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building green hospitals checklist

Canadian healthcare facilities are a powerful symbol of health and a recognized community leader. It is incompatible with the healing mission for these facilities to be sources of environmental harm through air and wastewater emissions, hazardous and solid waste generation, toxic chemical usage, greenhouse gas emissions, and poor indoor air quality. Many managers of aging Canadian healthcare facilities are beginning to design new facilities or add on to existing facilities. As healthcare corporations begin to plan for new facilities or additions, it is an opportune time to include environmental criteria into the usual design drivers of performance, cost, quality, patient and staff safety, and cultural, legal, and technical criteria.

The following checklist is intended to provide guidance to building project teams as members turn their focus toward green design and construction of new projects. In short, we encourage "whole system" thinking, front-loaded design, end-user consideration (staff and patients), and teamwork.

The checklist is but a sampling of the many initiatives to consider as we move toward green health care. The members of the Canadian Coalition for Green Health Care encourage hospitals to open dialogue and work with all their internal and external stakeholders to move toward a completely green hospital. ●

Prepared on behalf of the Canadian Coalition for Green Health Care (www.greenhealthcare.ca). The authors gratefully acknowledge the assistance of the Northumberland Health Care Corporation (Cobourg, Ontario), Health Care Without Harm, and the Canadian Healthcare Engineering Society. For more information, contact Kent Waddington (kent@kentwaddington.com).

BUILDING GREEN HOSPITALS CHECKLIST

1. Choose an Environmentally Friendly Site

- ☐ Avoid farmland, wetlands, flood plains, environmentally sensitive lands, and hazardous substance sites.
- ☐ Rehabilitate vacant areas as necessary.
- ☐ Share existing parking/transportation infrastructure.
- ☐ Minimize heat island (thermal gradient differences between developed and undeveloped areas).
- ☐ Take advantage of existing transit, water, and energy infrastructure in the community.
- ☐ Preserve local habitat, greenfields, and natural resources.

2. Design for Sustainability and Efficiency

Building

- ☐ Prioritize parks, greenways, and bikeways throughout the new hospital area. Plan sufficient shade.
- ☐ Investigate incentives available from the U.S. Department of Energy.
- ☐ Consider (re)use of existing buildings, including structure, shell, etc.
- ☐ Identify opportunities to incorporate recycled materials into the building, such as beams and posts, flooring, paneling, bricks, doors, frames, cabinetry, furniture, trim, etc.
- ☐ Provide suitable means of securing bicycles with convenient change/shower facilities for those who cycle to work.
- ☐ Design for durability—life cycle costing/value engineering strategy for finishes and systems to reduce waste.
- ☐ Maximize daylighting and view opportunities (building orientation, exterior/interior shading devices, high-performance glazing, photo-integrated light sensors, shallow floor plates, increased building perimeter, etc.).
- ☐ Designate an area for recyclable collection and storage that is appropriate and convenient with consideration given to using cardboard balers, aluminum can crushers, recycling chutes, and other waste management technologies to enhance recycling program.
- ☐ Consider the installation of an on-site compost vessel.
- ☐ Design for adaptability of building design as user needs change.
- ☐ Establish a project goal for locally sourced materials and identify materials and material suppliers that can help achieve this goal; this reduces environmental impact due to transportation and supports the local economy.
- ☐ Provide capacity for indoor air quality monitoring to sustain long-term occupant health and comfort (carbon dioxide sensors integrated into building automation system).

Energy

- ☐ Orient building to take advantage of solar energy for heating and daylighting, and to encourage natural ventilation and passive cooling.
- ☐ Consider heat recovery systems where appropriate.
- ☐ Use computer-simulation model to assist in maximizing energy performance.
- ☐ Install mechanical ventilation equipment.
- ☐ Install high-efficiency heating and cooling equipment.
- ☐ Install a lighting control system.
- ☐ Install high-efficiency lights, appliances, and fixtures with motion/occupancy sensors where appropriate.
- ☐ Consider heating/cooling and energy from renewable sources (e.g., solar, wind, biomass, geothermal, bio-gas, etc.).
- ☐ Minimize light pollution by proper and judicious illumination.
- ☐ Design the building with equipment to measure water and energy performance.
- ☐ Consider task lighting "opening window" technology, and underfloor HVAC systems with individual diffusers.
- ☐ Exceed minimum insulation requirements for walls, ceilings, etc., as prescribed by the U.S. Department of Energy.
- ☐ Install and maintain a temperature/humidity monitoring system to automatically adjust to building conditions and link system to building automation system.
- ☐ Consider the use of Energy Star and Environmental Choice products wherever possible.
- ☐ Deploy a monitoring and tracking system for all energy inputs with scheduled reviews to ensure efficiencies are being met.

Water

- ☐ Evaluate safe strategies to recycle wastewater/gray water for other purposes on the site.
- ☐ Limit disruption of storm water flows by minimizing runoff, increase on-site infiltration, and reduce containments through constructed wetlands, bioswales, etc.
- ☐ Consider collecting storm water runoff for other purposes (irrigation) on the site.
- ☐ Consider use of reverse osmosis feed water to feed steam boilers in power plant to reduce chemicals required, produce cleaner steam, increase cycles, and reduce boiler blowdown to the environment.
- ☐ Landscape with drought-resistant native plants and perennial ground covers. Situate building to take advantage of existing vegetation.
- ☐ Use low-flow taps, nozzles, and toilets.

Evaluation

- ☐ Ensure that building elements are installed and calibrated properly to meet the project's environmental health goals in addition to mechanical, electrical, and plumbing system requirements.
- ☐ Perform a two-week building flushout or test contaminant levels in building before occupancy.

Chemical/Indoor Air Quality

- ☐ Avoid ozone-depleting chemicals in mechanical equipment and insulation (zero tolerance for CFC-based refrigerant).
- ☐ Avoid materials that will offgass pollutants, such as solvent-based finishes and adhesives, carpeting, and particleboards that release formaldehyde.
- ☐ Audit existing building systems using refrigerant and fire suppression chemicals and remove HCFCs and halons.
- ☐ Specify refrigeration/fire-suppression systems that use no HCFCs or halons.
- ☐ Specify materials free from toxic chemicals and that do not release toxic byproducts throughout their life cycle, and avoid those toxins that are carcinogenic, persistent, or bioaccumulative. Key materials to avoid include mercury (switching equipment), arsenic (pressure-treated wood), urea formaldehyde (engineered wood), PVC (floors, wall coverings, furniture, roof membranes, plumbing pipe, electrical wire), and asbestos.
- ☐ Place air intakes away from vehicles and other such sources of pollution to prevent indoor air contamination.
- ☐ Adopt an indoor air quality management plan to protect the HVAC system during construction, control pollutant sources, and interrupt pathways for contamination.

Waste

- ☐ Encourage environmentally responsible forest management by using wood-based materials certified in accordance with the Forest Stewardship Council Principles and Criteria.
- ☐ Incorporate materials that are designed for disassembly and recycle/reuse at the end of functional life.
- ☐ Ensure adequate space for storage of hazardous waste (e.g., biomedical, chemical, radioactive, etc.).

3. Use Green Building Materials and Products

- ☐ Minimize the use of carpets and other such materials that have the potential to absorb and release indoor pollutants.
- ☐ Use high-reflectant roofing.
- ☐ Use high-performance windows (double-glazed, argon, etc.).
- ☐ Use rapidly renewable building materials, such as bamboo flooring, wool carpet, strawboard, linoleum, poplar OSB, sunflower seed board, wheatgrass cabinetry, hemp fabrics, etc.

- ☐ Use durable products and materials that require low maintenance.

4. Think Green During Construction

- ☐ Establish landfill diversion plan for site and building elements (land clearing debris, cardboard, metals, brick, concrete, plastic, clean wood, glass gypsum wallboard, carpet insulation) and track efforts to comply with recycling/diversion plan.
- ☐ Protect trees and topsoil during site work.
- ☐ Centralize cutting operations to reduce job site waste and simplify sorting.
- ☐ Minimize construction packaging material or return such waste to suppliers for reuse/recycling.
- ☐ Educate and seek feedback from crews, including subcontractors, about the environmental vision and the importance of green design and construction practices.

5. Keep Greening

- ☐ Establish a waste separation and recycling program, and educate staff as to the benefits.
- ☐ Educate and engage staff in all departments in current environmental initiatives and about opportunities to get involved.
- ☐ Establish a "Green Team" of staff from all departments to monitor progress toward environmental goals.
- ☐ Draft a measurements and verification plan to compare predicted savings (water, electricity) with those actually achieved once built.
- ☐ Create a staff environmental coordinator position.
- ☐ Phase out the use of chemical pesticides on greenspace in favor of organic horticultural approaches.
- ☐ Adopt green procurement protocols to screen all products for environmental benefits and alternatives.
- ☐ Develop an environmental management system.
- ☐ Engage in a "green power" contract with a local utility.
- ☐ Identify local recyclers/buyers of glass, plastic, organic waste, office paper, cardboard, etc.
- ☐ Identify and support waste haulers/recyclers who share a green philosophy.
- ☐ Initiate a policy of purchasing only fairly traded coffee and chocolate products in cafeterias/vending machines.
- ☐ Develop a wellness initiative to improve the quality of the employee's work life.

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BUILDING GREEN HOSPITALS RESOURCES

American Society of Healthcare Engineering, Green Healthcare Construction Guidance Statement (www.ashe.org/ashe/products/pdfs/ashe_guidance_sustainconst_rev2_0410.pdf)

Building Materials for the Environmentally Hypersensitive, Canada Mortgage and Housing Corporation (www.cmhc-schl.gc.ca)

Canadian Coalition for Green Health Care (www.greenhealthcare.ca)

Canadian Healthcare Engineering Society (www.ches.org)

Health Care Without Harm (www.noharm.org)

Healthy Building Network (www.healthybuilding.net)

Hospitals for a Healthy Environment (www.h2e-online.org)

Natural Resources Canada's Dollars to $ense energy management workshops (oee.nrcan.gc.ca/workshops)

Natural Resources Canada's ecoENERGY Efficiency Initiative (oee.nrcan.gc.ca/commercial)

U.S. Department of Energy (www.doe.gov/energyefficiency)

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