Alberta Infrastructure

Efficient Operations of Alberta Infrastructure Facilities

"The Green Guide"
Fourth Edition

Revised July 2024

Mission Statement

The Green Guide will assist Alberta Infrastructure's Property Management team in establishing, unifying and maintaining energy efficient and environmentally friendly building operations within a diverse portfolio. It promotes proven initiatives and strategies that are to be implemented as appropriate, recognizing that Alberta Infrastructure espouses individual leadership, operational competency and social responsibility in building operations.

Efficient Operations of Alberta Infrastructure Facilities outlines basic requirements, policies, and recommendations for the operation of Infrastructure owned buildings. The intention is that this document will act as a main reference for the operation of existing buildings while acting as a supplement to "Technical Design Requirements for Alberta Infrastructure Facilities" (Appendix A) for the renovation or construction of new and existing buildings. The expectation is that most of the strategies outlined in this document should be applicable to all buildings in Alberta Infrastructure's portfolio. While many of the strategies described within extend across the Properties Division, specific practices must be adapted on a site-by-site basis as circumstances dictate.

Input to the continual updating of this document is invited. Comments can be directed to:

Building Support Manager
Infrastructure - Property Management Programs & Integration

Energy Specialist
Infrastructure - Property Management Programs & Integration

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Section 1.0 Energy Use

Energy Use Policy

Alberta Infrastructure is committed to reducing harmful emissions to the environment by promoting the use of renewable resources, seeking energy efficient equipment, educating users and managing utilities with the goal of reducing consumption.

General Recommendations

1.1 Lighting

1.1.1 General Interior Building Areas (Office, Hallway, Lobby, Storage, Kitchen, Washrooms)

1. General open office area lighting should consist of high-efficiency lighting with a lighting level minimally required for the visual task. The suggested maximum lighting level on desk surface is 500 lux.
2. Lighting diffusers/lenses should be cleaned on a regular schedule.
3. Night lighting should be used to minimize the use of full lighting systems during non-operating hours.

1.1.2 High Bay and Exterior Lighting (Warehouses, Shop Areas, Parking Lots, Pedways)

1. High bay lighting should consist of high-efficiency T5 fluorescent tubes or LED lighting lowered to the minimally acceptable clearance for ease of light replacement.
2. Where fluorescent lighting is in hard to reach places, LED or Induction Lighting should be used to reduce need to replace bulbs due to the substantially longer bulb life.
3. Mercury vapor lights should not be used due to poor energy efficiency. Lower wattage metal halide lights should be replaced with LED or Induction lights.

1.1.3 Lighting Controls and Placement

1. Lights should be re-wired, particularly during renovations, into banks that correspond to location, activity type, and available daylight to reduce wasted light in unoccupied spaces.
2. Where possible, light banks should be independently controlled via switching systems that are programmable for changes in activity.
3. Where possible, lighting systems should incorporate daylight sensors and dimming technology that lower light output to the minimum level when daylight is available.

4. Photocells, if existent, should be cleaned on a regular basis to maintain optimal efficiency.

5. After hour workers should have the ability to light their immediate working area only, and if over-ride is provided, it should be limited to 2 hours.

6. Occupancy sensors and timers should be incorporated in all 'high downtime' areas that use fluorescent tubes such as washrooms, warehouses, shops, kitchens, printing/photocopy rooms, staircases, etc.

7. Exterior lighting should be controlled by photo sensors, time clocks, or Building Monitoring and Control Systems (BMCS) and be turned off whenever possible to reduce energy use and light pollution.

1.1.4 Fixtures and Ballasts

2. Specular (mirror-finish) reflectors should be used to improve efficiency of light fixtures.

3. Incandescent exit signs should be replaced with 3-7 W LED exit signs.

4. Refer to Technical Specification sections regarding removal and disposal of PCB capacitors, ballasts and transformers (Appendix B.3).

1.2 Energy Benchmarking, Monitoring, and Audits

1. Building management shall utilize the EnergyCAP system to track monthly energy use. System access and training can be set up by contacting:

   Energy Specialist
   Infrastructure – Property Management Programs & Integration

2. Before any major renovation or energy efficiency initiative is undertaken, consider scheduling an Energy Audit and benchmarking session with:

   Energy Specialist
   Infrastructure – Property Management Programs & Integration

1.3 Heating, Ventilation and Air Conditioning

1.3.1 Heating

1. When replacing boiler systems, ensure a heat loss calculation is performed and the equipment is sized to run at full output in order to maximize efficiency.

2. All boilers and manifolds should be fully insulated to reduce unnecessary heat loss.

3. Consider isolating offline boilers. It is recommended that warm water be run through pipes before restarting.

4. Constant speed pumps should be replaced with variable speed pumps, respective to load. If a variable speed pump is installed, it should be controlled by the temperature of the return water or heat loads of the space.

5. Condensing boilers should be used only in facilities where the whole heating system was designed for condensing boiler operation. If the heating system was not sized for low temperature heating (50^0C/40^0C or 60^0C/40^0C for supply and return water temperatures) the condensing boiler will not condense the flue gases to extract that extra, latent heat from the combustion process.
6. All Boilers and manifolds should be well insulated.

1.3.2 Ventilation/Cooling

1. High efficiency motors should be installed everywhere cost permitting. Variable speed control should be used for electric motors powering fans.

2. Reduce pressure losses and minimize duct leakage in distribution systems by sealing joints.

3. Ensure outside air damper seals are in good condition and are closed when the fan is off to reduce outside air leakage back into the building.

4. Washroom exhaust fans should be on occupancy sensors.

5. Variable capacity chillers should be considered when replacing existing chillers.

6. Buildings should utilize night cooling to reduce energy required for air conditioning, where feasible.

7. Dedicated air conditioning units should be installed where year-round air conditioning is required, free cooling should be used during heating season wherever possible.

8. Whenever possible, discontinue the use of “once through” water cooled cooling units in favor of more efficient cooling units (air cooled or recirculating/closed loop water cooled units).

1.3.3 System and Controls

1. Building Monitoring and Control System (BMCS) should be in place with full control and monitoring of central systems including lighting. System should be regularly checked and calibrated by a consultant specializing in system calibration.

2. Control limits on temperature setpoints should be as wide as possible for the type of space (office, storage, conference, etc).

3. Space set-point should be at 22 ^{O}C or lower for heating; 24^{O}C or higher for cooling.
4. Use of indoor/outdoor reset control for boilers and heating pumps should be in place.
5. Out-of-limit alarms that affect energy efficiency should be investigated immediately.
6. Management reports should be prepared to show deviations from optimal operating conditions in both technical and financial terms. Deviations should be explained and prevented in the future.
7. Carbon dioxide sensors should be incorporated into the BMCS to monitor indoor air quality.
8. Record of pump control and operation should be kept onsite.
9. Where system override is provided, it should be limited to 2 hours.
   It is highly recommended to ask the operator to maintain a logbook for "System Manual Overrides" and fill It as shown below for audit purpose.

	Start Date	Start Time	End Date	End Time	Reason for Manual Override	Description of Manual Override	Identified Root cause of complain/issue/reason (Y/N) If yes, please explain
Example	2023-11-01	7:00 AM	2023-11-01	4:00 PM	Client was not happy with the space temperature	Outdoor Air dampers were opened at 100 percent	No

10. Simultaneous heating and cooling should be minimized.
11. Major equipment should not be started simultaneously; instead, sequence startup of major loads in order to reduce demand use charges.

1.4 Domestic Water

Domestic hot water in Alberta Infrastructure buildings must satisfy client needs, while still maintaining energy efficiency and preventing the occurrence of *Legionella* bacteria in the system.

1. Depending on building type and usage, instantaneous local point of use water heaters could be considered versus central plant heating.
2. Circulation and storage temperatures should be 60^{0}C (according to the CSC) to prevent Legionella growth.
3. Water heating and recirculation pumps should be shut off when building is unoccupied.
4. All heaters, pipe work, flanges, and other fittings should be fully insulated to reduce heat loss from the system.

1.5 Building Envelope

1. All exterior exposed doors should be adequately weather-stripped and insulated.
2. Exterior doors should have a method of minimizing open time through the use of door closers (ie. pneumatic, spring, etc.)
3. Regularly used loading docks with large interior/exterior temperature differences in the winter should investigate the potential of using an air curtain to prevent heat loss.
4. Exterior window shades should be considered to prevent solar gain in the summer.

1.6 Small Equipment

1. All vending machines should be de-lamped and controlled by an “energy miser” to slow the cooling compressor when customers are not present.
2. No portable fans or electric space heaters are to be used in offices; minimal usage should exist in other areas.
3. Use of refrigerated water coolers should be discouraged. Alternately, timers should operate coolers during work hours only.

1.7 Preventative Maintenance Management Plan

1. Building Management shall follow the Alberta Infrastructure’s Facilities Maintenance System (FMS) for all preventative maintenance procedures and schedules.
   The intent is to maintain equipment at optimal operating levels for an extended period of time and to spot issues before they arise which may negatively impact building’s energy use and carbon output.

   Preventative maintenance programs are available by contacting:
   Maintenance Engineer
   Infrastructure – Property Management Programs & Integration

Section 2.0 Water Use

Water Use Policy

Alberta Infrastructure is committed to reducing water consumption through the use of appropriate water management systems and equipment and by supporting strategies that help both the building owner and tenant use water more efficiently.

General Recommendations

2.1 Domestic Water

2.1.1 General Operations

1. A formalized, properly utilized reporting system for water leaks should be in place.
2. Daily walk-through checks for leaking appliances and pipes should occur.
3. All timed valves should be coordinated with occupancy hours and sensors.
4. Dry clean, rather than wet clean practices should be in place for sidewalks and parking lots.
5. Caretaking staff should be made aware of water conservation practices.
6. Replace appliances that use “once through cooling” with models that use water more efficiently.
7. Review “Water Treatment Program Manual, June 2014” for more information (Appendix B.6).

2.1.2 Washroom/Bathroom/Kitchen

1. Fixtures should be replaced with water efficient models as replacement needs dictate.
    - Toilets: 4.8 L/flush or less
    - Urinals: 1.9 L/flush or less
    - Lavatory and kitchen faucets: 5.7 L/min or less
    - Shower heads: 7.6 L/min or less
2. All urinals and toilets operating on flushometers should have water saving diaphragms installed.
3. Group showers should be equipped with timed shutoff mechanisms.
4. Commercial grade kitchen spray valves should contain auto-off features and a knife edge spray.

5. Garburators should be removed from kitchen sinks. Organic waste should be disposed through other means.

6. Single lever faucets should be used when replacing current fixtures.

2.1.3 Mechanical Systems

1. Steam condensate from various systems should be captured and reused.
2. Makeup water should be metered to identify efficiencies.
3. Cooling towers should not be 'overdriven' by flowing excess water to the tower-condenser loop.

2.2 Irrigation

2.2.1 General

1. Use of potable water for irrigation should be minimized. Alternately, use of rainwater should be maximized where possible.
2. Local drought management plans should be in place.

2.2.2 Landscape

1. Landscapes should be graded to ensure minimal runoff and maximum uniform water soak time.
2. Limit turf to necessary areas only. Make use of stone gardens, brick sidewalks, cedar planters, etc. where possible.
3. Proper landscaping procedures should be undertaken (mulching, aeration, etc) to minimize evaporation, reduce runoff and maximize water uptake.

2.2.3 Plant Selection

1. Drought tolerant turf should be used to minimize the need for irrigation.
2. Plants requiring similar moisture levels should be grouped together to make use of zoning.

2.2.4 Irrigation System

1. Computerized automatic irrigation systems should be installed in larger properties if regular watering is required.
2. Timed semi-automatic systems should be used for smaller properties.

3. Rain gauges and weather monitoring should be incorporated into irrigation system to determine water requirement.

4. Water in the morning when temperatures are cooler to minimize evaporation.

5. Drip systems should be used over spray systems for watering flowerbeds and shrubs.

6. Irrigation systems should be properly zoned to differentiate between the differing water requirements of turf, flowerbeds, trees, shrubs, etc.

2.3 Ornamental Structures (Fountains, Pools, etc.)

1. Ornamental structures should be engineered to re-circulate water and minimize required make-up water.

2. Structures should not be operated when traffic and area occupancy is low.

3. Where possible, ornamental structures should use non-potable water sources.

2.4 Water Monitoring, Metering, and Audits

1. Monthly water consumption data should be collected for all meters onsite.

2. All outdoor irrigation should be metered separately to differentiate it from domestic water use.

3. A local monitoring program for identifying large changes in water consumption should be put in place for identifying leaks, loss of water, and other unexplainable phenomena.

4. Building management shall utilize the EnergyCAP system to track monthly water use. System access and training can be set up by contacting:

    Energy Specialist
    Infrastructure – Property Management Programs & Integration

Section 3.0 Air Quality

Indoor Air Quality Policy

Alberta Infrastructure is committed to ensure that standard reporting processes and efforts to maintain environmental quality are met.

More Information

Alberta Infrastructure maintains an Indoor Air Quality Guideline (Appendix B.4) that was updated in June 2020. This document provides a detailed process to address indoor air quality (IAQ) factors at Government of Alberta occupied facilities with emphasis on proper preventative maintenance routines and an IAQ response process.

Technical Specification sections regarding Mould in Indoor Environments (Appendix B.5) .

In addition to these programs, specific operational practices and product selection will be implemented to further improve indoor air quality.

Any further concerns regarding Indoor Air Quality should be directed to:

Manager, Building Environmental Unit
Technical Services Branch
infras.trc@gov.ab.ca

General Recommendations

1. An Indoor Air Quality Monitoring Plan must be in place at the building.
2. Nighttime outdoor air purging should be utilized to improve indoor air quality.
3. Outdoor air and return air systems should use MERV 8 filters or better.
4. High traffic entryways should have track-off systems such as grills, grates, or matting.
5. Carbon monoxide monitors should be placed in enclosed parking areas and near gas/fuel fired building equipment.

Section 4.0 Comfort

General Recommendations

1. Building Management must utilize the Work Order Request Tracking System (WORTS) to address tenant issues (i.e., IAQ, comfort, etc.).

2. Where possible, design of the site features and the base building must ensure that areas generally accessed by the public are accessible and meet current barrier-free or accessibility standards or guidelines governing the facility.

3. Occupants should be given some control over thermal comfort parameters in tenant spaces.

Section 5.0 Health and Wellness

Hazardous Building Materials Management Plan

Hazardous Building Materials Policy

Alberta Infrastructure is committed to the safe and environmentally responsible assessment, removal, disposal and management of hazardous building materials and contaminated sites.

Alberta Infrastructure and its contractors will:

- Promote and exercise the safe and proper handling of hazardous materials associated with Alberta Infrastructure's contracts for the protection of individuals and the environment.
- Manage identified contaminated sites in a manner that will remediate and minimize further contamination to the environment.
- Provide employees with the information, training and support needed to fulfill environmental responsibilities and to promote environmental awareness.
- Conduct reviews to ensure compliance with applicable legislation, regulations and internal environmental standards.
- Verify that consultant's and contractor's work is in compliance with applicable legislation, regulations and internal environmental standards.
- Continually review and improve its environmental management system.
- Conduct an annual review of its environmental objectives and targets.

Alberta Infrastructure has internal resources to help facility managers and building operators identify and manage hazardous materials. For building specific information or to inquire about a hazardous materials survey, contact:

Manager, Building Environmental Unit
Technical Services Branch
infras.trc@gov.ab.ca

General Recommendations

1. Building Management shall adhere to the abovementioned Hazardous Materials Policy.

2. The following maintenance activities should be followed to prevent the occurrence of legionella in the water systems: using effective drift eliminators, periodical cleaning, and employing a water treatment program with a proper biocide.

3. Secondary containment measures should be in place where chemicals are stored and used (i.e. spill containment pallets).

4. All buildings should have a comprehensive lead survey completed and consulted anytime renovations occur. Contact the Building Environment Manager listed above to determine the best course of action. (Appendix B.1)

5. Technical Specification Sections on Asbestos Management (and related) should be followed when dealing with asbestos (Appendix B.2).

6. All buildings should have a comprehensive asbestos survey completed and consulted anytime renovations occur. Contact the Building Environment Manager listed above to determine the best course of action.

7. All asbestos identified within buildings should be removed or encapsulated as soon as possible.

8. A Hazardous Chemical Products Management Program must be in place at the building, including at a minimum proper labelling and storage of chemicals, an up to date inventory of MSDS/WHMIS sheets stored on site (sheets must not be older than 3 years), and spill kits and spill containment procedures in place where chemicals are stored and used.

9. Response plans should exist for handling incidental release of hazardous materials.

Section 6.0 Purchasing

Materials Selection Policy

Alberta Infrastructure is committed to and supports the use of low environmental impact building materials, equipment and supplies in all of its facilities.

Alberta Infrastructure encourages the use of environmentally friendly materials in the construction, renovation, and caretaking of all buildings. This includes supporting products that are produced with minimal impacts to the environment and low or no off gassing carpeting and furnishings. Materials and supplies will have a high recycled content.

Construction Materials

1. Where options exist with respect to construction materials, materials that have minimal environmental impact while achieving its prime function should be chosen. This includes use of:

    a. Locally produced materials
    b. Materials which have a long lifespan with minimal maintenance
    c. Materials which are produced from renewable resources

2. Contracted services should be encouraged to identify to management any additional product and material changes that would further decrease negative environmental impacts.

Appendices

Appendix A
Technical Design Requirements for Alberta Infrastructure Facilities

Appendix B.1
Asbestos Management Technical Bulletins

Appendix B.2
Technical Specification: 02 82 01 Asbestos Control General Requirements
Technical Specification: 02 82 05 Asbestos Containment Procedures
Technical Specification: 02 82 15 Asbestos Encapsulation
Technical Specification: 02 82 33 Asbestos Removal

Appendix B.3
Technical Specification: 02 84 16 Removal and Disposal of PCB Capacitors and Ballasts
Technical Specification: 02 84 25 Removal and Disposal of PCB Filled Transformers

Appendix B.4
Indoor Air Quality Guideline

Appendix B.5
Technical Specification: 02 85 05 Mould Removal General Requirements
Technical Specification: 02 85 16 Mould Containment Procedures
Technical Specification: 02 85 33 Mould Removal Procedures

Appendix B.6
Water Treatment Program Manual