

Project Management & Design Administration Manual



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Department of Transportation and Infrastructure

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1 Introduction

1.1 Overview

1. The Project Management & Design Administration (PMDA) Manual describes the project delivery procedures required by the Department of Transportation and Infrastructure (TI), Government of Newfoundland and Labrador, Canada.
2. This manual is developed and maintained by the Building Design & Construction Division, Department of Transportation and Infrastructure, with input from professional and technical staff of the Infrastructure Branch. It is provided for the purpose of presenting standards, guidelines, and instructions for the delivery of projects.
3. 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.
4. Without a documented process and defined accountabilities, projects lose control and/or compromises are made during construction which reduce 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.
5. 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.

6. Adherence to the “Build Better Buildings” (BBB) policy is a requirement for TI building projects. Leadership in Energy and Environmental Design (LEED®) is a major component of the BBB policy. The most current edition of LEED® Canada documents shall be used on TI projects.

1.2 Acronyms

AHJ – Authority Having Jurisdiction
ATIPP – Access to Information and Protection of Privacy
BE – Building Envelope
BEA – Building Envelope Assessment
BBB – Build Better Buildings Policy, Government of NL
CCME – Canadian Council of Ministers of the Environment
CDR – Concept Development Report
CPE – Contract Performance Evaluation
Cx – Commissioning
CxA – Commissioning Authority
CM – Construction Manager
CO – Change Order
DDR – Design Development Report
DM – Design Manager
EDU – Department of Education and Early Childhood Development
ESA – Environmental Site Assessment
FCA – Facility Condition Assessment
GHG – Greenhouse Gas
GNL – Government of Newfoundland & Labrador [NL]
HPRM – Hewlett Packard Records Management
IFC – Issued for Construction
IFR – Issued for Review
IFT – Issued for Tender
LEED® – Leadership in Energy and Environmental Design
NLAA – Newfoundland and Labrador Association of Architects

NBCC – National Building Code of Canada
OGD – Other Government Departments
OPR – Owner Project Requirements
PARTS – Project Analysis Reporting Tracking System
PCA – Prime Consultant Agreement
PCO – Proposed Change Order
PEGNL – Professional Engineers and Geoscientists of NL
PMDA – Project Management and Design Administration Manual
PO – Purchase Order
PPA – Public Procurement Agency or Act
PPE – Personal Protective Equipment
RBCA – Risk-Based Corrective Action
REOI – Request for Expression of Interest
RFI – Request for Information
RFP – Request for Proposals
RFQ – Request for Quotations
SOA – Standing Offer Agreement or Contract
SWP – Safe Work Procedure
SC – Substantial Completion
TB – Treasury Board, Government of NL
TI – Department of Transportation and Infrastructure
TSI – Technical Services Inspector

1.3 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 and Early Childhood Development, Department of Health & Community Services).

Climate Change Lens – A process to ensure the integration of climate change considerations into the planning, design, and development of infrastructure projects that receive financial support from the Government of Newfoundland and Labrador (provincial government).

Climate Change Mitigation Assessment – An assessment to project potential energy use and GHG emissions during construction and operation phases, to project potential wastewater GHG emissions during operations, and to identify measures to reduce GHG emissions (e.g. construction procurement, energy switching, building insulation, LEED).

Climate Change Resilience Assessment – An assessment to identify climate hazards and risks to a project, describe potential impacts and consequences of those impacts, and describe resilience measures that have been integrated in project design (e.g. location, materials used, and construction methods).

Commissioning - The functional testing, documentation, and verification necessary so that the building systems will function to meet design intent to meet the Owner's operational requirements.

Commissioning Authority (CxA) – TI'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 TI'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 Architects who produce and are responsible for the design documents that are issued for construction, e.g. the Structural Engineer of Record, the Electrical Engineer of Record, etc.

Design Manager – The Design Manager is TI'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 TI to ensure that the Four (4) Stage Approval Process is followed, contracts are in place, and PMDA, LEED, Codes, Standards and Regulations are followed throughout the design process.

Environmental Assessment – A process by which the environmental effect of an undertaking is predicted and evaluated before the undertaking has begun or occurred.

Environmental Site Assessment – An assessment of the historical use and environmental condition of a site, conducted in accordance with the applicable guidance from CCME and Canadian Standards Association.

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

Fairness Advisor – An independent third-party whose role is to observe and/or monitor all aspects of a procurement process with respect to fairness, and to report as to the fairness of the process observed.

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

Licensed Architect – The person who holds a certificate of registration to engage in the practice of architecture under the Government of Newfoundland and Labrador Architects Act.

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 if 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 PEGNL or NLAA and 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. The Prime Consultant coordinates and delivers the design solution, provides contract administration services during construction, and assists in the commissioning process, as required by the terms of the Prime Consultant Agreement and as directed by the TI manager.

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

Project Coordinator – TI's staff member assigned to a project to coordinate, monitor and document the progress of the work.

Site Professional – A person or corporate entity meeting the provincial requirements listed in Appendix B of the Guidance Document for the Management of Impacted Sites, that manages the completion of remedial tasks and is authorized to sign a Record of Site Condition.

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

Specification – A document that specifies/identifies the performance requirements and/or the particular products and systems to be used in the contract and outlines how these products are to be installed.

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

User – The final occupant or occupants of the facility.

1.4 Project Partners

1. In most projects there are four (4) partners. 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. The four partners are as follows:

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.

2. Operating Agency/Department

The Operating Agency/Department is heavily involved in the programming and planning stages. They typically 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. Transportation and Infrastructure

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

4. Client Partners

Clients provide their design requirements through a program or project scope document referred to as the Owner's Project Requirements [OPR] 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.

1.5 Project Team

1. The project team consists of the Design Manager, Construction Manager, Consultant, TI Design Professionals, other TI personnel and Contractors. The project team leader is either the Design Manager or the Construction Manager depending on the stage of the project. In the case of a Design-Build project, the Consultant Team is employed by and works directly for the Contractor.

2. Design Manager (DM)

1. The Design Manager (DM) is the project team lead 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 TI'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, TI staff, and the Client Partners during the design phase.
3. The DM assembles the Project Charter and prepares the Request for Proposals (RFP) which includes a full description of the Consultant's scope of work, outlines the scope of the project in relation to client program requirements, establishes initial cost plan, and identifies the project delivery milestones.
4. The DM is responsible for obtaining all design submission and associated cost estimate approvals. The DM 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. All design submissions should be submitted to the Document Review Coordinator for circulation and review. Returned comments are to be reviewed for validity, compiled, and returned to the Consultant for incorporation into design.
5. The DM is to coordinate and screen input from various sources to ensure clear, non-conflicting direction is provided to the Consultant.
6. During the open call for bids, the DM is responsible for ensuring clarity of the contract documents, and conformity to tendering and contracting regulations. The DM is further responsible to the Government of Newfoundland and Labrador for bid compliance in accordance with the Public Procurement Act.

7. The DM is responsible for ensuring the signed construction contract documents have been prepared and distributed by Tendering and Contracts.
8. The DM is responsible for advising the Consultant of external relationships and incorporate client and TI professionals into the project organization chart.

3. 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 TI'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.

4. Project Consultant/Prime Consultant

1. The Project Consultant acts as an agent or as an extension of the staff of TI'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 "Standard Form of Agreement Between Owner and Prime Consultant", and as directed by the TI Design or Construction Manager.
2. The Consultant shall provide a project organization chart at the start of the project including sub-consultants and their responsible disciplines,

responsibility and reporting relationships, and contact information for all project personnel. Senior key professionals being assigned to the project should have acquired at least ten (10) years relevant professional experience. At least one (1) person is to be assigned as responsible for quality assurance, in addition to the design discipline leader.

3. In the case of a Design-Build project, the Consultant Team is employed by and works directly for the Contractor.

5. TI Design Professionals

1. The TI design professionals (i.e. Building 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.
2. There are other TI personnel who typically provide support to the Construction Manager during the construction stage but may provide support during the design phase as well. These staff include Technical Services Inspectors, Project Coordinators, Building Managers, Area Managers, and the Commissioning Coordinator.

6. Contractor

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

2 Infrastructure Approval Process

2.1 Capital projects

1. With a cost estimate of greater than \$5 million, capital projects are subject to the Infrastructure Four Stage Approval Process as outlined in the table below:

Stage /Gate	Process	Actioned By	Costing Reliability	Particulars
Stage 1	Project Identification	Client Department		Identify need for project, define project steering committee, no reliable cost estimate
Gate 1	Approval in Principle	Cabinet/ Infrastructure Budget Process	Order of Magnitude	No firm commitment. May advance early works (e.g. site) if defined and approved by Cabinet
Stage 2	Planning and Programming	Project Team		Scope development (services, site, cost, schedule), determine procurement model
Gate 2	Project Sanction	Cabinet/ Infrastructure Budget Process	± 30%	Approval to proceed to project execution unless otherwise noted
Stage 3	Procurement Preparation	Project Team		Engaging external advisors or consultants; preparing RFQs, RFPs, tender documents, etc.
Gate 3	Approval to Procure	Steering Committee	±10%	Must refer to Treasury Board and/or Cabinet where budget issues cannot be resolved by Steering Committee
Stage 4	Procurement	Project Team		Includes RFP process, tendering, etc.
Gate 4	Contract Award	Steering Committee/ Treasury Board/ Cabinet	± 0%	Overruns or pre-commitment requests to be referred to Treasury Board and/or Cabinet prior to award

2.2 Project Delivery

2.2.1 General

1. 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
2. Within each phase there are several steps in a logical sequence to achieve a quality end product.
3. The programming phase is often led by the Owner in consultation with the facility end user. Input from TI 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 of the Project Team.
4. TI is the lead partner during the design, construction, and post completion phases of the project. This manual describes specific requirements and responsibilities of the Project Team during these phases of the project.

2.2.2 Project Delivery Methodologies

1. Design-Bid-Build
 1. Design-Bid-Build is the common project delivery method. Under this delivery method, TI contracts separately with a Consultant and a Contractor. This methodology follows the

process outlined in this PMDA from project initiation, consultant engagement, design, contract administration, etc.

2. Design-Build

1. Design-Build is an alternative to the traditional Design-Bid-Build project delivery methodology. Under this methodology, TI (sometimes with the aid of an Owner's Advisor) develops an RFP describing the project scope, complete with technical narratives describing all project technical requirements and all relevant background information. The RFP is advertised, and a singular Design-Build Contract is awarded for the detailed design and construction for the project.
2. While the methodology follows the process outlined in this PMDA, responsibilities during detailed design and construction are all shifting to the Design-Build Contractor and their team. TI provides oversight to ensure that both the final design and constructed projects meet all technical requirements outlined in the RFP.

2.2.3 Project Execution

1. Document Management

1. All projects require digital files and folders to be created at start-up and should be maintained in accordance with departmental and IT policy.

2. Schedule

2. The Project Manager shall require Consultants and Contractors to submit a detailed schedule of their proposed work.

3. The schedule should divide the total project scope into smaller components, and document the resources required and time required (budget and schedule) for each component.
4. Deliverables and key milestones must also be included in the schedule.
5. The schedule provides a greater level of detail about the project that will assist the Project Manager with monitoring the project scope, budget, and schedule.

3. Monitoring

1. The Project Manager will track project progress to monitor the Consultant's or Contractor's progress against their schedule and ensure progress is in alignment with the budget and schedule.

4. Project Management

1. Project Management services and project oversight for all construction projects shall be provided by TI unless delegated in advance to a TI representative.

2.2.4 Procurement

1. TI is committed to obtaining the best value for the total acquisition cost of all goods and services purchased. To facilitate and encourage the timely purchase of goods and services, and to ensure its commitment to accountability, transparency, efficiency and equity, TI follows the Public Procurement Act (PPA) and Regulations of Government of Newfoundland and Labrador.
2. The Project Manager shall procure all Consultants, Contractors, vendors, and goods in accordance with the Public Procurement Act and Regulations.

3. For services and public works below the PPA threshold, as outlined in the Regulations, TI may elect to issue a limited call for bids to fulfill the requirement, obtaining quotes from a minimum of three (3) suppliers.
4. For services and public works above the PPA threshold, TI may issue an open call for bids in the form of either an open call for bids or a Request for Proposals (RFP).
5. Both the limited call for bids and the open call for bids (public tender) are evaluated based on lowest price. RFP's issued as an open call for bids are evaluated based on both technical and cost submissions.

3 Financial Management

3.1 Project Budget

3.1.1 General

1. The Design Manager shall be responsible for the finalized project budget estimate which includes, but is not limited to:
 1. Consultant fees
 2. Land procurement including legal fees
 3. Furniture and Equipment
 4. TI project costs
 5. Contingencies
 6. Location factors
 7. Assessment and remediation of site contamination
2. The project estimate must be within the approved project budget. The approved project budget cannot be changed without TI executive approval.

3. The Design Manager is responsible for the project budget estimate and project cash flows at assignment of project and shall be responsible until project handover to the Construction Manager has occurred. Following handover, this responsibility shall be handed over to the Construction Manager.

3.1.2 Project Tracking Spreadsheet

1. The Project Tracking Spreadsheet should be used for project cash flows and should be updated monthly as a minimum and whenever new information is received. The cash flow shall show yearly projections or actuals for all:
 1. Professional Services – Costs associated with Consultant Engagements for Design
 2. Purchased Services – Costs associated with Contractor works and services, land purchases, furniture, and equipment, etc.
 3. TI Salaries – All TI staff salaries that will be charged back to a project. Salary estimates should include anticipated costs for all staff who will be involved in the project
 4. TI Expenses – Any travel related expenses that will be charged back by TI staff in the execution of a project
 5. Property, Furnishings & Equipment – Land costs, and furniture and equipment costs for the project.
2. Cash flows and breakdowns are to be reported monthly in Budget Monitoring and in fact sheet updates where required. Unless noted otherwise, Budget Monitoring is required to be complete by the 10th of every month for all projects.

3.1.3 Consultant Construction Estimates

1. The Project Manager shall provide the Consultant with the Construction Budget following award of the Consultant Contract. The Consultant shall carry out cost planning and control services for their Design. Cost planning control services are included in the Consultant's scope of work whether explicitly stated or not.
2. Effective cost planning and control is of prime importance and requires the use of a third-party costing specialist in this discipline (i.e., Quantity Surveyor) unless permitted otherwise within the RFP.
3. The Consultant shall prepare construction estimates with each submission where identified as a requirement in the RFP. The quality of these estimates are as follows:
 1. Concept Design Report Estimate – Class D: $\pm 40\%$.
 2. Design Development Report and 33% Design Submission – Class C: $\pm 30\%$.
 3. 66% Design Submission – Class B: $\pm 20\%$.
 4. 99% and IFT's – Class A: $\pm 10\%$.
4. Each Construction Estimate must include a full Elemental Cost Breakdown following recognized formats such as "Hanscomb Yardsticks for Costing" or "RS Means". Any contingencies and location factors shall be identified as separate line items within the breakdown. Construction Estimates must be submitted in .pdf (portable document format) and .xls format.
5. For Class D estimates, elemental costs may be based on assumptions, historic data and calculations. Subsequent Class A, B, C estimates must be based on quantity take-off as information becomes available during the development of design.

6. If at any stage the Construction Estimate exceeds the approved Construction Budget, the Consultant shall notify the Project Manager and make recommendations as to how the design can be modified to bring the Project back within budget. Any modifications to the design required to bring the Construction Estimate within budget will be the responsibility of the Consultant and shall be undertaken at their expense.

3.1.4 Contract Breakdown

1. The contract breakdown, used for progress billings, will be supplied by the Contractor within 10 business days of Contract Award for review and approval by the Construction Manager. Only after the breakdown has been approved can the Contractor submit monthly invoices.
2. It is recommended that the contract breakdown be compiled to match the tender specifications for the project. i.e. general requirements, concrete, masonry, metals, etc. for larger projects. For smaller, less complex projects, a one- or two-line invoice may be acceptable.
3. The Construction Manager should review the contract breakdown to ensure that all work is captured and that the values for each line item are representative of estimated value.

4 Consultant Engagement Process

4.1 General

1. Consultants are engaged through a Request for Proposals (RFP) process.
2. Following the closing of the RFP and executive approval to proceed with the recommended Consultant, the Design Manager will prepare the “Standard Form of Agreement between Owner and Prime Consultant” for signature by the Consultant. The accepted proposal of fees, expenses and scope will be used as the basis of the agreement.

3. No work shall begin until proof of required insurance has been provided, site specific safety plan has been provided, and required documents are signed.
4. The Design Manager will ensure that the necessary encumbrance is prepared for the current fiscal year of the consulting contract. This is reviewed monthly as part of the budget monitoring process.
5. The Design Manager will ensure that the contract is set up appropriately in accordance with TI processes.

4.2 Consultant Fees and Expenses

1. Consultant fees and rates will be those agreed upon in the approved proposal.
2. Travel expenses (mileage rates, meal rates, etc.), when permitted in the PCA, are to be based upon the Government of Newfoundland and Labrador Treasury Board Travel policies which can be found online, at the following link: <https://www.gov.nl.ca/exec/tbs/policies/travel>. Reimbursement of expenses will be at the rates stipulated in the Government of Newfoundland and Labrador Treasury Board Travel Policy at the time of incurring expenses.
3. Information to support expenses must be included with the invoice relevant to the costs. Expenses not identified in the Treasury Board Travel policies shall be at cost. Itemized receipts must be submitted.
4. Personal vehicle mileage rates are set at the Basic rate at the time of travel.
5. Reimbursement for printing costs shall only be for those printed copies which are delivered/submitted to government department(s) or agencies. Cost of copies of convenience, for use by the consultant, will not be reimbursed.
6. Items which are not reimbursable expenses are:
 1. Alcohol
 2. Personal entertainment
 3. Gratuities

4. Personal calls
 5. Cleaning/laundry
 6. Personal use taxi
 7. Optional insurances offered by rental agencies
7. Travel outside the schedule agreed to in the “Standard Form of Agreement between Owner and Prime Consultant” must be pre-approved by the TI Design Manager or Construction Manager. Without approval, reimbursement may not be possible.
8. Consultants shall ensure that vehicle insurance is in place for their employees while conducting work on government-funded projects. Consultant claims of rental company insurances will not be reimbursed.

4.3 Consultant Invoicing

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. Supporting documentation for the invoice is to be provided if no fixed amount has been negotiated for the service to be provided.
2. Consultant invoices must be presented in a format consistent with the breakdown of the consulting contract, identifying the task and the percentage complete to date. Invoices should also indicate previously billed amounts for each task, if any.
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.
4. After handover of the project to the Construction Manager, the Construction Manager will normally assume responsibility for certification of further progress payments to the Consultant.

4.4 Consultant Changes 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. Any Change Orders increasing the contract amount can only be approved on the basis of sufficient project funding.
2. Change Order descriptions must clearly identify the scope change, reason for the change, and the time period if applicable.
3. A Change Order can also be issued for a credit in the event of scope reductions.

4.5 Other Consultants

1. Other Consultants utilized on building projects are commonly Land Surveyors, Environmental Consultants, and Geotechnical Consultants. The Design Manager, or the Prime Consultant will be responsible for the procurement of these services as outlined in the RFP.
2. Where legal property or topographical site surveys are indicated as a responsibility of the Consultant, the Consultant shall engage the services of registered land surveyor. Further guidelines for surveying services and required deliverables are given in this manual.
3. Subsurface soils investigations are required for new buildings and extensions to existing buildings including the project site. Further guidelines on environmental and geotechnical services are given in this manual.
4. When TI engages a Consultant directly, a contractual relationship is established between TI and the Consultant. When the Prime Consultant engages the Consultant, TI has no contractual relationship other than the agreement with the Prime Consultant.

5. 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:

1. Acoustical considerations
2. Food service design
3. High-speed, high-rise elevators
4. Wind and snow modeling of the building and site configuration
5. Building hazardous material assessments (hazmat)
6. Fire protection engineering
7. Way finding
8. Environmental site assessment
9. Historic construction and restoration
10. Ergonomics
11. Laboratory design
12. LEED
13. Durability

4.6 Standing Offer Agreements (SOA)

4.6.1 General

1. Standing Offer Agreements (SOA) are used to engage Professional Services for specific disciplines. Typically, two Consultants will be selected for each SOA. SOAs are advantageous in that they streamline the procurement of services that are repetitively required, establish affiliations and understanding of needs over time.
2. SOAs are typically entered for a period of two years, with a provision which allows either party to cancel the contract with a minimum of 90

days notice. Neither party may withdraw from the contract until one year from the date of signing has passed.

3. TI maintains active province-wide SOAs for a variety of disciplines.

4.6.2 Initiating Consultant Work under SOA

1. All Consultant Work under the SOA shall be initiated through the SOA Contract Administrator.
2. Requests for Quotations (RFQ) should be prepared by the requesting Project Manager using the RFQ template.
3. Once a response has been received from the SOA Consultant, the SOA Contract Administrator will review the completed RFQ to confirm conformity with the SOA and then will forward the quotation to the requesting Project Manager to confirm agreement with pricing, acceptability of proposed schedule, and availability of funding.

4.6.3 Coordination of Work and Payments for Work under SOA

1. The SOA Contract Administrator will request a Purchase Order (PO) for the Work identified on the approved RFQ. SOA engagements shall not proceed until the required PO is in place.
2. Following confirmation that the PO is in place, the Project Manager shall coordinate the work with the SOA and arrange any access required from the client group.

4.6.4 Payments for Work under SOA

1. The SOA Contract Administrator will facilitate payment of all invoices for work completed through the SOA. Payment should not be processed for any work until it has been confirmed that the invoiced work is complete and matches the approved RFQ.

5 Programming/Pre-Design

5.1 General

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 and outside of the main design contract.
3. Pre-design site investigations and programming services should be specifically requested in the RFP if required. Pre-design site investigations are normally focused on investigating and evaluating existing building conditions and ancillary site infrastructure, where such information has not been compiled by TI.

5.2 Needs Assessment

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.

5.3 Owner's Project Requirements

1. The Owner's Project Requirements (OPR) should be developed 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. Where Enhanced Commissioning is identified for a project, the OPR must be provided to the Commissioning Authority and design team prior to tender for

review against the Basis of Design. In a Design-Build, a detailed RFP may be reviewed in lieu of the OPR.

2. The OPR document should address the following issues, as applicable to the project:

1. Owner and user requirements
2. Environmental and sustainability goals
3. Energy efficiency goals
4. Indoor environmental quality requirements
5. Equipment and system expectations
6. Building occupant and operations/maintenance personnel requirements

3. 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. The OPR must be provided to the CxA and design team prior to tender so that it can be reviewed in comparison with the Basis of Design. In a Design-Build scenario, a detailed RFP may be reviewed in lieu of the OPR, if necessary.

5.4 Master Program

5.4.1 Spatial Program

1. Special areas and office support areas have to be designed to achieve the Client's needs, based on general design principles.
2. 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 TI design professionals.

5.4.2 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. The Consultant is to develop room data sheets for recording required performance criteria for both general systems and specified areas.

5.5 Site Evaluation and Selection

1. Potential sites for a proposed facility are short listed and the merits of each are evaluated by TI. When requested, the Consultant may be engaged to provide review for potential sites and make recommendations.
2. The completed evaluation is used as a resource for the final site selection process by TI and the client department.
3. Life cycle cost analysis should be considered for each site to assist in the decision process.
4. Each site is to be reviewed with respect to climate resilience.

5.6 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 (FCA) is to be performed prior to the end of the concept phase.
2. The cost of deferred maintenance is to be identified as it applies to the project.
3. Hazardous building materials may be subject to specific legislation regarding their assessment, handling and disposal, which may potentially affect cost and scheduling. For example, where asbestos material is present an Asbestos Management Plan must be established, and asbestos-containing material may only be removed by an approved Asbestos Abatement contractor. Demolition

- waste containing materials such as asbestos, lead, PCBs, biohazards, mercury, etc. may require disposal as hazardous waste.
4. The completion of an FCA will minimize surprises during construction. Unexpected conditions can lead to costly Change Orders, as well as the potential for delay claims from the Contractor.
 5. An FCA report must be prepared describing defective building systems and components, providing recommendations for renewal, identifying the associated costs, and its timing.

5.7 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 TI. In certain cases, the master planning can be included as a deliverable in the Consultant Service Agreement with the Project Consultant.

5.8 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.

5.9 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.

5.10 Pre-Design

1. The Consultant team shall review the approved spatial and functional program, and other supplied information. The Team shall study the characteristics of the site, record the data including information on existing structures, and carry out the following:
 1. Identify incompatible neighboring land uses, activities, and installations that could create adverse impacts
 2. Assess through a Site Professional, possible historical surface and sub-surface site impacts that could affect the viability or constrain the design of the project
 3. Produce measured drawings (as-found) for structures that will be affected by the construction program
 4. Provide advice on cost factors or risks in proceeding with the site as selected at this stage
 5. Provide advice on potential environmental concerns affecting the project
 6. Prepare an Environmental Protection Plan to prevent or minimize impacts if the project could adversely impact the natural environment and/or surface or ground water.

5.11 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.

5.12 Project Schedule

1. Upon project initiation, the Design Manager shall work with the Consultant to prepare a master project schedule. The schedule should begin on the date the project is approved and continue until the project close-out phase.

2. The project schedule must be accepted and approved by TI.
3. The Design Manager will use the master schedule to monitor the critical path of the project and highlight any issues or delays.
4. Schedule changes must be authorized through the Design Manager.
5. Any changes to the project schedule should be reflected and acknowledged through the project minutes.
6. The preferred schedule format is the use of Gantt chart.
7. The schedule must include all project phases, and highlight deliverables, milestones, and the critical path.

5.13 Approvals and Permits

1. At the outset of the project, the Design Manager shall work with the Consultant to identify all applicable approvals that may be required as part of the project.
2. The Consultant must work with the Design Manager and team to establish a complete list of approvals and permits required as part of each new project.

6 Design Phase

6.1 Design Period Procedures

6.1.1 General

1. The Consultant project team, accompanied by TI 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 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.

6.1.2 Design Phase Communications

1. Maintaining effective communication with the client department or agency is an essential part of the responsibilities of the Design Manager. 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. Unless otherwise arranged with the Design Manager, all communications during the design phase shall be routed through the Design Manager. For example, the Consultant should not contact the Client Department directly.

6.1.3 Schedule

1. The Design Manager is required to establish the Consultant deliverables schedule in the Consultant Services RFP. Deliverables schedule will be presented in the form of dates or a timeline from award of the Contract.
2. During design, the Design Manager is to establish a project schedule in consultation with the Consultant.

6.1.4 Cost Control

1. The Consultant is responsible for monitoring estimated construction costs during preparation of contract documents and advising the Design Manager of any significant deviations from the original budget. 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.

6.1.5 Design Errors and Omissions

1. An Error is defined as 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 defined as 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 by 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 competent professionals.
4. The Consultant shall complete all internal design checks and interdisciplinary reviews prior to submitting to TI's project team for review. Should it become evident that this review has not been completed by the Consultant, the document package will be returned without comment and with the expectation that the Consultant will

complete the work prior to further submission. Delays in the project are not acceptable. 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. The Construction Manager shall determine when an item is critical.
6. The Consultant shall be responsible for all design errors. The Consultant shall take immediate action 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 TI provided:
 1. The cost of such omissions does not entail removing material or equipment already installed
 2. The costs of such omissions are within the construction contingency allowance provided for in the cost plan

6.1.6 Design Considerations

1. The design of all new facilities and renovations should take into consideration the following:
 1. Budget Requirements

2. Client Requirements
3. Operation Requirements
4. Furniture Requirements
5. TI's Universal Design Standard
6. Climate Change Resiliency and Leadership in Energy and Environmental Design (LEED)

6.1.7 Design Team Meetings

1. The Design Manager shall arrange meetings as frequently as necessary, at a minimum monthly, with all members of the project team.
2. The Design Manager shall work with the Consultant to schedule all design team meetings at least two (2) weeks in advance.
3. All meetings are to be recorded and minutes circulated to the attendees, and others as deemed necessary.
4. Meeting Agenda and Review Documents
5. Standing agenda items for each design team meeting shall include the review of:
 1. Previous Minutes
 2. Project Status Reports
 3. Project Schedule
 4. Project Budget
 5. Change Orders
 6. Health and Safety
 7. Project Specific Items
 8. Meeting Minutes

6. The Project Manager shall ensure the Consultant or designate prepares minutes and circulates them to the design team for review no more than one (1) week following the meeting.

6.1.8 Stakeholder Input

1. Stakeholder groups will provide written approval (sign-off) of the design at the end of each stage.

6.1.9 Design Review Process

1. The Design Manager is to coordinate with the Consultant the requirements for all submitted review documents.
2. Once documents are received from the Consultant for review, the Design Manager is to complete the Document Submission Checklist, ensuring all applicable checklist items are complete prior to the document submission to the designated TI review coordinator. Documents should not be submitted for review until all relevant elements are ready for submission.
3. Electronic copies of review documents (.dwg and .pdf for drawing files; .doc and .pdf for specification files) are to be provided along with the completed Design Submission Checklist.
4. The Design Manager will review and submit/present the Comment Review Form to the Consultant.
5. The Consultant is to return the completed Comment Review Form to the Design Manager within 14 days of receipt, addressing the TI review comments.
6. The completed Comment Review Forms are to be included with subsequent review submissions.

6.1.10 Approval Requirements

1. The Design Manager is responsible for ensuring that the Consultant obtains all necessary approvals. This includes the approval of client partners and site 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.
2. Fire and Life Safety
 1. Submissions for Fire and Life Safety Plan Review should be made to the Department of Government Services by the Consultant for any contracts related to the construction or alterations of buildings as defined in the National Building Code of Canada. 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.
3. Municipalities
 1. 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 principle to ensure any municipal zoning regulations, bylaws, and ordinances are incorporated into the design.

3. The Contractor is not required to carry the cost of a municipal permit related to the performance of the Work.

4. Accessibility

1. Accessible Design to meet all current applicable codes, standards and acts including the TI Universal Design Standard. In the event of a conflict, the more stringent shall apply.
2. Plans and specifications shall be submitted by the Consultant to the Department of Government Services in accordance with the design registration procedures established under the provincial Building Accessibility Act and Regulations.
3. The Contractor shall be obliged to obtain and pay for any inspection permit fees levied by the Department of Government Services.

5. LEED Exemptions

1. The Government of Newfoundland and Labrador is committed to building sustainably. If it is anticipated that the project will not meet the Minimum Program Requirements under LEED and therefore not target a rating, the design and construction is expected to strive for the highest possible levels of sustainability and to implement strategies as outlined in the Government of Newfoundland & Labrador Building Better Buildings (BBB) policy. The Consultant will be responsible for preparing a LEED Scorecard to facilitate an exemption request, if required by the department. The Consultant will be responsible for the following:

2. Ensuring the lowest possible energy costs by incorporating high- efficiency lighting, high building envelope performance, and energy efficient heating and ventilation systems
3. Achieving a reduction in water use by using low-flow water consumption fixtures
4. Achieving enhanced indoor air quality through ventilation and the use of low VOC materials
5. The use of regional and recycled materials where possible

6.1.11 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 design work of external Consultants.
3. Review the drawings for:
 1. discrepancies
 2. poor or vague details
 3. insufficient as-built information reflecting existing conditions
 4. differences between specified and actual dimensions of specified equipment
 5. conflicting dimensions
 6. undersized mechanical rooms
 7. access for moving equipment around during installation of equipment
 8. safety in constructability and operation of the facility

9. access for proper regular maintenance
4. Review technical specifications for:
 1. adherence to the most recent version of the TI Master Specifications is used
 2. non-specificity of references
 3. missing or duplicated drawing notes and specification sections
 4. conflict between drawing and technical specifications
 5. subsurface conditions report
 6. clarity in scope and payment of site works and services
 7. LEED requirements were applicable
 8. requirement for a site-dedicated full-time contractor safety representative
5. Review Utilities in relation to:
 1. availability of temporary utilities
 2. relocation requirements of utilities by others
 3. description and location of existing utilities
 4. deteriorated condition of existing utilities
 5. unmarked existing utility lines
6. Perform an interdisciplinary interference check to identify:
 1. insufficient space to accommodate systems
 2. inadequate ceiling space particularly to accommodate HVAC ductwork
 3. inadequate mechanical rooms
 4. inadequate structural support

5. conflict between sewer lines and other items
6. conflict in reflected ceiling plans

6.1.12 Design Process during Design-Build

1. Design Build is an alternative to the traditional Design-Bid-Build project delivery methodology. Under this methodology, TI, sometimes with the aid of an Owner's Advisor, develops an RFP describing the project scope, complete with technical narratives describing all project technical requirements and all relevant background information. The RFP is advertised, and a singular contract is awarded for the detailed design and construction for the project
2. In the case of a Design-Build project, the Consultant Team is employed by, and works directly for, the Contractor. While the methodology follows the processes outlined in this PMDA, the responsibilities during detailed design and subsequent construction shift to the Contractor and their Team. TI provides oversight to ensure that both the final design and constructed project meet all technical requirements outlined in the RFP.

6.2 Concept Design

6.2.1 General

1. The Concept Design process documents and reports on the proposed building systems (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 format of the Concept Design documentation shall follow the table of contents as outlined in <http://www.gov.nl.ca/ti/files/works-ddr-model-index.pdf>
3. The document shall be assembled in such a way to facilitate its updating and expansion to incorporate:

1. the requirements of the project design report at the conclusion of the design development stage
 2. the systems description and operating principles required in the preparation of system operation manuals
 3. 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
 4. The review comments made by TI 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, interdisciplinary review by the Consultant team must be evident. This indicates to TI that there is constant communication between the design team members and will avoid major coordination issues at the final stages of design.

6.2.2 Prime Consultant

1. The Prime Consultant shall:
 1. identify information required from TI, the client, and other design disciplines before setting a design schedule.
 2. review the building performance criteria with the client.

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. meet with the Project Team to compile required information. Discussion should include details such as equipment and furnishings, including built-ins, for each space and the associated services required by the equipment and owner supplied items.
5. determine mechanical and electrical requirements other than the specified standards.
6. review the Department's project budget.
7. prepare a project cost plan including TI's project services costs.
8. develop a schedule for client and regulatory approvals of the project design.

6.2.3 Site Surveys

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 shall be coordinated with other disciplines and sub-consultants, in particular the Geotechnical and Environmental Consultants.
3. The Consultant will be supplied with, or can obtain access to, all existing relevant drawings for areas to be surveyed.

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, if requested.

2. Guidelines

1. Information provided shall be verified, except that a Geological Survey of Canada (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 60m 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.

3. Accuracies

1. Vertical

1. Benchmarks will be accurate to 5.0 mm.
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.

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.

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 note high- and low-level marks. Also measure depth of fresh water lakes and streams which impact the project site.

3. Determine direction of flow for all watercourses.
4. Determine elevations and cross sections of existing drainage channels where such will be used for drainage of new work.
5. Take invert and top elevations as well as pipe sizes of existing culverts and drainage structures in areas affected by new work.
6. 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.
7. 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.
8. Obtain information on and locate all overhead power utilities and underground power supply/distribution from field work and review of construction records.
9. Obtain road centerline, shoulder, and ditch elevations on existing public roads for a distance to be determined on either side of proposed site access location(s).
10. 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 for preservation during construction. Do not cut survey lines through tree clusters without prior authorization from the Design Manager.
11. Locate and indicate results of any test pits/borings.

5. Drawing Requirements

1. Show all dimensions 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 benchmarks 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 such 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 provide the Permit To Practice of the Consultant firm.

6.2.4 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 instructions regarding project requirements. In the preliminary investigation stage, provide air photo interpretation, literature search, site reconnaissance, and preliminary investigation report.
2. Where aerial photographs are available, map the site and surrounding area terrain to indicate some or all of the following:
 1. General drainage patterns

2. General slopes and ranges or gradient
 3. Bedrock outcrops, where present
 4. General surficial soil types
 5. Poorly drained or bog areas (peat or muskeg)
 6. Erosion features
 7. Old or potential slope failure areas
3. Review the geology of the area from known data, either to supplement the arial photo interpretation, or to replace it where aerial photos are not available. Search for all available physiographical data and previous site investigation data, along with any available well water records.
 4. Following arial photo interpretation and/or literature search carry out a preliminary site reconnaissance to physically examine landforms, drainage, erosion features, etc. In addition, hand auger holes or rod soundings may be used, or shallow test pits excavated, to confirm the general surficial soil, bedrock, and groundwater conditions.
 5. 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.

6.2.5 Environmental

1. Current and past activities on-site and on neighboring properties may have contaminated all or part of the site. Material imported as fill may also contain hazardous contaminants. Key steps to guide assessment of potential impacts involve:
 1. identification of Contaminants of Concern

2. identification of actual or potential human and ecological receptors
3. identification of transport mechanisms and exposure pathways
2. At minimum, a Phase I Environmental Site Assessment (ESA) should be done, covering the site and neighboring properties as required. A Phase II ESA involving intrusive investigation to determine site conditions, and risk assessment, may be needed. On simple sites with known history, these phases can be combined. On more complex sites, additional steps can be introduced.
3. A site identified or suspected as impacted must be reported in accordance with all applicable regulations.
4. In accordance with the Guidance Document for the Management of Impacted Sites, in order to obtain site closure, any Record of Site Condition must be signed by a Registered Site Professional.

6.2.6 Civil

1. Provide TI with the overall civil design intent for the proposed facility.
2. Describe each of the Civil components of the project, such as:
 1. site grading and layout
 2. domestic water supply, including capacity and flow rates
 3. sanitary sewers and existing capacity
 4. storm sewer and existing capacity
 5. traffic control
 6. paving
 7. 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 proposed measures for storm water management, which minimize 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.

6.2.7 Structural

1. Provide TI 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 the 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 project specific requirements. Develop the structural scheme for the primary structural system detailing each significant component and material, and provide alternates where applicable
4. Conduct field reviews and review existing drawings as appropriate.
5. In consultation with the site design Consultant, describe and oversee the program to be performed by the geotechnical Consultant as required.
6. The report shall include:
 1. a brief description of the chosen structural system using sketches, including comparison of up to three (3) alternative structural systems

2. development of structural framing plan for architectural concept being examined, to establish the viability of the structural system
3. 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.
4. identification of the various load combinations.
5. determination of quality, strength and specification of materials used in design.
6. relevant design/construction parameters/constraints from the geotechnical report that are used in the design.
7. method of design and analyses.
8. method of transfer of lateral loads in both orthogonal directions to transfer loads from roof to foundations using sketches and narratives.
9. identify any computer software used in the analysis and design.
10. description of provisions 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.
11. 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.

7. Prepare a conceptual cost estimate for structural components/systems or assist in the completion of the project estimate.

6.2.8 Architectural

1. Review the spatial and functional program, and other information given by TI or the Client.
2. Study the characteristics of the site, record the data including information on existing structures, and carry out the following:
 1. Produce measured drawings (as-found) for structures that will be affected by the construction program
 2. Provide advice on cost factors or risks in proceeding with the site as selected at this stage
3. Prepare Concept Design documents to describe:
 1. the general architectural design intent of the proposed facility
 2. the massing, fenestration, and materials selected for the exterior
 3. the envelope system, illustrating the approach to meet energy performance requirements
4. The spatial plan and the functional relationships including:
 1. major program areas and spatial plans showing the functional relationships inside these areas
 2. summary of deviations from the program areas, identifying the differences in net and gross building area
 3. complete system performance outline with environmental requirements, equipment, furnishings, and special considerations

4. provision of adequate space for layout and servicing of mechanical installations
 5. enlarged concept layouts for circulation areas
 6. proposed materials for interior finishes
 7. a list of all regulatory authorities
5. Interior Design discussion including:
1. general presentation of the colour scheme and furnishings
 2. brief description of the objective of the colour scheme and how they can be achieved
 3. a colour board showing the general colour scheme and the schemes of any special area are required
 4. catalogue cuts of special furnishings
6. Estimates of materials in the overall cost plan.

6.2.9 Mechanical

1. Provide the overall mechanical engineering design intent for the proposed facility. Include 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 applicable to the design.
3. Describe each of the proposed mechanical systems to be utilized in the facility:
 1. Heating
 2. HVAC and controls

3. Plumbing
4. Fire Protection
5. Other required specialized mechanical systems
4. Describe viable alternative mechanical system concepts (for the preceding systems) being considered.
5. Criteria to be considered are:
 1. Energy conservation
 2. Efficiency
 3. Maintainability
 4. Reliable performance (local parts and service availability)
 5. Capital Cost
6. Analyze the energy consumption of three alternative heating systems on a monthly and hourly basis for one year using total life cycle cost method.
7. Describe function of each mechanical system as it would operate in the proposed facility and its effect on the gross size of the building.
8. 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.
9. Identify recommended locations for mechanical rooms in the building and their approximate size (area and height).
10. Provide an initial cost estimate for the mechanical systems.

6.2.10 Electrical

1. Provide the overall electrical engineering design intent for the proposed facility.

2. Describe viable alternative electrical system concepts being considered. Criteria to be considered are:
 1. Energy conservation
 2. Efficiency
 3. Maintainability
 4. Reliable performance, (local parts and service availability)
 5. 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. Identify 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. Provide distribution single line diagram showing metering arrangement, transformers, and power supply feeders to distribution centers. Indicate the anticipated size of service entrance.
9. Provide lighting layouts and levels for typical spaces and a description of the proposed lighting strategy.
10. Provide 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.

6.2.11 LEED

1. Provide 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 to meet LEED requirements
3. At this stage, a decision will be made by TI to continue or discontinue the efforts towards LEED certification.
4. The Consultant shall provide updates on a regular basis, which shall include at a minimum:
 1. Status of credits/points achieved
 2. Factors limiting the achievement of any points planned for the project
 3. Issues with documentation submittal from all parties

6.2.12 Commissioning

1. The Commissioning specifications sections of the NL Master Specification Guide for Public Funded Buildings and the TI

Commissioning Guide 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:
 1. Identification of CxA
 2. Identify building systems to be commissioned
 3. Identify the documentation requirements such as Concept Development Report, Systems Manual
 4. Review and sign off on design concept for identified building systems
 5. Review responsibilities of all parties involved with commissioning
 6. Present design concept for identification of building systems

6.3 Design Development

6.3.1 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 during this stage that final design solutions become thoroughly defined and documented for acceptance by the client in achieving program requirements, and by TI 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 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:
 1. the requirements of the project detailed design
 2. the systems description and operating principles required in the preparation of system operation manuals and commissioning manuals
 3. LEED requirements or recommendations in order to achieve the certification level required for the project. Note, projects will require LEED Silver unless otherwise notified.
 4. LEED score card shall be included in submittals
 5. Format of the document shall be in conformance with the table of contents as outlined in <http://www.gov.nl.ca/ti/files/works-ddr-model-index.pdf>.
 6. 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. The Design Development 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.

7. In addition, the submission shall incorporate:
 1. a full listing of anticipated drawings
 2. a listing of applicable discipline technical specifications and new specification sections to be developed specifically for the project
 3. a listing of furnishings, furniture and client dedicated equipment to be procured under the capital cost of the project
 4. separate binders providing product/equipment literature for client and departmental acceptance, organized and referenced by specification sections
 5. LEED Scorecard revision and comments with respect to achievement of credits
8. 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.
9. The Design Manager will arrange design review meetings or other communications as may be required to conclude this stage of the design process.
10. A perspective rendering should be prepared.
11. At each submission, interdisciplinary review by the Consultant team is required.

12. A final Design Development Report is to be prepared by the Consultant at the conclusion of this stage.

6.3.2 Geotechnical

1. Upon completion of the preliminary investigation, the geotechnical sub-consultant is to meet with the Design Manager and the Consultant team to review other relevant information. The detailed geotechnical investigation shall include work as described in the following sections.
2. The pattern of borehole drilling and/or test pit excavation should be agreed between the geotechnical Consultant, the Consultant's design engineers, and TI. 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.
3. 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.
4. Carry out exploration and field sampling work in accordance with recognized practice, as recommended in the latest edition of the Canadian Foundation Engineering Manual, and by American Society for Testing and Materials [ASTM] Standards.
5. The frequency and type of sampling may vary based on the requirements of the project but should be under the control of the Geotechnical Consultant. Normally, standard sampling is carried out at 0.75m intervals initially, with a spacing often increased to 1.5m intervals below the 4.5m or 6.0m depth if conditions warrant such increase. Types of samples normally used include split spoons and thin wall

Shelby tubes. Other types of samplers may be required in certain types of soil.

6. In test pit excavations, representative bulk samples shall be recovered from the different stratigraphy units as necessary.
7. Perform 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.
8. 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.
9. 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 to assess correctly the apparent influence which the water condition may have on the design project as well as on construction procedures.
10. 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.

11. 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 are to be carried out in accordance with recognized practice such as recommended by ASTM.
12. 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 NBCC, and by ASTM.
13. 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.
14. 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.
15. 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.
16. Make recommendations in consideration of the project budget and the proposed project/building type.
17. Incorporate the part of the report containing factual information in the contract documents.

6.3.3 Environmental

1. Where incompatible activities on neighboring properties are identified in pre-design, they must be mitigated or controlled. Examples include - noisy fixed plant or equipment, air emissions, intrusive light, and locations of intrusive activities such as access routes or loading bays. Nuisance factors may be identified off-site or can originate on-site potentially affecting neighbors. Engineered mitigations include reduction at source, changing layout to relocate equipment or redirect traffic, constructing acoustic barriers, etc.
2. Engineered controls in place to manage site impacts may need to be protected, with access for monitoring maintained.

6.3.4 Civil

1. Provide details 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, as appendices to the Concept Design development submission.
5. Provide further developed site plans, site section and typical details of appurtenances and structures to fully explain design intent for site grading, services, and planting including:
 1. Location, orientation and finish floor elevation of the building, access from interior to exterior space and impacts on existing environment

2. Water piping network with fire hydrant location and maximum fire flow rates
 3. Sanitary sewer network with pipe sizes and slopes, calculated pipe capacity and design peak flow, and location of manholes
 4. Storm sewer network with pipe sizes and slopes, calculate pipe capacity, design storm flows, location of manholes, and catch basin inlet and outlet structures
 5. Routing and geometry of open drainage courses
 6. Proposed finished and existing site grades, geometry of cut and fill embankments, and limits of landscaping
 7. Layout and proposed grades of roadways and parking areas, number of parking stalls, locations for snow storage, walkways and curbs, pedestrian and vehicle access points to the building
 8. Areas designated for trees, shrubs, planters, and site furniture
 9. 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.

6.3.5 Structural

1. Describe the structural design program with respect to comments provided following TI and Client's review of the Concept report.
2. Identify desired standards of quality and the effect of such standards on serviceability requirements such as:

1. Deflection of slabs and beams and the effect of deflection on non-structural items such as curtain walls and glazing
 2. Control or advise of potential vibration induced by footfall or machinery
 3. Lateral drift of the structure
 4. Crack control in concrete and masonry structure elements
 5. Foundation settlement
 6. Soil-structure interaction
 7. 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 requirements 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.

6.3.6 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:
 1. fire separations and fire compartments and ratings
 2. occupant load and exit path (route) calculations
 3. architectural, mechanical, electrical and structural systems
 4. environmental and energy performance criteria
 5. rendering of the exterior of the project showing the materials and the colours 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:
 1. building floor to floor heights, identifying mechanical and other horizontal service space requirements
 2. exterior wall performance criteria, and components including typical details of major interfaces such as: wall/roof, wall/foundation, wall/intermediate floors, and wall/window
 3. roof assembly, drainage provisions, and waterproofing roof penetrations
7. Provide colour schemes for discussion with the client, including colours for special finishes.
8. Update description of colour scheme, provide updated colour board

9. Identify if any colour 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.

6.3.7 Mechanical

1. Update design synopsis describing the mechanical work with respect to the comments and discussion from the Concept Design Submission.
2. Update description mechanical systems operation, including flow diagrams, and system schematics.
3. Submit Design Development drawings showing:
 1. mechanical service connections indicating sizes and inverts
 2. location of major mechanical equipment
 3. ventilation distribution with preliminary sizing
 4. cooling and heating systems
 5. controls schematics and sequence of operations for all systems
 6. fire protection system, showing all major components
 7. 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.

6.3.8 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:
 1. legends and lighting/heating fixture schedules with manufactures catalogue numbers, lamps and remarks
 2. service equipment, and connections indicating sizes
 3. location of major electrical equipment
 4. distribution with preliminary sizing
 5. control equipment
 6. conduit and conductor layouts and sizes
 7. MCC & PF controls
 8. grounding
 9. proposed special loads
 10. lighting layouts, include list of maintained lighting levels to be designed fall spaces
 11. size of service entrance, complete with connected and demand loads indicated on a single line riser diagram

12. drawings of typical lighting, power, heating, and communication layouts and riser diagrams
 13. cable types, sizes and electrical ratings
 14. characteristics of all electrical equipment and devices
 15. fire alarm system, showing major components
4. Drawings of exterior electrical services showing:
 1. supply locations and size
 2. sub-station size and locations
 3. service routing
 4. street and area lighting layouts
 5. building and entrance locations
 5. All propose low-voltage (LV) systems including:
 1. telephone
 2. Closed-circuit television (CCTV)
 3. clock and program
 4. data
 5. public address
 6. fire alarm
 7. security
 8. 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.

6.3.9 LEED

1. Provide 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. Explain any changes in targeted points from the LEED scorecard provided in the concept design.
4. Update plan for document control and list of deliverables required from each discipline Consultant and Contractor such as to achieve the credits planned for.

6.3.10 Commissioning

1. Incorporate into the Design Development Report (DDR), a complete description of the design and system operation.
2. Include documentation on:
 1. building occupancy
 2. required physical areas for systems(s) and equipment
 3. air quality requirements
 4. energy performance
3. Identify building systems to be commissioned and submit updated systems descriptions to the Commissioning Authority [CxA].
4. For LEED projects targeting Enhanced Commissioning, the CxA is required to review the Concept Design Report (CDR). In a Design-Build arrangement, a detailed RFP may be reviewed in lieu of the CDR.

6.4 Detailed Design

6.4.1 General

1. Submissions of working drawings and specifications shall be made at the 33%, 66% and 99% (pre-tender) stages of detailed design. Various levels of review will be performed by TI 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, interdisciplinary review by the Consultant team must be evident. This indicates to TI 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. A 99% design submission should represent complete working documents, all design is complete, interdisciplinary reviews completed, coordination of all systems, interference checks completed.

6.4.2 Environmental

1. Where design changes affect the potential for nuisance from installations or activities identified in previous phases, or affect features designed to mitigate them, these activities and any mitigations should be re-assessed.

6.4.3 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:
 1. Location, orientation, and finish floor elevation of the building, access from interior to exterior space and impacts on existing environment
 2. Water piping network with fire hydrant location and maximum fire flow rates
 3. Sanitary sewer network with pipe sizes and slopes, calculated pipe capacity and design peak flow, and location of manholes
 4. Storm sewer network with pipe sized and slopes, calculate pipe capacity, design storm flows, location of manholes, and catch basins inlet and outlet structures
 5. Routing and geometry of open drainage courses
 6. Proposed finished and existing site grades, geometry of cut and fill embankments, and limits of landscaping
 7. Layout and proposed grades or roadways and parking areas, number of parking stalls, locations for snow storage, walkways and curbs, and pedestrian and vehicle access points to the building
 8. Areas designated for trees, shrubs, planters, and site furniture
 9. Location of vehicle and pedestrian signage, fencing and flag posts.

6.4.4 Structural

1. Structural notes on drawings to indicate:

1. Design criteria indicating all superimposed vertical and horizontal loads used in the design including live, snow, earthquake, wind, and dead loads. These loads should be designed as unfactored
 2. Reference to the geotechnical report on which the foundation design is based
 3. Brief material specification of structural elements.
 4. Absolute or relative deflection criteria for structural members
 5. Where forces are shown, the forces should be clearly identified as factored or unfactored
 6. Design standards
 7. Reference to drawings and specifications prepared by other disciplines
2. Foundation Plans to indicate:
1. Allowable soil-bearing capacity, pile capacities, and lateral earth pressures for retaining structure
 2. Size, location, dimension, and details of all foundations
 3. Assumed bearing strata or elevations
 4. Estimated pile lengths, or source for this information
 5. Location of known existing underground services and structures
 6. 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:
 1. General gridline dimension and overall building dimensions.
 2. Sizes, location, dimension and details of structural elements.
 3. Elevations, including slopes and depressions.
 4. Lateral load resisting system.
 5. Wind uplift system.
 6. Governing forces, moments, shear or torsion required for the preparation of shop drawings and detail drawings.
 7. Reinforcing bar sizes and details with fabrication and placing criteria.
 8. Location and detail of control, construction, contraction, and expansion joints.
 9. Locations, sizes, and details of all openings requiring reinforcement.
 10. Provision for future extensions.
 11. 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:
 1. Element size.
 2. Elevation of bottom of columns.
 3. Reinforcing steel and splice details for concrete columns.
 4. Details of structural masonry or reinforced concrete walls including lintels and reinforcing or significant openings.
 5. Stiffeners, lateral bracing, and local reinforcement.

6. Type and location of splices for structural steel columns.
 7. 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. Connection Requirements;
1. Design all connections or specify which connections are to be designed by others.
 2. For structural steel projects where CSA W47.1 certified fabricators are specified, clearly state who is responsible for connection design.
 3. 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.
 4. Show all dimensions and comprehensive connection details requiring no further engineering input.
 5. 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.

6.4.5 Architectural

1. Prepare contract drawings and specifications from the approved Design Development Report showing:
 1. Floor plans.
 2. Elevations.

3. Cross sections.
 4. Wall construction details.
 5. Window details.
 6. Roofing details.
 7. Component details.
 8. Case work and mill work details.
 9. Fire separations and fire compartments and ratings.
 10. Occupant load and exit path (route) calculations / way finding.
 11. Accessibility requirements.
 12. Rendering of the exterior of the project showing the materials and the colours selected.
 13. Reflected ceiling plans.
 14. Building floor to floor heights, identifying mechanical and other horizontal service space requirements.
 15. Exterior wall performance criteria, and components including typical details of major interfaces such as: wall/roof, wall/foundation, wall/intermediate floors, wall/window.
 16. Roof assembly, drainage provisions, and waterproofing roof penetrations.
2. Provide colour schemes.
 3. Provide information on areas that require special treatments.
 4. Catalogue cuts for furnishings, samples of draperies, and other finishes.

6.4.6 Mechanical

1. Prepare contract drawings to the same scale as that of the building layout design, where possible.
2. Where scale of drawings or complexity of work make drawings difficult to be read and interpreted, separate drawings should be provided for such areas of the work as:
 1. Plumbing drainage.
 2. Heating, ventilating, and air conditioning.
 3. Fire protection.
 4. Process piping and equipment.
 5. 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, 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.

6.4.7 Electrical

1. Plot plan showing incoming power and communication services
2. On floor plans show:
 1. Detailed system layout of all electrical systems, showing sizes, locations, and quantities.
 2. Room identification.
 3. Legend of all symbols.
 4. Circuit number at outlet and motors.
 5. All conduit and wire sizes.
 6. For each panel, a panel schedule with loadings.
 7. All equipment locations.
 8. Relevant details and sections.
 9. Schedules.
 10. Detailed control schematics including sequence of operation.
3. Single line diagrams of the power circuits with their metering and protection including:
 1. Complete rating of equipment.
 2. STs and PTs.

3. Maximum short circuit levels on which design is based.
 4. Identification and size of services.
 5. 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:
 1. Total connected load
 2. Maximum demand and diversity factors
 3. Sizing of standby power load if applicable
 12. Short-circuit requirements and calculations showing the required ratings of equipment used. Verify that breakers 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 NL Master Specification Guide for Public Funded Buildings, with “track changes” on, at pre-tender submission. Make changes required by TI and accept changes for tender documents.

14. Provide detailed equipment list with the following information:

1. Identification number.
2. Location.
3. Type, proposed manufacturer, make, model.
4. Operating parameter (max, normal, min).
5. Electrical requirements.
6. Control comments.
7. Other pertinent information.

6.4.8 LEED

1. Provide 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 scorecard will be issued with the Contract Documents 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 by an explanation why the point will not be met.
4. Update plan for document control and list of deliverables required from each discipline Consultant and Contractor to achieve the planned credits.
5. At this stage a decision will be made to continue or discontinue the efforts towards LEED certification.

6.4.9 Commissioning

1. The Consultant shall identify building systems to be commissioned and submit updated systems descriptions to the Commissioning Authority (CxA) for incorporation into the Commissioning Documents.
2. The commissioning specifications shall be included in the contract documents. The Consultant should review and discuss with the CxA any requirements specific to a project.
3. LEED projects require the Consultant to provide a Systems Manual in addition to the Operation and Maintenance Manual provided by the Contractor.
4. For LEED projects targeting Enhanced Commissioning, the CxA is required to review the Design Development Report (DDR). In a Design-Build arrangement, a detailed RFP may be reviewed in lieu of the DDR.
5. Preliminary Commissioning Manual shall be prepared by the CxA and shall be reviewed by the Consultant for comments.

6.5 Contract Documents

6.5.1 General

1. During this stage of the design process, the Consultant is required to submit a tabular drawing and specification list, indicating the percentage complete achieved to date with respect to each working drawing. This schedule is to accompany any progress payment request.
2. 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.
3. Working drawings are to be prepared and in accordance with this manual.

4. 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 consistent format.
5. A comprehensive technical review by the engineer of record must be completed prior to the submission of document for review by TI.
6. Interdisciplinary review by the engineer of all other disciplines must be completed prior to the submission of document for review by TI.
7. Coordinate with Authorities Having Jurisdiction, as required, and provide copies of correspondence respecting regulatory approvals of the proposed work.
8. The submissions are subject to review by the TI Project Team and Regional Inspection group. The Design Manager shall ensure the necessary approvals are in place prior to the open call for bids, and the contract documents accurately reflect the revisions and changes arising from the review/approval process.
9. The Consultant is responsible for design quality assurance to ensure accurate, coordinated and complete contract documents are prepared for construction purposes. TI requires a formalized interference design check, and a constructability review performed by Consultant's staff who:
 1. was not directly involved in design preparation.
 2. has at least ten (10) years design experience.
 3. has similar experience in administering and managing construction Change Orders.
10. Under certain authorized project delivery schedules, there is no alternative but to conduct the design checks and constructability review

during the open call for bids. 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. Amendments are not an avenue for completion of design tasks. The use of amendments to complete the design process will be reflected poorly in the Consultant review process.

11. Contract drawings and specifications will be provided by the Consultant for open call for bids in accordance with this manual.
12. Where requested by the Design Manager, the Consultant will arrange for the preparation and submittal of a final, coloured rendering of the project.
13. 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.
14. The contract documents are to fully address LEED requirements appropriate for the project and TI requirements.
15. 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 TI 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.
16. 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 presented in a clear and organized manner.

17. 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.

18. The Design Manager shall provide the Consultant with the Pre-Tender Checklist to be completed by the Consultant and submitted with the Issue for Tender documents.

6.5.2 Standard Front End Documents

1. Standard Front End documents consist of the Instructions to Bidders, Agreement Between Owner and Contractor, General Conditions, Certificate of Insurance. Completed Front End Documents will be provided to the Consultant by the Design manager in PDF format.
2. Modifications to the standard front end documents are not permitted without director approval. Project specific requirements are to be accommodated in the Technical Specifications.

6.5.3 Specification of Equipment and 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:
 1. reference to a relevant Standard
 2. reference to an accepted product evaluation publication
 3. prescriptive or performance criteria

6.5.4 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:

1. Normal business hours for work and exceptions such as noise or dust producing work.
 2. Payment for extended security costs.
 3. Responsibility and sequencing for furniture moving and relocation.
 4. Maintenance of fully functional entrances and exits at all times.
 5. Specific client requirements to ensure continuity of operations.
2. The time period permitted for completion of construction must be stipulated directly in Section 01 11 00 – Summary of Work. Coordinate required construction completion time period with Design Manager.
 3. A reasonable substantial completion date shall be stipulated in the contract documents.

6.5.5 Liquidated Damages

1. The standard clause for liquidated damages forms part of the 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.

6.5.6 Separate Contracts

1. The Design Manager shall coordinate Division 1 - General Requirements regarding the Contractor's responsibilities in dealing with other Contractors engaged by TI.
2. 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 TI enters into a direct contract with the successful sub-contractor for the maintenance service portion

6.5.7 Furnishings and 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.

6.5.8 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. An electronic document management system is used by the Building 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.

6.5.9 Cash Allowances

1. When Cash Allowances are required, they shall be coordinated with the Design Manager who will post them in the MERX spreadsheet, and shall also 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 contract 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, etc.
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.

6.5.10 Separate Prices

1. Separate Prices are included in the total value of bid. They identify the premiums for optional quality of materials, systems, etc.
2. Bid is to be awarded for full bid price, and Change Orders are to be issued during the construction period for separate price items.
3. Separate prices shall be used cautiously and only with manager approval.

6.5.11 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 coordinated with the Design Manager who will post them in the MERX spreadsheet. Bidders are expected to enter their unit prices in that table. The value of unit price work is included in the total bid amount.

6.5.12 Bid Documents

1. Following completion of the issued for tender documents, the Design Manager shall submit final documents for action to Tendering & Contracts Division.
2. Final documents shall be two print- ready .pdf documents – the first containing the cover page, index, front end, technical specifications, and the second containing the drawings.

6.5.13 Constructability Review

1. In an effort to reduce the incidence of design-related Change Orders a constructability review is to be completed by the Consultant prior to issue of contract documents.
2. This guide should be used for reviews of both in-house design and work contracted to external Consultants.
3. Review the contract documents with regard to:
 1. contract award conditions
 2. project duration and progress requirements
 3. measurements for payment clauses, as applicable
 4. site operations, safety and security

5. coordination of occupant requirements
6. exculpatory language
4. Review the drawings for:
 1. discrepancies
 2. poor or vague details
 3. insufficient as-built information reflecting existing conditions
 4. differences between specified and actual dimensions of specified equipment
 5. conflicting dimensions
 6. undersized mechanical rooms
 7. access for maneuvering equipment during installation of equipment
 8. LEED requirements where applicable
 9. safety in constructability and operation of the facility
 10. access for proper regular maintenance
5. Review technical specifications for:
 1. non-specificity of references
 2. missing or duplicated drawing notes and specification sections
 3. conflict between drawing and technical specifications
 4. subsurface conditions report
 5. clarity in scope and payment of site works and services
6. Review Utilities in relation to:
 1. availability of temporary utilities
 2. relocation of utilities by others

3. description and location of existing utilities
 4. deteriorated condition of existing utilities
 5. unmarked existing utility lines
7. Perform an interdisciplinary interference check to identify:
1. insufficient space to accommodate systems
 2. inadequate ceiling space particularly to accommodate HVAC ductwork
 3. inadequate mechanical rooms
 4. inadequate structural support
 5. conflict between sewer lines and other items
 6. conflict in reflected ceiling plans

6.5.14 LEED

1. The finalized LEED scorecard forms part of the contract documents. Throughout the construction phase, the Contractor, Consultant, and Project LEED AP, and TI Staff shall ensure that their respective responsibilities are fulfilled to meet the requirements of each credit sought.
2. All documentation is to be submitted to the LEED AP for the project for monitoring, and organization in preparation for submittal to the Canada Green Building Council (CAGBC).
3. Portions of the contract costs for each line item of the contract breakdown, for the Contractor and Consultants, shall be held to cover the LEED documentation process unless specific line items are identified.

6.5.15 Commissioning

1. The Consultant shall provide to the CxA a complete list of equipment with the following information:

1. identification number
 2. location
 3. type, proposed manufacturer, make, model
 4. operating parameter (max, normal, min)
 5. electrical requirements
 6. controls system narrative
 7. other pertinent information
2. Finalized Commissioning Manual will be prepared by the CxA and issued with the contract documents, including:
 1. commissioning tests and documentation forms
 2. training and instruction requirements
 3. 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.
 4. 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.
 5. The Design consultant will participate in on site performance verification activities.
 6. Portions of the contract costs for each line item of the contract breakdown, for the Contractor and Consultants, shall be held to cover the commissioning process unless specific line items are identified.

6.5.16 Safety Specification

1. The safety specification section 01 35 29.06 – Health and Safety Requirements, found on TI's website, should be modified with respect to the full-time on-site Contractor's Safety Representative. The Consultant is responsible for obtaining from the Design Manager the decision to include or not include the full-time on-site Contractor's Safety Representative.

6.6 Tendering and Award

6.6.1 Open Call for Bids

1. Procedures covering open call for bids are covered under the Public Procurement Act, Public Procurement Regulations, and relevant trade agreements.
2. A public open call for bids is required for work estimated to exceed the Public Procurement threshold.
3. Open call for bids that are advertised shall allow reasonable time for industry to respond. The open call for bids period is fifteen (15) calendar days. Depending on the complexity and if a site briefing is required, a longer period may be necessary and is assessed on a per project basis.

6.6.2 Limited Call for Bids

1. Public service work with an estimate less than the Public Procurement Threshold may be called by invitation.
2. A minimum of five (5) companies should be invited to submit pricing.
3. 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 the invite letter as required.

4. The letter of invite shall indicate that the following documentation is required to be submitted prior to the start of work:
 1. Letter of good standing with the Newfoundland and Labrador Construction Safety Association's Certificate of Recognition Program.
 2. Certificate of good standing with WorkplaceNL.
 3. Certificate of Insurance.
5. The required completion date is to be clearly specified.

6.6.3 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.

6.6.4 Inquiries from Prospective Bidders

1. Responses to inquiries may result in the requirement to issue an amendment. No directions or changes shall be made verbally.
2. Responses to any inquiry shall be disseminated to all prospective bidders.
3. Pre-tender estimates are not to be released.

6.6.5 Preparation of Amendments

1. Amendments shall be issued to notify bidders of changes to the contract documents, to clarify and/or correct portions of the contract documents, and to identify products as acceptable substitutes.

2. Amendments shall be issued no later than five (5) days prior to the open call for bids closing.
3. If an amendment is necessary with five (5) days prior to the open call for bid closing, the closing date shall be extended accordingly.
4. Amendments issued on day of closing require executive approval.

6.6.6 Substitution of Materials

1. Material may be substituted during the open call for bids period or after contract award, in accordance with the procedures as outlined in the NL Master Specification Guide for Public Funded Buildings, Section 01 25 00 – Substitution Procedures and Section 01 26 00 – Contract Modification Procedures.

6.6.7 Request for Bid Withdrawal

1. Approval for a Contractor to withdraw their bid after the open call for bids closing date is subject to Executive approval.

6.6.8 Bid Exceeding Project Budget

1. Contracts cannot be awarded without sufficient funding. If the bid exceeds the project budget additional funding must be approved before the Contract can be awarded.
2. Changes in project scope to reduce cost after tender closing is not permitted, except in cases where there is only one bidder and with executive approval.
3. If the open call for bids is not awarded at the price submitted by low bidder, the contract documents may be revised to reflect a change in the scope of work to comply with the budget. A new open call for bids may be issued.

4. The Consultant is responsible for the preparation of contract documents within the budget. If the open call for bids exceeds the project budget for reasons within the control of the Consultant, the Consultant shall provide redesign services at no additional expense.
5. With the exception of Consultant Contracts, pre-commitment approval is required prior to award for all Contracts that will extend into future fiscal years.

6.6.9 Design-Bid-Build Bid Analysis, Approval, and Award

1. Once Tendering & Contracts confirms that the bids from eligible bidders are submitted in accordance with the requirements, they prepare the Report After Tender Call [RATC] and action it to the Design Manager.
2. If the work is to proceed (funding in place, and with client approval), the Design Manager will recommend that the open call for bids be awarded to the low bidder. The Design Manager prepares a recommendation in PARTS. The recommendation in PARTS includes the Review of Bid, Contractor Evaluation, Cost Comparison, and Project Budget.
3. The recommendation is reviewed by the Manager of Facility Services Engineering, or the Regional Engineer, and sent to the Director for approval. The Director actions it to Tendering and Contracts to draft an award letter.
4. Tendering & Contracts prepares the contract award letter following notification of approval. The Director actions the letter to TI executive for approval.

6.6.10 Design-Build RFP Analysis, Approval, and Award

1. After closing of a Design-Build RFP, Tendering & Contracts prepare the RATC and action it along with all eligible Technical Submissions proposals to the Design Manager.
2. Technical Submissions are evaluated against the criteria provided in the RFP and proponents are assigned a score. Only Proponents achieving the minimum Technical Submission score will have their Cost Submission Opened.
3. If the work is to proceed (funding in place, and with client approval), the Design Manager will recommend that the Design-Build contract be awarded to the Proponent with the highest total score. The Design Manager prepares the RFP evaluation report and completes the recommendation for award in PARTS.
4. Following approval of the award recommendation, the Design Manager prepares the contract award letter included any Schedule “A” items which are required to be resolved prior to signing the contract.
5. Following approval of the award letter and acceptable resolution of the items identified in Schedule “A”, the Design Manager drafts the Contract. The Contract is signed first by the Design-Builder, then by TI Executive.

6.6.11 Construction Document Package

1. The Consultant shall provide a complete Issued for Construction [IFC] document package incorporating all amendments no later than five (5) business days after the open call for bids closing date.
2. Issued for Construction Drawings are to be issued, with the appropriate revisions noted in accordance with documentation standards outlined in this manual, in electronic .pdf format as well as AutoCAD (.dwg) file format.

3. Specifications are to be re-issued with amendment changes incorporated in each specification section. Specifications are to be provided electronically in .pdf and Microsoft Word (.doc) formats.
4. The Consultant may be required to prepare additional drawings to properly clarify and interpret the contract drawings. Sketches are not acceptable.

6.6.12 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.
3. The Design Manager is to ensure that all items in the Handover Checklist are addressed.

7 Construction Phase

7.1 Procedures

7.1.1 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 TI's Construction Manager.
2. Requirements for site safety are described in the NL Master Specification Guide for Public Funded Buildings, see Spec Section #01

35 29.06 – Health and Safety Requirements, and the Transportation and Infrastructure Contractor Safety Management Program.

3. The Contractor shall develop and submit to the Construction Manager a Site Specific Safety Plan.
4. The Construction Manager is to ensure that all project team members have access to the Contractor's Site Specific Health and Safety Plan.
5. Safety is to be included on the agenda of all construction progress meetings, both to review any incidents or changes and highlight safety concerns on the site.

7.1.2 Environmental

1. Environmental Awareness is to be included on the agenda of construction progress meetings, when applicable. The discussion shall include a review of the environmental protection measures outlined in Contract Documents. The Contractor shall ensure that fuels and hazardous materials are handled only by personnel who are trained and qualified in handling these materials. The Contractor will be required to verify qualifications and provide written confirmation of same to the Construction Manager.
2. Fuel storage areas and non-portable transfer lines shall be clearly marked and barricaded to ensure that they are not damaged by moving vehicles. Above-ground fuel containers shall be self-diked units complying with the Department of Government Services requirements.
3. Spills of fuel or other potentially harmful materials will be managed in compliance with all applicable regulations. Suitable spill kits will be maintained in proximity to areas where hydrocarbons or other hazardous liquids are handled.
4. Concrete batch plants or mixing sites will not be permitted within 100 meters of any watercourse, water body or wetland.

5. The Contractor shall supply a plan for cleaning equipment to the Construction Manager a minimum of five (5) business days before commencement of work.
6. Best waste management practices shall be applied toward the reduction, re-use and recycling of waste products and surplus material. The Contractor shall collect and dispose of all waste in compliance with applicable regulations and in a manner approved by the Construction Manager.
7. Any incident at the construction site involving bears or other wildlife shall be immediately reported to the Construction Manager and the appropriate authorities.
8. The Contractor shall ensure that dust is adequately controlled on the project. Water shall be used by the Contractor to control dust when necessary or as requested by the Construction Manager.
9. Around watercourses the Construction Manager will carry out visual monitoring to ensure that operations are not resulting in pollution and/or siltation of adjacent or downstream areas.
10. If previously unidentified impacts to soil or water are encountered, work shall be suspended and addressed in accordance with the Guidance Document for the Management of Impacted Sites.
11. Burning of material is not permitted. Where a fire resulting from accident or vandalism causes a release of hazardous material to the environment, appropriate contaminated site response procedures shall be applied.

7.1.3 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. Unless arranged otherwise by the Construction Manager, all communications during the construction phase shall be routed through the Construction Manager. For example, the Contractor should not contact the Client Department or Consultant team directly. The Consultant shall make known to the Construction Manager all communications directed to them from the Contractor, if any. The Consultant will provide a response only to the Construction Manager.

7.1.4 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 Site Specific Health and Safety Plan must be submitted at least five (5) business days prior to commencing any work on site. Refer to Section 01 35 29.06 - Health and Safety Requirements.
3. Where a project may have potential adverse impacts on the natural environment and/or surface or ground water, a Contractor Environmental Mitigation Plan shall be submitted for review at least five (5) business days prior to commencing work.
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.

7.1.5 Pre-Construction Meeting

1. A pre-construction meeting is required before any work starts on the project. The designated building representative and inspectors should attend the meeting. Client partners should be extended an invitation to attend.
2. A typical format for the meeting includes:
 1. Present the administrative requirements for the project
 2. Discuss roles of Department's Technical Services Inspectors
 3. Discuss requirements for any special inspections, testing, mockup, and authority of inspections, etc.
 4. The schedule/frequency for project meetings
 5. Review Change Order management procedures
 6. Review progress claim and payment procedure
 7. Review scheduling reporting procedures, including scheduling coordination
 8. Review site specific construction hazards and safety measures
 9. Review requirements for temporary facilities on site (e.g. materials storage, temporary power, water & sanitary sewer)
 10. Review project documentation management procedures such as project record drawings, shop drawings, samples, colour selections, etc.
 11. Communication matrix and decision-making authorities identified
 12. Location of project signs

13. Review environmental considerations applicable during construction
 14. Timely co-ordination and scheduling for performing tests, inspections and commissioning activities by the Owner and their agents
 15. Review listing of approved Sub-contractors and major suppliers (cannot be changed without approval from the Construction Manager)
 16. Review LEED requirements for construction process and documentation
3. TI will record and distribute meeting minutes; this task may be reassigned if necessary.

7.1.6 Project Status Reporting

1. Construction Progress Updates

1. On major projects the Construction Manager will prepare project status reports in the prescribed format, when required by the Director of Building Design and Construction.

2. Budget Monitoring Updates

1. Project Managers are to provide monthly Budget Monitoring updates for active projects by the 10th of each month, or as otherwise required.
2. The amounts reported in Budget Monitoring shall correspond to and match numbers contained in the Project Financial Tracking Sheet from which the amounts are derived.

3. The Projected FY Required field will contain the total amount expected to be spent in the current fiscal year. This amount includes contractor, consultant, as well as TI costs, and any other relevant project costs.
4. Projections for future fiscal years are required for multi-year projects. If a project is expected to carry over into the next fiscal year, the amount needed in the subsequent year will be entered into the Estimated Carryover field.

3. Project Information Sheet

1. The Design Manager shall prepare a Project Information Sheet for reference by departmental staff. This task may be assigned to the Consultant.
2. The Project Information Sheet 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:
 1. facility function
 2. building floor area(s)
 3. major building systems provided
 4. duration of planning and construction
 5. project budget forecast vs. actual costs incurred
 6. recognition of Client partners, Consultant and Contractor
 7. any special unique characteristics
 8. LEED certification level achieved
4. The Project Information Sheet will be updated at the conclusion of the project and submitted to the Construction Manager and the Design Manager for distribution to internal stakeholders.

7.1.7 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 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 General Conditions of Contract (GC). Refer to GC 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 GC 7 - Owner's Decisions.
5. 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:
 1. Numerical assignment of all RFIs
 2. A brief summary description
 3. Date submitted
 4. Date response sent
 5. Brief description of the response

6. RFI Log shall be reviewed at each construction meeting

7.1.8 Change Orders

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.
2. Any change in the contract amount shall be documented with a Change Order in accordance with the General Conditions of Contract, GC 18 - Changes in the Work, and GC 19 - Valuation and Certification of Changes in the Work.
3. 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.
4. 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.
5. 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 Procurement 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.
6. 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.

7. 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.
8. 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:
 1. Numerical assignment of all Change Orders (and proposed Change Orders)
 2. A brief summary description of the change requested
 3. The final value or estimated value of the change requested
 4. The total anticipated financial impact on the project
 5. The category of change
 6. Identification of changes in dispute with the Contractor
 7. Date the Change Order was requested
 8. Date the Change Order was approved
 9. Impact on schedule, if any
9. Change Order Log shall be reviewed at each construction meeting.
10. Category of change for each Change Order line item is to be identified under one of the following and indicated as such in PARTS:
 1. Category "A" – Additional Requirements - Client

2. Category “B” – Design Related
3. Category “C” – Site Conditions
4. Category “D” – Regulatory Requirements
5. Category “E” – Additional Requirements - TI

7.1.9 Shop Drawings

1. The Contractor is required to provide shop drawings for review in accordance with the technical specifications.
2. All shop drawings, whether prepared by the Contractor or Sub-contractors, must be reviewed 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. Review 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 TI’s approval.
5. TI 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 TI at the same time. TI 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.

8. 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:
 1. Specification Section reference
 2. Products Section Reference
 3. Product Description
 4. Reviewed By
 5. Review Status
 6. Planned Submittal Date
 7. Actual Submittal Date
 8. Planned Return Date
 9. Actual Return Date

7.1.10 Payment of Contractor's Invoices

1. Construction cost breakdown will be supplied by the Contractor for review and approval by the Construction Manager.
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.
4. Contractor's invoices shall be processed in accordance with General Conditions of Contract GC 21 - Certificates and Payments.

5. The Construction Manager is to check that required contract documentation is in place and sufficient funding is encumbered before recommending certification of Contractor payments.
6. 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.
7. The contract provides for payment of materials delivered to the site, but not yet incorporated into the work. The Construction Manager shall ensure the following conditions are met with respect to such certification of payment:
 1. The material is secured
 2. An inventory of materials must be supplied with the request for payment
 3. Supporting invoices from the supply source are provided pertaining to the inventory on hand
 4. No markups for Contractor's overhead and profit are included in the payment request.
8. In exceptional circumstances, a payment request for materials stored off site may be considered. In order for such a request to be entertained, the Contractor shall provide satisfactory evidence of meeting the following conditions:
 1. all the conditions for a "Materials On Site Payment" request are to be met
 2. a letter from the Contractor's surety acknowledging its agreement to allow payment for materials stored offsite
 3. proof of insurance against material loss or damage

4. leased space for storage of project materials shall be prepaid and proof of such provided

7.1.11 Owner's Right to Do Work

1. In the event of unacceptable performance or default by the Contractor, the Construction Manager should apply General Conditions of Contract GC 9 – Owner's Right to Do Work.
2. With approval from the Director, notice should be provided to the Contractor via email and a copy of all relevant correspondence may be forwarded to the bonding company.

7.1.12 Owner's Right to Terminate the Contract

1. The Owner's right to terminate or stop work is described in General Conditions of Contract GC 10 – Owner's Right to Stop or Terminate Contract.
2. Prior to the termination of a Contract, the Director will seek the advice of legal counsel and executive concurrence.
3. Notice of Contract Termination shall be provided to the Contractor by the Construction Manager.
4. The Director will write the bonding company to invoke the terms of the bond and begin negotiations to have them complete the contract.
5. A copy of relevant correspondence should be forwarded to the bonding company and Tendering and Contracts.

7.1.13 Environmental Considerations During Construction

1. Common environmental issues include:
 1. surface water runoff control and silt sediment transport
 2. soil erosion of embankments and siltation impacts
 3. site fires

4. construction debris collection, storage and disposal
 5. sanitation facilities
 6. excavation and disposal of hydrocarbon impacted soils
 7. accidental fuel spills
 8. storage, handling and disposal of hazardous substances
 9. dust control
 10. 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.

7.1.14 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 in accordance with GC 16.
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.

7.1.15 Quality Control and Inspection Services

1. Building in Quality

1. TI 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:
 1. a cohesive teamwork approach to design and construction
 2. advance planning during construction
 3. timely inspections of workmanship and material (prior to being covered up)
 4. a thorough facility commissioning program

2. Inspection Services

1. The Construction Manager will discuss the inspection requirements of the contract with the TSIs and Consultants to 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 may 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. 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.
4. 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.
5. Progress photographs should be taken and appended to the inspection report. Photographs are to be dated, along with a description of the photograph.
6. Where applicable, code and specification references are to be included in the inspection report.
7. 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.
8. 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.

9. 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.
10. The Technical Services 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.
11. A final inspection is to be completed before a Total Performance Certificate is issued and the Contractor's final invoice is processed.
12. 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 for ten (10) months following start of warranty period.
13. Facility users and building management personnel should be notified in advance of the warranty inspection.

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. 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.

7. Consultant Design Team shall participate in Substantial Completion and Total Performance inspections.

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:
 1. inspection, co-ordination, and administration of construction within the limits of authority assigned by the Construction Manager
 2. monitoring compliance with the site safety plan and regulatory requirements
 3. ensuring that the intent of the plans and specifications are carried out
 4. ensuring adherence to contract terms
 5. 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)
 6. initiation of action and required follow up to ensure prompt decision making to permit normal progress of work
 7. preparation of daily construction reports or daily journal in a format required by the Construction Manager
 8. preparation of reports and other documents as established by the Construction Manager specific for the project
 9. co-ordination of the client's and department's activities on the work site during construction

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. Deficiencies

1. Construction Manager, when considering deficiencies, shall include, in addition to construction items, the following:
 1. O&M Manuals
 2. LEED
 3. Commissioning
 4. Permits
 5. As-Builts
 6. Warranties
 7. Spare parts

7.1.16 Permits

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 TI staff.

2. Building Accessibility Regulations

1. The Contractor will be obliged to obtain and pay for any inspection permit fees levied by the Department of Government Services.

7.2 Contract Administration

7.2.1 Consultants Role in Contract Administration

1. Unless stated otherwise in the Consultant Engagement RFP, the Contract includes Contract administration services as follows:
 1. Site Meetings and Inspections
 2. 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.
 3. Prepare construction review reports, commenting on compliance with design and status of deficiencies
 4. Perform shop drawing reviews for compliance with the technical specifications and maintain a shop drawings review log.
 5. Review and provide comments on Operations and Maintenance Data Manuals submitted by the Contractor.
 6. Review reports from testing/inspection agencies and make recommendations on any required corrective actions.
 7. 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

8. Provide additional instructions as per General Conditions of Contract GC 3 - Additional Instructions and Schedule of Work, as required

9. Progress Payments review:

1. Review format and price breakdown structure submitted by the Contractor certification of construction progress payments
2. 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
3. Undertake field reviews to assist the Construction Manager to certify payment requests, substantial completion and final completion requests.

10. Requests for Information and Change Orders:

1. Advise on the interpretation of drawings and specification, and if required issue supplementary details and instructions
2. Comment on requested changes to the contract and prepare appropriate Change Orders
3. 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 five (5) working days.

11. Commissioning:

1. Attend startup of systems and report on any operational difficulties
2. Provide advice during the normal construction one (1) year warranty period

3. Conduct ten (10) month warranty inspection in conjunction with the CxA and TI
12. 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.
13. Review record drawings prepared and submitted by the Contractor to reflect condition of the project as turned over to the client.
14. Provide record drawings to TI in hardcopy (3 sets) and electronic AutoCAD (.dwg) and portable document file (.pdf) formats

7.3 Commissioning

7.3.1 General

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 TI or the Consultant associated with retesting caused by the Contractors failure to perform commissioning as specified will be charged to the Contractor.
3. The CxA 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 CxA arriving on site. It is not intended that the CxA observe the Contractor troubleshooting or completing work.
5. The Contractor may be penalized for extra costs associated with calling the CxA 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 CxA. 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 TI Guideline for Commissioning.
8. Refer to Section 01 33 00 Submittal Procedures for commissioning requirements for Structurally Attached Equipment

7.3.2 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:
 1. Hydrostatic testing
 2. Flushing
 3. Alignments, leveling, etc.
 4. Lubrication, priming, etc.
 5. Cleaning
 6. Start-up
 7. Completion of Testing Adjusting and Balancing
 8. 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 CxA prior to start of Performance Verification.
4. The CxA is not required to be on site during Installation Verification, however if possible, will attend and witness. In most cases, TI's TSI's or Project Coordinators will attend and witness where possible.

7.3.3 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 CxA is required to witness all Performance Verification.

7.3.4 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.

7.4 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.

7.5 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 TI 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.

7.6 Operation and Maintenance (O&M) 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.

7.7 Substantial Completion

1. The requirement of substantial completion as is defined in the Mechanics Lien Act. 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 13.13 – Commissioning (Cx) Requirements, paragraph 1.4.7 “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 General Conditions of Contract 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:
 1. Fire Alarm System
 2. Fire Protection System
 3. Emergency & Exit Lighting
 4. Heating Systems
 5. Mechanical Ventilation Systems

6. Accessibility requirements including power assist door openers
7. The Department of Government Services 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 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:
 1. Notification that all sub-contractors and suppliers have been paid in full except holdback
 2. Letter of Good standing from the Workers Compensation Commission
Satisfactory performance being made in the completion of deficiencies
 3. 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:
 1. Project record drawings have been received
 2. All deficiencies have been completed
 3. All spare parts and tools have been received
 4. All maintenance materials and special tools have been received
 5. All LEED documentation have been received
 6. All O&M Manuals have been received
 7. Permits have been received

8. As-Builts have been received
9. Warranties have been received

7.8 Final Completion

7.8.1 Issuance of Total Performance Certificate

1. The Total Performance milestone represents the completion of the construction contract period and is covered under General Conditions of Contract 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.

8 Post Completion Phase

8.1 Contract Close Out Documentation

8.1.1 Project Record Drawings

1. Where Contract Administration is included in a Consultant Contract, the Consultant will also be responsible for preparation of the Record Drawings.
2. In a Design-Build Contract, the Design-Builder's Consultant shall be responsible for preparation of the Record Drawings. The Owner's Advisor's responsibilities will be limited to review and comments.
3. 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 TI staff.

Record Drawings will be forwarded electronically to the Building Design & Construction for inclusion in TI's Drawing Management System.

4. Project Record Drawings shall be submitted in AutoCAD (.dwg) and Portable Document File (.pdf) formats.
5. Project Record Drawings are to be prepared to reflect changes in the contract drawings arising from:
 1. the issuance of tender amendments
 2. the issuance of design clarification drawings during construction
 3. the issuance of Change Orders to the construction contract
 4. 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
6. The Consultant shall clearly identify the revisions on the drawings to facilitate checking and review by the Construction Manager.
7. Project Record Drawings are to be prepared in accordance with documentation standards outlined in this manual and submitted fifteen (15) days prior to the Total Performance Certificate being issued.

8.1.2 Insurance Preamble

1. Department of Transportation and Infrastructure, General Insurance and Financial Analysis Division, of the Government of Newfoundland and Labrador requires that TI 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 TI which has title to these facilities and are responsible for their maintenance. The Department of Transportation and Infrastructure,

General Insurance and Financial Analysis Division, is responsible for administering property insurance on all these facilities.

8.1.3 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 to Department of Transportation and Infrastructure, Building Design and Construction.
3. The Building Data Sheet shall provide the following Information:
 1. Building Information
 2. Building name, number and location
 3. Whether it is a new building or modification to existing
 4. Scheduled date of project substantial completion
 5. Region and area
 6. Name of building manager
 7. Electoral district
 8. Year constructed and replacement cost
 9. Number of floors, and total floor area
 10. Building occupancy type
 11. Property insurance provider
 12. Organization occupying the building, holding title, and responsible for maintenance
 13. Construction Details
 14. Overall condition of facility

- 15. Structure type
- 16. Exterior and interior wall construction
- 17. Floor structure
- 18. Roof structure and finish
- 19. Building Services
- 20. Type of heating system
- 21. Electrical service
- 22. Special services
- 23. Fire protection information

8.1.4 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 Canada Green Building Council (CAGBC) within six (6) months of occupancy of the facility.

8.2 Contract Performance Evaluation

8.2.1 General

- 1. Performance monitoring is required in accordance with the Public Procurement Act and Regulations. Upon completion of the Contract, Contractor/Consultant Performance will be evaluated in accordance with the Contract Performance Evaluation [CPE] form. In accordance with Public Procurement Regulations Section 26, bidding privileges may be suspended due to noncompliant performance on a single Contract or substandard performance on two (2) or more contracts.
- 2. Evaluations are to be completed for all Open-Call contracts. Following completion of the design phase, the Design Manager shall complete a CPE. Likewise, the Construction Manager shall complete a

performance evaluation following completion of the Construction Phase, if applicable. Although evaluations are only required at the end of the Design phase and following completion of the Construction phase, the Building Design and Construction Manager can require evaluations be completed more regularly if deemed necessary.

3. This document is to be reviewed and approved by the Regional Engineer, prior to being submitted to the Director for approval.
4. In the case of construction contracts, the CPE is typically issued with the final completion certificate.
5. The Contract Performance Evaluation system is not intended to interfere with, or substitute for, the normal written communication that a Project Manager would initiate when dealing with unsatisfactory performance

8.2.2 Performance Rating Methodology

1. General

1. Performance will be evaluated on a points rating system relative to project execution and timeliness, administration and management, quality of work performed, and safety and environmental compliance. There is a minimum points requirement of 15 points for each of the 4 evaluation categories listed below.

2. Project Execution and Timeliness (25 points)

1. Conformance to the specified schedule in the contract in relation to circumstances within the Contractors/Consultant control will form the basis of points awarded in this category.
2. Timeliness deals with the Contractor/Consultant performance from the date of award to the date of substantial completion.

Performance on post completion activities, such as the clean-up of deficiencies, should be considered under the Management rating.

3. Administration and Management (25 points)

1. This category evaluates the extent to which the Contractor/Consultant takes charge of and effectively manages/administers a project without undue effort required by TI staff.

4. Quality of Work (25 points)

1. Conformance with contract documents and industry standards will form the basis of evaluation. This includes meeting/exceeding contract documents and industry standards, minimal deficiencies, and effective commissioning.

5. Safety and Environmental Compliance (25 points)

1. This section will be evaluated based on adherence to the OH&S Act, the TI OH&S Program, the site-specific safety plan, and all relevant regulations.

6. Interpretation of points rating will be as follows:

1. 60 – 100: Satisfactory Performance
2. 30 – 60: Unsatisfactory Performance (Non-Compliant)
3. 0 – 30: Unacceptable Performance (Substandard)

8.2.3 Contractor's Appeal

1. A Contractor may appeal a particular evaluation by submitting a written request, with supporting documentation, to the Project Manager.

8.2.4 Suspension of Bidding Privileges

1. TI will record the Contractor's rating on each contract and compile an overall rating based upon the Contractor's assessment of previous contracts.
2. Contractors receiving an "Unsatisfactory" rating will be notified in writing 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 two or more contracts, or one "Unacceptable" rating, may be identified for possible suspension of bidding privileges. The review will be based upon the Contractor's evaluations 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.
4. If a suspension of bidding privileges is approved by TI, then all bids from the Contractor during the suspension period will be rejected prior to open call for bids opening. Alternatively, any bids from a Contractor under suspension, discovered after opening, will be marked "Disqualified".
5. Suspensions apply to all TI tendered projects. Attempts by suspended companies to submit bids 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 bid.

8.2.5 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 with 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 TI projects.

8.2.6 Confidentiality of Information

1. Information compiled through the Contract Performance Evaluation process is intended solely for internal use of the Government of Newfoundland and Labrador. Evaluation information, such as reference checks from other tendering agencies, related to a particular Contractor(s)/Consultant(s) will not be released to outside parties without the consent of the affected Contractor/Consultant.

8.3 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.

8.4 Completion of Work Under Warranty

1. As outlined in General Conditions of Contract 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 TI 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.

8.5 Post Occupancy Evaluation

1. 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.

9 Documentation Standards

9.1 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. TI has the copyright for all documents prepared for or by the department.

9.2 Sealing and Signing 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 TI, 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.

9.3 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:
 1. Standard of the Canadian Standards Association (CSA) - CAN/CSA-Z234.1-00, Metric Practice Guide.
 2. National Building Code of Canada (NBCC).
2. Units for linear dimensioning are restricted to, meter (m) and millimeter (mm).

9.4 Technical Document Submittals

9.4.1 General

1. All documents are to be submitted in electronic format.
2. Documents are to be issued for review, for comment by TI 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, interdisciplinary review by the Consultant team must be evident. This indicates to TI that there is constant communication between the design team members, and will avoid major coordination issues at the final stages of design.
5. TI reserves the right to request copies of interdisciplinary review comments.

9.4.2 Electronic Submission

1. Electronic submission of all documentation shall be in native formats, along with a .pdf of the document.
 1. Word processing - MS Word (.doc)
 2. Spreadsheets - Excel (.xls)
 3. Drawings - AutoCAD (.dwg)
2. The electronic copy of reports shall be bound as one document, do not submit individual sections.
3. 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.
4. All drawings to be submitted in both AutoCAD (.dwg) format and portable file format (.pdf) format. Drawings will be accepted in the two previous AutoCAD versions.

5. The electronic copy of specifications shall be submitted as one document in portable file format (.pdf) format, and individual MS Word (.doc) files.
6. Specifications submitted for review purposes shall have Track Changes turned “ON”. Track Changes to remain visible for specification (.pdf) files.

9.5 Drawing Number and Signature Procedures

1. Consultants are to use TI standard drawing sheets which must be downloaded from TI’s website located [here](https://www.gov.nl.ca/ti/works/sheets) or at the following:
<https://www.gov.nl.ca/ti/works/sheets>.
2. The title block shall be completed as follows:
 1. The space under “Drawn by” shall be used for the name of the person responsible for drawing preparation.
 2. 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).
 3. The space under “Approved by” shall be used for the name of the design professional accepting responsibility for design and quality assurance.
 4. The space under “Project No.” shall contain TI’s project number.
 5. The space under “Date” shall contain the date that the drawing is issued in the format mm/dd/yyyy.
 6. 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”.

7. In the revisions column, revision “0” shall be entered and dated, “0” indicating “Issued for Tender” or appropriate stage. Submissions prior to tender shall be alphabetically numbered, and numerically numbered thereafter.
8. The space under “Drawing No.” shall contain the drawing designation per this document.
9. 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.
3. The Consultant’s professional stamp and permit to practice must be affixed to each drawing in the space provided.
4. The revision being issued must have signatures in all locations. Previous revision information may be electronically entered.
5. 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
S	Structural
A	Architectural
M	Mechanical
E	Electrical

9.6 Production of Drawings

1. Drawings Cover Sheets

1. The standard cover sheet shall be downloaded from TI's website [here](#) or at the link below. <https://www.gov.nl.ca/ti/works/sheets>
2. 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.

2. Drawing Sheets

1. The Standard Drawing sheets will be works-dtw-sht.dwg, size 535 mm x 840 mm (21" x 33").
2. A B1 size drawing sheet, works-dtwB1.dwg, may be used with Departmental approval, B1 size 707mm x 1000mm.
3. Standard Drawing sheet 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. Standard Drawing sheet size drawings are to use a plot scale of 1:2. This will produce a 280 mm x 430 mm (11" x 17") drawing.

3. Lines and Lettering by Object Line Weight

1. Line thickness shall be as follows:

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

2. 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 TI approval.

3. Consultants are to download and utilize the standard TI AutoCAD customizable colour table (.ctb) file to ensure proper line work delineation.
4. Line styles for line types shall be as follows:

Line Types	Style
Grid Line	very thin
Phantom Line	very thin
Hidden Line	thin
Centre 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 Drawing sheet 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	Roman S – 2.5 mm (0.35)
Titles under Drawings	Roman S – 4.0 mm (0.70)
Title Block	Small: Roman S – 2.5 mm (0.35) Large: Roman S – 4.0 mm (0.50)

4. Drafting Scales

1. Scale selection shall be as follows:

Stage	Type of Drawings	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.
	Key Plan	1:2000 1:1000
	Site Plan	1:500 1:200
	General Location Drawings	1:200 1:100 1:50
Contract Drawings	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

2. 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.

5. Dimensioning

1. Use the DTI DIM dimension style which is assigned to the Standard Drawing Sheet.

6. CAD Layers

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

Layer	Line Colour
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 the letter “X”.

7. X-Refs and Purging

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

9.7 Production of Specifications

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 [here](https://www.gov.nl.ca/ti/works/masterspec/masterspec/) or the link below:

<https://www.gov.nl.ca/ti/works/masterspec/masterspec/>

2. The specification shall be downloaded and edited in MS Word with “track changes on” for each individual project. Specifications shall not be re-used from previous projects.
3. Submit specifications in portable document file (.pdf) format, and MS Word (.doc).

9.8 Drawing Changes During/After the Open Call for Bids

1. All changes to the drawings during or after the open call for bids 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 (Colour # 61) accompanied by the appropriate revision number.
3. During the open call for bids period, all revised drawings are to be indicated in an amendment.

APPENDIX A - Technical Documents

1.0 Demolition

1. General

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

2. Demolition Plan

1. Prior to demolition, updated engineering and demolition grade hazardous materials surveys should be completed to determine the types of construction, presence of hazardous materials, general conditions of the structure and other relevant 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 the opportunity of resale, reuse, or recycling of construction materials. This should be considered in conjunction with LEED plans.
4. Special requirements for site hoarding and protection of vehicular and public thoroughfares or pedestrian traffic should be indicated and

shown on the site grading plan when required. Protection of the public in conformance with NFC and NBCC requirements.

2.0 Civil

1. Regulations

1. The latest version of the following codes and standards shall apply;
 1. National Building Code of Canada (NBCC)
 2. National Plumbing Code of Canada
 3. TI Universal Design Standard
 4. NFPA-101 Life Safety Code
 5. Building Accessibility Act and Regulations
 6. Provincial Master Specification Guide for Public Funded Buildings
 7. Other legislated codes and standards that will affect the design of the project

2. Authorities Having Jurisdiction

1. Office of the Fire Commissioner
2. Department of Government Services
3. Department of Environment, Conservation and Climate Change
4. WorkplaceNL
5. Municipality
6. Department of Fisheries and Oceans

2. Site Investigation

1. Visit the site and evaluate its characteristics.

2. Review and assemble existing conditions information on:
 1. stormwater surface runoff
 2. sanitary sewage collection system and wastewater treatment
 3. water supply and distribution system
 4. 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. When not provided by TI, solicit geotechnical Consultant services and manage the execution of the geotechnical program.

3. Submission Requirements

1. Submissions are to follow “Guidelines for the Provision of Engineering Services for Facilities” published by PEGNL, 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 Authority Having Jurisdiction. Submit copies of correspondence to Design Manager indicating status of submittals.

4. Design Flow

1. Domestic average design flow will be based on flows recommended in Department of Environment, Conservation and Climate Change 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. 4.Desirable pressure for domestic purposes is 400 to 500 kPa 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.

5. 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 take into consideration working pressure, laying conditions, earth pressure, traffic loads, etc.
4. Limit maximum flow velocity to 1.5 m/s.

6. 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.

7. Fire Protection

1. Mains and supply facilities must be capable of simultaneously supplying 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.

8. Sanitary and Storm Sewers

1. General

1. Provide separate sanitary and storm sewers.
2. Determine required design capacity of the new sanitary and storm connections for TI'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 TI's review.

2. Design of Sanitary Sewers

7. Design sewers to be flowing 75% full when carrying maximum anticipated flow.
8. Base maximum flow in sanitary sewer mains on peak domestic flow, taking into consideration water efficiency measures.
9. 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.
10. 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%.

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 one hundred (100) years, based on local rainfall intensity records.
3. Design for minimum velocity of 0.6 m/s in sewers under average conditions.

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, catch basin manholes should be used.

1. 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.

2. Sewage Lift Stations

1. Design sewage lift stations in accordance with the Department of Environment, Conservation and Climate Change and Municipalities' 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. Wet wells are to be equipped with high-water level alarms.
3. Evaluate backup power supply source, or provision for overflow in the event of primary power supply failure.

3. 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 manufacturer's 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.
5. The material used as backfill or fill supporting a footing, foundation or a floor on grade shall be of a type that is not subject to detrimental volume change with changes in moisture content and temperature.

4. Inspection and Testing

1. Specifications should 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. Site Grading and Surface Drainage

1. General

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:
 1. Preserve existing vegetation, and topsoil, particularly trees.
 2. Provide final road and site grades that ensure suitable pedestrian and vehicular access to buildings and permit adequate drainage of the site.
 3. 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 fails or becomes blocked.
4. Foundation drains are not to be connected to sanitary sewer system
5. 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.
6. Provide information on the impact of the proposed drainage system affecting the quantity and quality of runoff to receiving water bodies.
7. 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.

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 to be a minimum of 2% and a maximum of 5%

3. Culverts

1. Slope culverts to:
 1. minimum 0.5%
 2. maximum 6%
 3. 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 shall be designed for a one hundred (100) year return period.

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%.

10. 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 150 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.

11. Pavements – Roads, Parking Lots and Sidewalks

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.

2. Roads Design Criteria and Requirements

1. Design roads to incorporate the following parameters:
 1. minimum lane width 3.5 m
 2. minimum shoulder width 1.2 m
 3. 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 centerline: 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:
 1. gravel or crushed stone 5%
 2. 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:
 3. at T-shaped terminus, 9.0 m
 4. at road intersection, 10.5 m
 5. at parking lots, 6.0 m
 6. 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.

3. Parking Lots

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

3. Optimum gradient and cross slope:
 1. on paved areas 2%
 2. 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° where possible.
8. Parking stall dimensions:
 1. standard - 2.75 m wide, 6.0 m deep.
 2. Barrier Free – As per TI Universal Design Standard
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.

4. Sidewalks

1. Maximum gradient, 5% preferred
2. Maximum local cross slope, 5%.
3. Minimum gradient, 2%.
4. Barrier free ramps gradient as per the TI UDS.
5. Minimum width:
 1. For walks accessed by wheelchairs and pedestrians meet TI UDS requirements
 2. 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.

12. Planting Design

1. General

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 branch spread at maturity will not overlap underground utility/service lines.

2. Trees and 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.

3. Topsoil, Lawns and Plant Material

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.

13. Fencing and Guide Rails

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

14. Supply and Waste Handling

1. Provide service areas large enough to manoeuvre 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.

15. 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.

16. Signs

1. Traffic Control Signs
 1. Traffic control signs required to ensure safe movement about the site are to be based on the “Manual of Uniform Traffic Control Devices for Canada”, published by the Transportation Association of Canada.

2. Detail the size, mounting method and text of each sign on the site design drawings.

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.

3. Project Signs

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

17. Flagpoles

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

18. Drawing Contents

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.

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:
 1. every 0.50 m for average site slopes up to 1:5
 2. 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).
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:
 3. length, size, material and grade of sanitary and storm sewers between manholes

4. inlet and outlet pipe elevations for each manhole
5. watermain pipe material, size, bends and location of valves, connections, hydrant installations and drainage, and thrust restraint requirements
6. normal bedding and backfilling of pipes, special backfill under roads, parking areas and driveways
7. special bedding in rock trenches or poor ground
8. dimensioned location of all adjacent services and method of crossing under or over, support etc.
9. check locations of all adjacent underground services including telephone cables
10. typical details including manholes and catch basins, manhole ladders, any modification to typical structures, water service connections, service lateral details, trench bedding and backfilling details

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.

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.

3.0 Structural

1. Regulations

1. The latest version of the following codes and standards shall apply;
 1. National Building Code of Canada (NBCC)
 1. CSA A23.1/A23.2
 2. CSA S16
 3. CSA G40.21M
 4. CSA W59
 5. Newfoundland Building Standards Act
 6. Provincial Master Specification Guide for Public Funded Buildings
 8. Other legislated codes and standards that will affect the design of the project
 9. W.E.T.T. – Wood Energy Technology Transfer
2. Authorities Having Jurisdiction
 1. Office of the Fire Commissioner
 2. Department of Government Services
 3. WorkplaceNL
 4. Municipality
 5. Department of Environmental, Conservation and Climate Change

2. Submission Requirements

1. Submissions are to follow “Guidelines for the Provision of Engineering Services for Facilities” published by PEGNL, 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 Authority Having Jurisdiction. Submit copies of correspondence to Design Manager indicating status of submittals.

3. Structural Steel

1. Strength and serviceability limit states shall be utilized in the analysis and design of structural steel elements. Design of structural steel shall be in accordance with CSA G40.21M.

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 of 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.

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 pre-stressed 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.

6. Engineered Masonry

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

4.0 Architectural

1. Codes and Standards

1. The latest version of the following codes and standards shall apply;
 1. National Building Code of Canada (NBCC)
 2. National Energy Code of Canada for Buildings
 3. TI Universal Design Standard
 4. CSA B651
 5. NFPA-101 Life Safety Code
 6. Building Accessibility Act and Regulations
 7. Provincial Master Specifications Guide for Public Funded Buildings.
 8. Other legislated codes, and standards, that will affect the design of the project

2. Authorities Having Jurisdiction

1. Office of the Fire Commissioner
2. Department of Government Services
3. Department of Environment, Conservation and Climate Change
4. WorkplaceNL
5. Municipality

2. Facility Planning

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).

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:
 1. crawl spaces with concrete floors
 2. future basement areas where the concrete slab only is required for structural completion
 3. floor areas which are structurally completed and where the finishing work will be executed at a later date
 4. tunnels, trenches, etc., which have a roof or slab over 2.0 metres or more from the floor
 5. rooms below grade or sidewalk (e.g. transformer rooms)
 6. true area of columns and other projections beyond the face of exterior walls, providing they extend vertically for the full floor height
 7. dormers, bay windows, etc., providing they extend vertically for the full floor height

8. penthouses
 9. elevator machine floors within penthouses
 10. connecting links or walkways providing they are enclosed
 11. finished rooms in roofs and attics
 12. attached or isolated garages above and/or below ground level
 13. fully enclosed exterior staircases and fire escapes
 14. fully enclosed porches
 15. public lobbies
 16. elevators
 17. telephone and communications closets
 18. mechanical and electrical rooms
 19. elevator and mechanical shafts
 20. building service areas
5. Exclude the following area in computing the gross area:
1. crawl spaces which do not have concrete floors
 2. tunnels, trenches, etc., with less than 2.0 m head room
 3. exterior balconies
 4. canopies
 5. projections beyond the exterior wall face which do not extend vertically for a full floor height
 6. fan housings, etc.
 7. areaways
 8. unenclosed connecting links
 9. covered walkways
 10. unfinished roof and attic areas
 11. carports
 12. unenclosed exterior staircases and fire escapes
 13. isolated chimneys and that portion of chimneys above the roof line
 14. interior open court yards, light wells, etc

15. unenclosed porches
16. exterior steps and landings
17. exterior paving, patios and terraces
18. unenclosed areas which are roofed over
19. enclosed areas which are not roofed over
20. roof overhangs and cornices

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

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).

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.

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.

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.

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 to meet all applicable codes, standards and regulations.

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.

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 all applicable codes, standards and regulations, and allow for the 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.

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. 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 when more than one 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. 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.

12. Entrances and Exits

1. Provide entrances and exits that meet all applicable codes, standards and regulations and are sufficient to handle the occupant load for the building.
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.

13. Barrier Free Design

1. Design all buildings and sites with barrier free access in mind using the TI Universal Design Standard, the Buildings Accessibility Act, NBCC and applicable CSA standards.
2. Where possible eliminate doors to public washrooms off corridors.

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:
2. <http://www.gov.nl.ca/iet/files/publications-energy-betterbuildingspolicy.pdf>.
3. 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.
4. Select materials that are cost-effective over the life of the product.
5. Consider in material selection the embedded hazards with its incorporation into the facility and future disposal.
6. Promote the use of materials that are recyclable at the end of their life.
7. Consider materials manufactured with recycled material.
8. Consider relocation of client provided material and incorporate salvaged materials into the project where practical.
9. All materials selected must meet the intent of LEED prerequisites and credits being pursued.

15. Environmental Health

1. Concerns about the impact of the built environment on the occupants are increasing. When designing a healthy building a holistic approach to the occupants' health shall be taken.
2. Consider background factors, including light, noise and colour, in the building design.
3. Incorporate good design practice for ergonomics as outlined in current CSA Standards.
4. All materials selected must meet the intent of LEED prerequisites and credits being pursued.

3. Building Envelope

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:
 1. a minimum RSI as per the NBCC and NECB.
 2. minimum butt thickness to be 50 mm
 3. minimum thickness at any opening to be 50 mm
3. RSI to be averaged over the whole roof
4. Insulation and/or coverboard to be mechanically fastened or adhered with adhesive to CSA standard A-123.21 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. The preferred roofing membrane is two-ply modified bitumen.

2. Sloped Roofs

1. Where sloped roofs are incorporated into the design, the roof shall be a minimum 5:12 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. Ice and water shield to be installed should be installed at eaves, ridges, penetrations, valleys, etc. Install breathable underlayment across the rest of the roof. The roof is to be designed to shelter exits and entrances from snowfall and rainwater runoff.
3. Rain gutters are to be provided at all eaves.
4. Where snow slide is a problem, the roof shall incorporate snow/ice guard fencing.
5. 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. Fascia are to be covered with prefinished metal flashing. Flashings are to be minimum of two bent sections where fascia are over 150 mm in depth. Self-adhered membrane to be installed over the wood fascia prior the metal flashing.
6. Sloped roofs are to be ventilated in accordance with NBCC and ridge venting is to be incorporated into the venting system. Ensure that the net free vent area (NFA) of intake and exhaust vents is equal and balanced. A vent area calculation is to be provided when requested.

3. Roof Repair/Replacement

1. 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.
2. 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.
3. Provide details for roofs incorporating:
 1. vapor barrier continuity
 2. insulation thickness and slope
 3. securement of wood blocking and cants, with size of fasteners and depth of penetration
 4. continuation of roofing membranes
 5. built-up curbs at roof penetrations
 6. membranes flashings at roof drains, vents, curbs, etc.
4. Provide calculations for wind uplift requirements in accordance with CSA A123.21. Provide calculations of fasteners per board or per square foot for field, perimeter and corner areas with details of fastener pattern for each.
5. 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.

4. Skylights

1. Skylights are to be doubled shelled pre-moulded 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.

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 National Energy Code of Canada for Buildings.
2. The thermal resistance of the roof shall be in accordance with the National Energy Code of Canada for Buildings.
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.

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:
 1. Roof wall interface
 2. Window-wall interface
 3. Wall-door interface
 4. Wall-foundation interface
 5. Wall or roofs
 6. 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.

7. Vapour 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:
 1. Roof wall interface
 2. Window-wall interface
 3. Wall-door interface
 4. Wall-foundation interface
 5. Wall or roofs
 6. 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.

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 defence against rain and wind. Knowing that water will penetrate the first line of defence, 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 and vapour barrier or sheathing membrane behind the cladding and a 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 and 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 6.0 m. Compartments shall not exceed a width of 6.0 m, and a width of 1.2 m at building corners.

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 must incorporate the rain screen principle with a minimum air chamber of 19 mm.

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 provided it is prefinished on all sides. Vinyl should be attached with corrosion resistant fasteners which are not driven fully into the substrate, so that the vinyl is able to move/expand.
2. Vinyl siding is not acceptable in cold climates such as Labrador where vinyl becomes brittle.

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 should 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.

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. Mortar catchers should always be used/installed.
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:
 1. Stainless steel masonry ties
 2. Enough information for the Contractor to easily build the system

13. Sealants

1. Sealants are not to be used as the first line of defence 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. For existing buildings, new sealants should also never be applied on top of old sealants. The old should be removed and cleaned fully prior to installation of new.
7. Use high performance silicone sealants where possible.
8. Detail each typical joint such as expansion joint, or construction joint.

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.

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 to 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 by allowing water that gets behind the main frame to drain out. Caulking should not be depended on as a line of defence 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.

16. Exterior Doors

1. Exterior doors can be classified into three (3) sections:
 1. entrance doors
 2. exits and service entrances
 3. overhead doors
2. Design entrances doors for public entry to a building to meet the TI Universal Design Standard, the Buildings Accessibility Act, NBCC and applicable CSA standards.
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:
 1. extruded aluminum framing, with tempered insulating glass frame, glazing colours may vary

2. 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:
 1. laminated safety glass in upper half of door only
 2. 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.

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-M90 AAMA/WDMA/CSA 101/I.S.2/A440.

3. All windows shall be designed to meet the requirements of CSA A440.
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 TI.
6. The maximum height of sill above the floor be in accordance with the TI Universal Design Standard, the Buildings Accessibility Act, NBCC and applicable CSA standards for all vision panels.
7. No windows are allowed within the restricted pathway of an exit as determined by the NFPA-101 – Life Safety Code, unless protected accordingly.

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.

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:

1. Where the building is rectangular, align the long axis parallel to the prevailing winter wind.
2. Where the building is square, align the diagonal axis parallel to the prevailing winter wind.
3. 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.

4. Architectural Interior Finishes

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 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.

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.

3. Paints

1. The use of latex paints is standard. Oil base paints are restricted to areas where surfaces require constant cleaning, and ceramic tile cannot be used.
2. 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.
3. Stain selected for wood finishes should be selected with the long-term facility maintenance in mind.

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 Design Manager before incorporating special finishes.

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.

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.

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.

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 centre corridors, and patient areas.
4. When choosing colour, plain colours should be avoided.
5. Durability, cost and appearance are factors affecting the selection.

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 centres and school corridors.
3. Avoid solid colours and patterns. Select tiles with marbleized patterns.
4. Durability, cost and appearance are factors affecting the selection.

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. 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 colours and patterns.
3. Durability, cost and appearance are factors affecting the selection.

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.

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.

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 colour and width in accordance with International and National Sport Standards.
4. Background colours in general and colours in other areas are to be coordinated with Client. Avoid overly busy patterns.

5. Ensure contrast between the floor background and game lines for visibility.

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:
 1. vestibules
 2. areas that require secure storage
 3. areas that require fire ratings
 4. areas in a high moisture area
3. Gypsum board type
 1. Standard gypsum board for most dry areas.
 2. Moisture-resistant (MR) gypsum board for high-humidity or washroom vestibules.
 3. Mold-resistant board for shower areas or building entrances exposed to dampness.
 4. Type X gypsum board where fire rating is required.
 5. Seal all gypsum board joints with moisture-resistant compound.
 6. Avoid textured ceilings in high-moisture areas because texture can peel or trap mould.

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.

17. Finish Schedule

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 Tile Flooring Carpet
Exit Stairs	Gypsum Bd.	Paint	Rubber Tread and Nosing
Vestibules	Gypsum Bd. Paint	Paint Vinyl Wall Coverings	Quarry Tile Resilient Sheet Flooring
Office and Support Areas	Gypsum Bd. Paint 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

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.

19. Firewalls

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

5. Interior Design

1. Fit-Up Layouts

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

2. Colour Schemes

1. The Consultant may use an interior designer, or interior decorator to develop the colour 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.

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.

4. Office Furnishings

1. Clients may supply some of the office furnishings. Unlike systems furniture TI 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.

5. Window Treatments

1. Window treatments (or translucent glazing) 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. Other functions such as glare control, heat gain reduction, daylight control, durability and maintenance should also be considered.

3. Where draperies may be hung, liners should be used.
4. Where feasible, select one product for exterior window treatment, throughout the project.

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.

7. Artwork

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

8. Barrier Free Design

1. The Consultant is to follow the requirements of the TI Universal Design Standard, the Building Accessibility Act, NBCC and applicable CSA standards.
2. Where the Consultant finds a conflict between these documents, the more stringent shall govern.
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. The drawings must show, at minimum - wheelchair turning spaces, door approach and maneuvering spaces, clear floor space at sinks, toilets, counters, corridor widths, elevator cab clear dimensions, ramp

slopes, landings, and edge protection, handrail heights and extensions, etc.

5. Attention is required for handrails, provide details on the drawings.

5.0 Mechanical

1. Regulations

1. The latest version of the following codes and standards shall apply;
 1. National Building Code of Canada (NBCC)
 2. National Plumbing Code of Canada
 3. National Fire Code of Canada
 4. National Energy Code of Canada for Buildings (NECB)
 5. Applicable CSA Standards
 6. ASHRAE Standards and Guidelines
 7. SMACNA Manuals
 8. Provincial Fire Prevention Regulations
 9. National Fire Protection Association Standards(NFPA 101 Life Safety Code)
 10. ASTM and ASME standards
 11. Other legislated codes and standards that will affect the design of the project.
2. Authorities Having Jurisdiction
 1. Office of the Fire Commissioner
 2. Department of Government Services

3. Department of Environment, Conservation and Climate Change
4. WorkplaceNL
5. Municipality

2. Submission Requirements

1. Submissions are to follow “Guidelines for the Provision of Engineering Services for Facilities” published by PEGNL, 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 Authority Having Jurisdiction. Submit copies of correspondence to Design Manager indicating status of submittals.

3. Plumbing

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 with 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. Hot water circulation loop should be located as close as possible to the farthest fixture or tempered water assembly due to low flow fixtures.

3. Hot water service to fixtures and appliances shall be delivered at a temperature in accordance with ASHRAE 90.1 Energy Standard 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

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 pipes where they are to connect to site services outside building. Show invert elevations at locations requiring sudden changes in elevation.

6. Pipe penetrating roof shall be next size up from pipe below, minimum diameter of 75 mm, preferably 100 mm. Vent pipe roof penetrations should be located as far as possible from any air intake.
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.

3. Plumbing Fixtures

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 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 except where barrier free.
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 TI.
6. Vitreous china fixtures are preferred for most installations. Stainless steel fixtures are to be used in security related facilities.

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.

3. Sinks

1. All sinks shall be stainless steel.
2. Janitors' mop sinks should be as per the master specification guide. One janitor's sink per 1400 m², with at least one per floor, shall be provided.

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.

4. Fire Protection

1. Sprinkler and Standpipe Systems

1. Provide sprinkler systems where required designed to NFPA 13 – Standard for 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 – Standard for 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.

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 – Standard for Clean Agent Fire Extinguishing Systems.

3. Wet Chemical Extinguishers

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

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 - Standard for Portable Fire Extinguishing Systems. CO2 shall be used in electrical and data rooms.

5. Heating

1. General

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

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 latest edition of the National Building Code, 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 Z312.2	To CSA Z317.2
Correctional (Administration)	21° C	15° C
Correctional (Inmates)	21° C	15° C
Correctional (Industrial Areas)	20° C	15° C

3. Zoning

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

4. Forced Air Systems

1. Forced air heating systems are only applicable to buildings where multiple zone control is not required.
2. The furnace/air handler shall have two fan speeds where the furnace/air handler 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 above the ceiling with distribution grilles located in the ceiling. In certain circumstances (such as a garage bay), overhead exposed ducting may be acceptable.

5. Hydronic Heating Systems

1. General

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

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 (TI 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.

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.

4. Heating Fluids

1. Glycol mixture should be used in heating loops. 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.

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 pumps to have mechanical seals.
4. Pressurized EPDM bladder expansion tanks are preferred.

6. Distribution

1. Wall fin radiation is the preferred method of heat delivery for hydronic heating systems.
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 TI 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.

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.

8. Monitoring

1. Devices should be installed to allow testing of low water shut-off and must allow testing without draining the boiler.
2. Stack thermometers are required at breeching outlet of each boiler.
3. Thermometers are required on:
 - .1 Return piping of each zone
 - .2 Converging side of three (3) way valves
 - .3 Supply and return side of coils
 - .4 Supply and return headers of heating equipment
 - .5 Digital gauges and thermometers are preferred
 - .6 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.

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.

6. Fuel Tanks and Piping

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.

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 a overfill protection device.
7. Air pressure testing according to ULC standards before being put into service is required.

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 cathodically 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. 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 or when required by codes or regulations.

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.

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.

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 acceptable 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.

6. Ventilation and Air Conditioning

1. Ventilation

1. Minimum ventilation rates shall be as per ASHRAE Standard 62.1. 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 the HVAC System selection and its design to the owner's requirements and hourly occupancy fluctuations where significant 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:

1. Winter - not more than 0.15m/s
2. 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.

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:

1. Systems larger than 10,000 l/s - Static pressure control VSD (variable speed drive.)
2. 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:

1. No return fan - Where the building design makes possible a return air flow pathway open enough so a return fan is unnecessary.
2. 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.
3. 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.

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
Correctional (Administration)	24° C	None
Correctional (Inmates)	27° C	None
Correctional (Industrial areas)	None	None

4. 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.

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:
 1. Perimeter and interior spaces zoned separately
 2. Perimeter spaces normally zoned by exposure

3. Perimeter zones: maximum size for cooling, 100 m²
 4. Interior Zones:
 5. Maximum size – 250 m² for open space
 6. 100 m² for enclosed spaces
 2. Zone conference/meeting rooms larger than 20 m² 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 TI.
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.
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, counselling rooms, conference rooms, etc., provide a degree of acoustic privacy consistent with the rest of the construction.

7. Equipment and Components

1. General

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

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:

- .1 Optimum air inlet/discharge configuration (follow AMCA recommendations)
- .2 Noise levels
- .3 Highest operating efficiency
- .4 Part load operation for VAV systems

3. Coil face area:

- .1 Larger face area gives lower friction loss (both air-side and heating/cooling fluid)
- .2 Larger heat exchange surface area will permit smaller temperature difference (e.g. on cooling will permit higher refrigerant evaporating temperature and system efficiency)
- .3 On cooling, fewer rows may be possible

4. Filter face area:

- .1 Larger face area decreases static pressure drop, and increases dust-holding capacity.

5. Duct System Design:

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- .1 Larger coil surface areas will reduce condensing, and increase evaporating temperatures thus improving efficiency
- .2 Basic compressor efficiency and performance
- .3 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.
- 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.
- 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:
 1. Exterior wall drafts during cold weather when heating is from a ventilation system with ceiling supply
 2. 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
 3. Lack of adequate return air flow from private offices and meeting rooms
 4. 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.

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.

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.

7. Control System for HVAC

1. General

1. Most medium and large buildings will use 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 fan starters will be equipped with hand-off-auto switches.
2. Submit control sequence descriptions and schematic diagrams for all systems for review.

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 are required.
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:
 1. Continuously
 2. At a particular time of day
 3. On a predefined date
 4. When a specific measured or controlled variable reads a selected value or state
 5. 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. Required points are to be summarized in the specification or on the drawing.

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.

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. TI will provide the following to the Consultant for the life cycle study:
 1. Present value discount interest rate to be used
 2. Escalation rate for annual maintenance services
 3. Annual escalation rate to be applied for each energy source
 4. The asset life, generally 20-25 years
 5. 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. Analyse 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.

6.0 Electrical

1. Regulations

1. The latest version of the following codes and standards shall apply;
 1. Canadian Electrical Code CSA C22.1
 2. Workplace Electrical Safety CSA Z462
 3. National Building Code of Canada (NBCC)

4. National Energy Code of Canada for Buildings (NECB)
5. National Fire Code (NFC)
6. National Fire Protection Association (NFPA 101 Life Safety Code)
7. Electrical Safety in Patient Care Areas - CAN/CSA-Z32.2
8. Essential Electrical Systems for Hospitals - CAN/CSA-232.4
9. Standard for Installation of Fire Alarm Systems CAN/ULC-S524
10. Standard for Inspection and Testing of Fire Alarm Systems CAN/ULC-S536
11. Standard for Verification of Fire Alarm Systems CAN/ULC-S537
12. IESNA - Illuminating Engineering Society of North America
13. TIA/EIA 569-B, Commercial Building Standard for Telecommunications Pathways and Spaces
14. TIA/EIA 568-C, Generic Telecommunications Cabling for Customer Premises
15. EIA/TIA568, TSB40 Specifications for Category 6 Data Wiring
16. ANSI 607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

2. Authorities Having Jurisdiction

1. Office of the Fire Commissioner
2. Department of Government Services
3. Department of Environment, Conservation and Climate Change
4. WorkplaceNL

5. Municipality

2. Submission Requirements

1. Submissions are to follow “Guidelines for the Provision of Engineering Services for Facilities” published by PEGNL, 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 Authority Having Jurisdiction. Submit copies of correspondence to Design Manager indicating status of submittals.

3. General Requirements

1. Base the electrical design on providing the following features at the most economical cost, considering both investment and operating expenditures:
 1. Safety to personnel during operation and maintenance
 2. Ease of maintenance of equipment
 3. Flexibility of electrical services
 4. Energy conservation and efficiency (Pursuant to the latest edition of the National Energy Code)
 5. Proper coordination of all elements of the electrical system as to:
 1. Insulation levels
 2. Interrupting capacities
 3. Voltage & current ratings
 4. Protective devices
 5. Mechanical strength

6. Hazardous location classification

2. Coordinate electrical systems with all other affected disciplines and building systems.

4. Service and Distribution

1. Incoming Electrical Services

1. Generally, underground service through an exterior pad-mounted 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 pad-mount transformer is used, ensure pad-mount is at lower elevation than electrical room to prevent water infiltration into electrical room through underground ducts.
3. Overhead service is acceptable for buildings where overhead service is suitable for supplying building.
4. Include protective devices, instrument transformers, metering equipment and other requirements of the local power utility.
5. Coordinate with the local power supply utility to determine electrical system and equipment design requirements. 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. Consultant shall prepare a detailed building electrical service load calculation, including connected loads, with applicable demand factors, for each load with a summary of required

capacity of electrical service. These calculation should be shared with the Design Manager and the local power utility.

7. 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.
8. 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. Ensure that design and installation of service equipment is as per the local power utility standard drawings.

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.

3. Electrical Rooms

1. Allow additional space for future expansion of equipment, (e.g. extension, future distribution section on end of service entrance board or wall space for future distribution panel).

2. Ensure an independent ventilation system is provided, (gravity where possible), with intake and exhaust direct to the outside, 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. 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.
5. Minimize mechanical ventilation duct work in ceiling spaces above electrical rooms.
6. Design shall avoid installation of any plumbing or fire protection wet pipes in ceiling spaces above electrical rooms. If such installation is required, the Consultant must get approval from TI before continuing with the design.

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 engineer shall 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 silver-plated aluminum in main switchgear assemblies.
7. Specify sprinkler proof enclosure as required.
8. Specify a ground fault protection system if warranted by system size.
9. Specify quality and performance requirements to suit project application.
10. Locate switchgear away from walls to allow sufficient access around the entire switchgear assembly.

5. Transformer Types

1. Dry type transformers are preferred where transformer primary voltages is 15 kV or lower where insulation, coordination and protection satisfactory to the local power supply utility can be obtained. Provide lightning arrestors.
2. Liquid cooled transformers should be used where transformer primary voltage exceeds 15 kV, although dry type may be used if approved by the local power supply utility. Check BIL requirements. This type of transformer should be supplied by the Utility.

3. Only secondary voltages should enter the building, generally limited to 600V. Where higher voltages are required to the building, the Consultant shall provide reasoning for approval by TI.
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. Dry type transformers shall meet or exceed NRCAN 2019 efficiency standards tested as per 10 C.F.R Appendix A – Appendix A to Subpart K, Part 431 of Title 10 – Uniform Test Method for Measuring the energy Consumption of Distribution Transformers.
7. Specify building distribution transformers with 80 degree temperature rise to reduce heat and noise.

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 21 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.

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 pole breakers shall have single handle. Tie-bars are not permitted.
3. Specify mains or bussing to be made of silver-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.
7. Main lugs, main breaker incoming feeder lugs and feeder breaker termination lugs shall be suitable for copper and aluminum conductors.
8. Specify a lock on device for essential circuit breakers (ie. emergency and exit lighting).
9. Circuit breakers are to be equipped with electronic trip when rated 1,000A or greater.

8. Ceiling Distribution

1. Provide power distribution system, in the ceiling space, for office areas as follows:
 1. System to be capable of supplying three phase power to modular office furniture or single-phase pack poles
 2. Common neutrals not acceptable
 3. Connection length in ceiling not to exceed 3.0 m
 4. 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:
 1. System of zone conduits sized as required for open office areas or instrumentation cable tray routed along corridor ceiling space
 2. Terminate conduits/cable tray at backboard in communication closet
 3. Design the system to minimize length of cables, cables shall be supported and attached to building structure and shall not be laid/installed directly on top of the ceiling tile system
3. If zone conduit system is utilized, provide separate zone conduits for telephone and data.

5. Lighting

1. Interior Lighting

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-1).
3. Recessed fixtures shall have hinged frame lenses.
4. Use fixtures with parabolic louvers where glare is a problem. Light fixtures shall be selected to minimize glare.
5. Provide minimum Visual Comfort Probability V.C.P. value of 70 for all spaces.
6. 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.
7. Fixtures are to be relocatable within a 1.5 m radius without wiring alterations.
8. Provide a life cycle cost analysis. If a life cycle cost saving can be achieved, provide a programmable low voltage lighting control system with the following options:
 1. High-resolution colour monitor and CPU
 2. Desktop printer
 3. Manual switch and digital telephone override
9. 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 Buildings for interior and exterior lighting systems.
10. 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 for Buildings.

11. In most cases, the levels of illumination listed in IESNA Handbook are for specific tasks. When levels are listed for locations, (e.g. foyer) they shall be considered average levels.
12. In areas surrounding task locations, the average level of illumination shall not be more than $\frac{1}{3}$ 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 $\frac{1}{3}$ the average of the task levels.
13. 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 $\frac{1}{3}$ of the average lighting in the adjacent task space.
14. Switching of lighting fixtures shall be designed to conserve energy, using one or more of the following schemes:
 1. Separate switching of lights at the perimeter of the building
 2. Provide low voltage switching for general office areas
 3. Provide switching at each floor and at central location
 4. Automatic control systems (occupancy and daylighting sensors)
 5. Switching by zones, not less than four (4) zones/floor
 6. Switch lighting in all enclosed rooms separately
15. Switch lighting by zones in open and modified landscape spaces not exceeding 160 square meters.

16. In selecting reflectances and interior surfaces, bear in mind energy utilization implications as well as those of other disciplines.

1. Ceiling - 70%
2. Walls - 50%
3. Floors - 30%

17. Plan lighting designs for high ceiling areas (e.g. atriums, stairwells) such that ease of replacement is achievable. Use wall mounted fixtures in exit stairwells.

2. Lighting Fixtures

1. All light fixtures to be LED type.
2. Identify all fixtures on the design drawings and specify in detail in the specification, the quality of material, construction and standard of performance required.
3. Lenses are to be ULC certified.
4. Gymnasium lighting shall be LED.

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 corrosion resistant coated steel pole-counted, LED type fixtures to reduce pole swaying.
3. 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.

4. 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.
5. All exterior fixtures to be dark sky compliant.
6. Design exterior lights to achieve the LEED credit for Light Pollution Reduction.
7. Exterior lighting shall provide down lighting only and minimize flooding exterior with light. Focus exterior lighting on specific area to be illuminated.
8. Provide exterior lighting control by a photo cell and contactor with hand-off-auto (HOA) switch and time clock or programmable controller set back. Provide manual bypass.
9. Provide exterior security lighting for driveways, walkways and parking areas.

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.
4. Emergency power for emergency lighting shall be designed to last a minimum of 90 minutes.

5. Exit Signs

1. Exits and paths of exit travel are to be indicated by electrically illuminated universal running person exit signs.
2. Exit signs are to be illuminated with energy efficient LED. lamps.
3. Connect signs to emergency A.C. system, or provide an emergency lighting battery unit/exit sign combination unit.
4. Bilingual and international signs are to be provided where required.

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.
4. Ensure that heater housing type is suitable for the applications.

7. Systems

1. Intercommunication Systems

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

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-plex 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 colour 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 & Infrastructure. A CAN/ULC-S537 verification certificate and verification report shall be provided prior to take over inspection.
9. Provide complete riser diagram on drawings indicating all devices, locations, zones, isolation modules, conduit risers and sizes, wire type, and control sequences. A fire alarm riser to be posted next to the main fire alarm panel, sized so it is legible.
10. Provide one or more zones for each floor including penthouse, sprinkler system, dry or wet chemical systems, stairwells and air handling systems. Elevator machine rooms and hoistways

shall be shown as separate zones of fire alarm riser and annunciation.

11. Duct smoke detectors to be mounted in both supply and return ducts.
12. Refer to CAN/ULC-S524-06 Installation of Fire Alarm Systems for spacing and placement of fire detectors on various ceiling types.

3. Intrusion Alarm and Remote Monitoring

1. Use Departmental standard specifications and guidelines to suit project requirements.
2. 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.
3. Provide conduit for centralized monitoring and control systems and console for fire alarm, emergency telephones, elevators, and lighting systems.

4. Telecommunication Systems (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:
 1. CAN/CSA-T530, Commercial Building Standard for Telecommunication Pathways and Spaces
 2. CAN/CSA-T529, Design Guidelines for Telecommunications Wiring Systems 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. Multimode fibre cables are to be used for riser cables unless requested otherwise by the Design Manager.
7. Connect elevator emergency phone to Security Control Centre if applicable.

5. Clocks

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

8. Motors and Controls

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:
 1. Magnetically operated motor starter

2. Fused control transformer for 120 or 24 volt control
 3. Manual-off-automatic selector switch where remote control is used
 4. Combination starters are preferred, starters with separate disconnect devices may be acceptable
 5. 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 selected based on NEMA motor starter ratings. Specify sprinkler proof enclosure as required.
 11. Provide lockable disconnecting means within sight and one (1) meter from each motor.
2. Motor Control Centres (MCC)
1. Use MCCs where they provide an economical and practical grouping of controls.
 2. Centres should be free-standing structures.
 3. Use combination starters.
 4. Mount MCCs 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 centres 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.

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.

9. Lightning Protection

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

10. Control Systems

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

11. Emergency Generator

1. Provide an emergency power generator as directed or required by code, sized to operate the following:
 1. A number of spaces. See unit spaces for requirements
 2. A limited number of exterior lights for perimeter security (25%)
 3. Minimal heating and ventilating equipment
 4. Elevators (1 at a time to operate to closest floor)
 5. Fire alarms and exit lights, emergency lighting in stairwell, corridors and all other areas where required by code

6. Alarm and control systems
 7. All electrically operated doors
 8. Fire Pump(s)
 9. Any other specialized equipment identified by the Design Manager.
2. Confirm the load requirements for the standby generator to power the security lighting in addition to the emergency services and fire alarm systems.

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. 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:

1. 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.
2. 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 colour for receptacle cover plate.
3. Dedicated computer panelboards shall incorporate a line voltage conditioner/surge suppressor installed and connected in parallel with the panelboard feeder at the panel location.
4. 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.
5. 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.

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. Use compression two-hole bolt-on lugs on bus to eliminate retorquing maintenance.
2. Ground conductors shall be copper.

3. Provide grounding riser diagrams on working drawings and distinguish between distribution ground and bonding ground.
4. All below grade grounding connections are to be thermit weld type.
5. Ground rods to be 10mm diameter, 3m long copper clad steel type.
6. Grounding plates to be installed where ground conditions do not permit installation of grounding rods.

15. Sustainability Management System (SMS) Public Interface

1. When requested by the Design Manager, 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 touchscreen display and web browser.
2. SMS System Hardware: A touchscreen 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.

7.0 Build Better Buildings Policy and LEED

1. Build Better Buildings 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 <http://www.gov.nl.ca/iet/files/publications-energy-betterbuildingspolicy.pdf>, along with a guideline for using the policy.

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.

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 with a focus on decarbonization, quality of life, and ecological conservation.
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. 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:
 1. BBB policy
 2. CAGBC website
 3. LEED reference guides
 4. LEED certification duties as required for the project
5. All documentation shall be completed, compiled, and submitted in a timely manner.
6. A copy of the final submittal to the Canada Green Building Council shall be supplied to TI in Portable Document Format (.pdf) format. The pdf shall be bound so that only one file is to be transmitted.
7. The Consultant shall provide updates to TI on a bi-weekly basis, which shall include at a minimum:
 1. Status of credits/points achieved.

2. Factors limiting the achievement of any points planned for the project.
3. Issues with documentation submittal from all parties.