to 12): these facilities are under the jurisdiction of the Department of Education, who provide information directly to Department of Finance.
4. Facilities owned and maintained by Health Authorities: These facilities may be insured directly by the Corporation however, TW is still required to include this information, with qualification as necessary, in the Government Building Inventory Report.
5. Build - Lease Facilities: These facilities are generally constructed by private Owners and when completed, they are leased back to Government. Regardless of who insures, TW is still required to include the information, with qualification as necessary, in the Government Building Inventory Report.

7.1.4 BUILDING INVENTORY DATA SHEET

7.1.5 GOVERNMENT BUILDING DATA SHEET

1. The Design Manager shall prepare a Government Building Data Sheet for insurance and historical record at least thirty (30) days before substantial completion.
2. Complete the standard form entitled "Government Building Data Sheet" and distribute as follows:
    a. For all facilities except K to 12 schools:
        i. Department of Transportation & Works –Design and Construction Division
        ii. Department of Finance, Insurance Division
    b. For Schools K to 12:
        i. To the Department of Education, School Services & Facilities Branch
        ii. Department of Finance, Insurance Division
3. The Building Data Sheet shall provide the following Information:
    a. Building Information
    b. Building name, number and location
    c. Whether it is a new building or modification to existing
    d. Scheduled date of project substantial completion
    e. Region and area
    f. Name of building manager
    g. Electoral district
    h. Year constructed and replacement cost
    i. Number of floors, and total floor area
    j. Building occupancy type
    k. Property insurance provider
    l. Organization occupying the building, holding title, and responsible for maintenance
    m. Construction Details
    n. Overall condition of facility
    o. Structure type

p. Exterior and interior wall construction
q. Floor structure
r. Roof structure and finish
s. Building Services
t. Type of heating system
u. Electrical service
v. Special services
w. Fire protection information

7.1.6 LEED®

1. All LEED® documentation required from the Contractor must be submitted to the LEED® AP for the project.
2. The LEED® AP must make submittal to the CaGBC within six (6) months of occupancy of the facility.

7.2 PHASE 4, STEP 2 - CONTRACTOR PERFORMANCE EVALUATION

7.2.1 GENERAL

1. The Contractor Performance Evaluation System is a process designed to maintain an acceptable level of performance from Contractors carrying out work for TW. It also provides a means to identify Contractors with above average performance records and assist in the management of projects by Contractors with poor performance records.
2. A record of the performance of Contractors will be maintained to identify the following:
    a. Those Contractors who, by virtue of satisfactory performance will continue to be eligible to submit tenders for work with TW
    b. Those Contractors whose record of unacceptable performance may render their tenders for work with TW to be rejected
3. During the execution of the work, the Contractor is to be notified immediately if the work is not proceeding in a satisfactory manner. This notification would normally be confirmed in job meeting records or correspondence to the Contractor. The Contractor Performance Evaluation System is not intended to interfere with, or substitute for, the normal written communication that a concerned Construction Manager would initiate when confronted with unsatisfactory performance.

7.2.2 PERFORMANCE RATING METHODOLOGY

1. Contractor's performance will be evaluated on a points rating system relative to quality of work performed, timeliness in completing work, and management/administration of contracts/work.
2. Quality of Work Performed (30 points)
    a. The quality of the Contractor's work in conformance with contract documents and industry standards will form the basis for points awarded in this category.
3. Timeliness in Completing Work (30 points)
    a. Conformance to the specified schedule in the contract in relation to circumstances within the Contractors' control will form the basis of points awarded in this category.

b. If time is of special significance on a particular project, the Contractor's performance should be adjusted to reflect this. For example, if timely completion is critical, the unacceptable time performance rating should be defined as zero overrun whereas an equivalent overrun on a non-critical project would normally be rated less severely.
c. The time requirement should have been clearly identified in the contract documents and should have been emphasized to the Contractor as the work progressed.
d. The normal risks associated with contracting are not to be considered as causes beyond the Contractor's control.
e. Delays caused by sub-Contractors are the General Contractor's responsibility. However, if the General Contractor has taken all possible actions to expedite a sub-Contractor's work, the effectiveness of this effort should be considered when evaluating the Contractor's performance.
f. Timeliness deals with the Contractor's performance from the date of award to the date of substantial completion. The Contractor's performance on post completion activities, such as the clean-up of deficiencies, should be taken into account under the Management rating.

4. Management/Administration of Contract (40 points)
    a. This category evaluates the extent to which the Contractor takes charge of and effectively manages/administers a project without undue effort required by TW staff or Consultants. Items to be considered include:
        i. superintendence, work site coordination
        ii. scheduling of work
        iii. ordering of materials
        iv. shop drawings submission
        v. completion of deficiencies
        vi. interpretation of contract documents
        vii. clean-up of the work area
        viii. administration of change orders, progress claims and other pertinent documentation

ix. responsiveness to direction and instructions of Owner, cooperation with Construction Manager
x. quotation reasonableness on change orders
xi. payment of accounts to suppliers, sub-Contractors, employees, etc.
xii. adherence to safety and environmental regulations

7.2.3 Interpretation of Rating

1. Interpretation of points rating will be as follows:
    a. 60-100 Satisfactory Performance
    b. 30 - 60 Unsatisfactory Performance - Contractor will be put on notice that their level of performance needs to be improved. Bidding privileges may be suspended pending review on previous contracts.
    c. 0 - 30 Unacceptable Performance - Contractor will be reviewed for possible suspension of bidding privileges.

7.2.4 Completion of the Evaluation Report

1. A Contractor Performance Evaluation Report is required for all publicly tendered construction and maintenance/service contracts. The report will be completed in PARTS by the Construction Manager upon completion of the contract, reviewed by the Regional Engineer (if applicable) and approved by the Director, and distributed to the Contractor with the Final Completion Certificate. A copy of the form will also be forwarded to the Tendering & Contracts office.

7.2.5 Suspension of Bidding Privileges

1. Tendering and Contracts will record the Contractor's rating on each contract and compile an overall rating based upon the Contractor's assessment on previous contracts.
2. Contractors receiving an "unsatisfactory" rating will be notified in writing by Tendering and Contracts that their performance needs to be improved and failure to improve on future contracts may lead to a suspension of the Contractor's bidding privileges.
3. Contractors receiving an "unsatisfactory" rating on three contracts or one "unacceptable" rating may be identified for possible suspension of bidding privileges. The review will be

based upon the Contractor's overall performance on previous contracts and, if necessary, a more detailed report from the Construction Manager on the current contract. The results of the review will be communicated to the Contractor in writing by Tendering & Contracts.

4. If a suspension of bidding privileges is approved by TW, then all future bids from the Contractor will be rejected prior to tender opening. Alternatively, any tenders from a Contractor under suspension, discovered after tender opening, will be marked "disqualified".
5. Suspensions apply to all TW tendered projects. Attempts by suspended companies to submit tenders under a new company name or structure (successor corporations) are to be rejected. It is incumbent on the "new" company to establish the merits of having the opportunity to tender.

7.2.6 Reinstatement of Bidding Privileges

1. The duration of suspensions may vary depending upon individual circumstances. In general, first time suspensions will be a maximum of one year.
2. A Contractor's suspension may be lifted upon written request from the Contractor and successful demonstration of their ability to perform satisfactorily in future, for instance, successful completion of comparable projects for others since the time of suspension, identification and correction of problems that led to the suspension, etc.
3. In the event of reinstatement, the Contractor must achieve a "satisfactory" rating on the first subsequent contract in order to retain eligibility to continue bidding TW projects.

7.2.7 Contractor's Appeal

1. A Contractor may appeal a particular evaluation by submitting a written request, with supporting documentation, to Tendering & Contracts. Appeals will be investigated by a committee established by the Assistant Deputy Minister.

7.2.8 Confidentiality of Information

1. Information compiled through the Contractor Performance Evaluation System is intended solely for internal use of the Government of Newfoundland and Labrador. Evaluation information related to a particular Contractor(s) will not be released to outside parties, such

as reference checks from other tendering agencies, without the consent of the affected Contractor(s).

7.3 PHASE 4, STEP 3 - HANDOVER

1. The Construction Manager shall record the handover of keys to all new facilities to appropriate client representatives at time of occupancy.
2. The Construction Manager shall record maintenance materials, spare parts and tools required by contract turned over to the facility management.
3. The Construction Manager will send a copy of commissioning documentation and project record drawings to the facility's management for placement in the affected building or other appropriate location, and a copy to be retained by the Region.

7.4 PHASE 4, STEP 4 - COMPLETION OF WORK UNDER WARRANTY

1. As outlined in Contract General Condition GC-31 Warranty, the Contractor is responsible to make good any defect or fault appearing in the work during the one (1) year warranty period.
2. The Construction Manager shall advise the Contractor in writing of any observed defects and shall stipulate a reasonable time frame for the Contractor to undertake repairs.
3. If the Contractor fails to undertake the repair or adjustment in the stipulated period, the Construction Manager shall advise the Contractor in writing giving the Contractor the standard five (5) day period to undertake the work.
4. Should the Contractor fail to execute the repair, within the five (5) day period, the Construction Manager shall undertake the repair by the most expedient method and arrange to have the cost deducted from other contracts held with TW or make a claim against the contract performance bond.
5. Refer to the project commissioning documentation for warranties and guarantees for segments of the work in excess of the normal one year period.
6. Refer to the project specifications forming part of the Contract Documents.

7.5 PHASE 4, STEP 5 – POST OCCUPANCY EVALUATION

7. An evaluation of the facility is required ten (10) months post occupancy. This is to determine if the operation of the facility is in line with the design intent. Normally, occupant surveys are completed and equipment inspection or re-commissioning as required.

8. DOCUMENTATION STANDARDS

8.1 COPYRIGHT

1. The "Standard Form of Agreement Between Owner and Prime Consultant" outlines the Ownership of intellectual property dealing with the project and copyright.
2. TW has the copyright for all documents prepared for or by the department.

8.2 SEALING AND SIGNING OF DOCUMENTS

1. The Consultant or Sub-Consultant shall individually seal, sign and date technical documents contained in accordance with their respective Acts and Regulations. Electronic signatures are not acceptable; all documents shall be individually signed by the professional person(s) of record for the design and technical contents.
2. Where the contract documents have not been prepared in whole by the Consultant, and have been specifically directed by TW, the Consultant is not required to affix their seal, but shall indicate by their signature which parts of the documents have been prepared or amended under their direction or supervision.
3. The Consultant and sub-Consultants must be registered to practice in the Province of Newfoundland and Labrador.

8.3 SYSTEMS MEASUREMENT AND METRIC CONTENT

1. The SI system of measurement is referred to in the following documents, the latest issues, amendments and supplements of which apply:
2. Standard of the Canadian Standards Association (CSA) - CAN/CSA-Z234.1 Canadian Metric Practice Guide
3. National Building Code of Canada (NBCC)
4. Units for linear dimensioning are restricted to, meter (m) and millimeter (mm).

8.4 TECHNICAL DOCUMENT SUBMITTALS

1. All documents are to be submitted in electronic and hard copy.

2. Documents are to be issued for review, for comment by TW team and client partners. The Design Manager will assemble and consolidate all comments and forwarded to the Consultant, for incorporation into the report. This may be an iterative process, finishing with a final report signed and sealed by the responsible professionals.
3. The Design Manager will arrange review meetings or other communications as may be required to conclude report.
4. At each submission, inter-disciplinary review by the Consultant team must be evident. This indicates to TW that there is constant communication between the design team members, and will avoid major coordination issues at the final stages of design.
5. TW reserves the right to request copies of interdisciplinary review comments.

8.4.1 HARD COPIES

1. Review Sets:
    a. Provide 8 copies.
    b. Reports shall be assembled a 3-Ring binder, 8 ½" x 11".
    c. For report submissions, provide reduced drawings 11 x 17 format, bound separately from the report.
    d. Quantity of full scale drawings and graphic illustrations is to be determined on a project specific basis, minimum will be three (3) sets.
    e. Specifications submitted for review purposes in WORD (.doc) with track changes turned "ON".
2. Final Issued for Tender or Construction and all revisions of:
    a. Provide copies of drawings, specifications, and other contract related documents as stipulated in the "Standard for of Agreement between Client and Prime Consultant", if it is not stipulated, then the minimum number shall be twelve (12).
    b. Plot finished final drawings full size on bond paper. Using a pen plotter, direct imaging plotter, laser printer, etc. Finished final drawings will be original contract documents for tender.
    c. Specifications shall be printed on 8 ½" x 11" paper and bound.

8.4.2 ELECTRONIC SUBMISSION

1. Electronic submission of all documentation shall be in native formats, along with a ,pdf of the document.
2. The electronic copy of reports shall be bound as one document, do not submit individual sections.
3. Word processing - Microsoft WORD (.doc)
4. Spreadsheets - Excel (.xls)
5. Drawings - AutoCAD (.dwg)
    a. Each drawing is to be in its own (.dwg) file and named with the Drawing File Number as referenced in this manual. The file should not contain any external references and should be bound and purged.
    b. All drawings preferred in AutoCAD (.dwg) and Adobe Acrobat (.pdf) format latest version, drawings will be accepted in the two previous AutoCAD versions.
6. Secure files - Adobe Acrobat (.pdf)
7. Label disk by Project Number, Project Name, and Date.
8. Specifications submitted for review purposes in (.doc) with track changes turned “ON”.

8.5 DRAWING NUMBER AND SIGNATURE PROCEDURES

1. Consultants are to use TW standard drawing sheets which must be downloaded from TW’s Website. The title block shall be completed as follows:
    a. The space under “Drawn by” shall be used for the name of the person responsible for drawing preparation
    b. The space marked “Checked by” shall be used for the name of the individual responsible for drawing accuracy and co-ordination (Drawn by and checked by should not be the same person)
    c. The space under “Approved by” shall be used for the name of the design professional accepting responsibility for design and quality assurance
    d. The space under “Project No” shall contain TW’s project number
    e. The space under “Date” shall contain the date that the drawing is issued in the format mm/dd/yyyy

f. The space under “Scale” shall contain the words “AS NOTED”. Insert the appropriate bar scale from the provided bar scale list on the standard drawing sheet. Or indicate that a scale is not used by inserting “N.T.S”

g. In the revisions column, revision “0” shall be entered and dated, “0” indicating “Issued for Tender” or the appropriate stage. Submissions prior to tender shall be alphabetically numbered, and numerically numbered thereafter

h. The space under “Drawing No.” shall contain the drawing designation per this document

i. The space under “Drawing File No” shall contain the archive number as provide by TW.

j. The title block contains space for the project title, the drawing title, revision suffix, name and address on Consultant who prepared the drawings, reference north, professional seal and permit to practice.

2. The Consultant’s professional stamp and permit to practice must be affixed to each drawing in the space provided

3. The revision being issued must have wet ink signatures in all locations. Previous revision information may be electronically entered

4. TW utilizes the following series designation system to identify drawings by discipline, and provide a standard sequence within the final drawing package. A drawing number example is A1 which identifies the discipline series “A” as an architectural drawing, and “1” as the drawing number one in that series.

Series	Discipline
C	Civil/Site/Utilities/Landscaping
A	Architectural
S	Structural
M	Mechanical
E	Electrical

8.6 PRODUCTION OF DRAWINGS

8.6.1 DRAWING COVER SHEETS

1. The standard cover sheet shall be downloaded from TW's website. The Consultant shall add the Consultants' name and logo, the Client's name and logo, and a full list of all drawings bound under that cover.

8.6.2 DRAWING SHEETS

1. The standard drawing sheets will be DTW-SHT, size 535mm x 840mm (21 x 33).
2. A B1 size drawing sheet may be used with Departmental approval, B1 size 707mm x 1000mm.
3. DTW-SHT and B1 have a preset scale of 1:1. Drawings produced within the drawing area are to use the drafting scales outlined in this manual.
4. DTW-SHT size drawings are to use a plot scale of 1:2. This will produce a 280mm x 430mm (11 x 17 inch) drawing.

8.6.3 LINES AND LETTERING BY OBJECT LINE WEIGHT

1. For AutoCAD version 2006 and higher, line work delineation can use line weights assigned to specific objects rather than by color.
2. Line thickness shall be as follows:

Line Style	Full Scale Dwg (22 x 34)	Half Scale Dwg (11 x 17)
Very Thin	0.18mm	0.09mm
Thin	0.25mm	0.13mm
Medium	0.35mm	0.18mm
Heavy	0.50mm	0.25mm
Very Heavy	0.70mm	0.35mm
Thick	0.85mm	0.42mm

3. Drawings are to be produced using line weights for half scale drawings as indicated above. Full scale drawing line weights are to be used with Departmental approval.

4. Line styles for line types shall be as follows:

Line Types	Style
Grid line	very thin
Phantom line	very thin
Hidden line	thin
Center line	thin
Dimension line	thin
Extension line	thin
Break line	thin
Object line	thin
Border line	very heavy
Outline (New)	heavy
Leader	thin
Outline (Existing)	thin

5. Lettering styles and sizes listed are for the standard DTW-SHT and B1 drawing sheets. Line weights for drawing text may be assigned to specific text objects. Only standard AutoCAD fonts are to be used as follows:

Text Type / Location	Size
Text on drawings	RomanS - 2.5mm - 0.35mm
Titles under drawings	RomanS - 4.0mm - 0.70mm
Title Block	Small RomanS - 2.5mm - 0.35mm Large RomanS - 4.0mm - 0.50mm

8.6.4 DRAFTING SCALES

1. Scale selection shall be based on of CSA B78.5-93 Table 10.1 “Preferred Scales commonly used for different types of Drawings” and as follows:

Stage	Type of Drawing	Scale
Design	Sketch and preliminary drawings	Scales may vary, but it is recommended that preference be given to those used in the working drawing phase.
	Location drawings	Scale will vary according to maps used as reference.
Contract Drawings	Key plan	1:2000 1:1000
	Site Plan	1:500 1:200
	General location drawings	1:200 1:100 1:50
	Component range drawings	1:100 1:50 1:20
	Assembly drawings	1:20 1:10 1:5
	Component details drawings	1:20 1:10 1:5

Note: Scales listed above apply to individual plans or details produced within the drawing of the standard drawing sheet. Standard drawing sheet is not to be rescaled.

8.6.5 DIMENSIONING

1. Use the DTW DIM dimension style which is assigned to the DTW-SHT.

8.6.6 CAD LAYERS

1. The following layers are pre-established on the standard drawing sheets.

Layer	Line Color
0	White (Not to be used)
ASHTT	White (Not to be used)
Dim	Cyan
Stamp	White
Text	White
Title	Magenta

2. Create new layers as required with names as clear and descriptive as possible.
3. For layers that are impossible to purge and have no use a rename is suggested, such as Rename with letter “X”.

8.6.7 X-REFS AND PURGING

1. External referenced drawings or blocks (X-REF’S) contained within the drawings submitted to TW are to be bound using the “External Reference Bind” command.
2. All final drawings are to be “purged” prior to being submitted to TW.

8.7 SPECIFICATION

1. Prepare specifications using the latest edition of the NL Master Specification Guide for Public Funded Buildings. The Master Specification is available on the website http://www.tw.gov.nl.ca/works .
2. The specification shall be downloaded and edited in Microsoft WORD with “track changes on” for each individual project. Specifications shall not be re-used from previous projects.
3. Submit specifications on disk in Adobe Acrobat (.pdf) format, and Microsoft Word (.doc) format as well as hard copy.
4. Emailed submittals are not acceptable.

8.8 DRAWING CHANGES DURING/AFTER TENDERING

1. All changes to the drawings during or after tendering are to be shown in the Revisions Column of the original drawing indicating revision number, description, date and by whom. Also, indicate the latest revision number in the Revision Suffix Box of the title block.
2. Highlight the changed area on the drawing using a “Cloud” outline (Color # 61) accompanied by the appropriate revision number.
3. During the Tender Period, all revised drawings are to be indicated in an addendum.

9. CIVIL - TECHNICAL

9.1 REGULATIONS

9.1.1 CODES AND STANDARDS

1. National Building Code of Canada (NBCC)
2. National Plumbing Code of Canada
3. NFPA Standards
4. Building Accessibility Act and Regulations
5. AQQA Standards
6. Newfoundland and Labrador Department of Environment and Conservation Standards
7. Fisheries and Oceans Canada Standards
8. Other legislated codes, and standards, that will affect the design of the project

9.1.2 AUTHORITIES HAVING JURISDICTION

1. Office of the Fire Commissioner
2. Service NL
3. Department of Environment & Conservation
4. Workplace Health, Safety and Compensation Commission
5. Municipality

9.2 SITE INVESTIGATION

1. Visit the site and evaluate its characteristics.
2. Review and assemble existing conditions information on:
    a. stormwater surface runoff
    b. sanitary sewage collection system and wastewater treatment
    c. water supply and distribution system
    d. underground electrical
3. Review and assemble land use planning and development regulations pertaining to the site.
4. Assess location for vehicular entrance/exit to the site.

5. Solicit geotechnical Consultant services on behalf of the TW, and manage the execution of the geotechnical program.
6. Solicit site surveying Consultant services on behalf of TW, and manage the execution of the program.

9.3 CODES AND STANDARDS

1. Provide a listing of codes and standards applicable to the work in accordance with PEGNL "Guidelines for Municipal Engineering Services, Latest Edition".

9.4 SUBMISSIONS

1. Submissions are to follow Guidelines published by PEGNL, June 1996.

9.5 DESIGN FLOW

1. Domestic average design flow will be based on flows recommended in Department of Environment & Conservation's Guidelines, and take into consideration water efficiency measures to be deployed at the facility.
2. Make allowances for domestic peak flow of five times average design flow, for maximum daily flow of three times average design flow and for any special industrial type needs unless otherwise established by tests or reliable records.
3. Make allowance for internal water requirements for sprinkler or standpipe systems where appropriate. Consider supply to hydrants when sizing building connections and supply mains.
4. Desirable pressure for domestic purposes is 400 to 500kPa under average conditions.
5. Determine fire flows overall for building and site from the Fire Underwriters' Survey "Water Supply for Public Fire Protection, A Guide to Recommended Practice".
6. Mains and supply facilities are to be capable of simultaneously supplying the maximum daily domestic flow and the maximum fire flow requirement.
7. Limit maximum flow velocity in pipes to 1.5 m/s.

9.6 PIPES

1. Specify pipe materials in accordance with NL Master Specification Guide for Public Funded Buildings. Selection should consider local pressure, water quality, soil and climatic conditions.
2. Select pipe diameter based on hydraulic requirements. Do not oversize unless approval is given.
3. Ensure that pipe wall thickness calculations takes into consideration working pressure, laying conditions, earth pressure, traffic loads, etc.
4. Limit maximum flow velocity to 1.5 m/s.

9.7 VALVES

1. Provide one valve on each building connection at or near the tee off the main.
2. Provide one valve on each hydrant branch, located near the hydrant.
3. Provide sufficient valves on supply mains to enable a break to be isolated without interrupting the supply to more than approximately 250 m of main to avoid seriously affecting fire protection.
4. Direction of rotation and valve boxes is to be local standard.
5. Consider need for valve markers and special measures, e.g. pressure reducing valves, air release valves, electrical supervision, etc.

9.8 FIRE PROTECTION

1. Mains and supply facilities must be capable of supplying simultaneously the maximum daily domestic flow and the maximum fire flow requirement.
2. Minimum hydrant distance from any building to be 15 m and maximum length of hose to reach any part of a building to be 90 m. A hydrant is required within 45 m of the firefighting connection for the building. Ensure the drawings and specifications include any additional hydrants necessary.
3. Minimum size for pipe serving hydrants to be 150 mm diameter. Provide tie rods and thrust blocks at each hydrant plus one gate valve. Provide a satisfactory means of draining hydrants based on local practice.

4. Where a sprinkler system is used, consider need for separate supply line to the building to service sprinklers and standpipe system only. Check available flow and pressure to ensure that highest sprinkler heads are adequately served with minimum pressure and flow at the most remote sprinkler.

9.9 SANITARY & STORM SEWERS

9.9.1 GENERAL

1. Provide separate sanitary and storm sewers.
2. Determine required design capacity of the new sanitary and storm connections for TW's review.
3. Storm water or drain tiles shall not be connected to sanitary sewers.
4. Inform the Design Manager if it is not possible to dispose of sewage or storm water by gravity.
5. Exclude fuels and toxic chemicals from sewer systems.
6. Required capacity of the new sanitary and storm connections shall be determined as necessary for the design. Submit capacity requirement for TW's review.

9.9.2 DESIGN OF SANITARY SEWERS

1. Design sewers to be flowing 75% full when carrying maximum anticipated flow.
2. Base maximum flow in sanitary sewer mains on peak domestic flow, taking into consideration water efficiency measures.
3. Minimum velocity shall be 0.6 m/s at average flows and not less than 0.3 m/s at minimum flow. The latter requirement may be modified only if the maximum daily velocity exceeds 0.9 m/s and the sewer is self-cleansing. In general, the maximum velocity for sewers should be 3.0 m/s.
4. Building sanitary sewers shall be designed to accommodate peak domestic flows calculated on a fixture unit basis. Minimum size of sewer is 150 mm diameter. The preferred grade is 2%, with a minimum grade of 1%.

9.9.3 Design of Storm Sewer System

1. Drain all roofs and parking areas, roads, foundation drains, etc. to the storm sewer system.
2. Design for worst storm likely to be encountered in ten (10) years, based on local rainfall intensity records.
3. Design for minimum velocity of 0.6 m/s in sewers under average conditions.

9.9.4 Manholes and Catch Basins

1. Where the ground water level is above the sewer, special attention must be given to selection and waterproofing of manholes. Sanitary manhole covers should be of a tight-fitting type. The frames should be set in cement mortar and the tops placed slightly above grade whenever possible.
2. Manholes should be tested for water-tightness whenever conditions are wet.
3. Special attention must be paid to the structural strength of deep manholes,
4. For storm sewers, the water tightness of manholes is usually not critical. Generally, storm manhole tops will be of the perforated type, and may in fact double as catch basins or storm water inlets.
5. Safety landings are required when manholes exceed 5.0 meters in depth.
6. Manholes and inlet spacing in paved surfaces should not exceed 100 m.
7. In parking areas, catchbasin manholes should be used.

9.9.5 Sewage Forcemains

1. Design velocity shall not be less 0.8 m/s or greater than 1.5 m/s based on range of installed pumping capacity.
2. Provide uniform grade where possible.
3. Avoid dramatic changes in direction. Deflection of piping within allowable bending radius is preferred to accomplish changes in direction.
4. Consider automatic air relief valves at all high points.
5. Select pipe to withstand normal pressure and pressure surges.

9.9.6 SEWAGE LIFT STATIONS

1. Design sewage lift stations in accordance with Environment & Conservations' publication of "Guidelines for the Design, Construction & Operation of Water & Sewerage Systems", latest edition.
2. Use wet well design with duplex installation of submersible pumps.
3. Wet wells are to be equipped with high water level alarms.
4. Evaluate back up power supply source, or provision for overflow in the event of primary power supply failure.

9.9.7 BEDDING AND BACKFILLING

1. Where sewers pass under paved roads, drives and paved areas well compacted granular bedding and backfill shall be used for the full height.
2. Wide trapezoidal trenches are to be avoided where possible, and if used at all, the bottom section of the trench wall shall be vertical to a point 300 mm above the crown of the pipe and the trench shall be not more than OD +400 mm wide for pipes up to 825 mm diameter and OD+600 mm for pipes over 825 mm diameter.
3. Typical pipe bedding details on drawing are to show bedding and backfill and are to conform to the manufactures' recommendation for the loading and class of pipe selected.
4. If one or more services are located in the vicinity of a sewer pipe, detailed drawing and instruction shall be prepared showing how trenches are to be excavated and the various services bedded and supported during and after trench excavations.

9.9.8 INSPECTION AND TESTING

1. Specification shall call for inspection and testing of all sanitary and storm sewers before backfilling.
2. All sewers should be video inspected.
3. Deflection testing is required for sewers constructed of plastic pipe.

9.10 SITE GRADING AND SURFACE DRAINAGE

9.10.1 GENERAL REQUIREMENTS

1. To the greatest extent possible, design surface grades to preserve the natural character of the site while ensuring efficient treatment, retention and final disposal of surface water with minimal ground disturbance.
2. Site grading should produce a useable and easily maintainable ground surface not subject to flooding or erosion. Through initial rough grading and final site grading adhere to the following to the maximum extent possible:
    a. Preserve existing vegetation, and topsoil, particularly trees.
    b. Provide final road and site grades that ensure suitable pedestrian and vehicular access to buildings and permit adequate drainage of the site.
    c. Balance cut and fill as much as possible to localize the movement of earth. Ensure new grades merge smoothly with existing grades without causing low areas which pond water.
3. Establish building floor elevations so that ground floor of the building will not flood if storm sewer system becomes blocked.
4. Foundation drains are not to be connected to sanitary sewer system
5. Establish building floor elevations so that ground floor of the building will not flood if storm sewer system fails or becomes blocked.
6. Provide onsite storm water management to mitigate storm water discharge to the receiving environment. Achieve best storm water management practice respecting storm water treatment and retention.
7. Provide information on the impact of the proposed drainage system affecting the quantity and quality of runoff to receiving water bodies.
8. Provide positive drainage for the total site that is away from buildings with gradients of at least 2% (optimum 4%) for grass covered areas and 1% for hard surfaces.

9.10.2 SIDE SLOPES, DITCHES AND BACK SLOPES

1. Provide for a smooth transition at the top of cuts, toes of fills, bottom of ditches and other locations where the rate of slope is changing.

2. On slopes to be maintained and for long term slope stability of side slopes, use no less than 1 vertical to 3 horizontal to facilitate maintenance operations, especially grass cutting.
3. Design ditch cross section to have adequate hydraulic capacity and to keep water velocities below scour limits.
4. Ditches adjacent to pavements should be 150 mm deeper than pavement structure to avoid saturated foundations.
5. Ditches and swales are to be sodded or lined with crushed, clean rock, 100 mm minus.
6. Gradients for ditches:
    a. minimum 2%
    b. maximum 5%

9.10.3 Culverts

1. Slope culverts:
    a. minimum 0.5%
    b. maximum 6%
    c. maintain a flow of 1 to 3 m/s
2. Provide minimum cover of 400 mm from top of pipe to top of pavement or in accordance with the pipe manufacturer's recommendations.
3. Culvert should have an invert elevation at least 1.0 m below grade to avoid frost heave.
4. Culverts should be designed for a ten (10) year return period.

9.10.4 Drainage Appurtenances

1. Depth of catch basin leaders should be adequate to prevent freezing.
2. Minimum diameter of catch basin leaders and building connections is 200 mm and the minimum for storm sewers is 250 mm.
3. Maximum run to catch basins in surface drainage to be approximately 45 m. Aim at achieving a surface grade to catch basins of 1% to 2% with an absolute minimum of 0.4%.

9.11 Subsurface Drainage

1. Subsurface drainage systems will generally include foundation drains, under-slab drains, retaining wall drains, and general site sub-drains. Systems may typically include such

components as perforated and non-perforated pipe and fittings, graded fine and coarse aggregate filter material, geotextile fabrics, prefabricated drainage mats, and associated structures such as manholes, outfall structures, and sump pits.

2. Provide subsurface drainage systems as may be necessary to maintain site groundwater levels at least 400 mm (1000 mm preferred) below lowest floor slab or finished grade elevations, and to prevent hydrostatic pressure against basement walls or other earth retaining walls.
3. Provide filter medium surrounding and extending above pipe to highest groundwater elevation, or to floor slab sub-base elevation. Filter medium shall be fine aggregate, or coarse aggregate with surrounding geotextile fabric.
4. Perforated pipe 100 mm minimum diameter, shall be placed with perforations in the bottom half of the pipe. Minimum slope of perforated pipe shall be 0.2%.
5. Geotextile fabric is to be selected to suit soil characteristics for separation and filtration function. Equivalent or Effective Opening Size (EOS) will normally range between 150 um - 212 um.
6. Design for subsurface runoff as determined from geotechnical investigation, or using engineering judgment supplemented by recognized guidelines.
7. Typical cross-section of drainage trench containing perforated pipe should have a minimum trench width of 200 mm plus the pipe diameter with minimum of trench base of 100 mm below pipe.

9.12 PAVEMENTS - ROADS, PARKING LOTS AND SIDEWALKS

9.12.1 INTERSECTIONS

1. Ensure clear lines of sight at all intersections.
2. Avoid junctions near the crest of hills or where driver's vision is likely to be obstructed.
3. Design intersections to TAC standards.

9.12.2 ROADS DESIGN CRITERIA AND REQUIREMENTS

1. Design roads to incorporate the following parameters:
    a. minimum lane width 3.5 m

   b. minimum shoulder width 1.2 m
   c. minimum radius of horizontal curvature is 15 m inside edge for roads. Widen the inside lane by 0.6 m when minimum radius is used. For semi-trailers use compound curves for edge

2. Optimum horizontal road radii are 50 m. Radius used should accommodate critical vehicle.
3. Minimum turning radius for cul-de-sac edge of pavement: 14 m.
4. Minimum longitudinal gradient at centreline: 0.5% (absolute minimum is 0.35% if curbs provided).
5. Provide 2% cross slope.
6. Grades on hills not to exceed 5% where possible.
7. Shoulder slopes:
   a. gravel or crushed stone 5%
   b. earth or turf 6%
8. Where surface runoff water flows across more than one continuous lane (travelling or parking) use a minimum cross slope for the lane at the high point on the transverse profile.
9. T-shaped terminus used at dead-ends is to allow good driver visibility while backing. The wings of the terminus to be the vehicle length and 4 m minimum width.
10. Provide for the following minimum radii inside edge:
    a. at T-shaped terminus, 9.0 m
    b. at road intersection, 10.5 m
    c. at parking lots, 6.0 m
    d. at driveways, 4.5 m
11. Maximum grade within 30 m radius of intersection: 5%
12. Minimum grade for adequate drainage: 0.5%
13. Pavement structure: 50 mm asphaltic concrete over 100 mm granular base and 150 mm granular sub-base, except where site conditions require a different structure.

9.12.3 Parking Lots

1. Maximum gradient and cross slope 5%.
2. Minimum gradient and cross slope 0.5%.
3. Optimum gradient and cross slope:

   a. on paved areas 2%
   b. on gravel 3%
4. Locate entrances at least 60 m or as far as practical from street intersections. Left turn stacking should be checked.
5. Minimum setback for parking areas, 8.0 m from street right of ways and from buildings.
6. Provide turnaround at dead-ends by extending the aisle an extra 3.0 m.
7. Set parking spaces at 90^{o} where possible.
8. Parking stall dimensions: standard - 2.75 m wide, 6.0 m deep. Barrier Free - 3.6 m wide, 6.0 m deep.
9. Aisle width: 7.5 m.
10. Inside corners with parking areas to be rounded 1.5 m to facilitate turning in and out of parking spaces.
11. Where strip parking is to be provided, the access way may be widened and spaces designed as though the street were the access aisle. Provide an additional 1.0 m clearance from road edge to stall.
12. Pavement structure, same as roadways.
13. Provide low back curb unless otherwise directed.
14. Provide a large single parking lot where practical to facilitate ease of snow clearing and related maintenance. Large grassed landscaped islands to visually break up parking lot may be appropriate for major building complexes.
15. Provide grassed, snow dump area at each end of parking lot.

9.12.4 SIDEWALKS

1. Maximum gradient, 5% preferred
2. Maximum local cross slope, 5%.
3. Minimum gradient, 2%.
4. Barrier free ramps gradient, 5% preferred.
5. Minimum width:
   a. 1.5 m for walks accessed by wheelchairs and pedestrians
   b. 1.3 m for service entrances.

6. Avoid steps in walks but where unavoidable, provide at least three risers, and a handrail. Otherwise, follow natural grade up to 10% gradient.
7. Provide expansion joints and control joints as necessary

9.13 PLANTING DESIGN

9.13.1 GENERAL REQUIREMENTS

1. The planting design should reflect and preserve the natural character of the site.
2. All slopes should ensure drainage away from the building and towards natural drainage channels to minimize need for storm sewers.
3. Sodding should be used where the lawn must be established immediately or where grading results in steep slopes.
4. Materials, trees and shrubs, where required, should be selected for characteristics of sturdiness, low maintenance and tolerance to specific site condition. Generally, planting should be native and indigenous to site.
5. Plant material may be used to stabilize both existing and proposed grades.
6. Locate trees so that root spread and brand spread at maturity will not overlap underground utility/service lines.

9.13.2 TREES & SHRUBS

1. Select trees and shrubs sufficiently large to guarantee quick establishment and vigorous growth.
2. Avoid trees and shrubs within 1.5 m of curb.
3. Selection of trees and shrubs shall be in line with requirements of LEED® credits being pursued.

9.13.3 TOPSOIL, LAWNS AND PLANT MATERIALS

1. Sodding should be used where the lawn must be established immediately or where grading results in steep slopes.
2. Consider compost from local supply sources in lieu of importing topsoil. Application of recycled materials is to be encouraged in the development of the new site.

3. Introduce mowing strips adjacent to all buildings, 300 mm wide paved or crushed stone strips.
4. Specify planting to be performed as soon as practical and in stages where necessary in order to stabilize the site and limit soil erosion and sediment transport.
5. Plant material specified shall be from areas with similar climatic conditions. Use the site, soil type and those plants most likely to transplant successfully.

9.14 FENCING AND GUIDE RAILS

9.14.1 FENCING

1. Provide fencing details as applicable.

9.14.2 GUIDE RAILS

1. Place guide rails in accordance with recommendations of the Transportation Association of Canada.
2. Guide rails may be utilized as building or site structure protection.

9.15 SUPPLY AND WASTE HANDLING

1. Provide service areas large enough to maneuver trucks, minimizing the need for backing up.
2. Consider requirements for and siting of waste storage containers including recyclable waste.
3. Avoid locating truck parking areas near building air intake louvers.

9.16 SITE FURNISHINGS

1. Where site furnishings are being provided, the design is to be vandal proof, easily maintained and adequately secured to prevent quick removal.
2. Site structures include kiosks, transformer enclosures, storage bins, and ground maintenance storage facilities.
3. Assess with facility manager the site furniture requirements for seating facilities and litter collection.
4. Planters may be considered near entrances and in courtyards.

9.17 SIGNS

9.17.1 TRAFFIC CONTROL SIGNS

1. Traffic control signs required to ensure safe movement about the site are to be based on the "Canadian Uniform Sign Manual", published by the Transportation Association of Canada.
2. Detail the size, mounting method and text of each sign on the site design drawings.

9.17.2 EXTERIOR WAY FINDING AND INFORMATIONAL SIGNS

1. The way finding and informational needs of both vehicle and pedestrian traffic are to be addressed in the design. These signs are to provide direction information to the possible needs and services not otherwise obvious, such as parking areas, restricted areas, shipping and receiving.
2. The primary identification signs are to be free standing and sited according to Departmental direction.
3. Detail the size, mounting method and text of each sign on the site design drawings.

9.17.3 PROJECT SIGNS

1. Refer to the NL Master Specification Guide for Public Funded Buildings.

9.18 FLAGPOLES

1. Quantity of flagpoles will be project specific however, three (3) are common at major government buildings.

9.19 DRAWING CONTENTS

9.19.1 EXISTING CONDITIONS DRAWINGS

1. Refer to Site Surveys for drawing contents information to be prepared.
2. Provide soils information on existing conditions drawing comprised of location and logs of boreholes and test pits provided in the soils report.

9.19.2 GRADING DRAWINGS

1. The grading plan shall show sufficient grades and gradient arrows to indicate the site is adequately drained. The contour interval shall be:
    a. every 0.50 m for average site slopes up to 1:5
    b. every 1.00 m for average site slopes more than 1:5
2. Show ground floor entrance elevations of proposed buildings and finished elevations of grade at building corners and entrances.
3. Show proposed finished grades in relation to existing grades on grading plan.
4. Show location of manholes, catch basins, hydrants and valve boxes.
5. Direction and percentage of grade should be shown between all finished grades
6. Transitional sloping from proposed infrastructure to original ground should show the direction of sloping and design slope of 3:1 (H:V).

9.19.3 SITE SERVICES DRAWINGS

1. Dimension water, sanitary and storm services to existing buildings, features or survey lines to permit accurate setting out in the field during the construction stage and to facilitate location when repairs are necessary. Provide design grades to facilitate determining height of manholes and depth of watermain installation.
2. Drawings must cover:
    a. length, size, material and grade of sanitary and storm sewers between manholes
    b. inlet and outlet pipe elevations for each manhole
    c. watermain pipe material, size, bends and location of valves, connections, hydrant installations and drainage, and thrust restraint requirements
    d. normal bedding and backfilling of pipes, special backfill under roads, parking areas and driveways
    e. special bedding in rock trenches or poor ground
    f. dimensioned location of all adjacent services and method of crossing under or over, support etc.
    g. check locations of all adjacent underground services including telephone cables

h. typical details including manholes and catchbasins, manhole ladders, any modification to typical structures, water service connections, service lateral details, trench bedding and backfilling details

9.19.4 Landscaping Drawings

1. Intent is all landscaping features, such as surface cover, planting schedule and details are to be shown.
2. Provide planting schedule showing both botanical and common names of all plants, shrubs and trees. Show required plant size, height and planting spacing.
3. Coordinate with site grading plan to avoid conflicts with manholes, catch basins, hydrants, etc.

9.19.5 Pavement Plan

1. Show pavement extent and types with finished elevations, if not on grading plan.
2. Provide details for typical pavement section, curb, sidewalk, road and ditch section, and marking details.

9.20 Demolition

9.20.1 General Requirements

1. Prior to demolition the current status of environmental and health hazardous materials must be investigated and documented.
2. Subsequent to or in-conjunction with the environment abatement, two methods for demolition may be employed:
    a. Systematic demolition - to demolish a structure piece by piece in an orderly manner, which is normally carried out in the reverse order of construction.
    b. Demolition by rapid progressive failure - used to collapse a structure or a section thereof by the dismantling of the vital supporting members.
3. Systematic demolition is preferred where possible resale and/or reuse of construction materials will achieve environmental benefits.

9.20.2 Demolition Plan

1. Prior to demolition, an engineering survey should be carried out to determine the types of construction, condition of the structure to be demolished and the site conditions.
2. Utilizing the information obtained in the engineering survey, prepare a detailed demolition plan.
3. Where feasible, systematic demolition should be enforced, providing where possible the opportunity of resale, reuse, or recycling of construction materials. This should be considered in conjunction with LEED® plans.

9.20.3 Public Protection

1. Special requirements for the protection of vehicular and public thoroughfares or pedestrian traffic are to be indicated.
2. Show any site hoarding deemed necessary on site grading plan.

10. STRUCTURAL - TECHNICAL

10.1 REGULATIONS

10.1.1 CODES AND STANDARDS

1. Provide a listing of codes and standards applicable to work in accordance with PEGNL "Guidelines for Structural Engineering Services, Latest Edition".

10.1.2 AUTHORITIES HAVING JURISDICTION

1. Office of the Fire Commissioner
2. Service NL
3. Workplace Health, Safety and Compensation Commission
4. Municipality

10.2 SUBMISSION

1. Submissions are to follow Guidelines published by PEGNL, April 2011.

10.3 STRUCTURAL STEEL

1. Strength and serviceability limit states shall be utilized in the analysis and design of structural steel elements. In the design of structural steel to CSA G40.21M, steel with minimum yield strength of 300 MOA shall be used unless otherwise noted.

10.4 STRUCTURAL LUMBER

1. The usage of structural lumber shall be in accordance with the latest edition of the Canadian Wood Council Wood Design manual and applicable standards.
2. The preferred grades if sawn lumber for structural elements shall be No. 1 and No. 2 grade S-P-F, softwood S4S, moisture content of 19% or less unless otherwise indicated. Visual stress grades and machine stress-rated lumber are acceptable in wood construction.

10.5 REINFORCED CONCRETE

1. Concrete design strength is to be specified by the required compressive strengths at 28 days. In usual structural application, the concrete strength specified is in the range of 20-35 MPa for reinforced concrete and 35-45 MPa for prestressed concrete.
2. Reinforcing steel shall be billet steel grade 400 deformed bars. Welded wire fabric shall be provided in flat sheets only.
3. Concrete slabs on grade shall be designed in accordance with good engineering practice giving due consideration to subgrade and anticipated loading. The minimum compressive strength shall be 30 MPa and minimum thickness shall be 100 mm.

10.6 ENGINEERED MASONRY

1. The design of structural or load-bearing masonry walls, columns and pilasters shall be based on the twenty eight (28) day compressive strength of the concrete masonry,

11. ARCHITECTURAL - TECHNICAL

11.1 REGULATIONS

11.1.1 CODES AND STANDARDS

1. National Building Code of Canada (NBCC)
2. NFPA-101 Life Safety Code
3. Building Accessibility Act
4. Other legislated codes, and standards, that will affect the design of the project

11.1.2 AUTHORITIES HAVING JURISDICTION

1. Office of the Fire Commissioner
2. Service NL
3. Department of Environment & Conservation
4. Child, Youth & Family Services
5. Workplace Health, Safety and Compensation Commission
6. Municipality

11.2 FACILITY PLANNING

11.2.1 NET AREA

1. Includes the area measured from the interior walls including the interior face of surface of the exterior walls and is expressed as net square meters (NSM).

11.2.2 BUILDING GROSS AREA MEASUREMENT

1. The Building Gross is defined as the area, within the outside walls, as computed by measuring from the outside of the finished exterior walls, and is expressed as building gross square meters (BGSM).

2. Measure in square meters from outside to outside of walls at floor level for the area of each floor without any deductions for openings which occur within the floor area, except as noted later.
3. Where auditorium, swimming pool, gymnasium, foyers, etc., extend through two or more floors, include them by using the largest area at one level only.
4. Include the following areas in computing the gross area:
    a. crawl spaces with concrete floors
    b. future basement areas where the concrete slab only is required for structural completion
    c. floor areas which are structurally completed and where the finishing work will be executed at a later date
    d. tunnels, trenches, etc., which have a roof or slab over 2.0 metres or more from the floor
    e. rooms below grade or sidewalk (e.g. transformer rooms)
    f. true area of columns and other projections beyond the face of exterior walls, providing they extend vertically for the full floor height
    g. dormers, bay windows, etc., providing they extend vertically for the full floor height
    h. penthouses
    i. elevator machine floors within penthouses
    j. connecting links or walkways providing they are enclosed
    k. finished rooms in roofs and attics
    l. attached or isolated garages above and/or below ground level
    m. fully enclosed exterior staircases and fire escapes
    n. fully enclosed porches
    o. public lobbies
    p. elevators
    q. telephone and communications closets
    r. mechanical and electrical rooms
    s. elevator and mechanical shafts
    t. building service areas
5. Exclude the following area in computing the gross area:

a. crawl spaces which do not have concrete floors
b. tunnels, trenches, etc., with less than 2.0 m head room
c. exterior balconies
d. canopies
e. projections beyond the exterior wall face which do not extend vertically for a full floor height
f. fanhousings, etc.
g. areaways
h. unenclosed connecting links
i. covered walkways
j. unfinished roof and attic areas
k. carports
l. unenclosed exterior staircases and fire escapes
m. isolated chimneys and that portion of chimneys above the roof line
n. interior open court yards, light wells, etc
o. unenclosed porches
p. exterior steps and landings
q. exterior paving, patios and terraces
r. unenclosed areas which are roofed over
s. enclosed areas which are not roofed over
t. roof overhangs and cornices

6. If certain conditions warrant the inclusion of some of these items, list them separately from the gross area.

11.2.3 Department Gross Area

1. Includes the area measured from the interior face of the exterior wall to the centre of the demising wall for all adjacent departments including the gross area within and is expressed as Department gross square metres (DGSM).

11.2.4 Space Audit

1. The space audit is a check of the program gross and net areas.

2. The audit will be completed at the end of each design submission.
3. Any changes agreed to by the Project Team will be recorded.
4. Changes, which have not been agreed, will be corrected by the Consultant.

11.2.5 Net to Gross Ratio

1. The Department Net Gross to Building Gross Ratio for the building shall be between 1:1.20 and 1.30, where 1 represents the sum of net gross area for the building. This figure may vary depending on building classification.
2. The Net to Department Gross Ratio, for a department shall be between 1:10 to 1:15. This may vary depending on building classification.
3. Increase in an approved area, unless agreed, will not be allowed even, when the allowable gross building has not been met.
4. Gross area ratios will be decided at the program stage.

11.2.6 Flexibility

1. Government activities change periodically. It must be possible to accommodate these changes without undue disruption.
2. Design flexibility for immediate and future use of the space.
3. Pay particular attention to the location and arrangement of entrances, core areas, permanent corridors, elevator shafts and other fixed facilities.
4. In most Government facilities the open office concept is considered standard practice. Develop a building grid with column spacing and fenestration and service runs suited to flexible interior space requirements.
5. Locate plumbing and duct shafts to maximize consolidation of service space.

11.2.7 Appropriate Spaces

1. Every function shall be provided with the appropriate amount of space for the function of the work to be performed within that space.
2. Government maintains office space standards to accommodate office staff and their furniture requirements.

3. Space not covered by the standards and the facility program shall be adequately provided for using the NBCC, and NFPA-101 Life Safety Code.

11.2.8 Circulation

1. The space required to get from one work area to another.
2. Circulation space as a spatial program item is described as a building factor between the net programmed and ancillary areas for the building.

11.2.9 Circulation Routes

1. Circulation routes shall be simple, practical, and as short as possible.
2. The width of corridors shall be sufficient for the purpose required and designed to meet NBCC and NFPA-101 Life Safety Code for exiting, handicap accessibility, and movement of furniture and equipment.
3. Circulation routes need to pay attention to access to exits, as opposed to exits.
4. Circulation routes need to pay attention to public corridors versus corridors used by the public.

11.2.10 Vertical Circulation

1. Provide vertical circulation with sufficient width in the stairwells.
2. Provide elevators in buildings with more than two stories, including basements that need to be accessible by the occupants in their daily routine. Handicap lifts may be used in buildings not more than two stories.
3. Elevators are required to facilitate the movement of patients in a health care facility regardless of the number of stories.
4. Plan elevators and exit stairs for evacuation of the occupants in case of emergency.
5. Elevators and lifts are not required for access to mechanical or electrical rooms.

11.2.11 Horizontal Circulation

1. Plan horizontal circulation in individual rooms or suites to maximize the usable space.
2. The space within doorways and glazed units shall be planned to give the best use of the floor and walls for furniture and fittings.

11.2.12 ENTRANCES AND EXITS

1. Provide entrances and exits to the requirements of the NBCC and NFPA -101 Life Safety Code sufficient to handle the occupant load, and accessibility requirements.
2. Provide entrances to suit the function and not the aesthetics. Major access points shall be visible, accessible, and identifiable as the major access point without the need of signs.
3. Provide entrances (and exits used as entrances) with vestibules, and with adequate protection from the wind, rain, snow and ice.
4. Provide heat for all vestibules.

11.2.13 BARRIER FREE DESIGN

1. Design all buildings and sites with barrier free access in mind, except as permitted by law, using the Buildings Accessibility Act and applicable CSA documents.
2. Where possible eliminate doors to public washrooms off corridors

11.2.14 SUSTAINABLE DEVELOPMENT

1. Provincial government buildings are bound by the Build Better Buildings (BBB) Policy. The BBB policy provides a framework on inclusion/exclusion and how it is implemented. The BBB policy can be found at the following link:
    a. http://www.nr.gov.nl.ca/nr/publications/energy/betterbuildingspolicy.pdf
2. The Design Manager will give direction in consultation with the Client group as to the specific application of the BBB policy for each individual project.
3. Select materials that are cost-effective over the life of the product.
4. Consider in material selection the embedded hazards with its incorporation into the facility and future disposal.
5. Promote the use of materials that are recyclable at the end of their life.
6. Consider materials manufactured with recycled material.
7. Consider relocation of client provided material and incorporate salvaged materials into the project where practical.
8. All materials selected must meet the intent of LEED® pre-requisites and credits being pursued.

11.2.15 Environmental Health

1. Concerns about the impact of the built environment on the occupants are increasing. In designing a healthy building a holistic approach to the occupants' health shall be taken.
2. Consider background factors including: light, noise and color in the building design.
3. Incorporate good design practice for ergonomics as outlined in CSA -Z412-00 "Guideline on Office Ergonomics".
4. All materials selected must meet the intent of LEED® pre-requisites and credits being pursued.

11.3 Building Envelope

11.3.1 Flat Roofs

1. Generally, flat roofs shall be sloped to drains with a minimum of 2 % slope.
2. The slope shall be incorporated into the structure wherever possible. Otherwise use sloped insulation incorporating the following guidelines with:
    a. a minimum RSI of 1.3 thickness at any point opening to be 50 mm
    b. minimum butt thickness to be 50 mm
    c. minimum thickness at any opening to be 50 mm
3. RSI to be averaged over the whole roof
4. Insulation to be mechanically fastened to Factory Mutual Standard for the field of the roof. Final "Issued For Construction" fastening patterns shall be supplied with the insulation layment pattern. Fastening patterns shall be stamped by a design professional registered in the Province of Newfoundland and Labrador.
5. RSI to be averaged over the whole roof (minimum average RSI of 4)
6. The preferred roofing membrane is two-ply modified bitumen.

11.3.2 Sloped Roofs

1. Where sloped roofs are incorporated into the design, the roof shall be a minimum 4:12 slope. The method of insulation and finish covering may vary depending on the occupancy of the room below.
2. The preferred covering is asphalt shingles over ice and water shield.

3. The roof is to be designed to shelter exits and entrances from snowfall and rain water runoff.
4. Rain gutters are to be provided.
5. Where snow slide is a problem, the roof shall incorporate snow/ice guard fencing.
6. Sloped roofs are to incorporate eave protection. Extended 1200 mm up the rood measured from the inside face of the exterior wall.
7. Eaves are to be fire-stopped in order to protect the attic space from the spread of fire. Soffits should not be vented above and 300 mm beyond unprotected opening in building façade.
8. Facias are to be covered with prefinished metal flashing. Flashings are to be minimum of two bent sections where facias are over 150 mm in depth.
9. Sloped roofs are to be ventilated in accordance with NBCC and ridge venting is to be incorporated into the venting system.

11.3.3 Roof Repair - Replacement

1. The TW maintains a database record of all roofs in a roofing management program (Microroofer).
2. Any inspections or investigations carried out to determine the condition of a roof shall be recorded in the Microroofer format.
3. Data sheets and sample roofing reports are available upon request.
4. Completed data sheets, inspection reports, AutoCad drawings, and photos of roof conditions are to be submitted on CD Rom to TW for incorporation into the database.
5. Procedures for repairs and replacement and materials to be used for roofing projects are to follow the latest edition of the NL Master Specification Guide for Public Funded Buildings.
6. Flat roofing systems are not to be covered over by a replacement roof system consisting of a truss system unless the original roof covering is removed.
7. Provide details for roofs incorporating:
    a. vapor barrier continuity
    b. insulation thickness and slope
    c. securement of wood blocking and cants, with size of fasteners and depth of penetration
    d. continuation of roofing membranes
    e. built-up curbs at roof penetrations

f. membranes flashings at roof drains, vents, curbs, etc.

8. Provide calculations for wind uplift requirements in accordance with Factory Mutual. Provide calculations of fasteners per square meter for field, perimeter and corner areas with details of fastener pattern for each.
9. Where repairs are determined as the appropriate option, the repair technology will depend on the existing roof. If the repair program requires a large segment to be replaced, subdivide the roof area section, and then carry out a replacement on this roof area only.

11.3.4 SKYLIGHTS

1. Skylights are to be doubled shelled pre-molded plastic.
2. Doubled glazed sloped wall skylights are an acceptable alternate.
3. Skylights shall have internal condensation drains, connected to the internal roof drains.
4. Skylights are to be mounted on pre-moulded insulated curbs, with the skylight mounted a minimum 1000 mm above the top of the insulated roof, except otherwise recommended by wind-snow specialists.
5. Skylights should not be positioned on the roof areas, which are subject to the accumulation of snowdrifts

11.3.5 THERMAL INSULATION

1. The building envelope shall be wrapped with continuous insulation from the footing to the roof with interruptions as necessary for windows, doors and service entrances. Also refer to Model Energy Code for Buildings.
2. The thermal resistance of the roof shall be RSI-7 for attic type roofs and average RSI-4 for flat type roofs, for exterior walls RSI-3.5 including developed basements or in accordance with the National Energy Code of Canada.
3. The below grade insulation must be sloped away at 2% grade from the foundation wall when shallow footings are being used. The purpose of this technique is to deflect frost penetration and shed water coming into contact with the insulation. The foundation insulation must be supported on fill that will be unaffected by frost heaving.
4. At exposed exterior wall areas, the insulation shall be protected against damage to 200 mm below finish grade.

5. Fiberglass batt insulation should be used in stud walls in combination with rigid batt insulation on the exterior sheathing. Refer to NBCC for further information.

11.3.6 Air Barriers

1. The function of the air barrier is to eliminate air leakage from inside the building to the outside and vice versa. It is an important feature of the envelope performance, above and below grade.
2. Clearly identify and detail the barrier on all drawing details. Pay particular attention to:
    a. Roof wall interface
    b. Window-wall interface
    c. Wall-door interface
    d. Wall-foundation interface
    e. Wall or roofs
    f. All openings
3. The air barrier, unlike the vapor barrier, occurs at various locations in the assembly. The barrier must be properly tied to the air barriers of the different elements of the envelope. Where materials differ in the various elements of the building envelope, ensure continuity of the air barrier and compatibility of the materials used.
4. The barrier must be structurally supported and virtually impermeable to the passage of air.
5. The barrier must be durable.
6. It is desirable to place the barrier on the warm side of the insulation.
7. Where the air and vapor barrier is the same material, then the material must meet the structural and design requirements of both barriers.

11.3.7 Vapor Barriers

1. The function of the vapor barrier is to eliminate moisture leakage from inside the building to the outside and vice versa. It is an important function of the envelope detail, above and below grade.
2. Clearly identify and detail the barrier on all drawing details. Pay particular attention to:
    a. Roof wall interface
    b. Window-wall interface

c. Wall-door interface
d. Wall-foundation interface
e. Wall or roofs
f. All openings

3. The barrier is to be structurally supported.
4. The barrier is to be positioned on the warm side of the wall.
5. The vapor barrier is to be continuous and be connected with the barrier for the other elements that make up the building envelope.

11.3.8 Rain Screen Walls

1. Exterior wall cladding shall follow the rain screen principle that is recognizing that the exterior face is the first line of defense against rain and wind. Knowing that water will penetrate the first line of defense, it must be shown that the water has an efficient entry exit out of the wall assembly before it can do any damage. This principle points out the importance of a good air barrier or sheathing membrane behind the cladding and an air path that will let the water out to the exterior.
2. Air chambers in masonry veneer exterior walls shall not be less than 25 mm to ensure water that enters the assembly will not bridge the chamber.
3. The assembly is to provide a drainage route to the exterior, allowing in air and water out. All external vents should be at the same level, but must be above all obstructions in the wall assembly. Flashings that bridge the chamber are to provide positive drainage to the exterior and shall have a sloped bottom to the exterior.
4. The design of air chambers is to include the concept of compartmentalization. Compartment height should not exceed 6m. Compartments shall not exceed a width of 6.0 m, and a width of 1.2 m at building corners.

11.3.9 Wood Cladding

1. Wood siding is to be finished on all sides. The preference is for a factory finish, with a factory finish on all architectural accessories such as corner boards, trims etc.
2. The application of wood has to incorporate the rain screen principle with a minimum air chamber of 19 mm.

11.3.10 VINYL CLADDING

1. Attention must be given to the use of proper accessories, trims and starter strips. Wood trims are acceptable with vinyl siding, and should be prefinished on all sides.
2. Vinyl siding is not acceptable in cold climates such as Labrador where vinyl becomes brittle.

11.3.11 METAL CLADDING

1. It is important to pay particular attention to the detailing of all trims and flashings.
2. The application of metal siding has to incorporate the rain screen principle with a minimum air chamber of 25 mm, where horizontal flute or flat metal sidings are proposed. When vertical fluted sidings are used, air circulation is achieved on the back of 50% of the siding and therefore additional air space is not required. This type of siding should not be connected in direct contact with the air barrier.

11.3.12 MASONRY VENEER CLADDING

1. Masonry veneers include brick, concrete block and stone.
2. Special attention should be given to the air barrier details, and the securement of the cavity insulation to ensure the cavity is kept clear.
3. Masonry walls also require provision of movement both in vertical and horizontal direction. Masonry expansion and construction joints are to be clear of mortar, and sealed with sealant supported with a backer rod.
4. Masonry cladding shall incorporate weep holes to allow moisture to exit the cavity. Weep holes shall be free and clear of mortar and debris.
5. Flashings at the parapet of all masonry veneer walls shall be supported on 19 mm blocking and extend 100 mm below the upper most masonry unit. Vertical joints shall not be more than 9.0 m apart. All fastening of flashings shall be by concealed fasteners.
6. Details must show:
    a. Stainless steel masonry ties
    b. Enough information for the Contractor to easily build the system

11.3.13 SEALANTS

1. Sealants are not to be used as the first line of defense for preventing water entry.

2. If the caulked joint is too shallow or too narrow, the sealant may fail. Joints should not be less than 6.0 mm or more than 13 mm wide. The depth of the joint should not be less than half the width.
3. Sealants should not adhere to more than two sides. For a deep joint, a backer rod is to be used, which also acts as a bond breaker.
4. Backer rods are to be between 25-50% larger in diameter than the joint width. Use open-cell polyurethane or closed-cell polyethylene backer rods.
5. The sealant should be tooled to give a concave surface.
6. When selecting a sealant, select one that is compatible with adjacent materials. Do not paint the sealant.
7. Use high performance silicone sealants where possible.
8. Detail each typical joint such as expansion joint, or construction joint.

11.3.14 EXTERIOR WALL FRAMING

1. The inclusion of the material in a particular assembly must be compatible with the other assembly members and be cost effective.
2. The required asset life, the location of the project, the construction schedule, and the project budget are factors to be considered when making the design decision.

11.3.15 CURTAIN WALLS

1. The three main components of a curtain wall are glazing units, spandrel panel and frame.
2. Both glazing and spandrel panel units can be constructed to design RSI value with a limiting factor of the thickness of insulation being dependent on the frame thickness. Where preferred RSI values cannot be achieved within the frame thickness, a secondary wall may be constructed.
3. To achieve adequate thermal performance, the performance of the frame is critical. Thermally broken frames are essential.
4. To maintain a low air flow, and maintain energy efficiency and eliminate drafts and internal under section problems, particular attention to detailing joints is important. Joint sealing should be done with EPDM gaskets.

5. To ensure no air flow through the spandrel panel area, the panel should be provided with a factory installed metal back pan sealed to the interim frame member, and act as an air-vapor barrier.
6. A properly designed frame will incorporate the rain screen principle, allowing water that gets behind the main frame to drain out. Caulking should not be depended on as a line of defense for water penetration.
7. All fasteners and brackets should be corrosion resistant.
8. Allowances must be made to allow for movement that results from expansion and contraction as well as from building structure.
9. Joints between the curtain wall and adjacent components of the envelope such as the roof are important to detail.
10. Continuity of the insulation and the air vapor barrier over the envelope are important.

11.3.16 EXTERIOR DOORS

1. Exterior doors can be classified into three sections:
    a. entrance doors
    b. exits and service entrances
    c. overhead doors
2. Design entrances doors for public entry to a building to meet the "Building Accessibility Act" and its Regulations.
3. Entrances should be easily recognized from the approach to the building and from the parking area.
4. Entrances should be screened from the prevailing winds, protecting the public entering and leaving, and protecting the integrity of the entry from the elements. Design the entry to shed snow and rain away from the path of travel.
5. Design for security.
6. The entrance forms a major architectural part of a building. Acceptable systems are:
    a. extruded aluminum framing, with tempered insulating glass frame, glazing colors may vary
    b. hollow metal insulated door with tempered insulating glass in both top and bottom sections, thermally broken, exterior insulated metal door frames

7. Design the vestibule to avoid any hidden corners.
8. Design exits for the evacuation of a building. Exits should not be designed for other purposes.
9. As points of evacuation, exits should lead directly away from the building, be easily accessible, highly visible and well lighted.
10. Exit doors should be hollow metal insulated units in thermally broken, hollow metal, insulated frames.
11. Design doors used for staff or service entrance with:
    a. wire glass in upper half of door only
    b. heavy duty commercial grade hardware
12. Overhead doors are not to be designed as exit doors.
13. Overhead doors shall be designed to be electrically powered with manual override.
14. Where possible there should be an air curtain in front of the overhead door opening, providing pressurization to the space.
15. Design the sill detail of the overhead door to avoid any sticking due to freezing.

11.3.17 WINDOWS

1. With the exception of temporary structures or rented facilities, wood windows are not acceptable.
2. Fiberglass, metal, and vinyl windows are acceptable frame materials. All windows must have CCMC designation and be tested for CSA-A440-M90AAMA/WDMA/CSA 101/I.S.2/A440-08.
3. The province has several distinct climatic conditions that affect CSA- A440. All windows shall be designed for the particular climatic condition,
4. The design of all windows should allow for a top opening vent, with a maximum clear opening of 200 mm. The windows are to be located minimum 400 mm from the ceiling.
5. The minimum width of any operable window unit is 600 mm, maximum width is 900 mm allowable by TW.
6. The maximum height of sill above the floor is 750 mm in areas occupied by children under the age of eight (8) and in areas specially designed for persons in wheelchairs. The sill height for all other applications shall be 900 mm, except where privacy is a requirement.

7. No windows are allowed within the restricted pathway of an exit as determined by the NFPA-101 – Life Safety Code, unless protected accordingly.

11.3.18 Building Form

1. Heat loss or gain is proportional to the total surface exposed to the outside environment. Economic building forms retain heat energy by having a low surface-to-volume ratio. Perimeter-to-area ratio are also an indication of economic form, with the lower the ratio, the greater the energy savings.

11.3.19 Snow Drifting

1. Where feasible model testing shall be conducted to determine orientation of the building on site and the placement of entrance, exits and windows in an effort to mitigate snow drifting impacts.
2. Where testing is not possible, the following is suggested as a minimum guideline:
    a. Where the building is rectangular, align the long axis parallel to the prevailing winter wind.
    b. Where the building is square, align the diagonal axis parallel to the prevailing winter wind.
    c. Where deep snow exists consider elevating building above ground to allow air flow beneath the structure. If the building is rectangular align the short axis parallel to the prevailing winter wind. Shape the ground below the structure so that air flow accelerates most at the edge of the building.
3. Streamline the slope of the building keeping the roof profile low, or align the ridge parallel to the prevailing winter winds.
4. Place the plane of the entrance ways and exits parallel to the prevailing winter winds.

11.4 Architectural Interior Finishes

11.4.1 Wall Coverings

1. Wall coverings are an option in highly visible areas such as public waiting areas where appearance is important.

2. Vinyl wall coverings are quite acceptable for use in the senior executive offices and executive level meeting rooms.
3. Where movable walls are the prime interior partition construction, vinyl wall coverings are the preferred finish.

11.4.2 Ceramic Wall Tiles

1. Use ceramic tiles where maintenance is a concern, and where it is shown that the advantages outweigh the disadvantages.
2. Use ceramic tiles in commercial kitchens, and public washrooms as a wainscoting.
3. Ceramic tile should be full height in showers and around tubs. Reconstituted marble panels may be used as an alternate in these areas.
4. Use ceramic tile around urinals and around janitor sinks.
5. In wet or moist areas, use a water-resistant substrate.
6. Grout should not be white.

11.4.3 Paints

1. The use of latex paints is standard.
2. Oil base paints are restricted to areas where surfaces require constant cleaning and ceramic tile cannot be used.
3. Special coatings are restricted to areas that require highly resistant finishes and are to be applied to very stable substrate such as concrete block or plywood.
4. Stain selected for wood finishes should be selected with the long term facility maintenance in mind.

11.4.4 Other Wall Finishes

1. In areas where appearance is not important, concrete block or cast in place concrete may be used.
2. Request approval of the Deign Manager before incorporating special finishes.

11.4.5 Carpets

1. Durability, appearance, and cost are factors affecting carpet selection.

2. Provide level loop carpet product for all general areas. Plain colour carpets should not be used.

11.4.6 Ceramic Floor Tiles

1. Use ceramic tile flooring in areas that remain wet for several hours at a time, such as washrooms, shower rooms, and vestibules.
2. Durability, cost, and appearance are factors affecting the selection.
3. Specialty products should be selected for special areas, which require nonslip surfaces.

11.4.7 Quarry Tiles

1. Use quarry tile flooring in areas that remain wet for several hours at a time, such as washrooms, shower rooms, vestibules and commercial kitchens as an alternative to ceramic tile.
2. Durability, cost and appearance are factors affecting the selection.

11.4.8 Vinyl Composite Tiles

1. Do not use vinyl tiles in areas where exposure to cold or prolonged wetness will cause problems.
2. Vinyl tile should not be used in areas where daily maintenance is a concern. Sheet flooring products are more suitable.
3. Sheet flooring is to be used in health center corridors, and patient areas.
4. When choosing color, plain colors should be avoided.
5. Durability, cost and appearance are factors affecting the selection.

11.4.9 Resilient Sheet Tile Flooring

1. Resilient sheet flooring may be used in areas that remain wet for several hours at a time. (e.g. washrooms, shower rooms, and vestibules)
2. Resilient sheet flooring should be used in areas that require constant cleaning such as high traffic areas, health care centers and school corridors.
3. Avoid solid colors and patterns. Select tiles with marbleized patterns.

4. Durability, cost and appearance are factors affecting the selection.

11.4.10 Rubber Flooring

1. Rubber flooring is expensive, and certain types are difficult to maintain.
2. Rubber flooring may be a better choice for limited applications, such as wet areas, stair threads, landings and heavy traffic areas.
3. Durability, cost and appearance are factors affecting the selection.

11.4.11 Linoleum

1. Linoleum flooring may be used where there is high traffic in areas that require constant maintenance e.g. health care facilities, elevator cabs. Initial cost may be a concern.
2. Avoid solid colors and patterns.
3. Durability, cost and appearance are factors affecting the selection.

11.4.12 Vinyl Base

1. Use vinyl base with all flooring products except where the base is integral with the flooring material. (e.g. ceramic tile)
2. Rubber base is an acceptable alternative to vinyl.
3. Durability, cost and appearance are factors affecting the selection.

11.4.13 Natural Stone

1. Natural stone flooring may be used in areas of high traffic and in public areas which the designer may emphasize such as main corridors, lobbies and vestibules.
2. Use natural stone tile base with all natural stone flooring, except where the function of the space does not require the base to be an integral part of the floor. Vinyl base would be acceptable in this instance.
3. Durability, cost and appearance are factors affecting the selection.

11.4.14 Sport Flooring

1. Gym and multi-purpose rooms often serve different functions and floors are rarely protected from a variety of footwear.

2. Multipurpose rooms are defined for the purpose of the section as rooms that have space activity to facilitate a physical education program, but cannot accommodate basketball, volleyball or badminton due to height and floor size restrictions.
3. Game lines are specified for color and width in accordance with International and National Sport Standards.
4. Background colors in general and colors in other areas are to be coordinated with Client.

11.4.15 Gypsum Board Ceiling Finishes

1. Painted ceilings may have textured finish in public areas or where acoustic treatment is desirable.
2. The use of gypsum board ceilings is recommended in the following areas:
    a. vestibules
    b. areas that require secure storage
    c. areas that require fire ratings
    d. areas in a high moisture area

11.4.16 Acoustical Tile Ceilings

1. Finished ceilings in normal work areas are to be exposed suspended T-bar construction and acoustic tile.
2. Lay-in tiles, 610 x 610 mm or 610 x 1219 mm, with square edges are acceptable.

11.4.17 Finish Schedule

1. The following is a guide for interior finishes in the normal workplace environment:

ROOMS	CEILING	WALLS	FLOORS
Main Lobby	Acoustic Tile	Paint Vinyl Wall Coverings	Linoleum Resilient Sheet Flooring Carpet Natural Stone Ceramic Tile
Corridors	Acoustic Tile	Paint	Linoleum Resilient Sheet Flooring Carpet
Exit Stairs	Gypsum Bd. Painted	Paint	Rubber Thread and Nosing
Vestibules	Gypsum Bd. Painted	Paint Vinyl Wall Coverings	Quarry Tile Resilient Sheet Flooring
Office and Support areas	Gypsum Bd. Painted Acoustic Tile	Paint	Vinyl Tile Carpet Resilient Sheet Flooring
Washrooms	Paint	Paint Ceramic Tile Dado	Resilient Sheet Flooring Ceramic Tile Vinyl Tile
Storage	Paint	Paint	Vinyl Tile Paint
Stairs other than exit	Paint	Paint Vinyl Wall Coverings	Vinyl Tile Granite
Meeting	Paint Acoustic Tile	Paint Vinyl Wall Coverings	Carpet

11.4.18 INTERIOR DOORS

1. In general, interior doors are to be commercial/industrial grade with the finish to be project specific.
2. Veneers may be paint grade generally.
3. Standard stain grade doors shall be birch veneer, book matched.

11.4.19 FIREWALLS

1. Fire walls, separations, partitions shall be permanently identified as per international Building Code 703.7.

11.5 INTERIOR DESIGN

11.5.1 FIT-UP LAYOUTS

1. Develop office layouts using Departmental space guidelines to achieve the best use of the space.

11.5.2 COLOR SCHEMES

1. The Consultant may use an interior designer, or interior decorator to develop the color scheme. This work is considered as part of the standard basic services.
2. A written copy of the as-built colour schedule shall be included in the commissioning manual.

11.5.3 SYSTEMS FURNITURE

1. Systems furniture consisting of panels and components has been accepted as an alternative to free standing furniture.
2. The NL Master Specification Guide for Public Funded Buildings contains a section for systems furniture.

11.5.4 OFFICE FURNISHINGS

1. Clients may supply some of the office furnishings. Unlike systems furniture TW does not have fixed specifications for all levels of furnishings. The allocation for private office furniture is left up to the client department.
2. The furniture required for any complex should be tendered separately from the building structure.
3. Items not on standing offer shall be tendered with an appropriate specification, stating the material quality, performance standards and other information.
4. It is not acceptable to list a single manufacturer's product in the specification.
5. Similar items should be grouped when tendering, i.e. chairs, tables or office suites, where a desk, side table, and credenza must match. Some groups may be subdivided, e.g. desk chairs, lounge chairs.

11.5.5 Window Treatments

1. Window treatments may be required for all exterior glazing where sun shading and privacy are required. Clerestory windows are not required to have window treatments.
2. When selecting exterior window treatments, both the interior and exterior appearance should be considered. The exterior appearance should be compatible and present a unified design.
3. Where draperies may be hung, liners should be used.
4. Where feasible, select one product for exterior window treatment, throughout the project.

11.5.6 Planters and Plants

1. Planters may be used in open areas as space dividers where a degree of privacy and enclosure is required.
2. Artificial plants materials are to be inherently flame retardant.
3. Provide information on the type and number of planters and plants for consideration at the design development stage, and updated at the contract documents stage.
4. A two (2) year renewable maintenance agreement may be included at the time of tender. The maintenance agreement is to run from the end of the warranty period.

11.5.7 Artwork

1. Artwork may be provided to Government buildings under the Government Art Procurement program.

11.5.8 Barrier Free Design

1. The Building Accessibility Act applies to more than wheelchair challenged persons.
2. Where the Consultant finds conflict between the “Building Accessibility Act” and the NBCC the Act will govern, except where directed as part of the facility functional program, or by the Design Manager.
3. The Consultant will be responsible for any applications to the regulatory authority for the “Building Accessibility Act”.
4. Attention should be paid to clearances. Typical clearances should be detailed on the drawings.

5. Attention is required for handrails, provide details on the drawings.
6. The Accessibilities Act applies to more than wheelchair dependent persons. The requirements of the Act should be generally covered at the Concept Stage, discussing critical design issues and presenting equipment catalogue cuts.

12. MECHANICAL - TECHNICAL

12.1 REGULATIONS

12.1.1 CODES AND STANDARDS

1. National Building Code of Canada
2. National Plumbing Code of Canada
3. National Fire Code of Canada
4. Model National Energy Code of Canada for Buildings
5. National Energy Code of Canada for Buildings
6. Applicable CSA Standards
7. ASHRAE Standards and Guidelines
8. SMACNA Manuals
9. Provincial Fire Prevention Regulations
10. National Fire Protection Association Standards
11. ASTM and ASME standards
12. Other applicable international standards

12.1.2 AUTHORITIES HAVING JURISDICTION

1. Office of the Fire Commissioner
2. Service NL
3. Department of Environment & Conservation
4. Mechanical & Building Inspections, Department of Government Services
5. Department of Health & Community Services
6. Workplace Health, Safety and Compensation Commission
7. Municipality

12.2 SUBMISSION REQUIREMENTS

12.2.1 SUBMISSION REQUIREMENTS

1. Submissions are to follow PEGNL publication "Guidelines for Mechanical Engineering Services", August 1995.

12.3 PLUMBING

12.3.1 DOMESTIC WATER SUPPLY (HOT AND COLD)

1. Water meter is to be installed if required by municipality. If water meter is not required, provision for future installation should be shown on water service entrance detail. Water meter complete with output signal to the building EMCS.
2. Hot water circulation systems shall be in accordance to ASHRAE "HVAC Applications". Hot water circulation systems shall not be used where the distance of the hot water piping from the heater to the farthest fixture or appliance is less than 30 m. Attempt to locate hot water tanks close to the areas of highest use.
3. Hot water service to fixtures and appliances shall be delivered at a temperature in accordance with ASHRAE 90.1 Energy Standards for Buildings Except Low-Rise Residential Buildings. Booster heaters may be used at locations where fixtures or appliances require a higher water temperature than being generated by the hot water heater. Maintain stored water temperature at 60°C to prevent bacteria growth.
4. All showers are to be protected by scald proof devices. Central thermostatic mixing valves are an acceptable means of controlling water temperature.
5. Avoid locating plumbing in exterior walls.
6. Provide for freeze protected exterior hose bibs as required.
7. Provide for drain valves at all low points.
8. Provide for access to all valves and faucets

12.3.2 DRAINAGE, WASTE AND VENTING

1. Do not locate drain lines in exterior walls.
2. If a drain will only be used occasionally, a trap seal primer is required.

3. In Labrador, insulate vent piping at a distance of 3.0 m down from roof penetration.
4. Do not run horizontal vent pipe in vented attic space.
5. Invert elevations shall be shown for sanitary and storm sewer lines where they are to connect to site services outside building.
6. Pipe penetrating roof shall be next size up from pipe below, minimum diameter of 75 mm preferably 100 mm.
7. Clean-outs are required, for all sanitary lines, at changes of direction of 45 degrees and greater.
8. Slope all waste lines at a minimum of 2%,or to code whichever is greater

12.3.3 PLUMBING FIXTURES

12.3.3.1 Water Closets

1. Generally, water closets are to be wall hung type, open seat, and complete with flush valve (where sufficient water pressure exists). Provide elongated rim bowl syphon jet flush action water closets.
2. Water closets in public washrooms, schools and recreation facilities to be fitted with extra heavy seat ring only.
3. Use low water consumption toilet fixtures.
4. Electronic flush valve complete with manual override and hardwired with battery backup.
5. Dual flush may be used in limited applications on approval of TW.
6. Vitreous china fixtures are preferred for most installations. Stainless steel fixtures are to be used in security related facilities.

12.3.3.2 Hand Basins

1. Vitreous china fixtures normally are preferred. Stainless steel fixtures may be appropriate for high public use areas, security related facilities, and schools. Enamel covered steel, plastic, and fiberglass fixtures are not permitted.
2. Spring loaded faucets are not acceptable.
3. Use infra-red sensing faucets in public washrooms, with battery back-up.

12.3.3.3 Sinks

1. All sinks shall be stainless steel.
2. Janitors' mop sinks should be as per the master specification. One janitors' sink per 1400 m^2, with at least one per floor, shall be provided.

12.3.3.4 Drinking Fountains

1. Drinking fountains shall be stainless steel.
2. If refrigerated units are required they must be the self-contained type. Remote refrigeration units are not acceptable.
3. Hydration Stations are preferable.

12.4 Fire Protection

12.4.1 Sprinkler and Standpipe Systems

1. Provide sprinkler systems where required designed to NFPA 13-Installation of Sprinkler Systems. Consultant shall provide sprinkler layout. The fire protection Contractor is responsible for the final hydraulic design, calculations and detail layout with pipe sizes indicated, according to applicable codes and standards.
2. Sprinkler systems shall be electrically supervised.
3. Dry pendant heads should be used in areas where there is a possibility of freezing.
4. A glycol loop is necessary where sprinkler piping may be exposed to freezing temperatures.
5. Where standpipe systems are used, they are to be taken off sprinkler systems unless otherwise directed shall be designed in NFPA 14 – Installation of Standpipe and hose systems
6. Standpipe cabinets to be of sufficient size to accommodate a 9 kilogram dry chemical fire extinguisher.
7. Standpipe hose and nozzle fittings to be internal lug quick-connect couplings conforming to ULC S543–Standard for Internal Lug Quick Connect Couplings for Fire Hose.
8. Siamese fire department connection and caps shall have internal lug quick-connect couplings conforming to ULC S543. Siamese connection is to be in vicinity of the fire alarm panel.

12.4.2 Clean Agent Extinguishing System

1. A clean agent extinguishing system should only be considered for highly valued spaces which are not occupied designed to NFPA 2001 Clean Agent Fire Extinguishing Systems.

12.4.3 Wet Chemical Extinguishing Systems

1. Environmentally friendly, wet chemical extinguishing systems shall be installed over fryers and ranges, when required, designed to NFPA 17A Wet Chemical Extinguishing Systems.

12.4.4 Portable Fire Extinguishers

1. Portable fire extinguishers shall be specified ULC approved, rechargeable type extinguishers are acceptable for buildings which are occupied on a daily basis. Extinguishers selection and installation shall meet NFPA 10 Portable Fire Extinguishing Systems. CO^2 shall be used in electrical and data rooms.

12.5 Heating

12.5.1 General

1. Ensure heating system provides uniform distribution of heat. In particular, perimeter heating shall be designed to avoid potential for occupant discomfort by drafts from exterior wall.

12.5.2 Design Temperatures (heating load)

1. Use 1% January outside temperatures for critical spaces, otherwise use 2½% as listed in the Appendix C of the National Building Code, latest edition for the outside design temperature. Indoor design temperatures shall typically be set as per table below. Minimum temperature at floor level shall be 18°C.

	Occupied Hours	Unoccupied Hours
Office Areas	21°C	15°C
Warehouse, storage space, etc. With transient occupancy	15°C	10°C
Industrial areas such as kitchen, laundry, shops, etc.	18°C	12°C
Institutional	22°C	15°C
Laboratory	21°C	15°C
Health Care Facilities	to CSA Z317.2	to CSA Z317.2
Correctional (Administration)	21°C	15°C
Correctional (Inmates)	21°C	15°C
Correctional (Industrial areas)	20°C	12°C

12.5.3 ZONING

1. Spaces with similar thermal load profiles and/or occupancy shall be grouped into thermal control zones such as:
    a. perimeter and interior spaces zoned separately
    b. perimeter spaces, normally zoned by exposure
    c. the maximum size of perimeter zones for heating is the entire exposure
2. Each occupied space shall have its own heater and temperature control unless otherwise approved by TW.

12.5.4 FORCED AIR SYSTEMS

1. Forced air heating systems are only applicable to buildings where multiple zone control is not required.
2. The furnace shall have two fan speeds where the furnace supplies ventilation air. Where a separate ventilation system is installed one fan speed is sufficient.
3. Adequate outside air shall be introduced into the mechanical room for combustion.
4. Generally, ducts for air heating systems shall be run under the floor with distribution grilles located in the floor. In certain circumstances (such as a garage bay), overhead exposed ducting may be acceptable.

12.5.5 HYDRONIC HEATING SYSTEMS

12.5.5.1 General

1. Design to CSA B214 Installation Code for Hydronic Heating Systems

12.5.5.2 Boilers

1. The boiler plant shall consist of a minimum of two (2) oil-fired or electric boilers, each sized at a minimum of two thirds of the total load where economically justifiable. Three (3) boilers each sized for 33% of the total load is preferable. In critical applications, three (3) boilers each sized for 50% of the total load is preferable (TW approval required).
2. Establish the type of boilers to be used. Multiple pass forced draft fire-tube boilers are preferred in larger buildings where boiler size required exceeds 250 kW or electric multi-stage boilers.
3. Use retention head burners.

12.5.5.3 Chimneys

1. A separate chimney for each oil burning device is preferred.
2. Pressure rated chimneys are required for all forced draft appliances.
3. Chimney lengths should be minimized and kept within the heated building envelope as much as possible with the exposed exterior length kept to a minimum.
4. Cleanouts are to be provided at each change of direction. Cleanout covers shall be insulated.

12.5.5.4 Heating Fluids

1. Normally, the heating fluid will be 100% water.
2. Glycol mixture for colder climate regions such as Labrador in secondary heating loops to be determined on a project by project basis. Glycol is to be ethylene glycol premixed with inhibitors. A 100 mm air gap must be provided between water supply line and the top of the glycol make-up tank in glycol-water mixtures.

12.5.5.5 Circulation

1. Primary/secondary piping loops to allow constant or variable flow based on life cycle cost analysis on both loops under varying load demands are preferred for systems supplying over 50 kW. A single loop is acceptable for smaller heating loads.
2. Standby pumps are to be installed with each pump and sized to handle 100% of full system load. Use automatic start, with lead/lag automatic switch control and manual-off-auto selector switch.
3. All pump to have mechanical seals.
4. Pressurized EPDM bladder expansion tanks are preferred.

12.5.5.6 Distribution

1. Wall fin radiation is the preferred method of heat exchange.
2. If permanent cabinets or built-in furniture must be located against the same wall as radiation units ensure appropriate inlet and riser vents are installed.
3. Floor and wall mounted forced flow units are usually required for vestibules and entrances. Units should be recessed where structural conditions allow and controlled by low range thermostats.
4. Use radiant floor systems with approval of TW only.
5. A shut-off valve is required for each zoned section of radiation.
6. A balancing valve shall be provided for radiators on return branch piping.

12.5.5.7 Controls and Instrumentation

1. Provide indoor/outdoor controls for boilers with 2 or 3 step settings without reducing water flow to each boiler. Ensure a boiler's lowest water temperature shall not be below the boiler manufacturer's recommendations. Where low water temperature scheduling is economically justifiable, apply on secondary heating loops.
2. Normally open, electrically operated heating zone valves shall be used. Do not use thermostatic valves. Isolation valves and unions to be provided on both sides of zone valves and a piggy back drain is to be provided on the discharge side of the zone valve.
3. Thermostats located in public areas must have vandal proof guards. Locking type thermostats shall be used in public facilities where maintenance personnel only should be

able to adjust temperature settings. In areas where it is deemed appropriate for users to adjust thermostat settings, the range shall be restricted to prevent extreme settings. Where group of radiation units are controlled by a room thermostat, provide knob operated dampers in each unit enclosure.

12.5.5.8 Monitoring

1. Devices installed to allow testing of low water fuel cut-offs must allow testing without draining the boiler.
2. Stack thermometers are required at breeching outlet of each boiler.
3. Thermometers are required on wells located on:
    a. return piping of each zone
    b. converging side of three (3) way valves
    c. supply and return side of coils
    d. supply and return headers of heating equipment
    e. digital gauges and thermometers are preferred
4. A needle valve is required on supply and suction side of each pump, complete with pressure gauge and impulse damper. All gauges must be installed with isolating valves and snubbers.

12.5.5.9 Maintenance Requirements

1. Air Vents: with clearly identified access covers. Automatic air vents may only be used in mechanical rooms where system contains glycol. All air vents must have isolation valves.
2. An 18 mm combination hot and cold water connection shall be installed in the boiler room in close proximity to the boilers. The hose bibbs shall be equipped with vacuum breakers.
3. Access doors to all control and isolation valves are required.
4. Radiation cabinets must be secure but easily removable by maintenance personnel.

12.5.6 Fuel Tanks and Piping

12.5.6.1 General

1. Support tanks by a fire resistant cradle.

2. The design and installation of fuel tanks shall be in accordance with the National Fire Code of Canada and provincial regulations.
3. Use aboveground tanks, where possible.

12.5.6.2 Above Ground

1. Fabricate horizontal steel tanks conforming to ULC standards or field fabricated to API Standards.
2. Equip tanks with secondary containment conforming to ULC standards, and a provision for monitoring the secondary containment.
3. Coat tanks and steel containments internally and externally with a corrosion resistant material providing 100% surface coverage.
4. All above ground tanks shall be double walled with interstitial leak detection.
5. Detail guardrails as appropriate to protect tanks from vehicular traffic or other potential hazards.
6. Provide overfill protection device,
7. Air pressure testing according to ULC standards before being put in to service is required.

12.5.6.3 Underground

1. Place a geotextile fabric in the excavation to separate the native soil from the backfilling material.
2. Where underground tanks are proposed, first consideration shall be given to reinforced double wall fiberglass tanks.
3. Double wall tanks shall have interstitial leak detection conforming to ULC standards.
4. Steel tanks shall be catholically protected according to ULC standards. The cathodic protection system shall be commissioned prior to being put into use. Provision for future testing shall also be included.
5. Steel tanks shall be coated with a corrosion resistant material.
6. Tanks shall be anchored by ise or a reinforced concrete slab under the tank and anchor straps. The anchoring system must be designed to resist the buoyant force acting on the tank, when empty, fully submerged in water.

7. Reinforced fiberglass tanks shall have a minimum of 300 mm of bedding material (pea gravel) between the tank and concrete pad.
8. Double wall tanks shall be used when the capacity is greater than 20,000 L.

12.5.6.4 Piping

1. All storage tank piping located at or below the product level shall be equipped with either a manual or automatic shut-off valve as close as practical to the storage tank.
2. Primary piping shall not have buried mechanical joints.
3. Underground piping shall have secondary containment,
4. All storage tank piping shall be pressure tested before being put into service.

12.5.6.5 Additional Requirements for Sensitive Sites

1. Double wall tanks shall have interstitial leak detection conforming to ULC standards.
2. Underground tanks shall be of double wall construction.

12.5.7 Heat Pump Systems - Unitary Water-Loop

1. Minimize the use of console units. Use preferably ceiling mounted units and vertical closet-type units.
2. Select units for quiet operation. Locate units away from noise-sensitive areas and avoid noise transmission through ceiling and return air intakes.
3. Provide an acoustically lined “T” or “L” section at the return air inlet of each unit.
4. Units must be easy to access for routine service.
5. Operate the outside make-up air system at 100% when the outside temperature permits and modulate with return air when required.
6. In the ceiling plenum, duct the outside air supply for each pump to within 1.2 m of the return air of the unit, or discharge the air directly towards the inlet, or supply the outside air directly to the occupied space.
7. Thermal storage is generally required in reducing supplementary heating use and stabilizing loop temperature.
8. Provide freeze protection for the heat rejecter and associated piping.

9. Protect the supplementary heater against conditions of both thermal shock and low water flow.

12.5.8 Ground Source Heat Pumps

TO BE DEVELOPED

12.6 Ventilation And Air Conditioning

12.6.1 Ventilation

1. Minimum ventilation rates shall be as per ASHRAE Standard 62.1 (most current edition.) Outside air make-up shall not be less than all exhaust air flows. Control provision for continuous monitoring is an acceptable method of ensuring system is supplying minimum required ventilation rate.
2. Tailor a HVAC System type selection and its design to the need and hourly occupancy fluctuations where signification energy cost saving potential exists.
3. Provide HVAC system flexibility in buildings which employ an open-office type setting.
4. Equipment shall be BACnet Compatible.
5. Air velocity within an occupied space, defined as any point between 200 mm and 1700 mm from floor and more than 300 mm from a full height partition or an exterior wall, shall meet the following:
    a. Winter - not more than 0.15m/s
    b. Summer - not more than 0.25m/s
6. Locate outside air intakes so they will not entrain air from building exhaust or relief air outlets, vehicle exhausts, or other fume/contaminant sources. Consider relative locations, prevailing winds and air flow patterns around buildings in selecting exhaust/relief outlet and air intake locations.
7. Use flow stations to control and monitor all H/V unit fans.

12.6.2 Variable Air Volume (VAV) Systems

1. Bypass type VAV systems, with constant supply fan air flow, may be considered for small buildings where packaged air handling or roof top equipment is appropriate.

2. Performance characteristics of selected diffusers/grilles and registers shall be adequate over the whole range of air flows.
3. Do not use a VAV system to provide perimeter heating.
4. VAV system at minimum setting, must supply the minimum outdoor air requirements.
5. Supply fan air flow modulation control recommendations:
    a. Systems larger than 10,000 l/s - Static pressure control VSD.
    b. Systems smaller than 1,000 l/s. - No control; select forward curved fan to maintain acceptable duct static pressures as the system curve 'rides' up the fan curve. Ensure that excessive VAV terminal box pressure drops do not occur.
6. Return fan air flow modulation control recommendations:
    a. No return fan - Where the building design makes possible a return air flow pathway open enough so a return fan is unnecessary.
    b. Relief fan - Where the building design makes possible a return air flow pathway open enough so that the supply fan can draw return air effectively on minimum outside air operation, use a relief fan when the system is on free cooling operation. Relief fan and inlet damper should be controlled from building space pressure with high quality, low pressure span, differential pressure.
    c. Return fan - Use on large systems, and where free cooling is justifiable.
7. Where it is necessary to maintain specific pressure relationships between adjacent areas (such as adjacent to laboratories), special control provisions for the VAV shall be provided.

12.6.3 Design Temperatures (Cooling Load)

1. Use July 2.5% values as given in the National Building Code, latest edition for the outside design temperatures for space heat and humidity calculations. Omit envelope heat gains from cooling load calculations where air conditioned areas are unoccupied during summer months.
2. Interior design temperatures for cooling loads as per table below. The Consultant, upon request, shall show calculations indicating the need for mechanical cooling where necessary to maintain indoor design temperatures. If ventilation system is the primary source of heat, follow the design temperatures given previously.
3. Maximum temperature fluctuation is 2°C per hour.

Type of Space	Occupied Hours	Unoccupied Hours
Office Areas	24°C	None
Warehouse, storage space, etc. with transient occupancy	None	None
Industrial areas such as kitchen, laundry, shops, etc.	project specific	project specific
Institutional	24°C	None
Laboratory	24°C	None
Health Care Facilities to CSA Z317.2	to CSA Z317.2	to CSA Z317.2
Correctional (Administration)	24°C	None
Correctional (Inmates)	27°C	None
Correctional (Industrial areas)	None	None

12.6.3.1 Temperature Gradients

1. Horizontal - Maximum 2°C between 300 mm and 3000 mm from exterior wall at desk height.
2. Vertical - Maximum 2°C between 200 mm and 1700 mm from floor at any point more than 300 mm from an exterior wall.

12.6.4 Zoning

1. Group spaces with similar thermal load profiles and/or occupancy shall be grouped into thermal control zones. Given this principle, consider the following in making final zoning decisions:
    a. perimeter and interior spaces zoned separately
    b. perimeter spaces, normally zoned by exposure
    c. Perimeter zones:
    d. maximum size for cooling, 100 m^2
    e. Interior Zones:
    f. maximum size – 250 m^2 for open space
    g. 100 m^2 for enclosed spaces
2. Zone conference/meeting rooms larger than 20 m^2 separate with a local control to provide extra cooling and air changes as necessary.
3. Areas with special functional, occupancy or environmental requirements are to have separate zones or systems.

4. Each occupied space shall have its own cooling terminal unit and temperature controller unless otherwise approved by TW.

12.6.5 HUMIDITY

1. Humidification during the winter shall be required if it is determined that the humidity level will drop below 25% at the design room temperature. Provide 30% R.H. minimum humidification for normal occupancy.
2. Dehumidification during the summer months shall be accomplished by latent cooling. Cooling coils shall be capable of keeping humidity level below 60% at design room temperature.
3. Maximum humidity fluctuation is 20% per hour.

12.6.6 ACOUSTICS

1. Design HVAC systems to control equipment vibration and noise propagation such that background noises from these systems are below the maximums indicated in the most current version of the ASHRAE design manuals.
2. Ensure the HVAC systems serving private offices, interview rooms, counseling rooms, conference rooms, etc., provide a degree of acoustic privacy consistent with the rest of the construction.

12.6.7 EQUIPMENT AND COMPONENTS

12.6.7.1 General

Select systems, equipment and components to suit local service and maintenance capabilities. Use less complex equipment in remote areas.

12.6.7.2 Air Handling Equipment

1. Factors to be considered for operating efficiency and cost optimization when selecting air handling equipment:
2. Fan selection and efficiency:
    a. optimum air inlet/discharge configuration (follow AMCA recommendations)

b. noise levels
c. highest operating efficiency
d. part load operation for VAV systems

3. Coil face area:
    a. larger face area gives lower friction loss (both air-side and heating/cooling fluid)
    b. larger heat exchange surface area will permit smaller temperature difference (e.g. on cooling will permit higher refrigerant evaporating temperature and system efficiency)
    c. on cooling, fewer rows may be possible
4. Filter face area:
    a. Larger face area decreases static pressure drop, and increases dust-holding capacity.
5. Duct system design:
    a. Lower duct velocities and streamlined duct fittings both decrease system friction loss.
6. Roof top units are generally not recommended. However, in certain circumstances it may be hard to justify not using roof top units when analyzing capital cost. The use of roof top units generally depends on:
    a. the climate
    b. whether or not primary space heating depends on the unit, and
7. Controls complexity required.
8. Place over areas where noise is not a concern
9. Avoid contaminated air through heat recovery wheels. Avoid recirculation type heat recovery equipment defrost

12.6.7.3 Refrigeration Equipment Selection

1. Do not select refrigeration equipment using refrigerants which are restricted under the 1987 Montreal Protocol on substances which deplete the ozone layer.
2. All refrigeration equipment of 7.0 kW (2.0 tons) or greater capacity must be complete with a liquid-line filter-drier, complete with shut-off valves to permit service or replacement.

3. Select packaged refrigeration equipment which has service valves or ports to permit withdrawal, and isolation, of the refrigerant charge into a receiver or container, thus preventing its release to the atmosphere during service work. For refrigeration equipment with a cooling capacity greater than 35 kW (10 tons), select equipment with isolation valves to permit containment of the refrigeration charge in one portion of the system, thus reducing the amount of refrigerant which has to be recovered and replaced during service work.
4. In order to maximize refrigeration system operating efficiency, consider life-cycle cost optimization in the selection of refrigeration equipment, both packaged units and individually selected components. Some factors to consider are:
    a. larger coil surface areas will reduce condensing, and increase evaporating temperatures thus improving efficiency
    b. basic compressor efficiency and performance
    c. humidity requirements for product cooling/freezing may limit selection flexibility
5. Consider condenser heat recovery from product cooling/freezing units for domestic hot water preheating.
6. Where operation of refrigeration systems will be required in cold weather, ensure equipment with the necessary low-ambient temperature features is selected. Where refrigeration system components are located outdoors, or where freezing temperatures could occur, ensure the design provides for protection from freeze-up or damage due to the cold conditions.
7. Avoid use of municipal water supply for once-through water-cooled condensing unless there is no realistic alternative. If it is proposed, provide justification and obtain the approval of the Design Manager prior to commencement of final design. Discharge only to storm water drainage system.

12.6.8 Equipment Access

1. Provide access via stairway for equipment located in a penthouse.
2. Provide access for roof mounted equipment from the interior.
3. Equipment access doors must be hinged and latched.

4. Provide access around equipment so that it is easily accessible for servicing and maintenance.

12.6.9 Air Distribution Systems

1. Design ducts to conform to good engineering practice such as described in the ASHRAE and SMACNA Handbooks.
2. Distribution system design must permit easy relocation of any ceiling diffuser within a radius of 1.5 m.
3. Limit flexible duct use to buildings where frequent repartitioning is expected. Flexible ducts are not allowed to align duct branches. Maximum flexible duct length is 1.5 m.
4. Design systems for good air distribution throughout the occupied space under all load conditions. In particular, the design must avoid the following unsatisfactory conditions:
    a. exterior wall drafts during cold weather when heating is from a ventilation system with ceiling supply
    b. short-circuiting, when both supply and return are at the ceiling, particularly in perimeter areas during cold weather when the ventilation system provides space heating
    c. lack of adequate return air flow from private offices and meeting rooms
    d. incorporate ASHRAE HVAC applications volume included hourly circulation air changes in design
5. Provide low leakage type motorized dampers for inlet, relief or exhaust air at the building envelope.

12.6.10 Air Filtration

1. All filtration should meet the most current MERV standards.
2. For special applications such as hospitals or laboratories, select filters based on specific space requirements or standards.

12.6.11 Humidifiers

1. Humidifiers should be electrode steam design, with a self-contained cleanable steam cylinder, or provided by a boiler when economically justified.

2. Distribution shall normally be through a supply air duct mounted rapid steam absorption bank/panel.

12.7 CONTROL SYSTEMS FOR HVAC

12.7.1 GENERAL

1. Most medium and large size buildings will utilize an Energy Management and Control System (EMCS). Most control functions will be carried out by computerized direct digital controls (DDC). Local hard-wired controls will only be used for simple functions such as unit heaters, small exhaust fans and for all safety shut-downs such as freezstats. All fans starters will be equipped with hand-off-auto switches.
2. Submit control sequence descriptions and schematic diagrams for all systems for review.

12.7.2 HARDWARE

1. Control panels to be stand-alone intelligent controllers with non-volatile program memory. The panel is comprised of a micro-processor capable of supporting all necessary software.
2. Application Specific Controllers
3. Control panels shall have the capability of being networked for single point programming and for the sharing of point information and control instructions between panels
4. It should be possible for each control panel to have a dedicated local display or for a collection of control panels to share in single operator terminal
5. Control loops shall be user programmable, automatic self-tuning digital control loops with individual proportional gain and integral adjustments, capable of sharing controller inputs and integration through controller software
6. The system shall be capable of generating job specific control strategies that can be activated in any of the following ways:
    a. continuously
    b. at a particular time of day
    c. on a predefined date
    d. when a specific measured or controlled variable reads a selected value or state

e. when a piece of equipment has run for a certain period of time (trend)

7. Provide a personal computer interfaced with the Digital Control System (DCS) located in the mechanical room.
8. Specify web browser control where available for remote monitoring.
9. Provide a printer located in the mechanical room for printing alarms and summaries etc.
10. Required points are to be summarized in the specification or on the drawing.

12.7.3 SOFTWARE

1. Energy management system software shall be a graphics-based display in a Windows environment and contains features in the NL Master Specification Guide for Public Funded Buildings.
2. Include communications software package for remote monitoring of controls system.

12.8 ENERGY LIFE CYCLE COSTS

1. Identify those criteria which have the major or greatest effect on life cycle costs and whether only one specific escalation rate is required and can be justified for each major criteria identified.
2. Use energy costs obtained from utilities for oil, gas, and electrical energy sources when making comparative studies. Rates shall relate to energy peaks and consumption based on building concepts under consideration.
3. TW will provide the following to the Consultant for the life cycle study:
    a. present value discount interest rate to be used
    b. escalation rate for annual maintenance services
    c. annual escalation rate to be applied for each energy source
    d. the asset life, generally 20-25 years
    e. industry average costs for operating and maintaining mechanical systems if specific cost experience is unavailable for the proposed facility
4. Define a base building systems concept for use as a basis for comparison and selection of the final design concept solution. The base concept should represent the latest acceptable conventional system.
5. Analyze alternative systems' energy and cost deviations from the base concept.

6. Provide a life cycle cost summary comparing alternatives with the base building system concept.

13. ELECTRICAL - TECHNICAL

13.1 GENERAL REQUIREMENTS

1. Base the electrical design on providing the following features at the most economical cost, considering both investment and operating expenditures:
    a. Safety to personnel during operation and maintenance
    b. Ease of maintenance of equipment
    c. Flexibility of electrical services
    d. Energy conservation and efficiency (Pursuant to the latest edition of the National Energy Code)
    e. Proper coordination of all elements of the electrical system as to:
        i. insulation levels
        ii. interrupting capacities
        iii. voltage & current ratings
        iv. protective devices
        v. mechanical strength
        vi. hazardous location classification
2. Coordinate electrical systems with all other affected disciplines and building systems.

13.2 REGULATIONS

13.2.1 CODES AND STANDARDS

1. Canadian Electrical Code CSA C22
2. National Building of Canada (NBCC)
3. National Energy Code (NEC)
4. National Fire Code (NFC)
5. National Fire Protection Association (NFPA)
6. Provincial Fire Commissioner's Regulations
7. Electrical Safety in Patient Care Areas - CAN/CSA-Z32.2
8. Essential Electrical Systems for Hospitals - CAN/CSA-232.4

9. Installation of Fire Alarm Systems CAN/ULC-S524
10. Inspection and Testing of Fire Alarm Systems CAN/ULC-S536
11. Verification of Fire Alarm Systems CAN/ULC-S537
12. IESNA - Illuminating Engineering Society of North America
13. CAN/CSA-T530-M90 - Design Guidelines for Telecommunications
14. CAN/CSA-T529-M - Design Guidelines for Telecommunications Wiring in Commercial Buildings
15. EIA/TIA568, TSB40 Specifications for Category 6 Data Wiring

13.2.2 Authorities Having Jurisdiction

1. Office of the Fire Commissioner
2. Service NL
3. Department of Environment & Conservation
4. Mechanical & Building Inspections, Department of Government Services
5. Department of Health & Community Services
6. Workplace Health, Safety and Compensation Commission
7. Municipality

13.3 Submission Requirements

13.3.1 Submissions

1. Submissions are to follow “Guidelines for Electrical Engineering Services” published by PEGNL, August 1995 and this manual
2. Specifications are to follow the NL Master Specification Guide for Public Funded Buildings edited to suit the project requirements. Include track changes for each review submission.
3. Before final submission, submit plans and specifications required by the Inspection Authority, the Power Utility, Telephone Company, and Provincial Fire Commissioner’s Office. Submit copies of correspondence to Design Manager indicating status of submittals.

13.4 SERVICE AND DISTRIBUTION

13.4.1 INCOMING ELECTRICAL SERVICES

1. Generally, underground service through an exterior padmounted transformer is preferred and where required to conform to local practice. Cable and installation should be to the approval of the local Power Utility and Inspection Authorities. Provide spare ducts for future additions or maintenance. Ensure underground service conduit is suitably drained.
2. If an exterior padmount transformer is used, ensure padmount is at lower elevation than electrical room to prevent water infiltration into electrical room through underground ducts.
3. Overhead service is acceptable for small buildings.
4. Include protective devices, instrument transformers, metering equipment and other requirements of the local Power Utility.
5. Well in advance, discuss with the local Power Utility the size and type of service required. Obtain from them the three phase symmetrical short circuit fault level at the incoming end of their service to determine the interrupting capacity required for the service equipment.
6. Obtain from the local Power Utility data regarding point of connection, service characteristics and requirements, extent and cost of work provided by the Utility, type of service permitted (overhead or underground), whether a transformer vault is required and reasons therefore, and the best method of metering, outside or inside.
7. Obtain approval from the local Power Utility and Inspection Authority for proposed service entrance equipment, switchgear, duct-manhole systems, transformers, termination pole and associated equipment

13.4.2 CAPACITY OF ELECTRICAL SERVICE

1. Allow for 100% lighting load plus an appropriate demand factor on the remaining load based on operating characteristics.
2. The main service should provide for a maximum of 20% load growth plus an allowance for future expansion if anticipated.
3. Submit summaries of the connected and demand loads on the building at the contract document submission. Also show extent of loads connected to the emergency power, if applicable.

13.4.3 ELECTRICAL ROOMS

1. Allow room space for future expansion of equipment, (e.g. future distribution section on end of service entrance board or wall space for future distribution panel), when determined by program design.
2. Ensure an independent ventilation system, (gravity where possible), with intake and exhaust direct to the outside is provided, where heat generating equipment is installed, (e.g. transformers, remote mounted ballasts, etc.).
3. All major electrical equipment installations shall be located remotely from public areas and housed in areas providing limited access. All miscellaneous openings at the exterior of the building related to electrical systems shall be provided with approved security grilles or screens.
4. Design electrical rooms to allow future space for expansion/extension.
5. Do not locate electrical rooms under washrooms, shower rooms, janitor closets and kitchen's or any such areas where flooding could occur. Do not run plumbing lines in walls and ceilings of electrical rooms.
6. Minimize mechanical ventilation duct work in ceiling spaces above electrical rooms.
7. Do not design any plumbing or fire protection wet pipes so that they run in the ceiling spaces above electrical rooms. If it is absolutely unavoidable, the Consultant must get approval from TW before continuing with the design.

13.4.4 SWITCHGEAR ASSEMBLIES

1. Use metal-enclosed assemblies with circuit breakers where current, voltage and short circuit characteristics are within their limits.
2. Incorporate H.R.C. current limiting fuses into circuit breakers on circuits requiring high short circuit protection.
3. Fused switches may be used for main and distribution feeders.
4. The electrical equipment supplier is to provide a short circuit analysis and time-current coordination study to justify selection of fuses and breakers. Include in the analysis and study the system from the utility primary fuse to the largest breaker in each branch circuit panelboard and motor control center.

5. Specify for Owner's metering that the switchgear manufacturer install a micro-processor controlled digital AC instrumentation package for Owner's metering purposes.
6. All bussing shall be tin-plated aluminum in main switchgear assemblies.
7. Specify sprinkler proof enclosure as required.
8. Specify a ground fault protection system if warranted buy system size.
9. Specify quality and performance requirements to suit project application.

13.4.5 Transformer Types

1. Dry type transformers are preferred for primary voltages of 15 kV or lower where insulation, coordination and protection satisfactory to the Power Supply Authority can be obtained. Provide lightning arrestors.
2. Liquid cooled transformers are preferable above 15 kV, although dry type may be used if approved by the Power Utility. Check BIL requirements. This type of transformer should be supplied by the Utility.
3. When providing secondary voltage service entrance, padmounted or pole mounted utility-owned transformers are preferred.
4. Locate the transformer to minimize the length of the secondary cable run to the building and to minimize visual impact on the site.
5. Specify sprinkler-proof enclosures for transformers located in sprinklered rooms.
6. Meet or exceed US Department of Energy (DOE) CSL3 efficiency standards tested as per NEMA TP-2.

13.4.6 Wiring Methods

1. Wire size is to be No. 12 AWG minimum for power or lighting circuits. Bonding conductors may be a minimum of No. 14 AWG. Specify that each receptacle circuit providing computer power must have a separate dedicated neutral wire and be powered from dedicated panelboards thru separate harmonic mitigating transformers as required.
2. Specify wire type to be copper complete with RW90 XLPE insulation. Insulation ratings shall be a minimum of 600 volts for 347/600 volt a.c. circuits and 300 volts for 250 volt a.c. circuits and below. Specify the use of RWU90 type insulation on conductors for exterior underground use.

3. Give consideration to the use of nickel aluminum alloy conductors for feeders and large branch circuits 60 Amps and greater. Take into account differences in voltage drop and conduit size when using alloy conductors verses copper.
4. Minimum conduit size is to be 19 mm with an allowance made for the use of 12 mm conduit in cases where one (1) 3 wire, 15 amp branch circuit is wired or for switch legs.

13.4.7 PANELBOARDS

1. Use circuit breaker type panelboards for motors, power equipment and lighting. Consider use of MCP's for motor protection.
2. Circuit breakers are to be of the bolt-on type. Multiple breakers shall have single handle. Tie-bars are not permitted.
3. Specify mains or bussing to be made of tin plated aluminum.
4. Include in panelboards a minimum of 20% spare breakers and space for a minimum of 10% more.
5. Specify sprinkler proof enclosure as required.
6. Specify that splices are not permitted in any panelboard feeders.

13.4.8 CEILING DISTRIBUTION

1. Provide power distribution system, in the ceiling space, for office areas as follows:
    a. system to be capable of supplying three phase power to modular office furniture or single phase pack poles
    b. common neutrals not acceptable
    c. connection length in ceiling not to exceed 3.0 m
    d. allow for a maximum of four duplex receptacles per circuit except two duplex receptacles per circuit for computer
2. Provide communication (voice & data) system, in the ceiling space, for open office areas as follows:
    a. system of zone conduits sized as required for open office areas or instrumentation cable tray routed along corridor ceiling space
    b. terminate conduits/cable tray at backboard in communication closet

   c. design the system to minimize length of cables, do not install cables directly on ceiling tiles
3. If zone conduit system is utilized, provide separate zone conduits for telephone and data
4. Design system to minimize length of cables installed directly on ceiling tiles

13.5 LIGHTING

13.5.1 LIGHTING - GENERAL

1. For each room or area determine the task performed and provide maintained lighting levels as shown in the latest edition of IESNA (Illuminating Engineering Society of North America) Lighting Handbook.
2. Provide video display terminal task lighting to IESNA recommended practice for lighting offices containing computer visual display terminals (RP-24).
3. Recessed fixtures shall have hinged frame lenses.
4. Use fixtures with parabolic louvers where glare is a problem.
5. Provide minimum V.C.P. value of 70 for all spaces.
6. Design office area lighting to provide between 500 and 550 lux average maintained on the task with furniture and screens in place.
7. Provide local switching for enclosed rooms, (e.g. private offices, conference rooms, training rooms, etc.). For large areas provide a switching arrangement to conserve energy with the use of occupancy and day lighting sensors.
8. Fixtures are to be relocatable within a 1.5 m radius without wiring alterations.
9. Provide a life cycle cost analyses. If a life cycle cost saving can be achieved, provide a programmable low voltage lighting control system with the following options:
   a. high resolution color monitor and CPU
   b. desk top printer
   c. manual switch and digital telephone override
10. Provide exterior lighting control by a photo cell and contactor with HOA switch and time clock or programmable controller set back. Provide manual bypass.
11. Provide exterior security lighting for drives, walks and parking areas.

12. Energy efficient lighting systems shall be provided and shall not exceed the lighting power densities as per the latest edition of the National Energy Code of Canada for interior and exterior lighting systems.
13. The illumination of any space should be based on the intended use and the efficient utilization of energy. Follow the procedures recommended by the current IESNA Handbook to as great extent as possible without exceeding the allowable lighting power budget and power densities as permitted by the latest edition of the National Energy Code Canada.
14. In most cases, the levels of illumination listed in IESNA Model Handbook are for specific tasks. When levels are listed for locations, (e.g. foyer) they shall be considered average levels.
15. In areas surrounding task locations, the average level of illumination shall not be more than 1/3 the level of the task performed in the area. Where more than one task occurs in space, the general level shall not be more than 1/3 the average of the task levels.
16. In circulation and seating areas and other seldom occupied space or those in which no critical visual tasks occur, the average level of illumination shall not exceed 1/3 of the average lighting in the adjacent task space.
17. Recommended lighting levels for a few typical areas are as follows:
    a. hallways or corridors - 110 lx
    b. work and circulation areas surrounding work stations - 325 lx
    c. prolonged office work (on task only) - 550 lx
18. Design switching of lighting fixtures to conserve energy, using one or more of the following schemes:
    a. separate switching of lights at the perimeter of the building
    b. provide low voltage switching for general office areas
    c. provide switching at each floor and at central location
    d. automatic control systems (occupancy and daylighting sensors)
    e. switching by zones, not less than four (4) zones/floor
19. Switch lighting by zones in open and modified landscape spaces not exceeding 160 square meters.
20. Switching of lighting fixtures shall be designed to conserve energy, using one of more of the following schemes to achieve LEED credit:
    a. separate switching of lights at the perimeter of the building

b. provide low voltage switching for general office areas
c. provide switching at each floor and at central location
d. automatic control systems
e. switching by zones, not less than four (4) zones per floor
f. switch lighting in all enclosed rooms separately

21. In selecting reflectances and interior surfaces, bear in mind energy utilization implications as well as those of other disciplines.
    a. ceiling - 70%
    b. walls - 50%
    c. floors - 30%
22. Plan lighting designs for high ceiling areas (e.g. atriums, stairwells) such that ease of relamping is achievable. Use wall mounted fixtures in exit stairwells.
23. Place lighting to minimize the types of lamps to be used.

13.5.2 Lighting Fixtures

1. For indoors, recessed fluorescent fixtures utilizing low brightness pure virgin acrylic lenses or parabolic louvers are preferred. Ballasts to be electronic energy efficient type with less than 10% harmonic distortion. Lamps to be imperial measure, instant start, T8 configuration, energy efficient, color temperature and color rendering index (CRI) to match application.
2. For outdoors, LED fixtures are preferred.
3. Identify all fixtures on the working drawings and specify in detail in the specification, the quality of material, construction and standard of performance required.
4. Lenses are to be ULC certified.
5. Gymnasium lighting shall generally be fluorescent.
6. In schools classrooms arrange fixtures to avoid the need for special chalkboard fixtures

13.5.3 Exterior Lighting

1. For building perimeter lighting, use LED type fixtures, located on the exterior wall a minimum of 2700 mm above ground level. Ensure the fixtures are located to prevent damage caused from falling ice and snow from the roof.
2. Light the vehicle parking lot with pole-mounted, LED type fixtures.

3. Provide lighting levels as follows:
    a. perimeter lighting - 15 lx at ground level
    b. active entrance - 54 lx at ground level
    c. parking entrance - 10 lx at ground level
    d. secure parking compound - 10 lx at ground level
4. Emergency power is to be provided to perimeter lighting only to maintain 25% of the above lighting level where an emergency generator is provided in the project.
5. Account for site and building lighting impact on nearby residential areas. Lighting should be used in a positive way to enhance the appearance of both the site and building.
6. All exterior fixtures to be dark sky compliant.
7. Design exterior lights to achieve the LEED ® credit for Light Pollution Reduction.

13.5.4 Emergency Lighting

1. Provide sufficient emergency lighting to permit a safe evacuation. Design emergency lighting systems in accordance with the latest editions of the National Building Code of Canada, National Fire Code of Canada, and the NFPA 101 Life Safety Code.
2. Power for emergency lighting may be from a diesel generator, a central battery bank or individual unit battery packs.
3. If emergency lighting is from a diesel generator, supplement it with battery units in critical locations such as the public main lobby, electrical and mechanical rooms.

13.5.5 Exit Signs

1. Exits and paths of exit travel are to be indicated by electrically illuminated uni-lingual exit signs.
2. Exit signs are to be illuminated with energy efficient L.E.D. lamps.
3. Connect signs to emergency A.C. system, or provide additional sockets and D.C. lamps and connect to emergency battery units.
4. Bilingual and international signs are to be provided where required.

13.6 ELECTRIC HEATING

1. If electrical heating is used, ensure that the heating unit specified provides the required wattage but does not exceed specified values.
2. Integrate the heating controls with the total environmental aspect of the building.
3. Use low watt density heaters where feasible.

13.7 SYSTEMS

13.7.1 INTERCOMMUNICATION SYSTEMS

1. Provide an intercom and a public address/paging system as required.

13.7.2 FIRE ALARM SYSTEM

1. Provide a fire alarm system in accordance with the National Building Code of Canada and Authorities Having Jurisdiction.
2. The system is to be electrically supervised, single or two stage as necessary and zoned.
3. Control panel shall be multi-plexed type, of modular design, supervised, with space for future expansion, and in a metallic cabinet with viewing windows suitable for the location. Provide supervised bypass switches on panel to allow testing of bells, fan shut down or remote station notification.
4. Annunciator, where required, is to be electronic lamp type with lamp supervision, front relamping with plastic zone identification plates.
5. Manual Stations shall be addressable, pull lever, open circuit type, installed at 1200 mm height.
6. Heat and smoke detectors shall be the addressable type.
7. Wiring shall be color coded and minimum size #14 AWG for signal circuits, and #16 for station and detector circuits. Provide bonding wire for all field devices.
8. Specify the system be tested and verified by the equipment manufacturer prior to takeover inspection. At final inspection the certificates issued by the manufacturer shall be available to the Authorities Having Jurisdiction and Department of Transportation & Works.
9. Provide complete riser diagram on drawings indicating all devices, locations, conduit risers and sizes, wire type, and control sequences.

10. Provide one or more zones for each floor including penthouse, sprinkler system, dry or wet chemical systems, stairwells and air handling systems.

13.7.3 Intrusion Alarm and Remote Monitoring

1. Projects requiring Security Systems should be tendered with a separate contract for provision of security systems.
2. Use Departmental standard specifications and guidelines to suit project requirements.
3. All points of building entry and exit and interior unit spaces designated as requiring security control are to be equipped with the capacity for installation of intrusion alarms. All exterior doors and frames are to be provided with facilities for alarm devices and conduits to the security room.
4. Provide conduit for centralized monitoring and control systems and console for fire alarm, emergency telephones, elevators, and lighting systems.

13.7.4 Telecommunications System (Telephone and Data)

1. Provision of structured cable systems for data networks throughout new and existing buildings will be confirmed by the Design Manager at the Concept Design stage. Where required, they shall be configured for a “star” topology pattern, emanating from data closets with the use of dedicated zone conduits. Typically all data wire, conduit, patch panels, line cords, patch cords, plates, boxes, hubs, etc., will be supplied as part of the system.
2. Design a telecommunication system in accordance with the latest editions of the following guidelines and standards:
    a. CAN/CSA-T530-M90 “Building Facilities, Design Guidelines for Telecommunications”
    b. CAN/CSA-T529-M “Design Guidelines for Telecommunications Wiring System in Commercial Buildings”
3. Position Voice/Data outlets in close proximity to receptacle power outlets.
4. Provide a data raceway system complete with Cat 6 wiring, outlets, cover plates, patch panels, hub devices and patch cords to constitute a complete operable system. Zone conduits or cable trays in ceiling plenum are preferred complete with wall stub-ups from device outlets. Provide separate raceway for the telephone system.

5. Generally, provide one combination outlet per single office and at 8m intervals along perimeter walls where there are no offices (e.g. in open area office space).
6. Provide pay phones in the public lobby unless otherwise directed.
7. Connect elevator emergency phone to Security Control Center if applicable.

13.7.5 CLOCKS

1. Provide clock outlets in common areas such as main lobbies, cafeterias, lunch rooms, workshops, conference room, general offices, mail rooms, file rooms and classrooms wired back to central clock system controller.

13.8 MOTORS AND CONTROLS

13.8.1 MOTOR CONTROLS

1. Coordinate control sequences to provide starters, and other auxiliary control equipment with the proper characteristics and features to obtain the performance intended.
2. Provide disconnect switches, starters and auxiliary control equipment which are not an integral part of packaged units described in equipment specifications but which are required for performance and sequence of operation of equipment specified under other Divisions.
3. Check that the voltage drop due to motor starting is within limits acceptable to the local utility. If required, use a reduced-voltage starter or soft start.
4. Motor starters are not to be supplied from lighting panelboards -Supply separate from dedicated panelboards.
5. Automatic control devices such as thermostats, floats or pressure switches may control the starting and stopping of motors directly if designed and rated for that purpose. Otherwise use a magnetic starter.
6. When a manual-automatic operation is required, use a “Hand-Off-Automatic” selector switch. Connect the selector switch so that only the normal automatic regulating control devices will be bypassed when the switch is in hand position. Connect safety control devices, such as low or high pressure cutouts, high temperature cutouts, and motor overload in the control circuit in both the Hand and Automatic positions of the selector switch.
7. For three-phase motor starters provide:

a. magnetically operated motor starter
b. fused control transformer for 120 or 24 volt control
c. manual-off-automatic selector switch where remote control is used
d. combination starters are preferred, starters with separate disconnect devices may be acceptable
e. motor starter disconnecting devices to be manually operated and to be load-break fused or non-fused switches, or circuit breakers

8. Control devices in individual special purpose enclosures should be mounted in groups.
9. Mount control devices in a common enclosure where numbers warrant.
10. Motor starters are to be NEMA rated. Specify sprinkler proof enclosure as required.
11. Provide lockable disconnecting means within sight and 1 meter from each motor.

13.8.2 Motor Control Centers

1. Use motor control centers where they provide an economical and practical grouping of controls.
2. Centers should be free-standing structures.
3. Use combination starters.
4. Mount centers on continuous mounting channels on concrete.
5. Wall mount type may be used for groups of up to four starters.
6. Identify each starter by a black laminated plastic nameplate with white letters.
7. Specify control centers as per NEMA Standard for class and type.
8. Specify sprinkler proof enclosure as required.
9. Specify that splices are not permitted in MCC feeders.

13.8.3 Motor Equipment Feeders

1. In open equipment areas consider the advantages of running motor equipment feeders from overhead rather than up through floor slabs. Specify type of support.
2. Splices shall not be permitted in motor equipment feeders.

13.9 LIGHTNING PROTECTION

1. Review the requirement for the installation of lightning protection. If required, provide protection to meet CSA standard B72-1987 and any provincial or local regulation.
2. Provide specific comments on this subject in the design synopsis of the Concept Design submission.

13.10 CONTROL SYSTEMS

1. Coordinate provision of building automated control systems with the mechanical division.

13.11 EMERGENCY GENERATOR

1. Provide an emergency power generator as directed or required by code, sized to operate the following:
    a. a number of spaces. See unit spaces for requirements
    b. a limited number of exterior lights for perimeter security (25%)
    c. minimal heating and ventilating equipment
    d. elevators (1 at a time to operate to closest floor)
    e. fire alarms and exit lights, emergency lighting in stairwell, corridors and all other areas where required by code
    f. alarm and control systems
    g. all electrically operated doors
2. Confirm the load requirements for the standby generator to power the security lighting in addition to the emergency services and fire alarm systems.

13.12 CENTRAL CONTROL CONSOLES

1. The majority of large public buildings are equipped with fire alarms, trouble alarms and voice communication systems terminating at a central control console area which is monitored by security staff on a twenty-four hour basis. Where required, the master elevator control and intrusion alarm system shall also terminate at this area.
2. The central control console is normally located on the ground floor of the building and is readily accessible to any emergency response force responding to an alarm. Where the

central control console is co-located with an information desk or security checkpoint, the control console should be planned in such a manner as to prevent overview of access from the public counter.

13.13 POWER QUALITY

1. To ensure good quality power for standalone and networked computer systems, the building electrical systems design should incorporate features to reduce and eliminate line noise, voltage fluctuation, harmonics, and frequency variations.
2. Electrical distribution of power for computer receptacles shall be:
3. On dedicated branch circuit panelboards used solely for computer power supplies. Do not connect lighting, heating, motors, print M/C's, fax M/C's, etc. to dedicated panels for computers.
4. Regular ground receptacles complete with ground conductor to ground bus of panelboard. Provide bonding ground in panelboard feeder and tie to common ground bus in main electrical room. Specify distinguishing color for receptacle cover plate.
5. Dedicated computer panelboards shall incorporate a line voltage conditioner/surge suppressor installed and connected in parallel with the panelboard feeder at the panel location.
6. Isolate power for computer receptacle panelboards from the rest of the electrical distribution through a separate power-conditioning harmonic mitigating transformer. Specify that the transformer be sized to accommodate harmonic currents.
7. In existing buildings, perform a power quality study on the existing electrical distribution system with respect to power factor, harmonics, line noise (common and normal mode), voltage fluctuations and frequency variations.

13.14 GROUNDING

1. Provide grounding systems within electrical distribution networks to meet the latest edition of the Canadian Electrical Code, CSA C22.1, Section 10 - Grounding and Bonding.
2. Ground conductors shall be copper.
3. Provide grounding riser diagrams on working drawings and distinguish between distribution ground and bonding ground.

13.15 SUSTAINABILITY MANAGEMENT SYSTEM (SMS) PUBLIC INTERFACE

1. Provide an interactive Sustainability Management System (SMS) that uses real-time building systems data to educate users about energy and resource use as well as the building's high performance features. The user interface shall incorporate intuitive animated graphics and user interaction to engage a wide primarily non-technical audience via both a local touch-screen display and web browser.
2. SMS System Hardware: A touch-screen display and computer.
3. Web-hosted SMS System Software.
4. Provide all software, programming and hardware to provide a seamless BACNET interface to all monitored items including but not limited to Building Automation System, electric meters and water meters. Utilize this interface to provide all data for the public interface.
5. Provide facility electrical metering systems to have the data stream communication compatibility to transfer building electrical load information seamlessly to the BAS system and from the BAS system to the SMS system. The following load profiles require complete independent monitoring: lighting loads, heat loads, process loads, mechanical loads, elevators and others as indicated.

14. BUILD BETTER BUILDINGS POLICY AND LEED®

14.1 BUILD BETTER BUILDING POLICY

1. The Government of Newfoundland and Labrador's Build Better Buildings Policy came into effect in September 2010. The policy requires that new buildings, and renovations over a certain size and cost, must be built sustainably. The policy applies to all provincially-funded infrastructure projects, and can be found on www.gov.nl.ca, along with a guideline for using the policy.

14.2 LEED®

1. A preliminary LEED® Score Card shall be completed to assess the viability of committing the design and financial efforts required for a LEED® project as defined by the Build Better Buildings Policy. In cases where LEED® is deemed to not be viable, an exemption must be requested to exclude the project from the requirements of the BBB. The exemption is to be written by the Client Department and submitted to the Build Better Buildings Assessment Committee.
2. The design team is directed to the "Build Better Buildings Policy" (BBB) and the "Guide to Implementing the Build Better Buildings: for more information on the implementation of the BBB and LEED® for projects.
    a. http://www.nr.gov.nl.ca/nr/publications/energy/betterbuildingspolicy.pdf
    b. http://turnbackthetide.ca/whatsnew/bbb_implementation_guide.pdf

14.3 LEED® REQUIREMENTS

1. Leadership in Energy and Environmental Design (LEED®) is a Green Building Rating System administered by the Canada Green Building Council (CaGBC). The system is based on a credit system, where credits are divided amongst five categories; Sustainable Sites, Water Efficiency, Energy Efficiency, Material Selection and Indoor Environmental Quality.
2. The importance and impact of each credit is gauged by the number of points available for achieving the credit, which varies from credit to credit. Both the requirements and potential points for each credit are described in the current LEED® reference manual (see below).

There are four distinct levels of LEED® certification; Certified, Silver, Gold and Platinum. To obtain each level, a building must obtain a number of points as defined in the current LEED® reference manual, available through the CaGBC website.

3. LEED® is a system which focuses on the design and construction of buildings which promote the health of both the environment and the building's occupants. As environmental stewardship is important to the Government of Newfoundland and Labrador, LEED® certification is required for projects that fall within the requirements of the Build Better Buildings (BBB) Policy. All members of the project team are required to be active in the pursuit of LEED® certification for successful results. Project team will follow the principles and structure of the Integrated Design Approach, which is a key step in a successful LEED® certification result.
4. Design and Construction Managers should reference:
    a. Guide for Using the BBB for information on the process of implementing LEED® on building projects
    b. CaGBC website
    c. LEED® reference guides
    d. LEED® certification duties as required for the project
5. All documentation shall be completed, complied, and submitted in a timely manner
6. A copy of the final submittal to the Canada Green Building Council shall be supplied to TW in paper and Adobe (.pdf) formats. The (.pdf) copy shall be bound so that only one file is to be transmitted
7. The Consultant shall provide updates to TW on a bi-weekly basis, which shall include at a minimum:
    a. status of credits/points achieved
    b. factors limiting the achievement of any points planned for the project
    c. issues with documentation submittal from all parties

15. REFERENCE FORMS AND DOCUMENTS

Owner's Project Requirements Template

Owner Project Requirements

1. Introduction
2. Project Narrative
3. Owner and User Requirements
    - 3.1 Primary Purpose
    - 3.2 Form of Facility
    - 3.3 Program
        - 3.3.1 Occupancy & Schedules
        - 3.3.2 Functional uses
        - 3.3.3 Expansion
        - 3.3.4 Flexibility
        - 3.3.5 Views and Access
    - 3.4 Financial Considerations
        - 3.4.1 Capital Cost
        - 3.4.2 Operational Costs
    - 3.5 Project Planning and Design Considerations
        - 3.5.1 Schedule
        - 3.5.2 Life of Facility
        - 3.5.3 Quality of Materials and Assembly
    - 3.6 Community Interactions and Integration
    - 3.7 Training Requirements
    - 3.8 Owner and Operators
    - 3.9 Other
4. Specific Objectives
    - 4.1 Codes and Standards
    - 4.2 Accessibility
    - 4.3 Structure
    - 4.4 Architectural Considerations
        - 4.4.1 Acoustics
        - 4.4.2 Aesthetics
        - 4.4.3 Space Design
            - 4.4.3.1 Use
            - 4.4.3.2 Occupancy
            - 4.4.3.3 Schedules
            - 4.4.3.4 Lighting
            - 4.4.3.5 Temperature
            - 4.4.3.6 Humidity
            - 4.4.3.7 Acoustics
            - 4.4.3.8 Air quality
            - 4.4.3.9 Ventilation
            - 4.4.3.10 User Control
        - 4.4.4 Envelope
        - 4.4.5 Partitions
        - 4.4.6 Finishes
        - 4.4.7 Afterhours Use
    - 4.5 Energy Efficiency Goals – General
    - 4.6 Energy Efficiency Goals – Specific

- 4.6.1 Facility Orientation
- 4.6.2 Landscaping
- 4.6.3 Façade
- 4.6.4 Fenestration
- 4.6.5 Envelope
- 4.6.6 Roof

4.7 Environmental & Sustainable Goals

4.8 Mechanical Systems

- 4.8.1 HVAC Systems
  - 4.8.1.1 Types
  - 4.8.1.2 Equipment and Materials
  - 4.8.1.3 Quality
  - 4.8.1.4 Maintenance Requirements
  - 4.8.1.5 Reliability
  - 4.8.1.6 Preferred Manufacturers
  - 4.8.1.7 Environmental Conditions
  - 4.8.1.8 Equipment Locations
  - 4.8.1.9 Controls
  - 4.8.1.10 Other
- 4.8.2 Plumbing
  - 4.8.2.1 Systems Types
  - 4.8.2.2 Materials
  - 4.8.2.3 Hands Free Operation
  - 4.8.2.4 Fixture Requirements

4.9 Fire Protection Systems

4.10 Fire Alarm & Life Safety

4.11 Electrical Systems

- 4.11.1 Power Supply and Distribution
- 4.11.2 Lighting Systems
  - 4.11.2.1 Fixtures & Lamps
  - 4.11.2.2 Controls
  - 4.11.2.3 Daylight
- 4.11.3 Operational Security
- 4.11.4 Communication
- 4.11.5 Security Systems

4.12 Warranties, Operations, Maintenance

4.13 Commissioning Process

4.14 Constructability Requirements

4.15 Project Communication Requirements

4.16 Other

4.17 Approvals

Basis of Design Template

Basis of Design

1. Project Narrative (include Computer Generated Rendering)
2. Faculty Program
    - 2.1 Program Narrative
    - 2.2 Program Design Comparisons
    - 2.3 Summary of Departmental Spaces
    - 2.4 Gross Area Comparison
    - 2.5 Site Infrastructure
        - 2.5.1 Site Earth Works
        - 2.5.2 Water Mains
        - 2.5.3 Sanitary Sewer Mains
        - 2.5.4 Site Storm Drainage
        - 2.5.5 Manholes and Catch Basins
        - 2.5.6 Hard and Soft Landscaping
        - 2.5.7 Fire Water Supply and Hydrants
        - 2.5.8 Site Water Utility Distribution Piping
        - 2.5.9 Public Sanitary Utility Sewerage Piping
        - 2.5.10 Utility Drainage Field
        - 2.5.11 Geothermal Vertical Borehole Heat Exchanger
    - 2.6 Building Envelope
        - 2.6.1 Foundations
        - 2.6.2 Structural Framing
        - 2.6.3 Concrete Slabs on Grade/Suspended Slabs
        - 2.6.4 Thermal and Moisture Protection
        - 2.6.5 Roof Assembly
        - 2.6.6 Exterior Wall Assemblies
        - 2.6.7 Doors, Windows and Skylights
        - 2.6.8 Door Operators
        - 2.6.9 Entrances and Exits
        - 2.6.10 Overhead Doors
        - 2.6.11 Air Leakage Control
    - 2.7 Barrier Free
        - 2.7.1 Barrier Free Path of Travel (Exterior and Interior)
        - 2.7.2 Barrier Free Washrooms
            - 2.7.2.1 Water Closets
            - 2.7.2.2 Lavatories
        - 2.7.3 Shower Rooms
            - 2.7.3.1 Shower Stalls
            - 2.7.3.2 Shower Trim
        - 2.7.4 Automatic Door Operators
        - 2.7.5 Counter Spaces
        - 2.7.6 Parking Spaces and Walkways
    - 2.8 Fire and Life Safety
        - 2.8.1 Code Reviews (NRCC & NFPA Life Safety)
        - 2.8.2 Occupant Load Calculations
        - 2.8.3 Fire Commissioner's Form

- 2.8.4 Fire Separations
- 2.8.5 Escape Routes within Facility
- 2.8.6 Emergency Lighting
- 2.8.7 Wet Pipe sprinkler System
- 2.8.8 Dry pipe Sprinkler System
- 2.8.9 Wet Chemical Fire Suppression System
- 2.8.10 Clean Agent Fire Suppression System
- 2.8.11 Standpipes
- 2.8.12 Pre-Action Systems
- 2.8.13 Deluge Systems
- 2.8.14 Pressurization/Smoke Control
- 2.8.15 Fire Alarm
- 2.8.16 Fire Extinguishers
- 2.8.17 Fire Pumps
- 2.8.18 Exit Lighting Systems
- 2.8.19 Emergency Lighting Systems

2.9 Fit-Up and Finishes

- 2.9.1 Acoustical Performance
- 2.9.2 Room Fit-up and Finishes
  - 2.9.2.1 Millwork
  - 2.9.2.2 Interior Doors
  - 2.9.2.3 Folding Divider Partition
  - 2.9.2.4 Specialties
- 2.9.3 Furniture and Equipment
  - 2.9.3.1 Owner Supplied & Owner Installed
  - 2.9.3.2 Owner Supplied & Contractor Installed
  - 2.9.3.3 Contractor Supplied & Contractor Installed
- 2.9.4 Gymnasium Equipment
- 2.9.5 Residential Appliance

2.10 Food Services and Laundry

- 2.10.1 Kitchen Equipment
- 2.10.2 Pre-Fabricated Walk-in Freezers and Coolers
- 2.10.3 Cooler/Freezers Heat Recovery
- 2.10.4 Kitchen Ventilation
- 2.10.5 Laundry equipment
- 2.10.6 Laundry Heat Recovery

2.11 Conveying Systems

- 2.11.1 Fire Services Elevator
- 2.11.2 Elevators
- 2.11.3 Patient Lifts
- 2.11.4 Hydraulic Lift
- 2.11.5 Elevating Docks
- 2.11.6 Wheel Chair Lifts

2.12 Plumbing

- 2.12.1 Plumbing Fixtures
- 2.12.2 Domestic Water System
- 2.12.3 Domestic Water Treatment

2.12.4 Domestic Water Booster Pumps
2.12.5 Sanitary Sewer
2.12.6 Plumbing Vents
2.12.7 Storm Sewer
2.12.8 Non-potable Water System
2.13 Medical Gas
2.13.1 Medical Air System
2.13.2 Medical Vacuum System
2.13.3 Medical Oxygen System
2.13.4 Oxygen Generation
2.13.5 Nitrous Oxide
2.13.6 Nitrogen
2.13.7 Carbon Dioxide
2.13.8 Medical Test Gas Mixtures
2.13.9 Medical Vacuum
2.13.10 Waste Anesthesia Gas Disposal
2.14 HVAC
2.14.1 Steam Generators- Boilers
2.14.2 Electric Boilers
2.14.3 Hot Water Generator-Boilers
2.14.4 Hot Water Heating System
2.14.5 HVAC Water Treatment
2.14.6 Ground Source Heat Pump
2.14.7 Ground Loop Heat Exchanger
2.14.8 Water Source Heat Pumps
2.14.9 Air Source Heat Pump
2.14.10 Chilled Water System-Chillers
2.14.11 Chilled Water System
2.14.12 Humidification
2.14.13 Air Handling Systems
2.14.14 Air Handling Units
2.14.15 Fans
2.14.16 Reheat Coils
2.14.17 VAV Boxes
2.14.18 Space Pressure
2.14.19 Isolation Room Systems
2.14.20 Heat Recovery Systems
2.14.21 Hydronic Pumps
2.14.22 Dry Fluid Cooler
2.14.23 Chillers
2.14.24 Heat Exchangers
2.14.25 Radiation Heaters
2.14.26 Unit Heaters
2.14.27 In-Floor Radiant Heating System
2.15 Controls
2.15.1 DDC Systems
2.15.2 Energy Management System

2.15.3 System Architecture
2.15.4 Existing Systems
2.15.5 Control Sequences
2.15.6 Zone Control
2.15.7 Heater Control
2.15.8 Field Control Devices

2.16 Electrical-Distribution
2.16.1 Pad mount Switchgear
2.16.2 Exterior Load Break Switches
2.16.3 Interior Switchgear
2.16.4 Air Circuit Breakers
2.16.5 Conductors
2.16.6 Interior Feeders
2.16.7 Pad mount Distribution Transformers
2.16.8 Dry-Type Transformers
2.16.9 Lightning Arrestor
2.16.10 Overhead Service
2.16.11 Underground Service
2.16.12 Electric Load Bank
2.16.13 Cable Tray Systems
2.16.14 Power Factor Capacitors
2.16.15 Service Entrance Equipment
2.16.16 Motor Control Centres
2.16.17 Disconnect/Safety Switches
2.16.18 Equipment Enclosure
2.16.19 Splitters
2.16.20 Junction Boxes
2.16.21 Wiring Devices
2.16.22 Circuit Breakers
2.16.23 Conduits
2.16.24 Motor Starters
2.16.25 Grounding
2.16.26 Contactors
2.16.27 Electrical Outlets
2.16.28 Electric Heating
2.16.29 Snow Melt Cables
2.16.30 Metering
2.16.31 Electric Vehicle (EV) Charging Stations
2.16.32 Variable Frequency Drives
2.16.33 De-Stratification Fans
2.16.34 Power Generation Diesel
2.16.35 Automatic Transfer Switches
2.16.36 Ground Fault Circuit Interrupters - Class “A”
2.16.37 Conduits

2.17 Electrical-Lighting
2.17.1 Lighting
2.17.2 Exterior Transformers

2.17.3 Lighting Panel Boards
2.17.4 Interior Lighting
2.17.5 Exterior Lighting
2.17.6 Addressable Lighting Control System
2.17.7 Exit Signs
2.17.8 Roadway Lighting
2.17.9 Lighting Control Devices – Occupancy Sensors
2.17.10 Lighting Control Devices - LED Dimming

2.18 Electrical-Emergency Power
2.18.1 Emergency Power Generation
2.18.2 Transfer Switches
2.18.3 Generator Switch Board
2.18.4 Ventilation
2.18.5 Fuel System
2.18.6 Emergency Power Distribution

2.19 Communications, Data and Security
2.19.1 Intercom System
2.19.2 Public Address System
2.19.3 Nurse Call System
2.19.4 Central Clock System
2.19.5 Central Dictation
2.19.6 Television System
2.19.7 Security System Card Access
2.19.8 Security System- CCTV
2.19.9 Intrusion Detection
2.19.10 Telephone Systems
2.19.11 Assistive Listening Systems
2.19.12 Data Cable Systems
2.19.13 Uninterruptible Power Supply
2.19.14 Multi-purpose Room Sound System
2.19.15 Emergency Pull Cord System
2.19.16 Sustainability Management System – Public Interface
2.19.17 Sustainability Management System – Sensors & Meters
2.19.18 Door Hardware Wiring

3. LEED®

3.1 LEED® Scorecard
3.2 Sustainable Sites
3.2.1 Perquisite 1 Erosion & Sedimentation Control
3.2.2 Credit 1 Site Selection
3.2.3 Credit 2 Development Density
3.2.4 Credit 3 Redevelopment of Contaminated Sites
3.2.5 Credit 4 Alternative Transportation
3.2.6 Credit 5 Reduced Site Disturbance
3.2.7 Credit 6 Storm water Management
3.2.8 Credit 7 Heat Island Effect
3.2.9 Credit 8 Light Pollution Reduction
3.3 Water Efficiency

- 3.3.1 Credit 1 Water Efficient Landscaping
- 3.3.2 Credit 2 Innovative Wastewater Technologies
- 3.3.3 Credit 3 Water Use Reduction

3.4 Energy & Atmosphere

- 3.4.1 Prerequisite 1 Fundamental Building Systems Commissioning
- 3.4.2 Prerequisite 2 Minimum Energy Performance
- 3.4.3 Prerequisite 3 CFC Reduction in HVAC&R Equipment and Elimination of Halons
- 3.4.4 Credit 1 Optimize Energy Performance
- 3.4.5 Credit 2 Renewable Energy Performance
- 3.4.6 Credit 3 Best Practice Commissioning
- 3.4.7 Credit 4 Ozone Protection
- 3.4.8 Credit 5 Measurement and Verification
- 3.4.9 Credit 6 Green Power

3.5 Materials & Resources

- 3.5.1 Prerequisite 1 Storage & Collection of Recyclables
- 3.5.2 Credit 1 Building Reuse
- 3.5.3 Credit 2 Construction Waste Management
- 3.5.4 Credit 3 Resource Reuse
- 3.5.5 Credit 4 Recycled Content
- 3.5.6 Credit 5 Regional Materials
- 3.5.7 Credit 6 Rapidly Renewable Materials
- 3.5.8 Credit 7 Certified Wood

3.6 Credit 8 Durable Building

- 3.6.1 Indoor Environmental Quality
- 3.6.2 Prerequisite 1 Minimum IAQ Performance
- 3.6.3 Prerequisite 2 Environmental Tobacco Smoke (ETS) Control
- 3.6.4 Credit 1 Carbon Dioxide (CO2) Monitoring
- 3.6.5 Credit 2 Ventilation Effectiveness
- 3.6.6 Credit 3 Construction IAQ Management Plan
- 3.6.7 Credit 4 Low-Emitting Materials
- 3.6.8 Credit 5 Indoor Chemical & Pollutant Source Control
- 3.6.9 Credit 6 Controllability of Systems
- 3.6.10 Credit 7 Thermal Comfort
- 3.6.11 Credit 8 Daylight & Views

3.7 Innovation & Design Process

- 3.7.1 Credit 1 Innovation in Design
- 3.7.2 Credit 2 LEED Accredited Professional

4. Furniture & Equipment
   - 4.1 Owner Supplied and Installed (include Product Literature)
   - 4.2 Owner Supplied, Contractor Installed (include Product Literature)
   - 4.3 Contractor Supplied and Installed (include Product Literature)
5. Annexes
   - 5.1 Room Data Sheets
   - 5.2 Geotechnical Report
   - 5.3 Energy Simulation Report
   - 5.4 Ground Source Heat Exchanger Sizing

5.5 MNECB Checklist
5.6 Commissioning Plan
5.7 Specification Index
5.8 List of Drawings
5.9 Drawings (separate cover)
5.10 Costing Studies (separate cover)

Room Data Sheet Template

Room data Sheet

Project Name:		Project Number:	
Revision:		Date:	
Room Name		Room Number	

General Information

Space Name:		Net area (m2)	
Number of Spaces:		Ceiling Height (m)	
Periods of Use:		Number of Occupant	

Functional Requirements

Function / Activity:	
Important Adjacent Spaces:	
Important Access / Security Points	

Separations

Ratings	Walls	Floors	Ceilings
Fire			
Sound			

Architectural

Materials and Finishes	Walls	Floors	Ceilings
Construction			
Finish			
Flame Spread			
Door Construction	**Material / Finish**	**Fire Rating**	**Sound Rating**
Door			
Door Frame			
Door Hardware	**Style**	**Finish**	
Lockset			
Hinges			
Gasketing			
Other			

Fenestration

Orientation	Glazing

Orientation	Glazing

Equipment:

Built Ins:
Furnishings:

Singe:

Structural

Vibration Control	

Room data Sheet

Project Name:		Project Number:	
Revision:		Date:	
Room Name		Room Number	
Special Pads			
Floor Loading			

Mechanical

Room Control	Level of Control		
Heating		Fresh air	
Cooling		Humidity Control	
Air Filtration		Room Pressure	

Plumbing Fixtures	Type	Number	Hot Water	Cold Water
Lavatories				
Water Closets				
Other				

Sprinklers:			
Sprinkler Type:		Head:	

Electrical

Power Outlets	Housekeeping	Computer	Equipment	
Voltage 120/240				
Isolated Ground				
Surge Protection				
Lighting	Ambient	Task	Fire Alarm	Emergency
Lighting Level				
Fixture Type				
Special Requirements				
Level of Control				
Communications				
Telephone		Public Address		
Computers		Other		
Special				
Sound masking		Intrusion Alarm		
Surveillance Cameras		Doors		
Fire Safety	Type	Class		
Fire Alarm				
Heat Detectors				
Smoke Detectors				

Space Allocation Table

Category	Classification	Space Standard
1	Cabinet Minister	31.5 m^2
2	Deputy Minister and Leader of the Opposition	26 m^2
3	Assistant Deputy Minister, Executive Directors	17 m^2
4 HL 24+	Senior Management (Directors, Leader of the Opposition, Parliamentary Secretary)	11 - 13 m^2
5 HL-21 – HL 23 GS 41+	Managerial, Professional/technical & Senior Administrative Support requiring full height offices * (MHA's, Executive Assistants, Constituency Assistants	7-9 m^2
6 HL 23 & Below GS 33 – GS 40	Managerial, Professional/Technical & Senior Administrative Support with Cubicle Allocation	6-7 m^2
7 GS 30 – GS 32	Technologists, systems analyst and similar specialized staff	5 - 6 m^2
8 GS 29 & Below	Clerical Support: Clerk Typists, clerks, registrars, etc. General Support: Co-op Students, Regulatory inspectors	3.5 – 5m^2
9	Call Center Application	3 m^2
10	Reception / Waiting area	1 m^2 / person
11	Board, Meeting, Interview and training Rooms	2 m^2 / person
13	Filing Cabinets	1 m^2 / file cabinet

Application of this standard will result in the determination of total new usable space (NUS). Gross space which comprises the entire area inclusive of NUS, circulation space and shared areas totaling the entire space requirement is determined by multiplying the NUS by a grossing factor of not more than 1.35.

Government Building Data Sheet

GOVERNMENT BUILDING DATA SHEET

BUILDING INFORMATION

Building Number _____

Building Name _____

Location _____

Year Constructed _____ Number of Floors _____

Total Building Floor Area _____ M^2

Building Occupancy _____

Approx. Replacement Cost New: $ _____ Estimated Current Value: $ _____

CONSTRUCTION DETAILS

Overall Condition: Excellent _____ Very Good _____ Good _____ Fair _____ Poor _____

Structure Type: Wood Frame _____ Steel _____ Concrete _____
Other _____

Exterior Wall: Brick _____ Block _____ Wood siding _____
Other _____

Interior Walls: Gysum Board _____ Plywood _____ Plaster _____
Other _____

Roof Structure: Concrete _____ Wood Joists _____ Steel Joists _____
Other _____

Roof Surface: Asphalt Shingle _____ Built-up _____ Roll Roofing _____
Other _____

Major Floor Construction Type: Wooden _____ Steel Joints _____
Other _____

BUILDING SERVICES

Type of Heating System: Central Boiler System _____ Central Hot Air _____
Electric Thru Ventilation _____ Direct Electric Resistance _____

Electric Service: Voltage _____ Phase _____ Amps _____

FIRE PROTECTION

Distance to nearest manned fire station _____ (km)

Distance to nearest voluntary fire station _____ (km)

Number of fire hydrants serving structure _____

Is the building sprinklered? Yes _____ No _____ Partial _____

Does the building have a standpipe system? Yes _____ No _____ * Class _____

Is there a fire alarm system? Yes _____ No _____

GENERAL

REMARKS _____

* Class I – ($2^1/_2$ in. hose) Class II – ($1^1/_2$ in. hose) Class III – ($1^1/_2$ and $2^1/_2$ in. hose)

Date: _____ Signature _____

Telephone _____ Title: _____

29 Nov. 2006 (R0)

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Transportation and Works

Form 003 – 0594(R0)

GOVERNMENT BUILDING INVENTORY REPORTING SYSTEM

BUILDING INFORMATION (Please complete this section for all reporting)

Building Name: _____

Location: _____

Total building floor area *: _____ m^2

Approximate replacement cost new: $_____

Dept/Board/Organization holding title to property: _____

Dept/Board/Organization occupying building: _____

Dept/Board/Organization responsible for building maintenance: _____

* This includes all floor areas including finished basements.

TYPE OF TRANSACTION

Please complete the following where applicable concerning the status of the above building.

Building: New Construction _____

Acquisition _____

Disposal _____

Transfer _____ To: _____

From: _____

Addition/Renovation: _____ Estimate of cost: $_____

Notification of vacancy: _____

Effective date of transaction: _____

INCIDENT REPORT

Loss/Damage: Date: _____

Cause: _____

Estimate: $_____

Will the building be repaired/replaced? _____

Please attach detailed building data sheet for new construction, acquisition, renovation, etc. _____

Please attach picture of building if new, damaged, etc. _____

Notes: (Please include details of transaction)

_____

_____

_____

Date: _____ Signature: _____

Telephone: _____ Title: _____

Send To: Engineering Support Services Division
Transportation & Works
Confederation Bldg, West Block
P.O. Box 8700, St. John's, NL
A1B 4J6
Fax: (709) 729-5934

29 Nov. 2006

10 Month Occupant Survey

Building Name: _____ Date: _____

Point – In – Time Thermal Comfort Survey

1. Record the approximate outside air temperature and seasonal conditions:

___Winter ___Spring ___Summer ___Fall

_____°C ___Sunny ___Raining ___Foggy ___Windy

2. What is your general thermal sensation (check one that is most appropriate)?

___Hot ___Warm ___Slightly Warm

___Neutral

___Slightly Cool ___Cool ___Cold

3. Place an X where you are located:

Insert sketch of facility

Room Identification: _____

4. On which floor of the building are you located?

___ Basement ___1 ___2 ___3 ___4 ___5 ___6 ___7 ___8 ___9

5. Are you near an exterior wall (with in 15 ft)?

___Yes ___No

6. Using the list, please check each item of clothing that you are wearing:

___ Short-Sleeve shirt	___Long Sleeve Shirt	___T-Shirt
___ Long Sleeve Sweatshirt	___Sweater	___Vest
___ Jacket	___Knee-Length Skirt	___Ankle Length Skirt
___ Dress	___Shorts	___Athletic Sweatpants
___ Trousers	___Undershirt	___Long Underwear
___ Long Sleeve Coveralls	___Overalls	___Slip
___ Nylons	___Socks	___Boots
___ Shoes	___ Sandals	Other: _____

7. What is your activity level?

___Reclining	___Seated
___Standing Relaxed	___Light Activity Standing
___Medium Activity Standing	___High Activity

Building Name: _____ Date: _____

Satisfaction Survey

Insert sketch of facility

1. Place and X where you spend most of your time:

___ Basement ___1 ___2 ___3 ___4 ___Other

2. On which floor of the building are you located for normal hours?

___Yes ___No

3. Are you near an exterior wall (with in 15 ft)?

___Yes ___No

4. Are you near a window (with in 15 ft)?

5. Which of the following do you personally adjust or control in your space

___Windows blinds or shades
___Room air conditioning unit
___Portable heater
___Permanent heater
___Adjustable air vent
___Portable Fan
___Door to exterior space
___Adjustable floor air vent
___Operable window
___Door to interior space
___Thermostat
___Ceiling Fan
___None of these
Other _____

6. How satisfied are you with the temperature in your space?

Very satisfied 1 2 3 4 5 6 7 8 9 10 Very Dissatisfied
(Circle level of satisfaction)

7. If you are dissatisfied with the temperature in your space, which of the following contribute to your dissatisfaction? The temperature in my space is:

In warm/hot weather:

___Occasionally too hot ___Always too hot ___Often too hot

___Always too cold ___Occasionally too cold ___Often too cold

In cool/cold weather:

___Occasionally too hot ___Always too hot ___Often too hot

___Always too cold ___Occasionally too cold ___Often too cold

When is this most often a problem?

___Morning (before 11am) ___Midday (11am-2pm) ___Afternoon (2pm-5pm)

___Evening (after 5pm) ___Monday mornings ___Weekends/holidays

Other:_____ ___No particular time ___Always

8. How would you best describe the course of this discomfort?

___Humidity too high (damp)
___Air movement too high
___Incoming sun
___Drafts from windows
___My area is hotter/colder than other areas
___Thermostat is adjustable by other people
___HVAC system does not respond quickly enough
___Deficient window
___Humidity too low (dry)
___Air movement too low
___Heat from office equipment
___Drafts from vents
___Thermostat is inaccessible
___Clothing policy is not flexible
___Hot/cold surrounding surfaces

9. Describe any other issues related to being too hot or cold in your space.

Full Time Construction Safety Officer Form

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Dept. of Transportation & Works

GUIDELINE FOR REQUIREMENTS OF A FULL TIME CONSTRUCTION SAFETY OFFICER, IN RELATION TO TENDER SPECIFICATIONS

A Construction Safety Officer will be employed full time on a site project where:

- ☐ The project is seen by the Department of Transportation and Works as "complex" in nature.

Or where at least three of the following conditions exist:

- ☐ The project budget exceeds 10 Million Dollars.
- ☐ The project will employ more than twenty workers (at one time) and involve multiple trades/specializations.
- ☐ The project may increase risk to public safety, Or takes place in an occupied facility.
- ☐ Phases or requirements of the project would be deemed high risk (high rise scaffolding, diving, etc.).
- ☐ The project's anticipated construction period 6 months or more.

Project Title: _____

Project #: _____

Design Manager Review

Full time Construction Safety Officer is recommended for this project ☐ **Yes** ☐ **No**

Comments: _____

Completed by: _____

Director Approval: _____

Date: _____

Construction Manager Review

Full time Construction Safety Officer is recommended for this project ☐ **Yes** ☐ **No**

Comments: _____

Completed by: _____

Director Approval: _____

Date: _____

The recommendation of either manager will result in the utilization of a full time site Construction Safety Officer (CSO).