Manitoba Hydro

Facility Design Guidelines

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Accessible version available upon request.

Version Control

Version	Date	Changes
1.0	30-Nov-21	First publication.

Table of Contents

These Manitoba Hydro Building Facilities Design Guidelines ["The Guidelines"] were approved on November 30 2021 as an administrative document to be updated periodically.

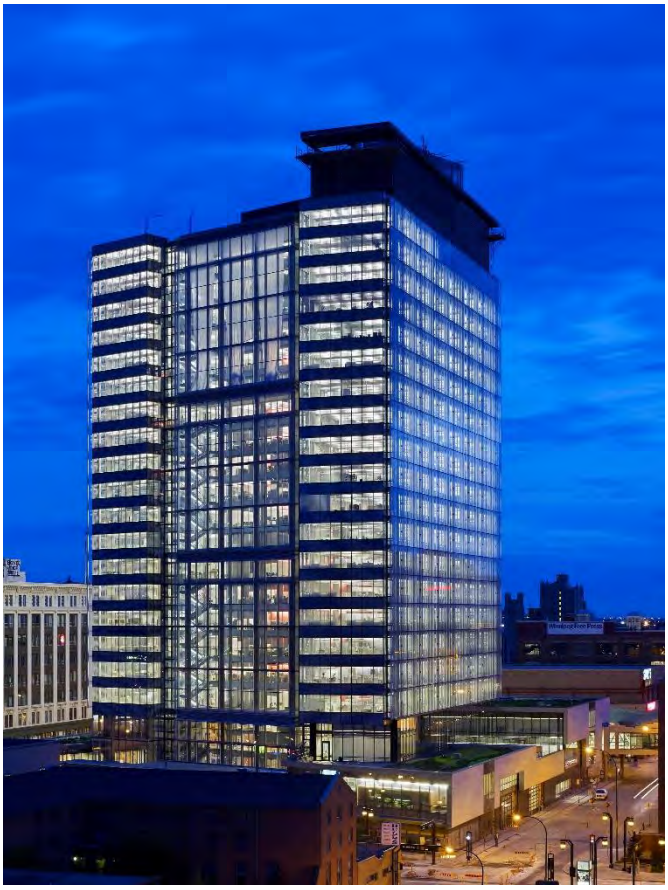
Manitoba Hydro provides these Guidelines to assist our staff and design consultants, and contractors with a better understanding of what Manitoba Hydro's expectations are for the design and construction of premises within the Corporate Facilities portfolio. The Guidelines are provided to the public on an information only basis.

Therefore, while the content is thought to be accurate on the publication date shown, the Guidelines are provided on an "as is" basis, and without warranty of any kind, either expressed or implied.

Manitoba Hydro, its officers, agents, employees and contractors will, in no event, be liable or responsible for losses or damages of any kind arising out of the use of the Guidelines. Additionally, changes may be made to the Guidelines without prior notice.

The information contained in the Guidelines is always subject to the provisions of all governing legislation and bylaws including, without limitation, the National Building Code, the Manitoba Energy Code, the Canadian Electrical Code, the National Plumbing Code, and the National Fire Code as they may be amended or replaced from time to time.

1. Executive Summary



Construction of new Manitoba Hydro-owned facilities, or major renovation of existing Manitoba Hydro - owned facilities, represents a significant investment of Crown resources. Ongoing upkeep of Manitoba Hydro buildings requires additional resources to ensure that the original investments in building assets are well-maintained and operating with optimum efficiency.

It is Manitoba Hydro policy to set out administrative procedures and guidelines that provide appropriate direction for the design and development of its building assets in order to promote a good return on investment. Manitoba Hydro is interested in fostering a high level of design quality in its facilities while ensuring that operation and maintenance goals are met, and that upkeep costs are minimized as much as possible.

At Manitoba Hydro, the construction of new buildings and the renovation of existing ones is mandated through the facility portfolio plan and capital approvals process. The intent of these Guidelines and Technical Specifications is to organize into a single resource document, the general performance and specification requirements for the various components of Manitoba Hydro projects. It is intended that this information will assist designers, contractors, and vendors to gain project approvals and select appropriate building assemblies, service systems, and material finishes that Manitoba Hydro expects in their completed buildings.

The Design Guidelines is not intended to provide barriers or limit the creative inputs of designers or constructors that work on behalf of Manitoba Hydro, but rather to delineate in a general way, what aspects of design and materiality Manitoba Hydro wishes to see delivered in its buildings.

Construction of a new build, major renovation, or minor recapitalization project can be a complex undertaking. With Manitoba Hydro expectations for design and construction clearly identified upfront, the task of delivering functional, resilient and quality infrastructure can be better facilitated.

2. Introduction

2.1. Mission Statement

"Provide sustainable facilities to support the success of people and business."

Manitoba Hydro's goal is to transition towards a facility portfolio that supports the productivity of our customers in a safe, efficient, and sustainable way. This is echoed in the mandate for Corporate Facilities:

Responsible for the planning, development, operation, maintenance and stewardship of a portfolio of facilities that provide a safe, secure, sustainable and optimal workplace in support of a dynamic and productive workforce.

Manitoba Hydro's Corporate Facilities Strategic Plan is aligned with the MB Hydro Strategy 2040 addressing key trends in energy utility management:

- **Digitization:** improved collection and use of energy data
- **De-carbonization:** shift toward use for low-carbon energy sources, such as Hydro-electricity
- **Decentralization:** considering the use of solar, wind, and other energy sources near to the end use

It is also aligned with the MB Hydro Asset Management Policy in relation to life-cycle planning, evidence-based decision making, and focusing on the system rather than only on the parts.

The designs of new building and renovation projects for Manitoba Hydro, must carefully consider the mission statement, corporate goals, and financial obligations. Designs shall support MB Hydro with attracting and retaining a skilled workforce, support the health, safety, and productivity of the staff, respectfully engage facility stakeholders and the communities they serve, achieve efficient use of resources both during construction and operations, and provide best value for the Crown over the lifecycle of the building.

The intent of Manitoba Hydro Design Guidelines is to standardize requirements for Manitoba Hydro-owned construction projects, both for new builds and for the renovation of existing buildings. The goal is to provide clear direction to architects, contractors, material suppliers, installers, and others in the construction industry regarding the expectations for the design and delivery of Manitoba Hydro funded projects.

MB Hydro Corporate Facilities takes a holistic approach to sustainability. Design decisions are to be based on environmental, social and economic considerations. This design philosophy values life-cycle fiscal considerations to determine best value. This broad understanding of sustainability shapes the MB Hydro design philosophy and development of our design charter.

2.2. MB Hydro Corporate Facilities Design Charter

MB Hydro Corporate Facilities' design philosophy is translated into tangible goals that form the Charter for facility management, as follows:

- **Attract and retain** a diverse and high-performing workforce that reflects the demographics of our community.
- **Support the health, safety, and productivity** of each employee to perform their job to the best of their ability.
- Consider the economic impacts of decisions based on the lifecycle of a project seeking **best value for the rate payer**.
- Demonstrate **environmental leadership** through energy efficiency and environmental sustainability.
- Make architectural decisions that demonstrate **respectful engagement** with communities and stakeholders

2.3. Manitoba Hydro's Commitment to Value-Based Design Making

Manitoba Hydro desires to make consistent, value-based decisions for all capital investments, including those related to the facility portfolio. All facility projects over $1-million must follow the Corporate Value Framework Process. This initiative is based on the following core strategic and organizational goals:

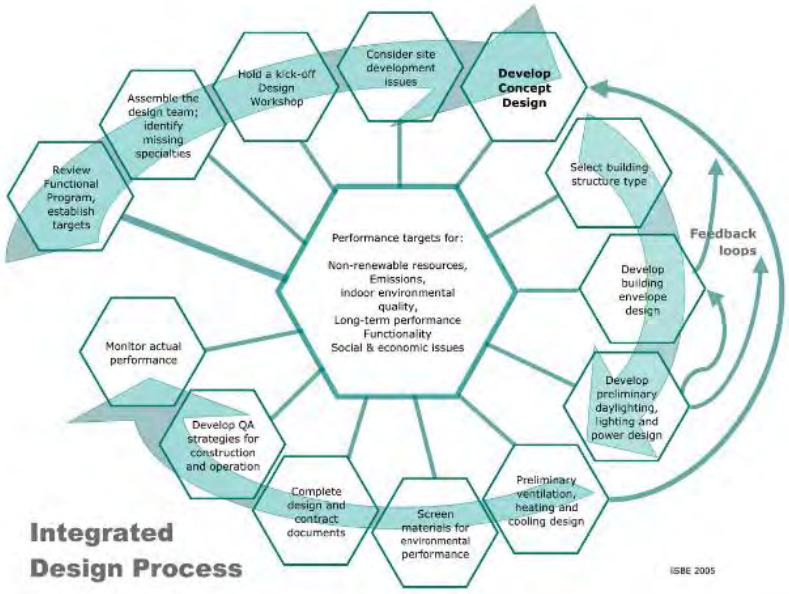
- Increase customer satisfaction: provide reliable, cost-effective distribution service
- Maintain customer service reliability
- Environmental stewardship: maintain the environment for generations.
- Public perception
- Financial: minimize customer rates
- Safety & Regulatory: safety first for our employees & community

These goals are distilled into quantifiable value measures known as the Corporate Value Framework (CVF). These values are calculated by measuring the magnitude of the benefit (or risk) and the likelihood of the risk (or benefit) occurring. The CVF process is an internal process within Manitoba Hydro, but often relies on inputs from the consultant.

The Corporate Value Quick Reference Guide is provided in Appendix 8.2.

2.4. Integrated Design Approach

Manitoba Hydro strives to ensure effective internal stakeholder engagement is carried out through an integrated design process during the planning and design phases for all new facilities and major renovation projects. An integrated design process utilizes a collaborative design approach, involving consultants, staff and user group representatives, to set a well-defined vision and performance objectives for the project and to identify strategies for achieving the desired outcomes.



3. Principles Guiding Design for Manitoba Hydro Facilities

Manitoba Hydro's goal is to have its buildings reflect design choices that enhance overall construction quality, embody best practices in construction technology, work to minimize long-term operations and maintenance costs, and promote building usefulness, resilience and longevity while getting best value over the lifecycle of the asset. These principles should be applied to all types of projects, including new builds, renovations, and minor alterations. The principles from the Design Charter are summarized below, with example strategies that are commonly used to support the design.

3.1. Attract and Retain a Diverse Workforce

Adaptability	Provide spaces that respond to the needs of the anticipated users of the building and are adaptable to future needs.
Accessibility	Provide spaces that value the dignity and recognize the diversity amongst our employees, emphasizing an equitable experience for all staff.

3.2. Health and Productivity

Encourage Movement	Provide spaces that encourage employees to move from fixed work points by providing casual and collaborative spaces that are inviting.
Daylighting and Views	Provide good daylighting and outdoor views to all office areas and throughout the building footprint.
Indoor Air Quality	Optimize indoor air quality by selecting interior products that minimize off-gassing of pollutant and chemicals. Explore options for dedicated outdoor air supply (DOAS) for new construction.
Thermal Comfort	Pursue an adaptive comfort model which improves the occupant experience by providing controllability of systems (air temperature, air movement, shade position, window position, etc) while reducing the burden on mechanical heating and cooling.
Acoustical Comfort	Follow best practices for acoustical comfort in workspaces.
Outdoor Amenities	Provide outdoor amenities for work and break opportunities.

3.3. Environmental Leadership

Systems Approach	An energy concept should be developed for new construction and major renovations which emphasize a holistic, systems approach over specific energy conservation measures at the equipment level.
GHG Reductions	Energy concepts for spaces should be developed that emphasize efficiency and GHG reduction and are aligned

	with the Manitoba Hydro Energy and Sustainability Guidelines for Facilities.
First Principles	Consider sun path, siting, form and massing as part of a holistic energy concept for new construction. Prioritize passive design, before considering technological solutions. Provide a scenario with a Thermal Energy Demand Intensity (TEDI) of less than 36 kWh/m^2/yr (Climate Zone 7) or 40 kWh/m^2/yr (Climate Zone 8).
Green Commuting	Support alternative commuting options for staff by providing amenities that encourage employees to walk, bike or bus to work.
Resource Efficiency	Prioritize reused, recycled and regional materials in construction where possible.
Embodied Emissions	Qualitative assessments of embodied emissions shall be made for major structural and envelope material decisions.
Evidence-based Design	Use energy modeling as a design tool to support the integrated decision-making process and validate the energy concept. Evaluate multiple options for envelope, lighting and HVAC systems and avoid reliance on rules of thumb and oversizing equipment.
Water Efficiency	Consult with Manitoba Hydro during the concept design stage to determine potential water impact of the project and decide whether a water budget should be developed. Use low-flow fixtures whenever possible and consider rainwater or greywater recovery systems.
Sustainability Tools	For new construction and major renovations, track the design against a Sustainable Design Checklist such as the LEED BC+C scorecard, current version.
Renewables	Hydroelectricity delivered by Manitoba Hydro is a low-carbon based energy source. Consider renewable energy solutions such as photovoltaics or biomass as an alternative to traditional back-up power sources.

3.4. Life-Cycle Value

Space Utilization	Value should be achieved by providing space that efficiently supports the core business need. Innovative design solutions should be considered that optimize the utilization

	of building footprints.
Repurposing existing assets	Explore opportunities to repurpose existing building assets for new requirements to reduce cost and minimize waste.
Durability	Provide durable buildings that are efficient and cost effective. Designs should stress simplicity and ease of construction. Consideration should be given to replacement strategies for equipment with a shorter lifespan than the building.
Maintainability	The operational phase should be considered in all design decisions, and an understanding of maintenance implications considered.
Metering and Verification	Support the operational phase by developing a metering plan and provide associated equipment to allow the building operators to understand and troubleshoot off-normal performance.
Incentive Programs	Explore all opportunities to leverage incentive programs to support the first cost of development, including programs from Efficiency Manitoba. Projects must certify through the New Buildings Program when applicable.

3.5. Respectful Engagement with Stakeholders

Design Quality	Provide designs that demonstrate Manitoba Hydro's core values to the public and ratepayers. Manitoba Hydro facilities shall represent a positive presence in the community.

4.

4. Design and Development Process

This section is intended to provide design teams with a common understanding of the design process in Corporate Facilities at Manitoba Hydro. Before describing expectations at the various design stages, there are several components of the design process that should be considered through the entirety of each project.

4.1. Integrated Design Process

Manitoba Hydro's default strategy is to ensure an integrated design process (IDP). This strategy is integral to the culture in Corporate Facilities at Manitoba Hydro. IDP should influence the entire design process from pre-design through to the operational phase. At Manitoba Hydro, IDP is not 'design-by-consensus', rather it values a holistic, systems-based approach to design, is supported by strong communication throughout a multi-disciplinary team and is led by a highly-competent Prime Consultant. Time is invested early in the design process to seek our opportunities to optimize the design based on the project's value framework.

- Early in the design process, involve all building design consultants and MB Hydro Owner representatives in a design charrette where the design goals for the asset are clearly developed and articulated.
- Create a well-defined set of performance objectives documented in a Project Charter. The Project Charter shall set project priorities and outline the hierarchy for decision making.
- Confirm MB Hydro's Owner's Project Requirements (OPR) has been provided by MB Hydro.
- Create a Basis of Design Report. Update as necessary through the design.
- Register the project for all applicable Efficiency Manitoba Incentive programs and provide Hydro with an estimated value for available incentives.

4.2. Life Cycle Cost Analysis

Manitoba Hydro strives to take a life-cycle approach to portfolio management, with the broad goal of achieving best value and sustainability throughout the entire life cycle of each asset. Specific requirements will be determined with the design consultant on a project-by-project basis. At a minimum, it is expected that consultants consider the life-cycle cost implications on a qualitative basis for the following building systems:

- Building envelope (skin, insulation, roofing systems, glazing)
- Mechanical Systems (heat/cool sources, air distribution system, hydronic system)
- Electrical Systems (indoor/outdoor lighting and controls)

For new construction or major renovations, these systems should be considered within the context of a holistic energy concept for the building.

4.3. Energy Modeling as a Design Tool

Energy modeling is a requirement for all new construction and major renovation projects and may also apply to envelope renewal or HVAC projects. Energy modeling should be considered a design tool, rather than a compliance check for capital projects at Manitoba Hydro.

An energy model allows the design team to assess the thermal and environmental impacts of design decisions. It supports innovation, by reducing the risk associated with new energy concepts and should free the design team from a reliance on previous practice or 'rules of thumb'.

4.4. Third-Party Commissioning

Manitoba Hydro has retained independent, third-party commissioning services through a framework agreement that allows this service to be applied for all projects where there is added value.

Commissioning scope and level of detail will be dependent on the scope and scale of each project. In general, all modifications to building automation systems and controls will be reviewed by Manitoba Hydro's independent commissioning agent. For new construction and major renovation projects, the following represents typical tasks for the commissioning agent at the various stages:

Pre-Design	• Develop OPR with Manitoba Hydro • Define commissioning scope and budget
Design Phase	• Develop commissioning plan when scope has been confirmed • Review Basis of Design for consistency with the OPR • Conduct design reviews at pre-determined phases, as described in the commissioning plan, for consistency with the OPR
Construction Phase	• Integrate commissioning plan into construction schedule • Review submittals • Develop functional testing procedures and execution • Site inspections and issues log
Close-out Phase	• Review Operations Manual for compliance with ASHRAE 1.4-2019 • Support Operator Training, as required • Support Measurement and Verification phase, as required.

4.5. Manitoba Hydro Capital Approval Process

All capital projects must be approved through the Capitals Approvals and Documentation process at Manitoba Hydro. This work falls within the scope of Manitoba Hydro's internal resources, but often leans on deliverables that result from the design process.

An overview of the types of approval processes involved is as follows:

Program Items (Total Project Value < $1M)

Projects with a total value (including construction, design and all internal costs) of under $1 million are considered program items and fall within a pre-approved capital renewal budget for Facilities at Manitoba Hydro. Program items have a streamlined approval process and inputs to this process are focused on scope and budget.

Projects (Value > $1M)

Manitoba Hydro uses the following Capital Approval Process for Projects with total project value > $1M:

PHASE 1 – Project Identification	Manitoba Hydro identifies a capital renewal or customer request as a potential project.
	Manitoba Hydro develops a very high-level project budget and determines the scope and deliverables for the concept development phase to be conducted by a consultant.
APPROVAL MILESTONE: Capital Investment Concept (CIC)	
PHASE 2 – Conceptual Design	Manitoba Hydro engages a consultant to develop a functional program, conceptual design and refine the project budget.
	Design is typically progressed to the Basis of Design or Schematic Design level, witheither a class 'D' or class 'C' cost estimate.

APPROVAL MILESTONE: Capital Investment Justification (CIJ)	
PHASE 3 – Project Delivery	With the approved CIJ, the project can now be delivered to completion by ManitobaHydro working with the design consultant, internal project management, and construction forces.
	Changes to the scope or budget require a Capital Investment Justification (CIJ)Addendum.

4.6. Design Deliverables and Milestones

Project submission requirement expectations depend on the size and complexity of the project, as well as if the project involves new construction and/or renovations. Expectations are outlined below, by phase:

	Minor Renovation <$1 Million	Major Renovation <$1 Million	New Construction
Class C Cost Estimate	Yes	Yes	Yes
Basis of Design	Yes	Yes	Yes
MBH Sign - Off on Preliminary Design	Yes	Yes	Yes
IDP with Project Charter	No	Yes	Yes
Energy Model	No	Yes	Yes
Efficiency MB Incentives	Yes	Yes	Yes
Sustainable Design Checklist	No	Yes	Yes

4.6.1. Functional Programming

When required, Consultants shall work with Manitoba Hydro to complete a Functional Program summary. MB Hydro shall provide the Consultant with the following information:

- List of Project Stakeholders
- Staff types, quantities & space allocation
- Organizational Charts

The program summary shall include the following information organized in spreadsheet format:

- Security requirements;
- Site requirements;
- Key business processes and unique activities;
- Mobility assessment;
- Collaborative and individual work-point requirements;
- Specialty spaces required, including storage;
- Specialty Furniture, Fixtures & Equipment required;
- Functional adjacencies, proximity and zoning recommendations.

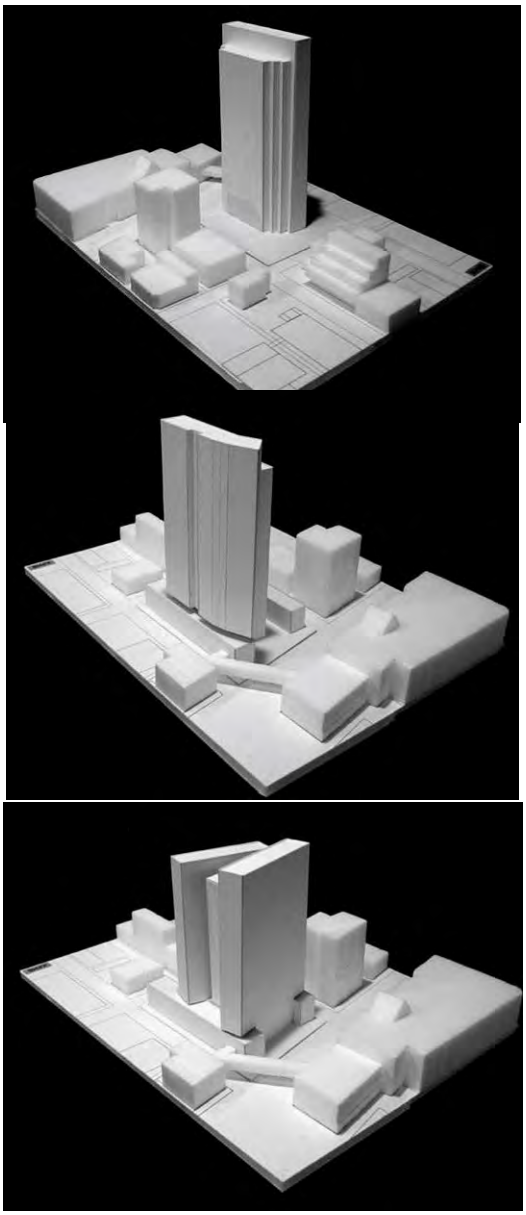
- Hours of occupancy for various zones

Consultants are required to meet with a MB Hydro representative to review the document findings and identify any additional information required. Additional interviews may be held with functional groups at the discretion of the Consultant upon MB Hydro's approval.

Room data sheets are not required.

Refer to Manitoba Hydro Furniture & Space Standards in Appendix.

4.6.2. Pre-Design Phase



The Pre-Design phase is often the most critical to the overall success of the project. In this phase, a wide range of concepts shall be explored, compared, and assessed for suitability to meet the goals of the project. Manitoba Hydro emphasizes the importance of a strong, integrated pre-design phase which culminates in a concept which provides best value over the life cycle of the asset.

OWNER'S PROJECT REQUIREMENTS (OPR)

The OPR is provided by Manitoba Hydro to describe and summarize the requirements for a successful project. The format of the OPR will be dependent on the project scope. For small-scale or simple projects, the OPR may be informally provided to the design consultant in an email or during a kick-off meeting. For larger projects, the OPR is a formal, structured document that should succinctly and broadly describe the requirements for the functional program, budget, quality, and systems.

The OPR should be considered a living document and is updated throughout the design process.

BASIS OF DESIGN (BOD)

The BOD is the design consultant's response to the Owner's Project Requirements. This deliverable is a requirement in all projects and program items and summarizes the consultant's understanding of the design problem presented by Manitoba Hydro.

The BOD should be largely narrative-based, easy to understand, and may include limited use of drawings. The level of detail should be enough to allow a cost consultant to generate a class D cost estimate for the project.

The Basis of Design will be reviewed by Manitoba Hydro prior to the start of Schematic Design. At a minimum it shall include:

- Summarized response to the Owner's Project Requirements with a descriptive interpretation of what will delivered during the design phase.
- A Sustainable Design Checklist identifying sustainability and wellness opportunities
- Identification of Efficiency Manitoba incentives which may be available to the project

4.6.3. Schematic Design

This phase emphasizes exploration and should be highly collaborative between the design consultant and Manitoba Hydro. With a clear understanding of the requirements from the OPR and BOD, the design consultant should begin to test options against the values outlined in this guideline.

For new construction and major renovation projects, specific items to be explored (in addition to standard design tasks) include:

PROGRAM AND REGULATORY REQUIREMENTS

- Define building areas and functional interrelationships.
- Preliminary code review; early identification of unique, specific challenges.
- Develop strategy for Manitoba Building Energy Code compliance.

SUSTAINABLE DESIGN

- Develop and document energy concept, considering holistic approach to occupant comfort, energy efficiency, and low-embodied energy design.
- Create an energy model to inform the design process.
- Provide a Sustainable Design Checklist identifying sustainability and wellness targets
- Consider available incentive programs
- Explore options related to building massing and orientation in context of the site planning
- Identify glazing percentages, window shading, and bird-friendly design considerations.
- Identify options for heating and cooling and domestic hot water systems.
- Consider structural and envelope selections based on embodied energy and environmental impacts over the life cycle of the facility.

COST CONTROLS

- Engage a cost consultant to provide Class C cost estimate
- Confirm the schematic design meets project budget

4.6.4. Design Development

The Design Development stage represents a transition from creative exploration to decision-making. The design tasks in this phase should focus on constructible solutions for envelope, structure, interior systems, and M&E components. For new construction and major renovation projects, some specific items to consider include:

PROGRAM AND REGULATORY REQUIREMENTS

- Engage code authorities for preliminary review, as required.
- Confirm project delivery method for construction phase.

SUSTAINABLE DESIGN

- Detail typical building assemblies and components, including all building systems.
- Identify mechanical equipment and controls and lighting selections.
- Identify possible thermal bridging conditions. Assess using reference guides, or through thermal modeling, as required.
- Update Energy Model to reflect decision-making and verify progress against goals established in OPR and BOD.

COST CONTROL

- If requested by MB Hydro, engage a cost consultant to provide updated class B costing.
- Confirm project budgeting is on target.

DESIGN DOCUMENTATION

- Prepare Drawings and Outline Specification
- Update Sustainable Design Checklist
- Submit the Design Development Submission package to MB Hydro for review.
- Incorporate required design adjustments in the Design Development package.

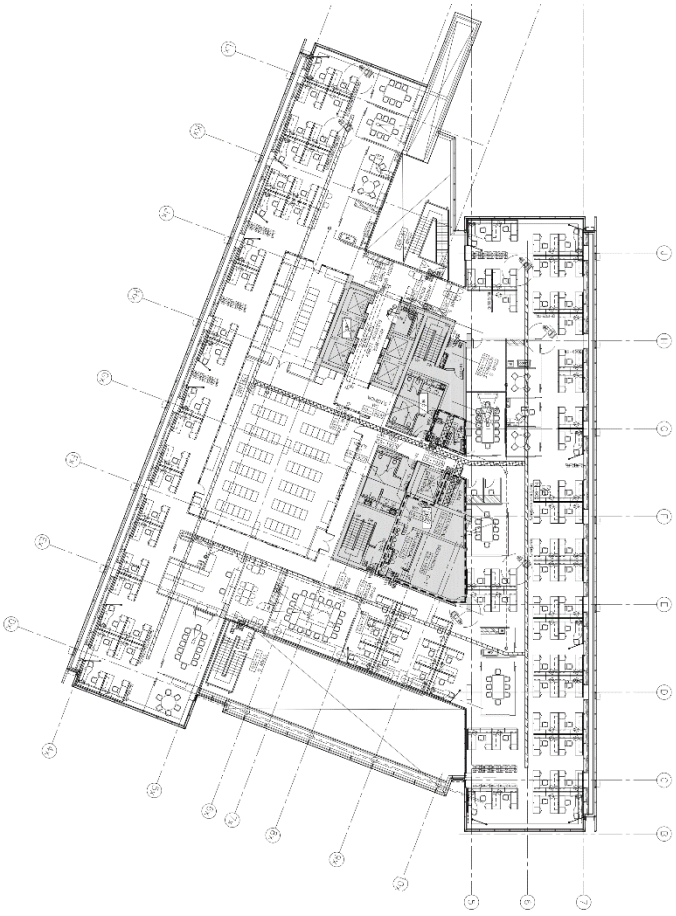
4.6.5. Construction Documents

FINALIZE DETAILING

- Confirm all building assemblies, systems, and finishing material schedules and equipment schedules.
- Provide clear documentation of the required glazing properties, including center of glass u-value, system effective U-value, solar heat gain coefficient, and visible light transmittance, as well as contractor's responsibility for verifying system performance.

QUALITY CONTROL

- Confirm detailing and equipment incorporates Manitoba Hydro materials and systems requirements.
- Confirm energy and GHG building performance requirements are met using energy modeling.
- Confirm Consistency: confirm that all consultant's work is consistent and has been coordinated. Ensure that the consultants' work does not incorporate standard details that do not reflect the designed construction assemblies for the project. Check all dimensional requirements for specified products and systems and ensure there is consistency between all of the consultants' drawings and specifications.

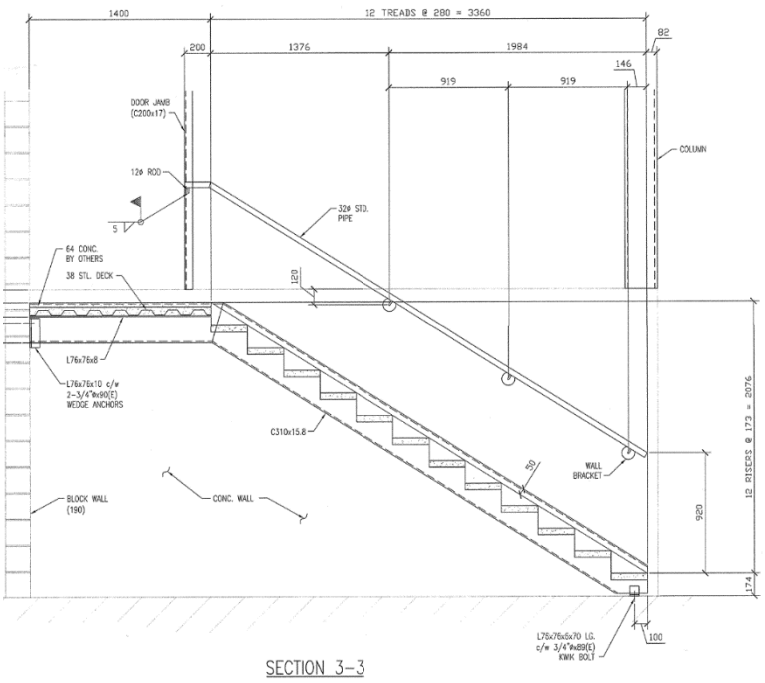


DESIGN DOCUMENTATION

- Provide Issued for Tender drawings to MB Hydro for tendering when project will be tendered
- When changes made during the tender phase are complex enough to make Contract Administration challenging, Hydro may request that the consultant provide IFC drawings as an additional service.
- Complete final energy model based on IFC drawings and sign-off on Coordinating Registered Professional Letter of Assurance for compliance with the MECB.
- Complete application for Efficiency Manitoba incentives

4.6.6. Contract Administration Phase

For small projects, Manitoba Hydro staff will assist with Contract Administration (CA) services. Confirm scope split prior to starting this phase.



Consultant team is expected to provide review for general conformance with the Contract Documents. Consultant team is also responsible for responding to RFIs, reviewing Submittals, and issuing Changes to the Contract and Supplemental Instructions as well as Contractor's deficiency list and close out submittals.

Manitoba Hydro Staff will also review progress of the work in order to manage progress billing and payment certification, unless this service is part of the consultant's scope during the CA phase.

4.6.7. O+M / Warranty Phase

A robust and detailed close-out process is critical to successfully transition a project from construction into the occupancy phase. The key deliverables that require extensive coordination between Manitoba Hydro, the contractor, consultant, and commissioning agent are:

SYSTEMS MANUAL

- Manitoba Hydro maintains an electronic Systems Manual based on ASHRAE Guideline 1.4-2019 for Hydro facilities. The Systems Manual serves as the building-systems resource and technical operations manual for the facility. It is a collection of information and documentation on the building's planning, design, construction, and commissioning, along with operational requirements, maintenance information, training and testing documentation for the use of building operations, and maintenance and optimization of the facility over its useful life.
- The scope requirements related to the Systems Manual for a particular building should be discussed at the outset of the project. Depending on the scope of work, a Systems Manual may need to be created, edited, or (in rare circumstances) left unchanged.
- For new and renovation commissioned projects the Contractor shall be responsible for collecting the Systems Manual data for review by the Commissioning Agent. The Commissioning Agent shall be responsible for updating the Systems Manual during the Commissioning Process.
- For projects not commissioned, the contractor shall be responsible for collecting the Systems Manual data which is reviewed by the consultant and Manitoba Hydro. Manitoba Hydro will receive the reviewed data and update the existing Systems Manual.
- All Systems Manual information shall be provided in an easy to read, PDF format.

RECORD DRAWINGS

- Manitoba Hydro requires the consultant to prepare and issue record drawings for all projects, unless directed otherwise.
- Record drawings rely on good quality information provided by the contractor to reflect actual locations of building components and should incorporate all changes to the original drawing set. As-

Built drawings provided by the contractor should be reviewed carefully by the consultant and a clean copy issued by the consultant to Manitoba Hydro.

- Equipment tables shall be updated in the record drawing set.
- Record drawings shall be provided in digital format only, in both PDF and AutoCAD (version 2020 or earlier) formats.

O&M MANUALS

- Manitoba Hydro requires the consultant to review contractor's provided O+M manuals for completeness, unless directed otherwise.

5. Drawing and Specification Standards

Manitoba Hydro strives to achieve consistency across drawings and technical specifications to promote quality assurance and efficiency.

5.1. Unit of Measure

Manitoba Hydro requires SI units to be the default unit of measure on all drawings and specifications. Converted I-P units can be shown for information and may be requested for information by Manitoba Hydro. Renovations of existing facilities with I-P base plans can be completed in I-P units with SI conversions shown.

5.2. Manitoba Hydro Drafting Standards

- Layers: All drafting shall conform to the National CAD Standard
- Blocks: All furniture blocks shall be obtained from Corporate Facilities; no 3D furniture blocks will be accepted.
- Fonts: Use Calibri as standard font. Arial Black may be used for titles and annotation. No other fonts are accepted.
- Line widths: Set all line widths to 0
- Bound Drawings: All drawings are to be sent unbound
- X-References: Only base building drawing and reflected ceiling plans may be used as external references. All external references shall be attached at point 0,0
- Drawing numbering: All drawings issued for bid or construction must include two drawing numbers. The primary number is determined at the discretion of the consultant, to facilitate easy references during the project. The secondary number is determined by the Manitoba Hydro Corporate Drawing Numbering System and is used for filing purposes.
- Refer to Minimum Standards for Drawings for Consultants in Appendix.
- Refer to MH Drawing Number Systems standards in Appendix.

5.3. Presentation of Technical Specifications

Technical specifications sections are to be provided by the Consultant following a similar format. Sheet specs may be used for small projects where appropriate and discussed with Manitoba Hydro based on project size and complexity. Where sheet specs are provided on the drawings, also provide specifications in Word format. Technical specifications shall be performance-based whenever feasible.

MB Hydro template for Construction General Conditions is provided in Appendix.

6. Design Guidelines and Technical Specifications

This section is intended to provide specific requirements related to Manitoba Hydro's facility portfolio. Industry norms and standards should be followed throughout and are not necessarily highlighted in the requirements below.

6.1. Division 00 and 01 – Procurement & Contracting Requirements, General Requirements

Manitoba Hydro's Supply Chain Management department provides Division 0 ("General Conditions") and Division 1 ("General Requirements") specifications for all projects. Supplements to the Division 1 specifications may be required and should be completed based on Master Format, published by CSI and CSC. Typical specification content not addressed by Manitoba Hydro's standard documentation, includes the following sections:

- 00 31 00 – Available Project Information:
  - Include site information that influences the work including but not limited to geotechnical investigation, environmental site analysis, hazardous material survey, topographical survey. These documents do not form contractual requirements, but are provided to aid the bidder in understanding influential factors.
- 01 14 00 – Work Restrictions:
  - Include information about how the contractor is permitted to use the site including things like site access, building access, partial owner occupancy etc.
  - This supplements General Requirements (Construction) Part 8 – Contractor's Personnel, Article 37 – Hours and Days of Work.
- 01 25 00 – Substitution Procedures:
  - Define administrative procedures for requesting the Purchaser's approval of the "equal article" including when a substitution is permitted, how to request a substitution, contractor's responsibilities, and consultant's response.
  - This supplements General Requirements (Construction) Part 10 – Standards, Quality Control and Reporting, paragraph 72.1.
- 01 26 13 – RFI Procedures:
  - Define administrative procedures for situations when the contractor requires additional information: what is an RFI and what is not, how to submit an RFI, Contractor's responsibilities, Consultant's response.
  - This supplements General Requirements (Construction) Part 1 – Scope of the Work, paragraph 3.3.
- 01 31 19 – Project Meetings:

- Define administrative requirements for meetings: types of meetings (project start-up, pre-installation, progress, warranty) schedule, attendees, mandatory agenda, responsibilities (chairing, recording and distributing minutes)
- This supplements General Requirements (Construction), which includes limited information on meeting requirements (See Part 3 - Purchaser's Schedule, Article 8 Meetings).

o 01 32 00 - Construction Progress Documentation:

- Define administrative requirements for documenting progress including either a GANNT or CPM baseline schedule; regular updates to the baseline schedule; submittals schedule; and progress photographs.
- This supplements Construction General Conditions which includes requirements for progress statements and payments (GC31 and GC32).

o 01 33 00 - Submittal Procedures:

- Define administrative requirements for submittals including product data, shop drawings, samples, reports, certificates, manufacturer's instructions, processing time, format, lines of communication, and purpose of the consultant's review.

o 01 35 21 - Sustainability Requirements:

- Define sustainability requirements for projects with sustainability goals.

o 01 35 46 Indoor Air Quality Management

- Define requirements for maintaining indoor air quality during construction, project phasing, changing of filters, building flush-out prior to occupancy, and indoor air quality testing prior to occupancy.

o 01 41 00 - Quality Control:

- Define administrative requirements for controlling quality including procedures to control, measure and report quality such as mock-ups, tests, and responsibilities. As with other Division 01 Sections the requirements here are general and rely on the technical sections for particular application to the work.
- This supplements General Requirements (Construction) Part 10 - Standards, Quality Control and Reporting.

o 01 51 00 - Temporary Utilities:

- Define administrative requirements for temporary power, light, and heating.
- This supplements General Requirements (Construction) Part 9 - On Site Work, articles 65, 66, and 70; and coordinates with Construction General Conditions GC25.

o 01 56 00 - Temporary Barriers and Enclosures:

- Define requirements for protection of the work including site fences, dust barriers, weather barriers, etc.

o 01 57 00 - Temporary Controls:

- Define requirements for temporary environmental controls including management of dust, water, erosion, and plant life protection.
- This supplements General Requirements (Construction)) Part 9 - On Site Work, paragraph 40.1.

- 01 71 00 - Examination and Preparation:
  - Define requirements for surveying, and verification of existing conditions for work that is dependent on the work of other sections or other contracts.
- 01 73 00 - Execution:
  - Define requirements for fastening, concealment of services, compliance with manufacturer's instructions, and various other common requirements for carrying out the work.
- 01 73 29 - Cutting and Patching:
  - Define cutting and patching requirements for work in existing facilities, and new construction. Include structural, operational, and visual requirements
- 01 74 00 - Cleaning and Waste Management:
  - Define requirements for progress and final cleaning; waste management (disposal, recycling, reuse, salvage); and waste related sustainability requirements.
- 01 77 00 - Closeout Procedures:
  - Consultants may have preferred methodology for closeout activities. These could be defined in this section with careful attention to the Construction General Conditions.
  - This supplements Construction General Conditions which includes requirements for completion of the work (GC38).
- 01 78 00 - Closeout Submittals:
  - Define requirements for operation and maintenance manuals, spare parts, and as-builts.
- 01 79 00 - Demonstration and Training:
  - Define requirements for training Manitoba Hydro personnel for operation and maintenance of specialized products and equipment.

6.2. Division 02 – Existing Conditions

6.2.1. Geotechnical Investigations

FUNCTIONAL STATEMENT

Manitoba Hydro strives to develop a catalog of geotechnical reports for all properties in the portfolio in order to provide the best available information to the consultant to reduce the risk of subsurface condition uncertainty.

SPECIFIC REQUIREMENTS

When required, Manitoba Hydro will provide for a geotechnical investigation report indicating the following:

- *Subsurface soil and groundwater conditions;*
- *Recommendations for excavations, dewatering and foundation design for the building and associated site development;*
- *Recommendations for backfill materials and compaction; and*
- *Recommendations for pavements, parking and traffic areas.*

Geotechnical studies shall be in accordance with Code and Permit requirements (e.g. Limit States design) and the Consultants design requirements. The study/design should address sulfate action on concrete.

The geotechnical report is provided for information only, and no guarantee of subsurface conditions is made, other than those documented at exact borehole investigation locations. Any Contractor engaged by Manitoba Hydro to make improvements or install new construction on the site is required to make him or herself familiar with all existing conditions and with the findings of the geotechnical report.

Water ground level information may change over time and old data may not be relevant.

- MH has Geotech resources and previous studies that can be consulted with in the early stages of a project.
- Copies of any new Geotechnical Studies shall be forwarded to MH's Geotechnical group for corporate filing.

Environmental Site Assessments (ESAs) are done by Manitoba Hydro on a case-by-case basis prior to the project.

6.2.2. Selective Demolition

FUNCTIONAL STATEMENT

Demolition shall be carried out in a way that is least disruptive to ongoing operations and the health and safety of MB Hydro staff, the public, and construction team. Demolition shall consider opportunities for material salvage and reuse, landfill diversion, and protection of adjacent sites and infrastructure.

SPECIFIC REQUIREMENTS

- Review project-specific construction and demolition waste management goals with Manitoba Hydro and incorporate waste management guidelines and diversion requirements into the specifications
- Protect waterways and storm sewers from sedimentation caused by construction activities.
- Require that the contractor control construction related dust and dirt from being transported off the construction site.
- Protect existing topsoil and require that the contractor implement measures to avoid soil erosion during construction before vegetation is established.
- When a project involves construction in an occupied or partially occupied building, require that the contractor segregate work areas from occupied areas to prevent contamination of indoor air quality in occupied areas, Including segregation of ventilation systems.
- Require that the contractor implement a plan to protect the indoor air quality inside the space, including protection of absorptive materials stored on site from potential moisture damage, sealing or protection of permanent air handling equipment operating during construction activities with MERV8 filtration, including all return and transfer grilles. Require that new filters are installed immediately prior to occupancy.
- Require that the contractor prohibit smoking inside the construction site and within 7.5m of building entrances, openings, and air intakes.

6.3. Division 03 – Concrete

FUNCTIONAL STATEMENT

Ensure concrete materials and construction methods conform to the guidance provided by the Cement Association of Canada (CAC). Concrete materials shall be consistent with overall project goals for durability, safety, occupant comfort, sustainability, and minimization of greenhouse gas emissions.

SPECIFIC REQUIREMENTS

- The Contractor will appoint and pay for a CSA certified inspection agency to review concrete mix designs and perform concrete testing in accordance with latest CAN/CSA and other relevant industry standards.

- The architect shall prepare concrete topping specifications to ensure compatibility with floor finish materials, including specification of moisture content requirements.
- Concrete hardener should be used in areas where flex-track vehicles will be parked. Acceptable product is Sika Emericrete SH.
- Repairs to defective concrete must be done as soon as possible after the removal of formwork and after the consultant has established a material and methods schedule for concrete repair.
- The consultant shall reserve the right to reject concrete installations with defects comprising over 1% of the area of the concrete or if defects are in close proximity. Defective concrete must be removed with replacement concrete to be installed at no additional cost to the project.
- Floors that are be left exposed, or that receive carpeting, resilient flooring, or sheet membrane waterproofing, shall be finished flat and free from defects that would telegraph through finish materials.
- Provide control joints at required locations to control cracking.
- Require that the contractor avoid air bubbles which lead to spalling after power trolling.
- Concrete sidewalks and paving should meet municipal engineering standards.
- Provide a 1220 mm wide concrete apron outside the building at all overhead doors.
- Provide 1220 mm tall concrete bollards at both the inside an outside of all overhead doors

6.4. Division 04 - Masonry

FUNCTIONAL STATEMENT

Meet all industry standards for brick veneer, concrete block, all connectors, metal flashings and thru-wall membrane flashings, and mortar mixes. In general, the recommendations of the Masonry Advisory Council and International Masonry Institute provide guidance for the design and construction of masonry work.

SPECIFIC REQUIREMENTS

- A pre-construction meeting is required with the masonry contractor and the consultant to review specifications, submittals, and construction issues.
- A site mock-up of masonry construction shall be made for review by Consultant before construction begins.
- Concrete unit paving is not preferred owning to differential settlement problems.
  Ensure masonry assemblies are detailed to the technical standards of CCMPA.

6.5. Division 05 - Metals

FUNCTIONAL STATEMENT

Provide an efficient load-bearing building structure including columns, beams, open-web joists and floor deck. American Institute of Steel Construction (AISC) is the primary reference for metal framed construction. Miscellaneous metal fabrications shall be designed and engineered to anticipated loads and have durable finishes.

SPECIFIC REQUIREMENTS

COLD-FORMED METAL FRAMING

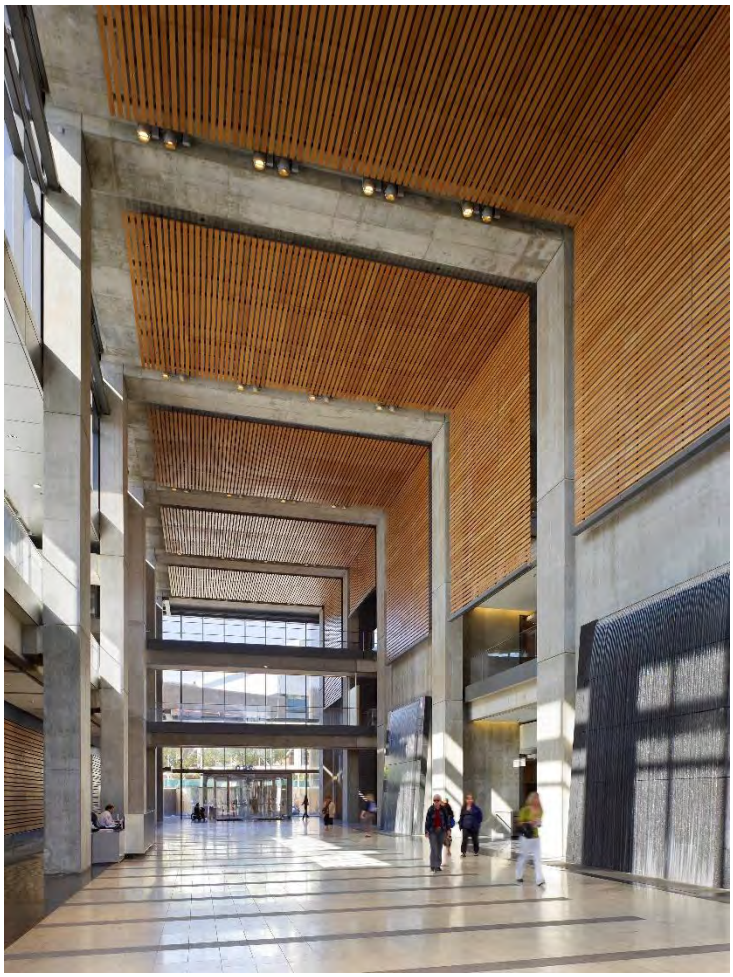
- Provide complete wind load-bearing steel stud system with accessories, to design loads specified on the structural drawings. Install insulation and vapour barrier in areas that will become inaccessible as construction progresses and protect these installations from the weather as required.

MISCELLANEOUS METALS

- The Contractor shall retain a structural engineer registered in the Province of Manitoba to prepare signed and sealed shop drawings for guardrails, handrails and other miscellaneous metal fabrications.
- Finish for miscellaneous aluminum or steel metals shall be powder-coat paint.
- Anchoring systems to be typically vertically mounted base plates with neoprene gaskets. Miscellaneous metals shall have a powder coat paint finish.
- Take precautions against galvanic reactions. Provide appropriate coatings to separate dissimilar metals.
- Powder-coated components must be mechanically fastened.

6.6. Division 06 – Wood, Plastics and Composites

6.6.1. Rough Carpentry



FUNCTIONAL STATEMENT

Workmanship shall conform to the industry's best practices. Composite wood products shall be chosen which are low emitting and avoid toxic additives.

SPECIFIC REQUIREMENTS

Provide lumber grades and products as shown on the structural drawings. Specify wood materials and adhesives which are ultra low emitting formaldehyde (ULEF). Avoid pressure-treated products containing arsenic. Minimum standards for Rough Carpentry Products include the following:

INTERIOR FLOOR SHEATHING

- Use T&G D.Fir or Spruce plywood, glue and screw.

FLOOR UNDERLAYMENT

- Ply, 9mm (11/32") thick spruce plywood with the finish face double-sanded and the back face lightly sanded. Prior to installation, confirm that the finish product will be acceptable to the resilient flooring manufacturer.

EXTERIOR DECK SHEATHING

- Sheathing grade, D.Fir T&G plywood. If PVC deck waterproofing is to be installed, use select tight face plywood.

EXTERIOR FASCIAS AND TRIMS

- No.2, S-P-F textured (combed) finish, pre-primed, not less than 51mm (2") nominal thickness for new builds. For heritage buildings, typically nominal 51mm (2") thick D.Fir select pre-primed S4S material is required.

EXTERIOR HEAVY TIMBER CONSTRUCTION, LANDSCAPING

- No.2, S-P-F pressure-treated material.

WIRE MESH (FENCING OR STORAGE LOCKERS)

- 76x76mm (3"x3") x 10 gauge welded wire mesh, galvanized.

SILL GASKETS

- Close cell polyethylene foam.

CAVITY FURRING

- Cedar or pressure-treated Hem-Fir.

GRAB-BAR AND RAILING BLOCKING

- 38x235mm (2x10) typical. See Building Code and Accessibility Standards for locations of grab bars. Provide blocking or backing for all fixtures and fittings, in addition to that for grab bars and railings.

MILLWORK AND SPECIALTIES BLOCKING

- Provide 19 mm thick plywood blocking panels secured to partition framing for all Architectural Woodwork base and upper cabinet and full height cabinet locations, and for Division 10 Specialties inclusive of but not limited to markerboards, tackboards, and roller shades.

WOOD PRESERVATIVES

- ACQ preservative typical for all exterior wood locations in contact with concrete, masonry, or where moisture may occur, at roof upstands in flat roofs, planters, heavy timber construction, fence posts and cavity furring.
- Treat all field cut surfaces of pressure-treated wood with two brush coats of ACQ preservative.

COMPOSITE WOOD DECKING

- Composite decking is MB Hydro standard for exterior decking. Consider slip resistance of material.

6.6.2. Architectural Woodwork

FUNCTIONAL STATEMENT

Workmanship shall conform to the North American Architectural Woodwork Standards. Finish carpentry and exposed wood structure shall be detailed and finished to provide for long-term durability and resilience, as well as add to the aesthetic appeal of the building. Resilient and wipeable, easily cleanable finish surfaces are required for architectural millwork. Select materials and adhesives which have ultra-low emitting formaldehyde (ULEF).

SPECIFIC REQUIREMENTS

CASEWORK

Custom grade, flush overlay construction, typical:

- High Pressure Decorative Laminate (HPDL) Cabinets – all exposed parts HPDL with matching 3 mm thickness colour-through PVC or Non-PVC edge banding on Medium Density Fibreboard (MDF) or plywood; all semi-concealed parts of Low Pressure Decorative Laminate (LPDL), also known as Thermally Fused Melamine (TFM), with matching 1 mm thickness colour-through PVC or Non-PVC edge banding.
- Interior seams at low level should include silicone at joints to prevent water damage as a result of spills.

WOOD PANELLING

- Wood Veneer cabinets for Transparent Finish–Grade A face veneer, inclusive of adjustable shelving, shall be of veneer plywood core with 6 mm thickness matching solid wood edge banding.

COUNTERTOPS

- Composite acrylic polymer type non-porous homogeneous countertops, with built-up front and exposed end edges, and an integral monolithic splash with self-cove transition at joint for all wet areas (e.g. “Corian”)
- HPDL on 19mm plywood substrate is acceptable for dry surface countertops.

CABINET HARDWARE

- D-pulls, contemporary style, surface mounted, stainless steel with satin finish.
- Hinges; fully concealed, nickel plated steel, self closing, 107 degree door opening, Blum or equivalent; , to meet 80,000 cycles with 9 lbf proof load using the Life Cycle Test, in accordance with the ANSI/BHMA A156.9 Cabinet Hardware, for Grade 1 hinges.
- Drawer slides; box drawers - minimum 40 kg dynamic load rating, under mount, full extension, soft close, synchronized with rack and pinion, fully adjustable, four-way adjustments, length to suit maximum cabinet depth. Large box drawers larger than 200 mm height and 400 mm width, similar, except with 70 kg dynamic load rating. Manufacturer Blum or approved equivalent.
- Shelf supports, predrilled type, nickel finish steel

CLOSETS

- One 25 mm x 305 mm x closet width fixed shelf of HDPL finish on MDF substrate, and one 33 mm diameter heavy duty chrome hanging rod complete with end and intermediate support brackets

WINDOW SILLS

- Hardwood or composite acrylic polymer type non-porous homogeneous material with all exposed edges eased, and all joints to adjacent materials caulked.

6.7. Division 07 – Thermal and Moisture Protection

6.7.1. Building Envelope

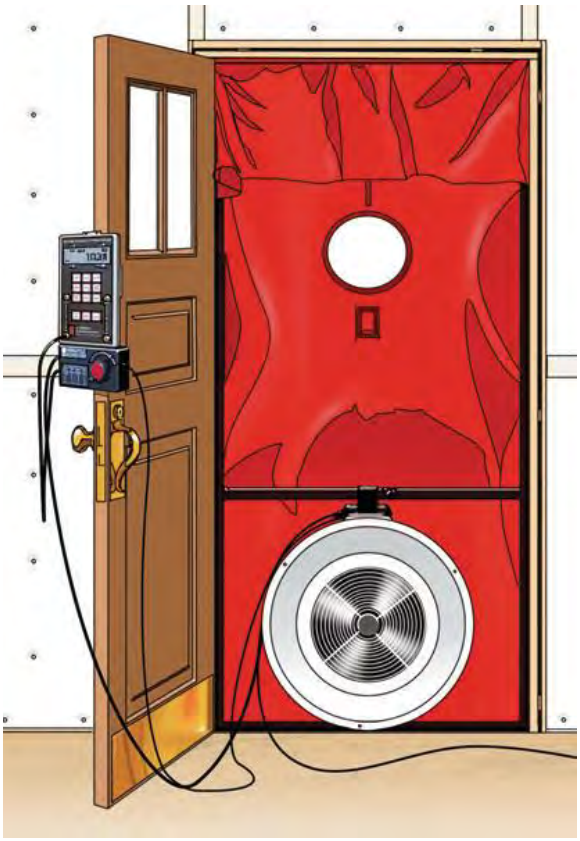
FUNCTIONAL STATEMENT

Ensure building envelope detailing sheds the weather in an appropriate manner, meets energy utilization performance standards for thermal performance and air-tightness, and is durable and maintainable.

SPECIFIC REQUIREMENTS

- The building envelope shall be designed and constructed with a continuous air barrier system comprised of air barrier assemblies to control air leakage into and out of the conditioned space.
- All materials and components of the air barrier system shall have an air permeability less than 0.02L/s/m^2 at 75Pa.
- Air leakage rates for fenestrations and doors shall meet or exceed prescribed air leakage rates identified in the National Energy Code for Buildings.
- Components of the air barrier must be durable and must resist forces created by wind, stack effect, and thermal expansion and contraction. Ensure all components of the air barrier system are compatible.
- Favour exterior air barrier system approaches to interior air barrier systems.
- Consultant to provide design details which clearly identify and maintain continuity of insulation and AVB. Review contractor's shop drawings for continuity of insulation and AVB. Proper detailing of interface conditions, penetrations, and transitions is critical for achieving an air-tight building.
- Consider construction sequencing when developing air barrier details. Consider potential for damage to the air barrier during the course of construction.
- For tall buildings, consider interior compartmentalization by sealing interior shafts, elevator shafts and stairwells to limit unwanted stack effect.
- Air tightness is an important consideration for energy efficient buildings. Plan for careful detailing and whole building air tightness testing for new construction and envelope retrofits of projects which are not primarily used for vehicle storage and do not include a large number of overhead doors.
    - Whole building air tightness testing shall be performed as soon as the air barrier is complete and mechanical system is installed to allow for the maximum opportunity to correct deficiencies. Achieve whole building air tightness of 2.0 L/s/m^2 @ 75Pa in accordance with ASTM E779 or ASTM E1827.

- Specify requirements for air barrier mock-ups and performance testing to allow evaluation of constructability and coordination issues on a small scale. Testing shall be carried out on typical details as well as details which are complex in accordance with ASTM E1186 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.



- A Commissioning Agent specializing in building envelope will be engaged by Manitoba Hydro for large or complex building envelope projects (new construction, major renovation, and envelope renewal). Commissioning scope for the building envelope will be determined on a case-by-case basis, but generally will include:
  - Concept Design: determine envelope life expectancies, set air/water/thermal envelope strategies, review Basis of Design documentation.
  - Design Development: review drawings, details and specifications.
  - Pre-Construction: determine protocol for mock-ups and testing, if required.
  - Construction: periodic field reviews, randomized building envelope testing (air leakage testing, wind-driven rain testing, etc)
  - Occupancy: contribute to Owner's Manual for related topics.

6.7.2. Dampproofing and Waterproofing

FUNCTIONAL STATEMENT

The purpose of dampproofing is to minimize the passage of water through a material, generally through soil. Waterproofing is intended to keep out both water vapour (moisture) and liquid water. The management of water in vapour or liquid form is a priority in building durable, sustainable buildings.

SPECIFIC REQUIREMENTS

All dampproofing and waterproofing products and detailing to be reviewed by the Building Envelope Commissioning Agent, who will also review installations of same in the field, including (but not limited to):

- Waterproofing materials for suspended parkade slabs and decks over habitable spaces.
- Waterproofing for balconies over non-habitable spaces.
- Dampproofing, composite drainage mats and protection board.

6.7.3. Insulation

FUNCTIONAL STATEMENT

Appropriate thermal insulation within major building envelope systems (floor slabs, wall system and roofing system) is a critical component to ensure energy-efficient operations, occupant comfort and advancing GHG emission reductions. The use of acoustic insulation will improve the workplace environment.

SPECIFIC REQUIREMENTS

- Identify effective R-value of typical assemblies on the Building Assemblies legend.
- Provide a calculation of the overall thermal transmittance of assemblies, including the impact of interfaces between various building envelope materials, in accordance with the National Energy Code for Buildings 2017 (3.1.1.7).
- For existing buildings, ensure that insulation upgrades are not deleterious to the integrity of the existing building assemblies in the long term. Modify and relax energy utilization upgrades as required in order not to negatively impact the longevity of the existing building structure or exterior or interior finishes.
- Acoustic insulation to be included in wall and floor assemblies in order to meet code-required STC ratings. Meet or exceed the following minimum STC ratings acceptable for partitions in each space type:
    - Enclosed offices: STC 45
    - Enclosed rooms requiring enhanced speech privacy: STC 52
    - Meeting rooms, training rooms, and rooms with similar functions: STC 52
    - Support spaces (e.g. copier rooms, storage rooms, and rooms with similar functions): STC 35
- A sound masking system shall be provided for MB Hydro workplaces with a contiguous office area exceeding 71 m^2 (2500 ft^2). The system shall be engineered to provide ambient sound levels that supports speech privacy and mitigates sound transfer within open work areas, and between enclosed and open spaces. It shall be zoned to suit the room functions and occupancy of the spaces.

6.7.4. Exterior Finishes

FUNCTIONAL STATEMENT

The exterior building envelope must be durable and must be designed in accordance with the "rainscreen" principle. Face-sealed envelope systems should not be used.

SPECIFIC REQUIREMENTS

- Wood signage and shingles are not desired
- The envelope shall meet or exceed the requirements established in the CSA S478: "Guideline on Durability in Buildings". Design and technical requirements include the following:
    - Walls must have a minimum 50-year full-service life and at least 30 years of service life prior to a major rehabilitation;
    - Windows must have a minimum 25-year full-service life and at least 15 years of service life prior to a major rehabilitation of gasket and seal replacements;
    - Roofs must have a minimum 20-year full-service life;
- The exterior wall design must provide complete control of the migration of heat, air and moisture through the building enclosure. Minimizing risk of moisture-related failures must be prioritized in the design of exterior walls;
- The cladding must have the means to evacuate moisture from the wall assembly and must comply with the American Society of Heating, Refrigerating and Air-Conditioning Engineers ASHRAE 160: "Criteria for Moisture-Control Design Analysis in Buildings";
- The percentage of vision glazing and energy performance characteristics of exterior glazing materials shall consider passive solar design best practices;
- Metal and glass cladding systems must meet the requirements of the American Architectural Manufacturers Association and CSA Group's AAMA/CSA 101-A440 "North American Fenestration Standard for Windows, Doors, and Skylights" in terms of maximum air leakage, as well as meet the performance class AW40;
- Opaque wall assemblies must be a pressure-equalized rainscreen design and must eliminate thermal bridging;
- Window wall assemblies are not to be permitted for multi-storey buildings,
- Select exterior finishes that will provide long-term building resilience.
- Select exterior building finishes and provide appropriate detailing to achieve long term durability, and functional and aesthetic design quality .
- Consider neighbourhood context and overall community character when selecting exterior finishes.

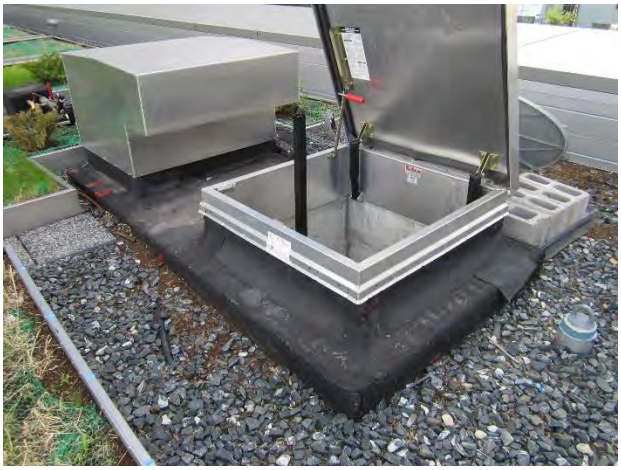
6.7.5. Roofing, including Roof Hatch

FUNCTIONAL STATEMENT

Roofing systems require assemblies that are highly resistive to physical damage including impact and water-entrapment resistance. All material and workmanship standards must conform to the guarantee standards of the Roofing Contractors Association of Manitoba (RCAM).

SPECIFIC REQUIREMENTS

- Roofing design, including metal flashing and trim, must follow the recommendations of the Canadian Roofing Contractors' Association (CRCA) and RCAM;
- Roof membranes are to be 2-ply, fully adhered membranes, and loose-laid.
- Single-ply roof membranes are not to be used;
- All inverted roof assemblies including green roofs must incorporate suitable wiring systems to facilitate the use of the electric field vector mapping (EFVM) non-destructive testing method to test for leaks in the waterproof membrane;
- Roofing is to be sloped to drains and to avoid ponding on the surface of a membrane;
- The exterior surface of parapet walls and penthouses must be consistent and integrated with the envelope assembly materials;
- Roof insulation must be installed in a minimum of two layers to maximize thermal breaks;
- There must be continuity of the roof waterproof membrane and the wall air barrier;
- Noise-emitting roof-mounted equipment must be housed in penthouses or screened by walls;
- Roof-mounted equipment must be set back from the roof edge to minimize visibility and allow access for maintenance and repairs;
- Critical roof-mounted equipment must be installed to permit roof system replacement or maintenance without disruption of equipment performance;
- Pitch pocket details are not acceptable
- No building element may be supported by the roofing system except walkways;
- Exposed waterproof membranes on roofing assemblies must be protected by walkways along routes to and around rooftop equipment and all public/building user activity;
- Roof-mounted devices, such as antennae, lightning rods, flagpoles, and roof anchors, must be integrated into the building structure and roof design;



- All podiums and rooftop areas providing access to building occupants and the public must have protected waterproof membranes and insulation, as well as structural assemblies that will withstand the structural loading of planned activities and parapet heights that will address occupancy requirements.
- Provide roof hatches with high performance insulation values.
- Typical warranty expectation for roofing systems is minimum 10 years.
- Where applicable, roof assembly form from Efficiency Manitoba should be used to quantify incentive opportunities.

Acceptable Products - dependent on design objectives and building resilience goals:

- Low slope membrane roofing
- Sheet metal roofing

6.7.6. Fire Stopping and Smoke Seals

FUNCTIONAL STATEMENT

Provide firestopping materials at assemblies with fire-resistance ratings at joints and openings where movement is anticipated and accommodated and where other building components penetrate rated assemblies. Smoke seals should be specified at door locations where a barrier to limit the transfer of smoke.

SPECIFIC REQUIREMENTS

- Furnish and install all required fire-stopping and smoke seals within fire resistive wall and floor assemblies.
- All fire-stopping and smoke seals shall be listed by Underwriters' Laboratories of Canada [ULC], and shall form a draft-tight barrier to retard the passage of smoke, flame and hose stream, as noted in the appropriate ULC classification. Underwriters Laboratories of Canada (ULC) is an independent product safety testing, certification and inspection organization that is accredited by the Standards Council of Canada (SCC), and which supports governmental product safety initiatives.
- Mechanical and electrical penetrations through rated floor, roof and wall assemblies are to be fully coordinated with the Mechanical and Electrical Divisions, and all penetrations will be fire-stopped with the appropriate ULC-listed fire-stopping system, to the satisfaction of the consultant and the authority having jurisdiction.
- Strict sequencing protocols for the installation of fire-stopping should be followed:
  - No installation is to proceed unless review and return of fire-stopping shop drawings has been completed.
  - Fire-stopping to floor and roof slab penetrations must precede drywall track installation.
  - Fire-stopping must precede fireproofing installations.
  - Fire-stopping at slab edge detail to exterior wall panels and at window panels must be done with all panel installations.
  - Fire-stopping must precede mechanical pipe insulation (ensure air and vapour barriers are continuous also).

6.7.7. Joint Sealants

FUNCTIONAL STATEMENT

Joint sealants are used to seal joints and openings between two or more substrates and are a critical component for building design and construction. The main purpose of sealants is to prevent air, water and other environmental elements from entering or exiting a structure while permitting limited movement of the substrates.

SPECIFIC REQUIREMENTS

- Install as required by the MB Building Code, the Building Envelope Sections of these Guidelines, or as directed by the Building Envelope Consultant.
- Colour of the joint sealant to be selected by the consultant, from the manufacturer's complete range of available colours.
- Install acoustic sealant in sound-rated gypsum wallboard assemblies. Seal all lapped and end joints in polyethylene vapour barriers.
- Pay strict attention to workmanship aspects of sealant installations:
    - Establish correct depth to width relationships for installation of backer materials and sealants. Control the depth of the joint to the sealant manufacturer's recommended thickness.
    - Sealant shall be applied in continuous beads, without open joints, voids, air pockets or embedded impurities.
    - Finished caulking shall be smooth, free from ridges, wrinkles, sags and air pockets, and have a slightly concave shape.
    - Excess caulking shall be promptly removed as work progresses, to avoid damage adjacent finished surfaces.

6.8. Division 08 – Openings

6.8.1. Doors and Frames

FUNCTIONAL STATEMENT

Entrance doors shall be manufactured of heavy-duty materials that can withstand continuous high traffic. The exterior side of one leaf of a double door entrance shall have a lock guard or astragal to limit tampering or break-ins. Exterior doors used for egress only should not have any operable exterior door hardware.

Interior doors shall meet durability and functional program requirements as well as those published by the Steel Door Institute (SDI), Window and Door Manufacturers Association (WDMA) and Door and Hardware Institute (DHI).

SPECIFIC REQUIREMENTS

Install doors as required by the Building Code. To maximize building resilience and service longevity, select doors and hardware to suit function and location.

STEEL DOORS AND FRAMES

- Doors and frames to exit stairs, service rooms and suite entrance frames from public corridors must conform to the Canadian Steel Door and Frame Manufacturer's Association's Specifications.
- Fire-rated doors shall be fabricated in accordance with underwriter's requirements, labeled as required.
- For corridor fire doors, provide smoke seal and maximum area of fire protective glass. Avoid use of wired glass even where permitted by code.
- Doors in elevator vestibules and stairs at parking garages should provide maximum glazing allowed by code.
- For exterior doors provide flush panel design with polyurethane core insulation, extruded aluminum low profile (accessible) sills with width to match frame depth, and mechanically fastened, extruded aluminum weatherstripping with neoprene inserts, and an adjustable sweep at the sill.
- Thermally broken exterior door frames to be specified

EXTERIOR ALUMINUM ENTRANCES AND STOREFRONT DOORS AND CURTAIN WALL

- Sealed glazing thermal aluminum fabrications meeting all best practices for quality assurance.

- Main building entries shall be equipped with automatic door openers with operating devices located in accessible locations. Automatic, power-operated doors should be provided and serviced by local installers.

- Glazing performance characteristics shall be fully described directly on the drawings, including center of glass u-value, solar heat gain coefficient, and visible light transmittance. Frame ratio and properties shall be included where relevant.
- Curtain walls must be a pressure-equalized rainscreen design;
- Curtain walls and windows must use high thermal performance, thermally broken, metal frames with high-performance glazing units:
- Specify that a thermal analysis of the window systems must be provided by the supplier based on the National Fenestration Rating Council's NFRC 500: "Procedure for Determining Fenestration Product Condensation Resistance Values".

OVERHEAD DOORS AND GATES

- Electrically operated overhead metal doors and gates with heavy-duty hardware and high security and safety features.
- Provide sectional overhead insulated doors with a minimum nominal thermal performance of R-13 for conditioned space.
- Detail overhead door frames to reduce air leakage
- Specify heavy-duty weather stripping at the perimeter of the door, and high-quality gaskets between door panels.
- Glazed openings, when required, should support natural daylighting but avoid allowing a view in to garage for security.
- Garage openers to be provided without remote controllers.

INTERIOR WOOD DOORS AND FRAMES

Wood doors shall conform to the North American Architectural Woodwork Standards 3.1 or latest edition, commercial grade.

- Wood doors with clear finish should be solid core, with solid wood frames for matching clear finish.
- Painted wood doors should be solid core, and typically have flush tempered hardboard faces, pre-primed.
- Frames shall be finger jointed PSF frames, pre-primed for paint.
- Avoid bi-fold and sliding bypass doors

OPERABLE PARTITION SYSTEMS, SECURITY GRILLES AND ACOUSTIC FOLDING DOORS

- For all door clearances and structural supports, ensure doors operate freely and are resilient in operation for the long term.
- Acoustic Folding [Accordion] doors will have a minimum STC rating of 39 for Ready-Rooms and minimum STC of 52 for Classrooms and Meeting Rooms.
- Operable partitions with acoustic seals may be specified, where feasible. Operable partitions shall be finished in fabric with a minimum STC rating of 52. Integrated whiteboards may be included.

6.8.2. Windows

FUNCTIONAL STATEMENT

High-performance windows shall be carefully designed to maximize daylighting and views while optimizing the thermal balance of the building. Window placement and performance should be integrated into the holistic energy concept for the overall building.

SPECIFIC REQUIREMENTS

In specifying windows and the ratings for air and water tightness and wind load resistance, the Consultant will refer to energy utilization requirements, solar heat gain, as well as conforming to CSA A440S-1 Canadian Supplement to the North American Fenestration Standard specification for windows, doors, and skylights and CSA A440-17.

Confirm all requirements with the energy modeling and building envelope consultants.

- Operable windows shall meet or exceed the requirements for sash strength stiffness, and ease of operation noted in CAN/CSA A440. Opening windows should be equipped with glass fibre mesh screens in an aluminum frame.
- Windows should be EnergyStar, or equivalent and rated for the local MB climate zone.
- Detail window installations to maintain the continuity of the air barrier at rough openings, as well as at junctions with other structural assemblies or at entrances and storefronts.
- Correctly locate and install flashings, deflectors and weep holes to ensure proper drainage of moisture to the building exterior.
- Provide flashing with end dams over window heads and sill flashing with end dams at windowsills.
- All installations to be field tested to confirm compliance with CSA A440-17 required ratings.

VINYL WINDOW ASSEMBLIES

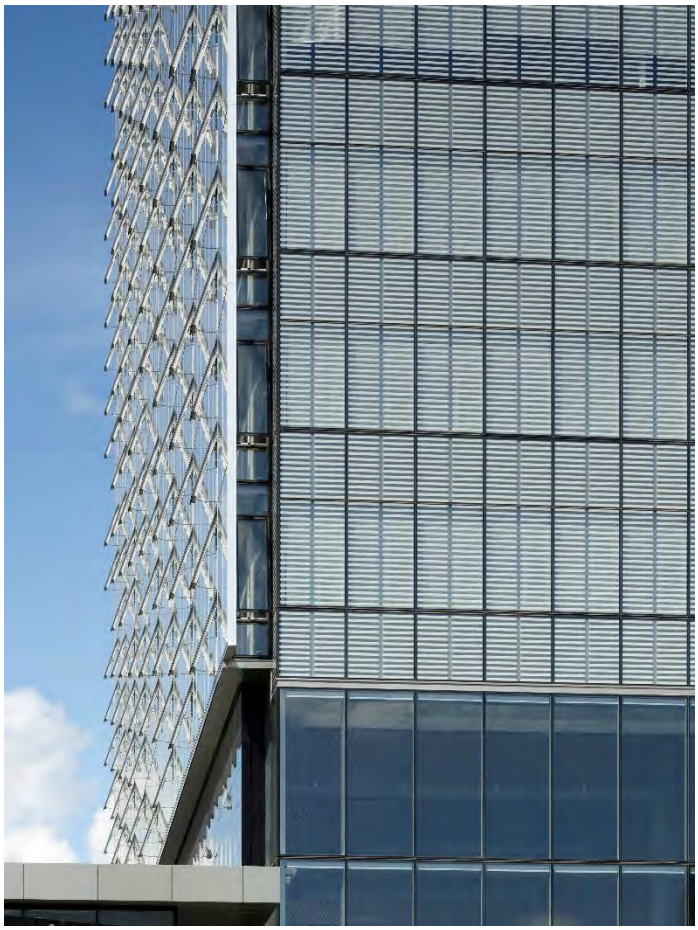
- Awning or casement windows only; sliders are not acceptable.
- Supplier shall provide a certification for required performance levels for U-factor, SHGC and air leakage.
- All PVC frames shall be continuous multi-chambered tubular vinyl extrusions with internal steel reinforcement.

METAL WINDOWS AND CURTAIN WALL

- Typically, vinyl frames are preferred over metal for energy utilization reasons.
- Supplier shall provide a certification for required performance levels for U-factor, SHGC and air leakage.

GLASS AND GLAZING

- Provide clear documentation of the required glazing properties, including center of glass u-value, system effective U-value, solar heat gain coefficient, and visible light transmittance, as well as contractor's responsibility for verifying system performance.
- Install heat strengthened and tempered glass where required for fire and life safety.
- Install sealed units in accordance with Insulating Glass Manufacturers of Canada guidelines and CAN/CGSB guidelines.
- Provide visual detection on all full height glazed walls and doors. MB Hydro standard is 50mm diameter dots spaced 150mm on centre placed 1350mm from finished floor using 3M pressure sensitive application in Dusted Crystal.



6.8.3. Finish Hardware, Architectural and Security

FUNCTIONAL STATEMENT

Finish hardware shall be heavy duty commercial quality, integrated with the building security and controls systems. Comply with MB Hydro requirements for product and system standards, and keying. Comply with applicable building codes for life safety and accessibility standards.

SPECIFIC REQUIREMENTS

ARCHITECTURAL HARDWARE

Provide a detailed finish hardware schedule showing each separate type of hardware item, including make, model, material, function, size, finish, or other pertinent information.

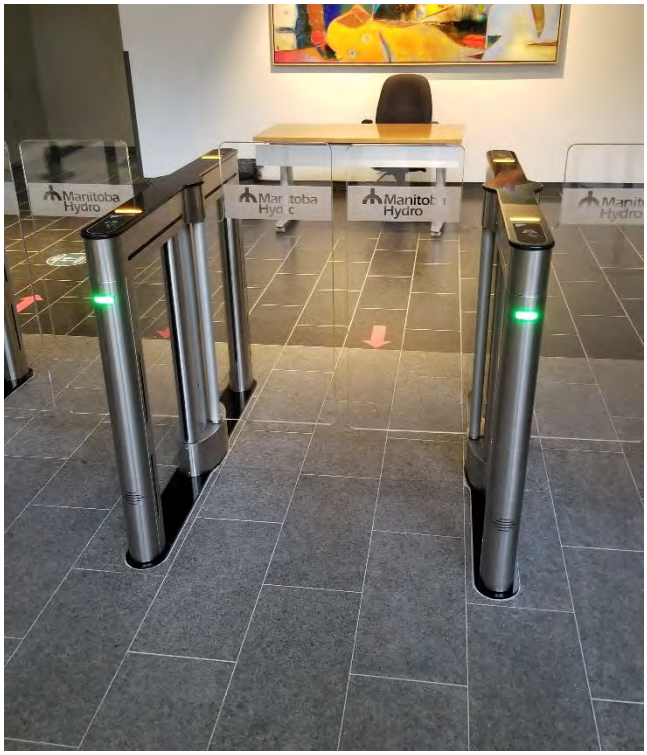
The Schedule should also include a door by door description of all hardware items to be supplied with each door specified for the project. This Schedule should also incorporate all security door hardware items specified in the Security specification.

- Typical door hardware products are available from Allegion Canada Inc.
  - Heavy duty institutional grade hardware, keyed to match existing doors.
  - Panic sets – Von Duprin 98E0 US26D 3'
  - Electric Strikes - Von Duprin 6211 Series
  - Exit Device: Von Duprin RX 33A/35A.
  - Door Closer on exterior doors: Heavy duty, high security; LCN 4510
  - Auto door operator actuator; 36" vertical bar style; hardwired; surface mounted where possible.
  - Passage and lock sets
    - Renovations: upgrade to current standard. If not feasible match existing building locksets.
    - New Construction: Schlage C Keyway lever lockset; ND10S RH0626 13
    - 048 Latch, 10 – 025 Strike 1 5/8" – 2 1/8" door; 2 $\frac{3}{4}$" backset
  - Door closers on interior doors; LCN Model 4041, or approved equivalent
  - Hinges; Allmar ABB6191; 4.5" x 4" 32D NRP stainless, or approved equivalent
  - Verify with the Project Manager if card reader access is required for any door
  - Keying by Manitoba Hydro

SECURITY SYSTEM AND HARDWARE

- Consult with Manitoba Hydro's Corporate Security department on the security requirements for the building, including door security items.
- The supply and installation of the security system equipment shall be by Manitoba Hydro.

- The Consultant shall design the power system required for electric strikes, card readers, cameras, door operators, etc. to be included in the construction contract.
- Extensive glazing at doorways into interior lobbies enhances wayfinding and building security. Install security hardware with ease of use and accessibility in mind.



6.9. Division 09 - Finishes

6.9.1. Interior Finishes

FUNCTIONAL STATEMENT

Finish materials shall be commercial quality, appropriate to room functions and activities, and selected for longevity, durability, and ease of maintenance. All smooth floor finishes shall meet or exceed their respective industry standards for safety and slip resistance. Installation of finish material shall conform to the respective industry's best practices.

SPECIFIC REQUIREMENTS

FLOORS

- Preparation: contractor shall ensure that site conditions meet the flooring product manufacturer's requirements for physical (floor flatness and levelness, defects, etc.) and environmental (temperature, humidity, ventilation, etc.) prior to proceeding with the work.
- Porcelain floor tile or an alternative approved high durability flooring shall be considered in entrance areas and other high traffic areas. Porcelain floor tile shall be large format, and full body porcelain with a minimum slip resistance rating, i.e. Dynamic Coefficient of Friction (DCOF) in accordance with ANSI 137.1-2017 (Tile Slip Coefficient Test, Section 9.6) of 0.42 for dry conditions or 0.6 for wet conditions. A darker grout color is preferred. Provide a porcelain tile wall base with a minimum height of 100mm (4"). Porcelain tile shall be installed in compliance with the (TTMAC) Tile Specification Manual, current edition.
- Resilient sheet flooring (vinyl or rubber composite) shall be used typically in general use and wet areas and installed as per the NFCA Specification Standards Manual, current edition. All resilient sheet flooring shall have welded seams.
- Standard applied resilient wall base, thermoplastic rubber, coved toe profile, shall be installed typically.
- Install self-cove wall base to a minimum of 100 mm (4") height in wet areas, in lieu of standard applied resilient wall base.
- Grease resistant rubber resilient sheet flooring shall be installed in areas where grease and oil exposure is a concern.
- Vinyl tile, and commercial grade luxury tile is acceptable for general use areas

- Electrical Labs and IT areas shall have electrostatic dissipative flooring.
- Exposed concrete floors must be sealed or finished with epoxy.
- Carpet tile shall be specified for all areas requiring carpeting. Refer to Manitoba Hydro Corporate Standards for acceptable carpet tile products.
- Floor finish accessories shall include but are not limited to transition strips, termination trims, treads, and nosings.
- Maintenance materials: furnish 1 full carton for every 50 cartons of flooring type, colour, and pattern installed.
- Entrance area flooring:
    - *Renovations of existing entrance vestibules without recessed foot grilles:* Interface Step Repeat Collection pattern SR699, 500 x 500 mm.
    - Vestibules in new construction: recessed foot grille, pans, frames, and assembly components of corrosion resistant stainless steel Type 304, for permanent recessed installation, c/w installation anchorages and accessories, capable of withstanding minimum 226 kg/wheel load applied to a solid 127 x 51 mm wide polyurethane wheel, 1000 passes without damage.

WALLS AND PARTITIONS

- Paint finish on gypsum board is the typical finish.
- Design partitions to meet acoustic, fire-rated assembly, and shaft-wall assembly requirements.
- Wall and partitions in Corridors and other heavy traffic areas with equipment or cart traffic shall be resistant to impact and abuse. Install wall protection panels.
- Provide 1220 mm high stainless steel corner guards in high traffic areas.
- All washrooms shall have water-resistant gypsum board on all partitions behind plumbing fixtures, including behind porcelain wall tile finish partitions.
- Cementitious panel board shall be installed on shower partitions.
- Additional wall protection shall be installed behind all urinals. Either 6mm white solid surface, porcelain tile, or PVC wall paneling is acceptable.
- All washroom walls shall extend to the underside of slab and be insulated for sound (STC 47 minimum).
- Provide concealed wall blocking behind all washroom accessories.
- Provide all required access panels. Coordinate with mechanical and electrical consultants and contractors to ensure access panels locations allow for all required maintenance operations.

- Where sound absorptive panels are fixed to partitions, coordinate to avoid conflict with service access requirements and controls.
- Demountable partition systems are preferred for all office areas, where possible.
- Meeting rooms or spaces that require additional privacy shall be constructed to provide a minimum sound rating of STC 52.
- In general, a 3" band of cement board or plywood is preferred along the bottom edge of interior walls, with drywall meeting above, in rural locations to prevent water damage.
- Consult with Manitoba Hydro's Corporate Security department to identify security-rated partitions required for specialty rooms.

CEILINGS

- Commercial quality suspended acoustic ceiling tile (ACT) with a minimum Noise Reduction Coefficient (NRC) rating of 0.70 are preferred in lieu of paint finish gypsum board ceilings.
- Consideration shall be given to the use of ACT with a high Ceiling Attenuation Class (CAC), of 35 or greater, for spaces such as, open office area and corridors to enclosed spaces requiring speech privacy.
- To enable access to services in ceiling plenums, ensure that all ceiling systems are designed for ease of removal and replacement without damage to the ceiling product.
- Provide washable ceiling tiles in kitchens and washrooms.
- Provide fire-rated gypsum wallboard assemblies as required above T-bar ceilings.
- Provide vertically mounted foil-backed acoustic baffling above demountable walls to underside of structure for all meeting rooms, quiet rooms and private offices.
- Provide vertically mounted foil-backed acoustic baffling in raised access floor plenums beneath demountable and framed partitions for all meeting rooms, quiet rooms and private offices.

PAINTING

- The painting work will include surface preparation of substrates as required for the acceptance of painting, including cleaning, small crack repair, patching, caulking, making good surfaces and areas of existing assemblies, priming and back-priming as required under MPI Manual preparation procedures.
- If defects in the substrate become apparent after the prime coat is applied, the contractor shall advise in writing identifying the additional preparation work required, and obtain Manitoba Hydro written acceptance prior to proceeding with the work.
- Use low VOC paints and sealants.

- Work shall comply with MPI standards for Exterior Painting Systems, Interior Painting Systems applicable to both renovations and new construction.
- Gloss levels:
    - G5 (semi-gloss finish) - partitions in Kitchen, Washrooms, and Janitor Rooms, all paint finish doors, door frames and interior trims, paint finish metal stair components, inclusive of handrails and guardrails, and on exposed structural steel, ductwork, conduits, and fasteners.
    - G3 (eggshell finish) - typical for gypsum board partitions
    - G2 (velvet finish)-typical of gypsum board ceilings and bulkheads
    - Lumber and wood materials for clear or stained finishes – G4 (satin finish)

- Refer to Manitoba Hydro Corporate Standards for specific paint brands and products.
- For acceptable colour palettes for MB Hydro buildings' exteriors and interiors, refer to the Corporate Colours Memorandum included in the Appendices section of this document.
- Colour-matched paint finishes from other paint manufacturers will not be accepted.
- All washrooms, shower rooms, and kitchen walls with sinks shall receive two finish coats of waterborne acrylic epoxy paint in a G5 semi-gloss finish.

6.9.2. Washroom Specialties

FUNCTIONAL STATEMENT

Products and systems shall be high quality commercial grade, fabricated of durable materials, finishes, with heavy duty hardware, and selected for safe and intuitive ease of use.

SPECIFIC REQUIREMENTS

- The layout in multi-stall washrooms shall allow for some sightlines from the entrance of the washroom facilities into the room's circulation areas while still protecting privacy within the stalls. Avoid direct sightlines from the entrance to urinals and mirrors.
- Promote universal accessibility with properly designed entrance, access corridors, door opening widths, adequate space around doors, among other design elements in accordance with the NBC 2010, the corresponding Manitoba Amendments, and MB Hydro accessibility enhancements determined specific to the project.
- Washrooms in newly constructed buildings shall incorporate washrooms that are single-user, gender-inclusive and universal, preferably one on every floor where possible.

COMMON AND ACCESSIBLE WASHROOMS

Comply with the requirements described in the NBC 2010, the corresponding Manitoba Amendments, and MB Hydro accessibility enhancements determined specific to projects.

WASHROOM ACCESSORIES

- Grab bars (or future adaptability for same to comply with accessibility standards.
- Paper towels are preferred to hand dryers. Both may be provided if space and budget allow.
- if paper towels are used, accommodate requirements for outside paper towel contractors.
- Include recessed or semi-recessed refuse containers, or freestanding waste bins with lids where using recessed types are not feasible.
- Toilet paper, paper towel, soap and feminine product dispensers shall be supplied by MB Hydro.
- Toilet partitions – shall be floor mounted and overhead braced with stainless steel base and fittings.
    - Acceptable products
        - High Density Polyethylene (HDPE)
        - Metal with baked enamel finish
        - Hardware = heavy duty polished chrome or brushed nickel with tamper-proof screws. Full height continuous stop and hinge side filler to completely eliminate all sightline gaps around the door where possible.
- Access doors in mechanical shafts for accessing supply and returns valves and mechanical piping shall be easily accessible for operation and maintenance.
- Doors of single-user universal washrooms shall be equipped with power door operators

6.9.3. Locker Rooms & Locker Areas

LOCKERS

- All lockers shall be 20ga metal construction; powder coat finish.
- Locker quantities shall be identified in the functional programming.

GARAGES & SHOP AREAS

- Open utility lockers with lockable compartment
  - Dimensions: 24"W x 24 "D x 72"H
  - Features: 16-18 gauge steel, top shelf with locking storage - padlock compatible, metal clothing rod, ventilated sides, self-supporting.

LOCKER ROOMS/CHANGE AREAS

- Features: 72"H, laminated honeycomb door, vented slots, steel coat hooks, friction catch with hasp for lock. Dimensions to suit application.
- Provide a bench in the locker area length proportionate to the number of lockers: minimum length of 915mm (36").
- If required, shower area shall be adjacent, but separate, from locker area.

EQUIPMENT/TOOL LOCKERS

- Dimensions: 24"W x 18"D, multi-tier.
- Features: laminated honeycomb door, vented slots, steel coat hooks, 10ga hasp for lock.

6.10. Additional Interior Design Considerations

FUNCTIONAL STATEMENT

Products and systems shall be high quality commercial grade, fabricated of durable materials, finishes, with heavy duty hardware, and selected for safe and intuitive ease of use.

SPECIFIC REQUIREMENTS

MIRRORS

- Unframed type fixed to walls using concealed clips are preferred (number as recommended by the mirror manufacturer).
- Use low VOC Mirror adhesive.

WINDOW COVERINGS

- Window coverings should be considered as part of a holistic energy concept for the building, and properties should be specified to support this broader concept.
- Determine requirements and window blind preferences from Manitoba Hydro Facilities staff for the specific building installation.
- Supply and install fabric roller shades complete with manual pull chains and metal fascia.

- Fabric shall be blackout in meeting rooms and solar screen on exterior windows. Provide dual brackets for meeting room window roller shades, allowing for both the blackout and solar screen fabrics.
- Large conference rooms shall have motorized blinds with wall mounted controls.
- Refer to Manitoba Hydro Finish Standards document for finishes and fabrics.

WHITEBOARDS AND TACK BOARDS

- Porcelain steel magnetic whiteboards with a non-porous writing surface and marker ledge. Whiteboard surface shall double as a projection screen.
- Sizes and locations of whiteboards and tack boards shall be noted on all drawings
- Glass boards may be proposed for large conference rooms.
- Provide all backing in walls as required to install boards.
- Where possible whiteboards or tack boards shall be integrated into demountable wall panels.

SHELVING

- Configure as per specific program requirements.
    - use storage racks - "Interlok" no-bolt shelving as the design standard.

SIGNAGE

- Provide Interior emergency exit and fire plan signage.
- Provide Interior wall-mounted engraved lamecoid room identification signage, including building accessibility-related signage
- All signage shall comply with CSA Standard B651-18, Accessible Design for the Built Environment
- Refer to Manitoba Hydro Interior Signage Standards document provided in Appendix.

GARBAGE AND RECYCLING AREA SPECIFICATIONS

- For general building facilities, locate in a functionally appropriate location, near an elevator, and easily accessible for pick-up by garbage and recycling vehicles and trucks.
- Base required garbage and recycling handing areas on anticipated loads, and numbers of required bins and totes.

- Provide for interior recycling and trash receptacles in all public areas, kitchen, and resource rooms. Provide appropriate signage to guide separation of recyclables and trash by the visiting public and by staff.
- Review waste types expected to be generated by the project and consider waste separation and storage strategies to facilitate maximum diversion rates.

ELEVATOR DESIGN CONSIDERATIONS

- Select an elevator installation and maintenance company with a good history of service with Manitoba Hydro. Consult with Manitoba Hydro facilities staff.
- Elevator and accessory design must comply with Building Code mandated standards for accessibility, as well as for enhanced accessibility.
- Consider acoustic separation requirements to minimize perceived elevator noise concerns.
- Cab finishes: refer to Manitoba Hydro Corporate Standards and project specific Functional Program.

6.11. Division 10 – Specialties

6.11.1. Exterior Signage

FUNCTIONAL STATEMENT

Corporate facilities should be leveraged to build the strength of the Manitoba Hydro brand through signage consistent with the Manitoba Hydro Brand Guidelines.

SPECIFIC REQUIREMENTS

Use Manitoba Hydro Branding Guidelines (included in Appendix) to ensure consistency across the portfolio. Specific areas of relevance in the guidelines include:

- Exterior signage for building identification
- Building addressing
- Use of corporate logo
- Primary color palette for branding

Refer to Appendix for standards for interior signage.

6.11.2. Bird Control Devices

FUNCTIONAL STATEMENT

Provide bird-friendly building design which avoids creation of conditions likely to lead to in-flight collisions with buildings and other structures.

SPECIFIC REQUIREMENTS

- For new buildings and renovations that include glazing, meet CSA A460:19 Bird-friendly Building Design, including:
    - Building design: Avoid creation of fly-through conditions, black-holes/passage effects, and glass corners.
    - Glazing specifications should balance the requirements of the energy concept while presenting a minimal risk of bird strikes. To be considered:
        - Treatment of glazing materials: glass up to 16m above grade and at least 4m above green roofs shall be treated with visual markers on the exterior glass surface.
        - Material selection: low reflectance glass and exterior non-glass materials with reflectance value of no more than 15% shall be preferred

- Building integrated structures: consider exterior screens, shades, or aviary mesh installed at least 50mm in front of the glazing as an alternative to visual markers
- Building and site design: consider migratory bird paths
- Interior and Exterior Lighting: Provide dark-sky compliant exterior lighting fixtures and provide lighting controls which dim interior lighting during non-occupied hours.

- Provide devices to prevent birds from landing and roosting on specified surfaces, e.g. roof edges and under roof eaves. Bird spike strips are the preferred device.

6.12. Division 11 – Equipment

6.12.1. Fall Arrest and Restraint

FUNCTIONAL STATEMENT

Design to consider requirements for fall arrest systems to allow users to comply with Worker's Compensation Board (WCB) and Workplace Health and Safety requirements

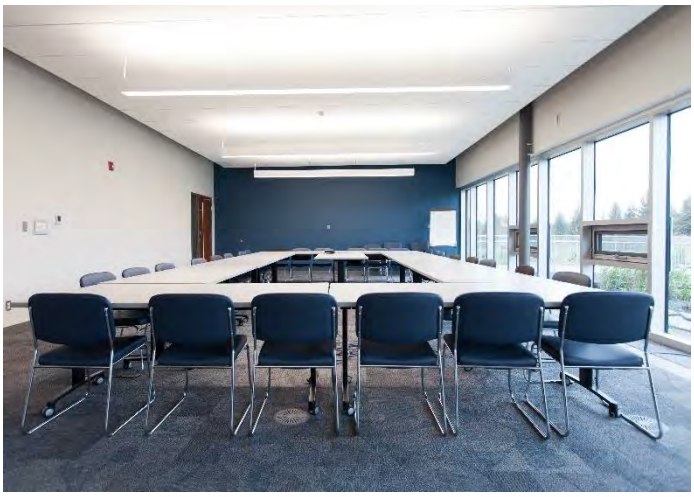
SPECIFIC REQUIREMENTS

- Include provision for custom design, supply and installation of a roof and building mounted safety tie back and lifeline anchor system incorporating a fall arrest and fall restraint safety system.
- Fall arrest system shall allow users to comply with Workers Compensation Board [WCB] requirements.
- Design shall allow for any additional structural members in the building framing to enable the structural system to accept the design loads.

6.13. Division 12: Furnishings

FUNCTIONAL STATEMENT

Products and systems shall be high quality commercial grade, fabricated of durable materials, finishes, with heavy duty hardware, and selected for safe and intuitive ease of use.



SPECIFIC REQUIREMENTS

- All free-standing furniture shall be coordinated with and provided by Manitoba Hydro Corporate Facilities.
- Refer to Manitoba Hydro Furniture & Space Standards for standard furniture sizes and configurations.
- Refer to Manitoba Hydro Standard Finishes for furniture finishes. Where finishes are not identified, concept finishes may be provided for Manitoba Hydro's review.

Refer to referenced standards provided in Appendix.

6.14. Division 21 – Fire Suppression

FUNCTIONAL STATEMENT

Fire Suppression systems should be maintainable and adaptable to future building changes while support the safety of building occupants.

SPECIFIC REQUIREMENTS

- Design to comply with Manitoba Hydro's Fire Manual and Local Code, whichever is stricter.
- Special consideration to including sprinkler systems provided where systems are protecting critical assets such as Emergency Operations Centres and bucket trucks.
- Dry-type systems shall be implemented in any areas that are or may be exposed to freezing conditions for prolonged periods, such as unheated spaces, spaces with overhead doors, covered parking areas. Dry-type sprinklers shall also be provided where sprinklering is required in inaccessible or concealed spaces.
- Existing glycol-based fire protection sprinkler systems shall be replaced by dry-type fire suppression systems when any work is required to reconfigure, extend, or otherwise modify the sprinkler system, or as required by the Authority Having Jurisdiction. New glycol-based sprinkler systems are not permitted.

6.15. Division 22 – Plumbing

FUNCTIONAL STATEMENT

Buildings shall aim for the highest water efficiency performance possible while considering operational and fiscal responsibility. Manitoba Hydro's overall goal for water efficiency is to reduce the gross water consumption of its buildings portfolio by 25% compared to the 2019 baseline by 2040.

SPECIFIC REQUIREMENTS

GENERAL

- Preference is for ball valves at piping terminations. Provide valve tags.
- Provide labeling on all piping, identifying piping function and flow direction. Labelling to be completed so that end user can identify piping from any room in the building.
- Provide floor drains in all wet areas. Trap primers are required for all floor drains; where trap priming is impractical, mechanical trap seals are acceptable.
- Preference is for hard-wired touchless faucets in wash basins and lavatories, and automatic toilet and urinal flush valves. However, touchless faucets may not be appropriate in areas where personnel routinely wear reflective clothing or personal protective equipment.
- Indoor plumbing fixture and fitting efficiency: Select low and ultra low flush and flow fixtures.
- Review use of low-flow fixtures in rural areas with low-pressure domestic water lines and long piping runs.
- Water-Efficient Products: Where applicable reduce the use of potable water through the use of fixtures with automatic or metered controls.
- Water using appliances: select Energy Star® certified or Watersense labelled products where available.
- Process water: Do not use once thru cooling; where once-thru cooling exists on site, discuss conversion opportunities with MB Hydro.
- Provide Grease Traps to reduce the discharge of fats, oils and grease [FOG] into the sanitary systems. Fully automatic "grease recovery devices" are a preferred product.

PLUMBING EQUIPMENT

- Sump pumps should be installed on UPS systems and connected to fire alarm to notify operations if there is a failure.
- Where a building is protected by a single weeping tile or sanitary sewer sump pit, the sump shall be equipped with multiple pumps or a duplex pump, and control system. In all cases (simplex and duplex sump pump systems), the sump pit shall be dimensioned to allow for easy installation and retrieval of the pump(s), and unobstructed operation of pump level controls. The designer may deem it

necessary to supply duplex pumps for critical applications, including elevator sump pits and buildings with high peak weeping tile system flowrates.

- Water softeners – required in areas requiring wells and where potable water is extremely hard (greater than 120 mg/L).
- Water filtration – required in areas requiring wells.
- Water heater – electric preferred.
    - c/w drain pan piped to floor drain.

PLUMBING FIXTURES

- Water closets shall be flush valve, wall mounted where possible, hands-free, low flow.
- Flush tank where water demand does not allow for flush valves. Tanks shall be bolted.
- Urinals shall be wall hung, hands free, flush valve.
- Barrier free fixtures where required. Lavatory drains shall be offset and insulated.
- Lavatories shall be undermount, stainless steel. Lavatory faucets shall be hands-free, hard-wired.
- Kitchen sinks -double bowl, stainless steel, 200mm depth. Faucet shall be two handle, swing spout.
- Janitor sink – floor mounted, molded stone, stainless steel front cap.
- Drinking Fountains – Barrier free, c/w water bottle filler.
- Shower: Barrier free shower head and regular use shower head, c/w seat.
- Emergency eye wash stations and showers – cartridge type. Hard piped where required by building code.
- Hose Bibbs – Interior and exterior hose bibbs required c/w shut-off valve in accessible location. Hose bibbs in garage spaces should have flow-reducing valve to discourage vehicle washing, except in specific vehicle wash bays.
- Washer Connection – c/w water hammer arrestors, hot and cold water, centre drain.

ROOF DRAINAGE

- Provide a minimum of two roof drains per contained, near-flat roof area. A single drain may be provided for near-flat roof areas less than 6 sq. m (entrance canopies, elevator penthouses, etc.)
- Near-flat roofs shall use internal drainage systems routed through conditioned building spaces, insulated from exterior wall penetration to 3m inside heated space.
- Coordinate usage of flow-control drainage with Structural Division.
- Any flow discharged to grade (sites without stormwater service, buildings with pitched roofs using gutter and downspout drainage) shall be directed away from pedestrian and vehicle areas, other areas where icing could become a safety hazard, and away from areas that could be damaged by erosion.
- Provide thermostatically controlled heat tracing extending from any rainwater leader that discharges to grade, to at least 1m inside the heated building. Coordinate with Electrical Division.

- Rainwater shall not be captured and reused for any mechanical system unless formally directed to do so by Manitoba Hydro.

6.16. Division 23 – Heating, Ventilation and Air Conditioning (HVAC)

FUNCTIONAL STATEMENT

Provide innovative HVAC systems that support high quality indoor environments with low energy consumption and GHG impacts, and which are integrated with architectural systems. HVAC systems should support operational efficiency and utilize a data-driven approach with measurement and verification systems to optimize building performance. HVAC systems for new construction projects should be part of a holistic energy concept which considers space usage, massing, form, and envelope.

Design shall align with Manitoba Hydro's Energy and Sustainability Guidelines.

SPECIFIC REQUIREMENTS

6.16.1. General

- HVAC system design and heating fuel selection shall consider minimizing energy consumption and GHG direct emission impacts. Heating shall be provided by, in order of preference: high efficiency systems using electric heating (heat pumps); hydronic heating systems that provide future fuel flexibility, electric resistance heat, and high efficiency natural gas with prior written approval from Manitoba Hydro.
- Minimum energy efficiency design targets shall be defined by compliance with the Manitoba Energy Code for Buildings, latest version in force.
- Provide information to Hydro for input into Hydro's Owner's Manual Template, including information on maximizing the operational efficiency of the mechanical system.
- Ensure that all servicing, maintenance, and replacement parts can be installed in a functional and workmanlike manner.
- Design conditions shall be January 1% and July 2.5% as per the Manitoba Building Code. **Consult with Manitoba Hydro at the onset of the project to determine whether more stringent design requirements are appropriate due to the nature of the facility, or in planning for predicted future climatic conditions.**
- Design mechanical systems to provide an indoor environment for occupied spaces that meets performance requirements of ASHRAE 55, except where associated humidity levels are deemed by the Consultant to pose risk of damage to building structures based on climatic design conditions for the design location. In these cases, the Consultant shall make recommendations on humidification and dehumidification performance requirements to Manitoba Hydro for consideration.
- Emphasize occupant controls of indoor environment to leverage advantages associated with the Adaptive Comfort model in ASHRAE 55.
- Design new ventilation systems in compliance with latest version of ASHRAE 62. Include ventilation calculations information on ventilation drawings.

- Where the building contains structures or systems that are sensitive to humidity, provide appropriate humidification systems. Unless otherwise required by the supplier or manufacturer of the affected building structures and systems, the space relative humidity setpoint shall be 20% when the outdoor temperature is lower than 0°C and 30% when the outdoor temperature is higher than 0°C.
- Coordinate with Electrical Division for requirements for heating, cooling, ventilation, and humidity control for spaces containing Uninterruptible Power Supplies (UPS), electrical distribution, telecommunications and digital communications equipment.
- All equipment, devices and controls require support from knowledgeable local technical support personnel and staff, including local sales representatives and local field service/factory trained representatives, especially regarding servicing of all equipment.
- All replacement parts and components need to be readily available (preferred less than 10-day delivery wait time), and cost effective.
- Mechanical and electrical equipment shall be installed to facilitate ease of long-term maintenance. Avoid installing equipment in confined spaces or configurations, or in locations that have access problems.
- Use variable capacity control on all pumping systems where there is diversity; preference is for the use of integrated pump controls with variable speed drives (VSD) or electrically commutated motors (sensorless pump control).
- Packaged rooftop air handlers, when used, shall utilize electric heating and direct expansion cooling utilizing a refrigerant with the lowest commercially available Global Warming Potential (GWP) rating.
    - In special circumstances where Manitoba Hydro accepts that it will be too difficult to provide packaged rooftop air handlers with electric heating, gas heating systems shall be high efficiency condensing type.
- As a minimum standard, air handling systems supplying 2350L/s or greater airflow, or if otherwise required to achieve MECB compliance, shall use variable speed fans. For multizone systems, variable volume air handlers will be paired with variable volume air valves to suit zoning controls requirements; zone air valves may be supplied complete with reheat coils to meet space heating demands and reduce HVAC system energy consumption by supporting supply air temperature reset.
- Where specialty systems are considered to achieve maximum efficiencies, the consultant shall provide adequate proof that design team has expertise in design of the specialty systems. Designers shall present Manitoba Hydro with a minimum of 3 successful projects completed by design team, with references, for consideration by Manitoba Hydro. Manitoba Hydro has final authority for accepting such specialty design consulting services from any Consultant.

- New facilities and major additions, as defined by MBC and MECB, shall have dedicated HVAC systems; such facilities shall not share HVAC services with existing facilities unless a district heating system is available.
- Minimize the usage of outdoor ductwork and heating piping.
- All HVAC services (piping, ducting, valving, terminal units, etc.) shall be identified according to Manitoba Hydro nomenclature standards and industry best practices. Identification shall include colour coding and alfa-numeric labels.
- Where a Backup Power source is available, ensure the following equipment is connected:
    - All components of any heating system within the building,
    - Building Automation System
    - Additional freeze protection systems
    - Critical systems on a case by case basis.
    - Additional non-critical systems may be placed on standby power, based on Manitoba Hydro approval of Consultant recommendations.

6.16.2. Heating Systems

HYDRONIC SYSTEMS:

- Preference should be given to the two-pipe reverse return system for hydronic systems. Direct return systems may only be used where flow can be reliably established and maintained at all terminal units.
- Provide isolation valves on supply and return mains, risers, and major branches.
- Provide isolation valves for terminal heating and cooling devices and mechanical equipment at the supply and return connections. Circuit balancing valves must be provided at each terminal unit, and at main piping branches branch.
- Wafer style valves are not acceptable as isolation valves.
- Valves sized DN150 (6NPS) and larger shall be equipment with gear operators.
- Hydronic system water treatment chemicals shall include: dispersants, phosphonates, corrosion inhibitors and alkaline controller product.
- Piping shall not be supported by equipment and shall be supported from floor or roof structure above where practical. Pipe supports from floor below are to be a channel strut support system (equal to Unistrut) complete with pipe clamps.
- Mechanical grooved couplings are not to be installed in concealed locations.
- Piping systems using mechanical groove couplings shall be field inspected, certified, and warrantied by the supplier as complete piping system for a minimum of 25 years, inclusive of all labour and materials related to any leaks or failures in the system and include reparation of any building elements damaged by the product failure.
- The install of any grooved pipe system shall be trained and certified in installation by the supplier of the piping system.

HEATING WATER SYSTEMS

- When a natural gas boiler is due for replacement and the location is not suitable for conversion to electricity, the following shall apply:
    - All boilers to be condensing

- Hydronic heating system controls shall operate boilers in cascade sequencing and optimize to minimize return water temperature.

- Water treatment shall be performed initially and monitored by a local hydronic water treatment specialist or trained facilities management personnel.
- The Consultant shall review Manitoba Hydro's requirements for level of boiler system redundancy based on the needs and functions of the specific facility. Unless written direction is provided by Manitoba Hydro, provide a minimum of 2 boilers, each sized at minimum for 65% of total heating design capacity. Systems with three or more boilers shall be configured in N + 1 configuration, where N is the total design heating capacity.
- Preference is for boiler systems arranged in primary-secondary piping configuration. The Consultant shall be responsible for selecting boilers suitable for variable flowrate operation if specifying variable-primary piping configuration.
- Except for boiler circulator pumps in primary-secondary piping systems, all hydronic circulator pumps shall be sized for duty/standby operation at 100% of maximum design capacity.
- Provide glycol solution for all heating coils, terminal heating units, and radiant heating systems which may be subjected to freezing. Specify pre-mixed inhibited propylene glycol only.
- Preference is to select the lowest glycol concentration required to avoid pipe bursting for in-floor heating systems and air coils treating outdoor air, and freeze protection for all other air coils.
- Domestic hot water generation and hydronic heating shall be provided by separate equipment unless formal written approval is granted from Manitoba Hydro to combine the functionality into a single system. Where domestic water heating is added to the building heating system, combined heating capacity shall meet previously defined redundancy criteria.

HEAT PUMP SYSTEMS

- Water-source heat pump systems shall utilize a system of heat rejection equipment that allows for water-side economizer cooling operation as outdoor conditions permit.
- Air-source heat pump systems shall not be used for occupied space heating systems without prior written approval from Manitoba Hydro. Where approved, such systems shall be designed for the climate and provided with supplemental electric heating capacity to suit winter design temperatures.
- Ground-source heat pumps should be considered for feasibility whenever electric resistance heating is proposed.
    - Closed loop systems are preferred over open loop systems.
    - Any boreholes or areas part of a ground source heat loop shall be located outside of the building footprint.
    - The ground loop design must be performed by a Professional Designer using recognized ground loop design software such as GLD, GshpCalc, GLHEPRO, or an equal alternative.
    - Dimensioned or scaled site plan drawings of the ground loop heat exchanger, groundwater wells, all headers, and piping must be included in the drawings and specifications.

STEAM HEATING AND CONDENSATE SYSTEMS

- Steam heating system shall not be used for new HVAC systems in new construction, and major additions and alterations.

6.16.3. Cooling System

GENERAL

- Chilled water cooling is preferred for systems over 100 kW of refrigeration.
- Do not provide mechanical cooling to mechanical equipment rooms, vestibules, washrooms, storage rooms, or other typically unoccupied spaces.
- Where hydronic systems provide cooling in the winter, heat rejection shall be by a dry cooler or closed-circuit cooling tower. Opportunities for heat recovery must be considered, including heat recovery chillers.
- Where chilled water circuits are cooled by air cooled chillers, dry or adiabatic coolers and experience temperatures below 6°C, provide a minimum of 15% glycol concentration in chilled water circuits. Specify pre-mixed inhibited propylene glycol only. Provide 50% propylene glycol solution where chilled water systems may be subject to freezing conditions.
- Chillers shall allow for remote control of supply water temperature reset.
- Provide a minimum of two chillers, each with multi-stage or variable flow pumping on the chilled and condenser water circuits for:
    - Central cooling plants serving multiple buildings.
    - Buildings with chiller cooling load exceeding 1750 kW output.
- For reciprocating chillers, provide multiple compressors for chillers over 34 kW output. Provide at least two stages of capacity for chillers over 25 kW output and at least three stages of capacity for compressors over 125 kW output. Chillers with three stages of capacity control or less shall have an additional hot gas bypass stage.

DIRECT EXPANSION (DX) SYSTEMS:

- Minimum system efficiencies shall meet or exceed compliance requirements of MECB.
- Where DX cooling systems of capacities exceeding 17kW (5Ton, nominal) are the primary source of mechanical cooling for electrical, telecommunication, and IT equipment rooms, supplemental outdoor air cooling systems (complete with minimum MERV8 filter efficiency) shall be provided, unless the design consultant demonstrates that such a supplemental system has a financial payback period exceeding 5 years.

6.16.4. Ventilation and Air Handling Systems

GENERAL REQUIREMENTS

- Provide energy recovery on all outdoor air intakes.
- Maximize the use of energy recovery on all sources of exhaust air. The design consultant may identify sources of exhaust deemed to be unsuitable for use in energy recovery systems where potential contamination of exhaust and fresh air streams could pose a threat to occupant health or comfort. These specific conditions shall be reviewed with Manitoba Hydro before abandoning design for energy recovery.
- All 100% outdoor air (make-up air) systems shall be Demand Controlled Ventilation (DCV) systems to minimize energy consumption, unless required to operate continuously under certain conditions by Code.
- Provide "free-cooling" functionality on all energy recovery systems serving air handling systems with mechanical cooling capacities greater than 17kW (5Ton, nominal), at minimum.
- Energy recovery systems shall be designed and specified to allow continuous operation at winter design conditions while minimizing the requirement for supplemental heat. Suitable means of providing continuous operation include preheat coil, blending return air, appropriate selection of heat recovery media, and varying enthalpy wheel speed. Alternating mass energy exchangers do not require pre-heat.
- Defrost or frost prevention strategies involving exhaust-only or recirculation type methods, where ventilation air is interrupted to the occupied spaces, shall not be accepted unless the design Consultant can demonstrate that some existing building condition prevents this (eg. insufficient capacity in electrical and HVAC building services to provide outdoor air preheating).

ZONING

- Limit interior zones, and exterior zones on the same exposure, to maximum 600 L/s, unless a specific function requires more.
- Provide separate zones for corner spaces if cooling requirements are significantly different from adjacent zones.
- Match heating and cooling zones.
- For VAV systems, variable volume air valve minimum positions shall maintain ASHRAE 62 ventilation rate requirements.
- Interior zone reheat coils for VAV systems shall be controlled to minimize use for energy efficiency.
- Zones requiring process air (fume hoods, etc.), shall be provided with VAV or venturi valve systems complete with reheat coils. The air valves shall be controlled open to maximum air supply position when process air is required, returning to normal VAV operation otherwise. Venturi valves are the preferred option in any lab environment.

DISTRIBUTION

- Ensure adequate air circulation to the occupied spaces under all flow regimes for variable volume systems.
- Coordinate supply air ceiling diffuser locations to avoid airflow interference and dumping of air into the occupied zone.

FILTRATION

- Minimum MERV 8 (50mm deep media) required for all applications providing 100% outdoor air, and as pre-filters for recirculating systems. Increase performance as required to suit the application, based on best industry practices.
    - Minimum MERV13 filtration shall be provided downstream of pre-filters in new recirculating air handling systems. Consult with Manitoba Hydro at the onset of design to confirm whether higher levels of filtration are desired on a case-by-case basis.
    - Notify Manitoba Hydro in writing where HVAC system limitations prevent application of this requirement; exceptions may include modifications to existing HVAC systems, and some packaged roof top air handlers and furnace-style air handlers.
- All energy recovery equipment shall be equipped with filtration on both air streams, and filtration shall be replaceable without removing the energy transfer media.
- Terminal units like fan-coils and remote heat pumps installed in concealed or normally unoccupied areas (ceilings, raised floors) shall have return air ducting to an area where filter maintenance can be conveniently conducted without disturbing facility staff.

6.16.5. Air handling units (AHUs) and Equipment

GENERAL

- Where electric heating is not possible (or practical as agreed to by Manitoba Hydro) provide minimum of two stages of heating for gas-fired equipment where modulating gas heating sections are not available.
- All air systems shall require an outdoor air economizer, and supply and return (or exhaust) fans. Exceptions: residential style furnaces; 100% outside air make-up air handlers, which may omit all forms of cooling and operate on a single blower system.
- Air handler construction shall provide insulated casings, hinged and sealed access doors, and lighting for inspection of all chambers and serviceable components.
- Air handler casing insulation (thermal and acoustic) shall not present any fibrous insulation to the airstream.
- Air handler mixing sections shall be pre-engineered and with documented performance, capable of mixing outside and return air to a maximum temperature gradient of 5°C.
- Outdoor air shall be tempered prior to mixing with return air, where outdoor air temperature would create condensing conditions upon mixing with warm and humid return air.
- Minimize implementation of humidification systems. Atmospheric steam generators with low absorption distance distribution headers (less than 300mm) in the air handler plenum or supply ducting is the preferred method for humification, when required.
- Provide pre-heating and post-heating capacity as necessary for air handling systems providing ventilation air, to ensure continuous ventilation can be maintained without reducing room temperature below setpoint.
- Do not use mechanical rooms as return air plenums.

MAKE-UP AIR HEATERS (MAUS)

- Cooling shall not be provided for 100% outdoor air systems providing makeup air (interlocked with exhaust systems), unless explicitly required by Manitoba Hydro on a case-by-case basis.

- Demand controlled MUA systems controlled to CO or NO2 gas detection systems shall be provided with a local user override control feature to allow building occupants to operate the exhaust and makeup air system on a timer-based control (adjustable during commissioning), unless directed otherwise by Manitoba Hydro.
- In vehicle storage and drive through areas, interlock forced-air space heating systems with overhead door operation so space heating is disabled while doors are in the open position. Control sequencing shall be provided to override the overhead door system interlocks to enable heating when space temperature drops low enough to pose a risk of freezing plumbing, sprinklers, or other sensitive equipment. Include notification signage at the thermostat(s) of the need to close overhead doors to re-engage the heating systems.

TERMINAL AIR DEVICES

- Fan powered units shall utilize electrically commutated motors where commercially practical.
- Variable volume air valves shall be provided with reheat coils (electric or hydronic) to support control strategies that minimize energy consumption of the overall air handling system, such as supply air temperature reset.
- Force flow heaters and unit heaters shall be, in order of preference: electric heat; hydronic heat; natural gas heat exchanger, with prior written approval from Manitoba Hydro.
- Force flow heaters and unit heaters in vestibules shall be controlled with a thermostat located in the vestibule with a maximum heating temperature capability of 15°C to minimize energy consumption.
- Prioritize the use of air barriers at high frequency overhead doors where practical. Consideration should be given to unheated air barriers at large overhead doors.

ROOF MOUNTED EQUIPMENT

- Preference for all equipment to be mounted at grade level, or within mechanical room. New equipment to be installed on the roof only with express approval of Manitoba Hydro.
- Roof mounted equipment shall be located to avoid the need for fall arrest equipment wherever possible.
- Where requested by Manitoba Hydro, architectural screens shall be located minimum 1500 mm away from any roof mounted equipment, or further if required to maintain manufacturers' equipment service and installation clearances.
- Coordinate placement of any new or replacement equipment on roof with a Structural Engineer and Architect to ensure roof capacity is adequate, reinforcement is designed and implemented where necessary, and roof covering systems are properly coordinated with equipment mounting requirements.

KITCHEN EXHAUST SYSTEMS

- Exhaust systems required for commercial cooking operations shall be designed in accordance with NFPA 96, latest edition in force.

FUME AND PROCESS EXHAUST SYSTEMS

- Energy recovery is not required on these airstreams unless explicitly required for MECB compliance.

RADON GAS MITIGATION

- All building designs shall have a Radon Mitigation Plan. Coordinate with MB Hydro to determine if radon extraction is required at the time of new construction, or if rough-in for a future extraction system is sufficient.

- Acceptable mitigation options include the Radon mitigation measures listed in “EPA Radon Prevention in the Design and Construction of Schools and Other Large Buildings”:
    - Soil depressurization
    - Building pressurization
    - Sealing radon entry routes

6.17. Division 25 – Building Automation/Integrated Automation

FUNCTIONAL STATEMENT

Provide building automation systems with control and monitoring capacity to maintain occupant comfort, enable building operational and maintenance efficiency, and optimize energy efficiency. The building automation systems include measurement and verifications systems that allow for continuous optimization of the control and performance of building systems.

SPECIFIC REQUIREMENTS

6.17.1. General

- All new buildings shall be designed and installed with a Distributed Digital Control (DDC) Building Automation Systems (BAS).
- Buildings will be exempt from including a BAS by request only, at the discretion of Manitoba Hydro.
- Use latest Niagara 4 framework with BACnet compliant control devices to provide a BAS that:
    - Controls and monitors heating, ventilation, and cooling systems related to temperature and humidity control.
    - Controls and monitors equipment that requires scheduling, or any item that requires remote monitoring.
    - Integrates with the lighting system for monitoring purposes.
    - Consists of a consistent front-end complete with graphics, scheduling, alarming, trending, and remote accessibility capabilities.
    - Enables energy management functionality.
    - Is fully programmable and adjustable by end user.
- Align specifications for BAS with Manitoba Hydro's Building Automation System Guidelines which details the following:
    - System architecture
    - Electrical installation requirements
    - Field devices and instrumentation minimum requirements
    - User graphics interface standards
    - Alarm management and annunciation
    - Trending requirements
    - Data archiving requirements
    - Point naming conventions
    - Sequence of operation standards
- For projects where an existing facility utilizes a BAS architecture different than the standard for new buildings, Manitoba Hydro shall first secure a feasibility review of existing BAS to identify whether the existing BAS can meet the needs of the building; where the existing BAS is determined to be capable of supporting project requirements, the feasibility review shall also provide an initial pay-back period analysis for implementing a new standard BAS.
- Acceptable Controls vendor to be identified by Manitoba Hydro in existing buildings.

- All license fees, installation labour costs and commissioning costs shall be included in the installing contractor's contract price.

6.17.2. Hardware and Software

- All required computer hardware and network access provided and supported by Manitoba Hydro, when required.
- The BAS shall be designed with minimum of 10% spare physical point input/output capacity at each RCU.
- Provide an additional ten output points at panels closest to security and fire alarm primary control panels for future alarm use.
- Control of any mechanical system is not allowed to be split between multiple RCUs.
- The firmware on the BAS panels must be compatible with the existing building automation network infrastructure. If new BAS installations are not backwards compatible to the Manitoba Hydro network server, the Controls contract shall include the cost to supply and install upgraded software on the common BAS network server.
- Any BAS in any Manitoba Hydro facility shall be completely accessible by specially trained BAS personnel within the Manitoba Hydro Organization. This access shall include the ability to make graphical changes and access to programming. Additional tiers of restricted access shall be provided to on-site facilities management personnel. Coordinate requirements for user access with Manitoba Hydro based on the staffing capacity at the respective facility.
- Proprietary or control systems with restricted access will not be permitted.
- Proprietary stand-alone control systems are not acceptable without prior written approval from Manitoba Hydro. Exceptions include OEM boiler and chiller controllers and cascade sequencing controllers, split system air conditioning and heat pump system controllers, variable refrigerant flow/volume system controllers, and controllers for gas fired makeup air units.
    - Air handling system components (blowers, dampers, heating & cooling systems, dehumidification systems, energy recovery systems) shall be controlled directly by the BAS. Air handling system field controllers are only acceptable if they can communicate directly with the building BAS without a gateway controller, and all control points for the air handling system are writable through base building control systems to allow for future adaptation.
    - Packaged rooftop units and remote A/C units shall be controlled by BAS contacts using conventional W/Y/G control wiring.
    - Split system air conditioner and heat pump systems shall be provided with BAS thermostat interface card to allow for control of scheduling, temperature setpoint, and alarming.
    - All systems provided with OEM equipment controllers (boiler controllers, chiller controllers, etc.) shall accommodate BAS enable and setpoint control using analog and discrete signals.
    - Heat pump and variable refrigerant flow/volume systems may operate on standalone integrated controllers if all input and output points have separate physical terminals or hard points. Virtual points from a proprietary controller will not be accepted.
    - Integrated controllers for terminal heating, cooling, and ventilation equipment shall be manufactured by the maker of the BAS system to ensure native compatibility. The Consultant shall seek prior approval from Manitoba Hydro for deviations from this requirement.

- Proprietary multi-zone systems (example: variable volume and temperature (VVT) systems for furnaces and packaged air handlers) will not be accepted without prior written acceptance by Manitoba Hydro.

6.17.3. Documentation Requirements

- Provide a schedule of all physical and virtual control points, complete with short description, the point type, any alarm limits and fail-safe position, and associated system name.
- Group points in the schedule by mechanical system.
- Provide a detailed control sequence for each mechanical system, including set points, interlocks and alarms.
- Provide detailed control sequences to accomplish any global optimization strategies, including set points, interlocks and alarms.
- Complete set of shop drawing submittals for all hardware, control actuators, and controllers required to achieve BAS control functions.
- Complete set of wiring diagrams for each mechanical system, complete with coordination notes for Electrical and Mechanical divisions.

6.17.4. Testing and Commissioning

- Controls Contractor shall provide testing and commissioning of the BAS in conjunction with Commissioning Agent when applicable.
- All commissioning shall be completed using graphics generated for the user interface, and the graphics shall be verified at the same time that point end-to-end checks and programmed sequences of operation verifications are completed to ensure point layout indicated on graphics is consistent with the point locations in the field.
- Point to point checks shall be conducted and provided electronically for review.
- The Controls Contractor shall provide training to the building Owner and Operations staff to demonstrate how the building is intended to operate. Training shall include a hands-on learning component, and records of training shall be kept. Consider having training sessions for complex systems video recorded for future reference.

6.17.5. Metering

FUNCTIONAL STATEMENT

Provide metering and monitoring infrastructure to enable operational and maintenance efficiency and optimize energy efficiency.

SPECIFIC REQUIREMENTS

- All Corporate Facility buildings shall have site-level water, gas, and electricity services metered and connected to the BAS or data acquisition system with remote access and trending capabilities.

- Sub-meters connected to the BAS will be considered on a project-by-project basis. The following shall be considered:
  - Water/Fluid
    - mechanical makeup water/fluid for systems such as cooling towers, chill water system, heating water systems, heat pump systems, geo/ground loop, and solar system
    - irrigation systems
    - process systems
  - Gas
    - Major gas equipment, appliances, processes
  - Electricity
    - Lighting, mechanical, and plug loads
  - Hydronic Energy

- Any energy use monitoring shall be collected through sub-meters that are BACnet enabled, or through virtual metering.
- All hydronic energy monitoring shall be collected through the measurement of flow and differential temperature. The calculation of energy will be performed at the meter or within the BAS.
- All sub-meter water and energy data collected will be stored on MB Hydro's servers. The system must also be capable of delivering this data using BACnet over Ethernet, BACnet over MSTP and BACnet over TCP/IP to third party data repositories capable of accepting BACnet data.

6.18. Division 26 - Electrical

FUNCTIONAL STATEMENT

Design to following sustainable and operation and maintenance best practices for electrical systems in new and existing buildings. Design is to emphasize conservation, optimized building performance and continued improvement of energy use, building systems efficiency and indoor environmental quality.
Each project will have their own specific requirements to meet the needs of the building and end users. The electrical portion of the work will meet these needs in the most efficient and economical manner possible while meeting or exceeding all applicable codes and standards.

SPECIFIC REQUIREMENTS

- Specify equipment with Energy Star certification whenever possible.
- Use high efficiency motors and pumps. Consider premium efficiency motors and pumps where applicable.
- All equipment, devices and controls require support from a knowledgeable local technical support staff, including local sales representatives and local field service/factory trained representatives, especially regarding servicing of all equipment.
- All replacement parts and components need to be readily available (preferred less than 10-day delivery wait time), and cost effective.

6.18.1. Power and Distribution

FUNCTIONAL STATEMENT

Provide an efficient and robust electrical distribution with flexibility for future changes and growth.

SPECIFIC REQUIREMENTS

- For new construction, lighting, mechanical and plug loads need to be segregated on separate electrical panels for energy monitoring purposes. Energy monitoring shall be provisioned for future use and meet the requirements outlined in 'Integrated Automation' section.
- Provide digital metering complete with power quality capabilities at all main service entrance distribution, main emergency power distribution, and all major distribution centers. Confirm locations and requirements with MB Hydro representative.
- Large renovations or large changes to electrical distribution shall review the requirements for power factor correction and harmonic filtering. The end result shall meet or exceed the power quality requirements for Manitoba Hydro.
- Surge protection devices (surge suppressors) shall be installed on main service entrance distribution equipment and any panel boards where critical microprocessor-based equipment resides. Coordinate surge suppression requirements with MB Hydro representative.
- Single line diagrams are to be updated at the completion of every project which altered the electrical distribution of the building.
- All electrical distribution equipment shall be labeled appropriately to designate the equipment's voltage (600V, 120/208V, etc.), power source (normal, emergency, etc.) and any other pertinent information

(floor, area, etc.). Equipment labelling shall provide distinct and recognizable labels and not have repetitions. Labeling shall also follow MB Hydro's standard for Systems Naming Protocol.

- Electrical consultant to conduct an arc flash and short circuit study in accordance with IEEE 1584.
- Back up power, through the use of generators, UPS units, etc., shall be provided to meet the needs of the building and MB Hydro. Confirm requirements with MB Hydro representative.
- Electrical Directory Review: Once the preliminary electrical directories for each electrical panel have been defined, provide to MB Hydro for review and comment before finalization.
- Electrical distribution equipment should be given consideration for access for maintenance activities.

6.18.2. Lighting

FUNCTIONAL STATEMENT

Lighting design shall incorporate Manitoba Hydro's sustainability principles with products and systems that provide safety and security, energy conservation, long life low cost of ownership, service and maintenance accessibility, and occupant wellness.

SPECIFIC REQUIREMENTS

- All lighting should be designed to suit the task and location. Lighting levels and uniformity targets shall meet or exceed IESNA recommendations. Photometric calculations shall be submitted when requested. The light loss factor (LLF) which is used in these calculations, shall take into consideration the lamp lumen depreciation factor and dirt depreciation factors associated with the light source and environment
- In washrooms, lighting shall be installed at sufficient levels to accommodate use by individuals with lower vision per IES RP-28-20. Combine above mirror lighting over vanities with general room lighting
- Use appropriate lighting selections based on the function of the space and energy efficiency.
- All interior lighting shall not exceed the energy density limits as defined in the MECB, using either the whole building area method or the space-by-space evaluation method.
- All exterior building lighting shall not exceed the lighting power density limits as defined in the MECB.
- All lighting, interior and exterior, to be LED. Any deviation from this is to be approved by MB Hydro representative.
- Specification and placement of integrated LED fixtures should consider ease of replacement at end-of-life and prefer industry standards as they emerge and evolve.
- LED luminaires shall meet or exceed the requirements of the most current DLC standard and be DLC/Energy Star certified. Luminaires shall meet all Manitoba Efficiency requirements.
- All luminaires shall be of steel or aluminum construction and be complete with acrylic lenses.

- LED luminaires shall be installed giving consideration to maintenance access of the luminaire itself and the associated accessories (drivers, sensors, etc.). Accessibility to luminaires to be provided by ladders or powered lifts. If special equipment is required for lighting maintenance, then the consultant shall, prior to tender, prepare and submit a Lighting System Maintainability Plan to Manitoba Hydro for review and approval. It shall contain documentation describing the special equipment, access arrangements for special equipment, and a maintenance schedule and spare parts list.
- Consideration must be given to ensure access for maintenance activities. Luminaires and equipment should be accessible from ladders on flat surfaces such as floors or stair landings, or from powered lifts with a maximum lift of 6.1m [20 feet].
- The lighting design proposed for all public areas such as corridors and stairways shall ensure the life safety of building occupants at all times and shall allow for zero lighting energy use when the building is un-occupied. (i.e. lights off until occupancy has been detected or an emergency has occurred).
- Daylight harvesting opportunities should be implemented in areas where natural daylight is available.
- A portion of the lighting fixtures shall be wired to an emergency power panel if an emergency generator is available. Lighting circuits fed from emergency power panels shall be arranged so that they may be switched or dimmed.
- All exterior lighting shall be rated for expected temperatures (e.g. -40C), dark sky compliant, low glare, and be complete with house shields when applicable. Up lighting will only be allowed to be use on artwork and flags. Request approval from MB Hydro for every use of up lighting.

LAMP, BALLAST, DRIVER & FIXTURE GUIDELINES

- 3500° K shall be the typical color temperature used for all interior applications.
- 4000° K shall be the typical color temperature used for all exterior applications.
- The use of LED lamps is encouraged and as substitutes for traditional applications involving CFL, MR-16, PAR 20, PAR 30, BR30, PAR 38 lamps, and linear fluorescent lamps. LED lamps shall be Energy Star rated.
- The use of LED fixtures is encouraged and shall be DLC (Design Lighting Consortium) listed. The drivers shall have either 0-10V or phase dimming capability (for buildings where it is not practical to run low voltage wiring).
- Lamps shall be the longest life available. Preference will be given to lamps and lighting containing the lowest amount of mercury and other toxic components.

- LED light sources shall meet or exceed the efficacy levels as outlined in the most current version of the DLC Solid-State Lighting Technical Requirements (https://www.designlights.org/our-work/solid-state-lighting/technical-requirements/):
- LED light sources shall have a minimum lifetime L70 rating of 300,000 hours. Luminaires shall have a minimum 80 CRI.
- Luminaires shall be constructed of extruded aluminum frames with high reflectance white enamel finish. Luminaires shall be complete with high quality acrylic lenses.

LIGHTING CONTROLS

- All interior lighting (including stairwells) shall have controls such that when the lighting is not needed, it will automatically be either turned off or dimmed to a low output condition and shall conform the MECB standard.
- Interior lighting shall be connected to an addressable, non-proprietary control system suited to the building's current use. The control system shall be supported for a minimum of 20 years after the project is complete and be easily expandable/modifiable.
- All exterior building mounted lighting and exterior building area lighting shall be controlled by photocell. Lighting which is powered from the building electrical system shall be controlled by a standalone lighting control system.
- Occupancy sensors shall be dual technology type with both Passive Infrared (PIR) and acoustic/ultra-sonic sensors and may be either line voltage or low voltage types. Low voltage occupancy sensors with 1 or 2 poles and local power packs are preferred. Slave power packs are not acceptable.
- Offices shall have light control switches at all entrances, exits and vestibules. These interior spaces shall also have occupancy/vacancy sensors integrated with the control switch or mounted at a high level in a corner and arranged for semi-automatic operation such that manual operation of the local switches is required to energize the lighting while occupancy/vacancy sensors and local switches will de-energize the lighting. Large spaces may need more than one sensor.
- Meeting spaces should include physical controls for light levels, and also include occupancy sensors to ensure lights are turned off when not required.
- Corridors, lobbies, washrooms and similar public spaces shall have occupancy sensors, mounted at high levels, and arranged for full automatic operation to dim the light fixtures to a level which meets the minimum requirements for emergency egress during periods of vacancy. Occupancy sensors are not permitted in interior spaces that may be or may become hazardous. Some spaces may require more than one sensor.
- Where feasible, all offices, corridors, stairways and other public spaces shall incorporate daylight harvesting via use of interior mounted photocells and arranged to take advantage of free illumination while maintaining acceptable minimum illumination levels within the space.
  LED dimmers shall be compatible with the LED lamps used and their drivers.

6.19. Division 27 – Communications

FUNCTIONAL STATEMENT

To provide a complete and operational telecommunications system meeting or exceeding the requirements of Manitoba Hydro.

SPECIFIC REQUIREMENTS

- Follow Manitoba Hydro Telecommunications Guidelines and Generic Guidelines for Premises Cabling at Manitoba Hydro Buildings
- Communication closets/room shall be grounded back to the building main electrical ground. All wireways, voice/data racks, cabinets, and cable trays shall be grounded.
- Wireless Access Points (WAP's) shall be located throughout the building to provide a broad coverage of all occupied spaces. Wi-Fi heat mapping shall be provided to MB Hydro for review.

6.20. Division 28 – Electronic Safety and Security

6.20.1. Security Systems

Consult with Manitoba Hydro's Corporate Security department on the physical security requirements.

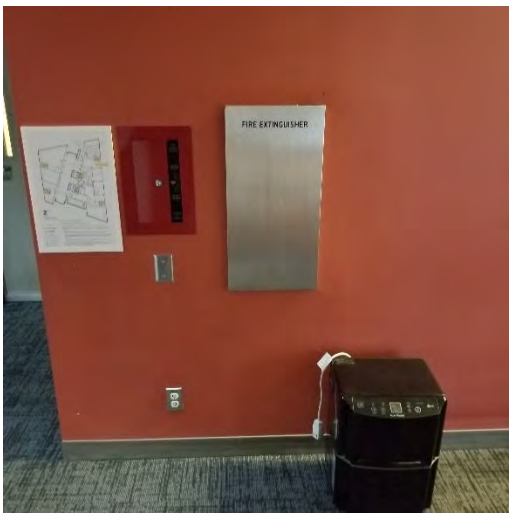
The supply and installation of the security system equipment shall be by Manitoba Hydro.

The Consultant shall design the power system required for electric strikes, card readers, cameras, door operators, etc. to be included in the construction contract.

6.20.2. Life Safety Systems

FUNCTIONAL STATEMENT

Select life safety systems which provide the best life cycle cost, and which meet or exceed the national building code requirements.



SPECIFIC REQUIREMENTS

- Design to comply with Manitoba Hydro's Fire Manual and Code, whichever is stricter.
- Fire Detection systems shall be "Addressable".
- Fire Detection panel for "major" buildings shall have communications to a ULC listed monitoring company, for 24/7 notification if an alarm occurs.
- MH preferred products: Notifier or Siemens Fire Alarm System, or equal as approved by MH Fire Engineer.

FIRE ALARM

- Fire alarm systems shall be installed in accordance with the National Building Code of Canada, Canadian Electrical Code, CAN/ULC-S524, and Manitoba Hydro's Fire Manual.
- All installations or modifications to fire alarm systems shall be verified by the fire alarm manufacturer representative. Test results shall be provided to MB Hydro for review.

EXIT SIGNAGE

- Exit lighting shall be provided in accordance with the National Building Code and the Canadian Electrical Code.
- All exit signs shall be illuminated by LED light sources and shall have an emergency power NiCad battery.
- Exit signs shall be powered at 120 volts from emergency power panels, if available.
- The "Running Man" style EXIT sign that conforms to the CAN/ULC-S572 standard is required as set out by the National Building Code.

EMERGENCY LIGHTING

- Emergency lighting must be installed in accordance with the latest revision of the National Building Code.
- Provide standby emergency generator if motor loads require emergency power.

- All battery pack lighting, remote heads and exit lights shall be LED type. It is important that extra stock is available on site so that repairs can be done quickly and effectively as required for the life safety system.
- The battery packs shall be long life type and either 12 volts DC or 24 volts DC and shall be in accordance with CSA C22.2 No. 141.
- All battery packs shall be mounted on the wall using anchors capable of supporting the weight, or mounted on an appropriately sized shelf.
- Generator and Electrical rooms shall be provided with an emergency battery lighting pack.
- If a 12 volt DC battery lighting pack is used for emergency lighting power, it shall be rated for 36 watt to 360 watt and should not be self-testing.
- If a 24 volt DC battery lighting pack is used for emergency lighting power, it shall be either a 360 watt unit or a 720 watt unit, and should not be self-testing.
- For both 12 volt DC and 24 volt DC systems, the heads and remote heads shall be 4 watts each.
- Battery packs that are fed from a 120 volt AC. source shall have a 120 volt duplex receptacle mounted adjacent so that the battery pack can be plugged into the receptacle, to facilitate testing and replacement when needed.

6.21. Division 31 – Earthwork

6.21.1. Earth Moving

FUNCTIONAL STATEMENT

Earth moving should be conducted in a safe, environmentally responsible manner that provides best value long-term.

SPECIFIC REQUIREMENTS

- Comply with Manitoba Hydro Safety requirements and Manitoba Work Safe: Guide for Excavation work.
- Manitoba Hydro will engage and pay for independent testing as specified by the Geotechnical Engineer.
- Prior to starting work on site, develop and implement an Erosion and Sedimentation control plan which addresses preservation of vegetation, construction access, sediment controls, soil stabilization, controlling of flow rates, drain inlet protection, control of pollutants, dewatering, protection of slopes, and maintenance and management of the plan.

6.21.2. Stormwater Management

FUNCTIONAL STATEMENT

Stormwater should be managed in a responsible manner to avoid overwhelming existing infrastructure and sedimentation of receiving sources.

SPECIFIC REQUIREMENTS

- Consider stormwater retention and re-use where feasible for sanitary flushing purposes or irrigation for landscaping.
- In urban locations, the post-development stormwater runoff rate shall not exceed the pre-development stormwater runoff rate.
- In urban and non-urban locations, use measures to filter stormwater runoff prior to discharging into natural bodies of water or the storm sewer.
- Perform site assessment to choose different sustainable methods to reduce the storm water flows and improve the quality of stormwater runoff such as bioswales, rain gardens, etc.
- Use bioswales: a shallow planted channel used to convey runoff through the site while allowing infiltration into the ground. Side slopes of swale shall be: 3:1 maximum. Longitudinal should be 1-2%. Vegetation shall be self-sustaining, without the need for fertilizers or pesticides. For resilient and robust planting, native species which can tolerate periods of drought and periodic inundation are recommended.

6.22. Division 32 – Exterior Improvements

FUNCTIONAL STATEMENT

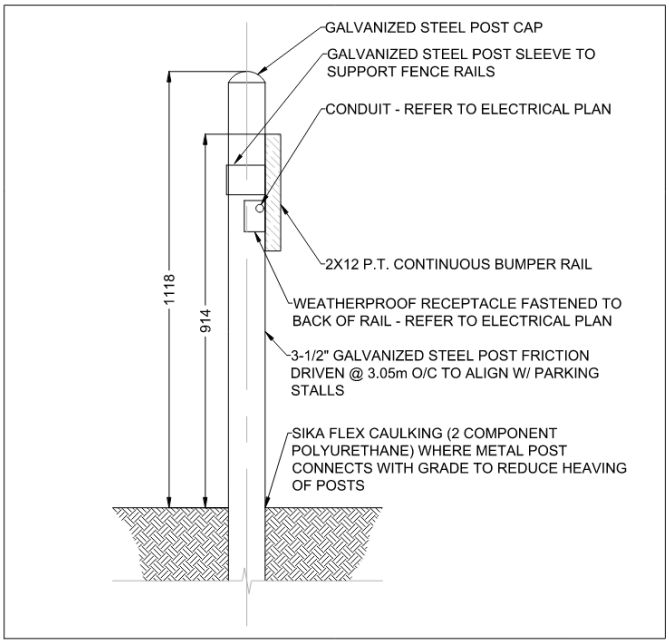
Exterior surfaces finishes shall be functional, sustainable, safe and universally accessible. Preference should be given to local materials with minimum maintenance requirements.

SPECIFIC REQUIREMENTS

- Follow Canadian Landscape Standards by CSLA
- Use vegetation to maximize the co-benefits of Biodiversity and Amenity. Plant material selection should be based on site specific consideration of soil, drainage, exposure and other pertinent conditions. All plant material shall conform to the Canadian Nursery Trades Association Metric Guide Specifications and Standards.
- Consider views from indoors to outside in planting design.
- Install bike racks for all facilities within 10km of a residential neighbourhood. Racks for staff shall be installed under cover to protect from the elements.
- Minimum two years of maintenance is recommended to establish plants properly on the site.
- Provide well-designed exterior surface and landscape areas that are simple in design and layout and that require low amounts of maintenance.
- Landscaping over building and parkade structures requires careful attention in order to avoid ongoing maintenance. Avoid small areas of sod and trees and shrubs with aggressive root systems.
- Locate trees to avoid maintenance resulting from falling leaves in gutters or catch basins, and tree root issues at building foundations.
- Provide an outdoor seating area for staff at locations with full-time occupancy.

- Specify plantings that require little or no irrigation. Generally, employ native plant species. Provide plant species appropriate to Natural Resources Canada's Plant Hardiness Zone specific to the project location.

- Invasive /alien plant species or aquatic species are not allowed. Check Government of Canada's current list of invasive and invasive alien species.
- Protect existing trees of significance: All healthy trees above 6" caliper are to be protected.
- Protect habitat for plant and animal species identified as threatened or endangered within the Government of Canada's Species at Risk Act.
- Select hard surface exterior paving material with low solar heat gain qualities
- Site design to consider principles of Crime Prevention through Environmental Design
- Design exterior parking barriers with a sleeve connection to allow adjustments to be made to the rail when levels rise and fall. See typical detail



4 TYPICAL PARKING FENCE RECEPTACLE DETAIL
N.T.S.

- Provide at least one level 2 electric vehicle charging station in a preferred parking spot for all locations with at least 20 full-time occupants. Consider additional charging stations depending on overall building capacity.

7.

7. Glossary

Developments incorporating Building Resilience and Construction Quality have a descriptive and regulatory language that is specific to the requirements of this design and construction strategy:

Accessibility

A barrier-free design standard that allows for persons with disabilities to approach, enter, pass to and from, and make use of an area, its facilities, and technologies without the assistance of a third party or caregiver. Accessibility allows for independence of use and movement by individuals who have a loss or a reduction of functional ability, including persons in wheelchairs or those with a sensory disability, such as visual or hearing impairment. Universal Design – which pertains to the design of spaces, environments and products to be usable by all people, including those with disabilities, without the need of specialized design – may be requested by MBH for "Enhanced Accessibility" for specific projects.

Adaptable Buildings

Anticipating future needs, or changing aspects of existing buildings and public spaces to make them more functionally useful, to people with diverse abilities.

For example, bathrooms without grab bars can be constructed with backing in the wall framing, to enable the addition of grab bars in the future.

ANSI

The American National Standards Institute [ANSI] is a standards organization that oversees the development of voluntary consensus standards for a large variety of products, services, systems, and personnel in the United States. In addition, the organization coordinates U.S. standards with international standards to try to ensure consistency.

ASHRAE

The American Society of Heating, Refrigerating and Air-Conditioning [ASHRAE] is an international standards organization for numerous building related systems. It is the organization's mission to advance the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry.

Automatic Door / Power-Assisted Door

A door equipped with power-operation and controls that open and close the door without manually touching the door. Switches for such doors typically are push plates to enable accessibility, but can also include photoelectrical devices, or floor mat actuators.

Power-assisted doors to promote accessibility should be installed at building entrances and key interior doors, such as washroom doors.

BACNet

Is an ANSI / ASHRAE standard communications protocol for direct digital control networks and automated building mechanisms. It was designed to be used for applications such as heating, ventilation, and air-conditioning control, lighting, access control, and fire detection systems and their associated equipment.

Barrier-Free Design

A design philosophy that looks to eliminate physical barriers on the ground plane that impede freedom of movement. Primarily concerned with avoiding curbs, steps or changes in grade that make movement in a wheelchair difficult or impossible, barrier- free design also helps the average person's ease of mobility, since trip hazards are avoided or eliminated.

MB Building Code

The legislation that governs the design and construction of new buildings, additions to buildings, alterations to existing buildings, and the occupancy of any building. The MB Building Code adopts the National Building Code of Canada, with amendments, and sets out the minimum requirements for accommodating energy efficiency and accessibility in buildings.

MECB 2013

The Manitoba Energy Code for Buildings 2013 adopts the National Energy Code of Canada for Buildings (NECB) 2011, with amendments and provides minimum requirements for the design and construction of energy-efficient buildings and covers the building envelope, systems and equipment for heating, ventilating and air-conditioning, service water heating, lighting, and the provision of electrical power systems and motors.

Crime Prevention through Environmental Design [CPTED]

An approach to building and urban design which can foster feelings of security for residents and users. CPTED principles should also endeavor to accommodate principles of Enhanced Accessibility.

Direct Digital Control [DDC]

Refers to the building automation system that will typically be used to control lighting and HVAC mechanical systems in a building.

Egress, Means of

A continuous and unobstructed path of exit travel, in a vertical or horizontal travel direction, or a combination of both, that provides for the ability to safely leave a building. On upper floors of a building, an accessible means of egress allows for exit to be accommodated without the use of stairs, elevators or escalators, by means of providing areas of rescue assistance, such as areas of refuge or protected lobbies.

Energy Star® and Energy Star® Certified [Also, Energy Star® Portfolio Manager]

Energy Star® is an international standard for energy efficient consumer products. Energy Star® qualified products meet strict technical specifications for energy performance --- tested and certified.

Energy Star® Certified refers to products and buildings that meet strict North American energy performance standards. Typically these products and buildings use at least 20-30% less energy than required by comparable federal standards.

Energy Star® Portfolio Manager is an online tool that can be used to measure and track energy use, water consumption, and greenhouse gas emissions, and to benchmark a building's performance against similar type buildings in Canada. A certification is provided when a building scores above the 75th percentile on the Energy Star® performance scale. All MB Hydro facilities are registered with Energy Star® Portfolio Manager.

HVAC

Heating, Ventilation and Air Conditioning [HVAC] is the technology of indoor environmental comfort. HVAC system design is a sub-discipline of mechanical engineering, based on the principles of thermodynamics, fluid mechanics, and heat transfer.

IESNA

The Illuminating Engineering Society of North America [IESNA] is a non-profit organization that publishes standards for the lighting industry.

IP

Refers to Internet Protocol, the principal communications protocol in the Internet protocol suite for relaying datagrams across network boundaries.

MERV

The minimum efficiency reporting value [MERV], is an ASHRAE measurement scale designed to rate the effectiveness of air filters, based on a rating scale of 1 to 16.

Higher MERV ratings correspond to a greater percentage of air particles being captured on each pass through a filter. A MERV 16 filter will capture more than 95% if particles sized from 0.3 to 10 micrometers.

MSTP

Multiple Spanning Tree Protocol [MSTP] is an open source communications protocol language connecting terminal controllers to a main direct digital control processing system, and is defined by the applicable networking standard IEEE 802.1Q.

NRCan

Natural Resources Canada [NRCan] works with other government departments, the provinces and territories, and other Canadian and international partners to address energy needs and potential, while considering new policies, practices, and technologies.

Service Entrance

Typically a non-public entrance, provided for the delivery of goods and services. As such entrances often also provide entry for staff, principles of accessibility should also be considered.

Signage

Providing for general information or way-finding in buildings and in the public realm, signage should provide for a wide range of effectiveness in communication, and include an appropriate combination of written word, pictorial, and tactile information, including Braille.

Sustainability

Meeting present needs without compromising the ability of future generations to meet their needs. Sustainability is described as having three main components: economic, social and environmental. Providing for accessibility and barrier-free design enhances the social sustainability of urban places for the long term.

TCP/IP

Transmission Control Protocol / Internet Protocol. It is the principal communication protocol in the Internet protocol suite for relaying datagrams across network boundaries.

Technically Not Feasible [Building Renovations and Alterations]

When an existing building is being altered, at times a building upgrade cannot be contemplated because of structural or building services considerations.

In some instances building upgrades that promote use of the building by persons with disabilities should be contemplated, even though they do not provide complete compliance with minimum code requirements for new construction, and are “technically not feasible”.

An example of such a condition would be the installation of a wheelchair lift in a building that cannot accommodate installation of a code-compliant elevator. Inadequate budget is not a reason to relax full compliance.

Virtual Metering

Function of monitoring energy use of specific systems or pieces of equipment, based on demand and run time, through a building’s direct digital control system and analog current transducers.

Wayfinding

The spatial problem-solving process that a person uses to reach a destination. Wayfinding is assisted by orientation clues that can be made available in the local setting, and includes signage, surface textures, colours, illumination, acoustic treatments, and other architectural features.

8. Appendices

Appendices are available from Manitoba Hydro Corporate Facilities as separate documents.

8.1. MH Facilities Energy and Sustainable Policy

8.2. MH Corporate Values Quick Reference Guide

8.3. MH Building Automation System Guidance

8.4. MH Mechanical System Standards (In Development)

8.5. MH Furniture and Space Standards

8.6. MH Standards for Security Fencing

8.7. MH Standard General Conditions and General Requirements

8.8. MH Minimum Standards for Drawings Produced and Submitted by Engineering Consultants, Architectural Consultants, and Drafting Services

8.9. MH Corporate Facilities Drawing Standards 2020

8.10. MH Drawing Numbering System

8.11. MH Interior Signage Standards

8.12. Systems Naming Protocol

MBH is in the process of establishing a standard naming protocol for all equipment in their facilities. Equipment naming shall be in accordance with the following naming protocols. Lamacoid plaques shall be specified for all equipment in mechanical and electrical rooms and rooftops.

Systems	Label	System	Label
Air Compressor	ACM	Forced Flow Heater	FF
Air Conditioner	AC	Furnace	FUR
Air Handler	AHU	Generator	GEN
Air Separator	AS	Geo-Exchange System	GEOX
Backflow Preventor	BP	Glycol	GLY
Boiler	B	Heat Exchanger	HE
Buffer Tank	BT	Heat Pump System	HP
Cabinet Unit Heater	CUH	Heat Recovery Ventilator	HRV
Ceiling Fan	CF	Heating Coil	HC
Chilled Water	CW	Humidifier	HUM
Chiller	CH	Infrared Heater	IFR
Carbon Dioxide Sensor	CO	Makeup Air System	MUA
Cooling Tower	CT	Multi-Zone Air System	MZ
Dehumidifier	DH	Outdoor Air	OA
Direct Expansion Cooling	DX	Pump	P
Domestic Cold Water Systems	DCW	Radiant Panel	RP
Domestic Hot Water Systems	DHW	Roof Top Unit	RTU
Electric Duct Heater	EDH	Single Zone System	SZ
Electric Unit Heater	EUH	Storage Tank	ST
Energy Recovery Ventilator	ERV	Terminal Reheat	TR
Exhaust Fan	EF	Unit Heater	UH
Expansion Tank	ET	Variable Air Volume	VAV
Fan Coil	FC	Variable Frequency Drive	VFD

Equipment shall be numbered using the following standardized naming protocol:

Equipment Label-##.$$

- Where ## is a number representing the floor number where the unit is located. When the unit is located on the roof, use 'R' instead of a number.
- Where $$$ is a number representing the sequential numbering of units

Example, when a building has three rooftop air conditioners, they would be labelled AC-R-01, AC-R-02, and AC-R-03.

8.13. MH Standard Finishes

8.14. MH Generic Guideline for Premises Cabling

8.15. MH Brand Guidelines

8.16. MH Commissioning Guidelines

01 79 00 Demonstration and Training

01 91 13 General Cx Requirements

8.17. MH Fire Manual

8.18. Quick Reference Guide: Standards

ASHRAE 1.4-2019 – Preparing Systems Manuals for Facilities

ASHRAE 62.1-2019 – Ventilation for Acceptable Indoor Air Quality

ASHRAE 160-2009 - Criteria for Moisture-Control Design Analysis in Buildings

ASHRAE 55-2017 – Thermal Environmental Conditions for Human Occupancy

CSA S478-2019 - Guideline on Durability in Buildings

CSA 101-A440-17 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

CSA A440S-1:17 - Canadian Supplement to the North American Fenestration Standard

CSA B651:18 - Accessible Design for the Built Environment

CSA A460:19 - Bird-friendly Building Design

IES RP-28-20 - Recommended Practice: Lighting and the Visual Environment for Older Adults and the Visually Impaired

MECB-2013 - National Energy Code for Buildings, with Manitoba Amendments

NAAWS 4.0 - North American Architectural Woodwork Standards 4.0 (2021)

NECB-2011 – National Energy Code for Buildings