

5.1.4.3

A phased project shall be planned to ensure a consistency across all of the projects. As much as possible, phased projects shall

- a) avoid building operating capacity that requires enhanced supports that do not get introduced till a much later phase;
- b) maintain consistency across all phases (wayfinding, service routes, materials, systems, etc.);
- c) perform work in earlier stages to avoid re-working recently completed work (e.g., provide connections/tie-ins to future phases and size central services to meet future demands); and
- d) plan for logical sequence of work (avoid disrupting the same areas in multiple projects).

5.1.4.4

In addition to phasing the project over several projects, construction of any or all projects could need to be “staged”; that is, construction could need to occur in smaller “steps” or stages to allow operations to safely continue while the earlier stages of construction/redevelopment occurs. Staging the construction of any phase of redevelopment shall be planned in consultation with service providers (clinical, support, administrative), building systems operators, and authorities having jurisdiction to mitigate all safety risks.

Where a project requires construction staging or phasing, this shall be considered in the early planning of the facility. Phasing or various stages of construction might present challenges that will impact the planning and design. In addition, there could be additional costs and scheduling constraints associated with this type of planning. These costs shall be factored into the early budgeting for the redevelopment.

During implementation (construction), staging and phasing shall be performed in accordance with Clause 5.3.3.

5.1.4.5

Staging shall be planned in accordance with CAN/CSA-Z317.13.

5.1.5 Master planning and assessment

5.1.5.1

A master plan shall be developed, based on the master program. The master plan shall

- a) specify how the functional objectives and space requirements identified in the master program can be achieved on the existing site or on a new site.
- b) provide the HCF with the vision of how to best allocate and develop space rationally and coherently in response to program needs, over a short, medium and longer-term.
- c) describe the existing situation, define opportunities for development, make recommendations for implementing the master program, summarize capital costs for development options, and illustrate the building strategy and phasing in schematic design form.

Notes:

- 1) If the HCF already has a master plan, it might only be necessary to update it to reflect the current understanding of health care needs and the information of the community served.
- 2) Some HCFs, such as community health centres might not require a master plan as their expected building life cycle or lease of the facility will not outlast their service plan.
- 3) Staff who were involved in the initial planning should have the opportunity to review and comment on the master plan.

5.1.5.2

The master plan shall include the following in graphic and descriptive form:

- a) Existing and proposed site diagrams:
 - i) site services (utility locations and civil planning)
 - ii) utility locations
 - iii) civil planning
 - iv) site utilization
 - v) vehicular traffic flow
 - vi) pedestrian traffic flow
 - vii) entrances and exits from building(s)
 - viii) entrances and exits from site; and
 - ix) parking strategy (number of spaces, layout, etc.); and
- b) Existing and proposed building floor plans:
 - i) all floor plans at a scale no less than 25 mm (10 m);
 - ii) boundaries and names of all component space;
 - iii) primary vertical and horizontal circulation space; and
 - iv) entrances and exits from components and building.

5.1.5.3

The HCF master plan shall plan the site to address the multi-faceted layers of stakeholder requirements including the following:

- a) the functional requirements of the particular HCF;
- b) the requirements of municipal agencies;
- c) concerns and needs of other stakeholders;
- d) applicable jurisdictional requirements;

Note: Provincial/territorial and local codes and zoning by-laws can apply.

- e) design guidelines;
- f) the potential effect of the development on the site environment and surrounding ecosystems;
- g) sustainability targets in relation to the recognized sustainability program used (see Clause 4.6.1.2); and
- h) standards of practice.

Notes:

- 1) An understanding of each site's unique qualities is necessary to provide an optimum solution for a HCF and the community in which the HCF will be created. No two sites, existing or future, are the same. Each has their own qualities that need to be understood.
- 2) The process for developing and achieving consensus from stakeholders on the vision for the design/construction project should be seen as an investment in the success of the project. Through the collaborative process of listening to and documenting stakeholders' expectations and the desired outcome early in the design/construction process and throughout the process, the greater the likelihood of success throughout each stage of the project.
- 3) The planning process should consider cultural needs and expectations of the anticipated patient population as they apply throughout the HCF. For example, planning of spaces and services for indigenous populations (who are served by HCFs both within and outside of traditional communities) should consider how cultural aspects will touch on all areas of design, including those that extend beyond the traditional spiritual spaces such as chapels. Such plans could need to accommodate an indigenous formulary, integration of traditional healing, and other design elements that recognize the importance of cultural and spiritual beliefs. The needs of other populations could require different types of accommodation, specific to their cultural needs and expectations.

- 4) *It is useful to develop a staged approach to ensure the effective translation from vision statement to design concepts and operations as follows:*
- guiding principles speak to the shared values and culture of the organization as the project is developed and in operation;*
 - project goals set targets and methods for the successful implementation of the project; and*
 - design objectives describe the building performance and environmental qualities required to support the project goals.*

5.1.5.4

The master plan should be accompanied by a space table that compares the master program target areas with the areas provided in the master plan. It should include a summary of the total building gross floor area in the plan.

5.1.5.5

Depending on specific jurisdictional requirements, the master plan may also include

- building gross square metres (BGSM);
- breakdown by component (CGSM);
- master plan cost estimate, including
 - planning costs;
 - design fees;
 - design contingency;
 - construction costs;
 - staging costs (interim accommodations during implementation may include parking, shuttles, rent for off-site space, moving costs, renovations to interim space, etc.);
 - construction contingency;
 - escalation contingency;
 - miscellaneous construction-related costs (permits, fees, insurance);
 - commissioning costs;
 - ancillary costs (e.g., furniture and equipment); and
 - facility start-up costs.

Note: This can also include administrative costs for the overseeing agency's project specific staff, additional staffing needed during implementation (e.g., security, housekeeping, portering, duplicate clinical staff, etc.).
- project schedule, including
 - municipal submissions, e.g., site plan and building permit;
 - ministry approval to proceed;
 - commissioning (extends through all stages of the project);
 - schematic design development and review by authorities;
 - design development and review by authorities;
 - development and review of contract documents by authorities;
 - tender period, including closing and analysis;
 - approval to tender;
 - continuity of site service, and site preparation schedule;

Note: This includes

- relocation of patients and infrastructure supports;
- reassignment of wayfinding and transportation routes and corridors;
- compliance with initial IPC plan;
- preparation and approvals for construction fire safety plan;
- preparation and approvals for project site work safety plan; and
- maintaining compliance with insurance and site security requirements.

- x) construction;
- xi) phasing;
- xii) occupancy, including planning, training, etc.; and
- xiii) deficiency period.

Refer to applicable jurisdictional requirements for site remediation.

5.1.5.6

A site analysis shall be conducted for all construction projects.

Note: This is an essential pre-design service that includes evaluation of an existing or potential site in relation to the building program, budget and construction schedule.

For a renovation or addition to an existing building, there shall also be an infrastructure assessment. See Clause [5.1.12](#).

5.1.5.7

Depending on the scope and the nature of the project, a physical feasibility study could be needed for an existing HCF and aligned with the HCF Classification/role of the HCF in the regional delivery of health care services. The HCF shall determine prior to the completion of master planning if this type of study is needed.

5.1.5.8

Based on the site evaluation report, the HCF plan shall explain how the site will be impacted by the development. The master plan shall define long-term strategies for current and future infrastructure, and for current and future site use (i.e., parking and other on-site amenities that could be required in the short and long terms).

5.1.5.9

Planning shall incorporate strategies to eliminate the deficiencies identified in these assessments.

5.1.5.10

Depending on the complexity of the project, a sustainability review, an affordability review or a reaffirmation of the project scope may be required with the project sponsor and funding agencies.

5.1.5.11

A master plan shall be developed to define the requirements for the technology and communications systems in conjunction with the master plan for the facility. The master plan shall consider the following:

- a) the functional requirements of the particular HCF;
- b) the current state of the HCF and regional systems that will be part of the HCF going forward;
- c) integration between technology and communications systems, and with the telecommunication systems; and
- d) the need for different networks in the organization.

5.1.6 Functional program

5.1.6.1

A functional program shall be developed following the master plan and as a first step in preparing for the design stage. The functional program at the preconstruction stage shall provide a detailed

description of each proposed activity, together with an estimation of the building and staff resources which will be required to support each activity.

Note: Although simulation and mock-up tools are associated more with the design phase, there could be occasions where these tools could provide relevant information to support planning and programming decisions. See Clause 5.2.4.

5.1.6.2

The functional program shall describe in detail:

- a) the purpose of the project;
- b) the projected demand or utilization;
- c) major assumptions guiding the service;
- d) operational concepts and descriptions; functional requirements;
- e) staffing patterns and responsibilities;
- f) patient/family needs and the approach to accommodating these needs;
- g) supply and materials flow;
- h) component relationships;
- i) considerations for the planning and design of the space in order to achieve required functions;
- j) space requirements, and environment of care components (including key elements of the physical environment);
- k) strategies for flexibility and adaptability to ensure the facilities will continue to accommodate the changing health care environment over time;
- l) functional requirements; and
- m) other basic information related to fulfillment of the institution's objectives.

5.1.6.3

The functional program shall be developed taking into account the following considerations as they apply to the HCF being designed:

- a) population analysis, to determine potential volumes (workload) that are anticipated and the profile/characteristics of the patients;
- b) patient type based on historic services and projected needs (e.g., specialties, volumes, acuity, etc.);
- c) scope of services (i.e., the general functions performed by each service group, and the additional roles and functions they will provide in this particular HCF);
- d) critical mass/sufficient workload to sustain high quality;
- e) proximity to other service providers and the services provided; and
- f) availability of resources, such as
 - i) physicians;
 - ii) clinical and technical staff;
 - iii) allied health workers (e.g. social workers, physiotherapists, etc.);
 - iv) alternative care providers;
 - v) materials/specialized supplies; and
 - vi) clinical and general supporting services.

5.1.6.4

The functional program shall include analysis of the appropriate operating model on which to base the planning for each service. The description of the assumptions regarding the operating model shall include sufficient evidence to prove the HCF considered all applicable options and developed the functional program according to evidence-based design in other facilities.

The operating model and its implications on the facility planning shall be balanced against the need for flexibility. The HCF will sustain the health care needs of the community for 50+ years; as operating models evolve over time, the facilities shall be planned so that they are effective for the appropriate operating model — but also capable of adapting to changes that could occur in the future.

5.1.6.5

The functional program is the foundation for the building design and shall be the working document or reference point for the subsequent planning process. Its purposes are to:

- a) provide a brief for subsequent project participants (including the architect) to tell them what the project is about;
- b) provide a brief to the reader to summarize the critical themes for the project;
- c) describe the scope of services and functional needs of the program or service;
- d) determine the components necessary to create a positive experience for the patient and family members;
- e) document operational policies for the facilities (e.g., whether there will be central instrument processing, central registration, etc.) which will affect operations;
- f) establish who will do what (e.g., portering, reception functions, handing out and collecting meal trays, IV additives, etc.) and what will affect staffing, quality of service, and in some instances, organization of space;
- g) establish space requirements and distribution of space and directions for their organization in order to achieve desired functions; and
- h) provide advice regarding the planning and design of the space to achieve the identified functional requirements.

5.1.6.6

The functional program may focus on a single component or area, or encompass an entire institution; however, it shall include all services to be planned as part of the design stage.

It shall precede a capital project of any significance, as it shall act as the link between operational planning and construction. The process used to develop a functional program shall be interactive, including meetings with stakeholders critical to understanding and re-thinking the functional needs of the department or services. This may include patients/families, department staff (front-line, managers, etc. in the department and in directly associated departments), other service providers and medical staff as well as consultation with senior management and the board.

5.1.6.7

Depending on specific jurisdictional requirements, the functional program may include:

- a) assumptions/guiding principles;
- b) scope of services, functions, and procedures;
- c) projected workload and required staffing;
- d) advice or considerations for the planning and design of the area;
- e) projected space requirements;
- f) equipment requirements and costs (new and replacement);
- g) updated capital costs;
- h) other costs associated with the project (decanting);
- i) schedule update; and
- j) simulation based mock-up evaluations.

5.1.6.8

The functional programming process shall include activities to define the scope and content of the post-occupancy evaluation (POE). See Clause 5.6.

5.1.7 Furniture, fixture, and equipment planning

5.1.7.1

A list of necessary furnishings and equipment shall be developed to align with the functional requirements developed for the HCF. The goal is to select the most appropriate items with the very latest technology.

Note: See Clause 7.3.1.

5.1.7.2

To achieve these objectives; the HCF shall conduct the furnishings and equipment planning process as two stages:

- a) preliminary planning to source devices that match the service-delivery model, to set planning and design criteria necessary to accommodate the devices, and to identify realistic budget estimates; and
- b) detailed design, procurement, and installation; to develop detailed furniture and equipment solutions and to create facilities that will accommodate the specific needs of the devices.

Note: *The objectives of furnishings and equipment planning are to*

- a) *accommodate specific functions required by the HCF;*
- b) *match the tools and technology to the service-delivery model; with the flexibility to update the tools in the future as service models evolve and/or technology advances;*
- c) *delay obsolescence by selecting the most up-to-date technology (i.e., postpone the procurement process as long as possible to reduce the time between the selection, purchase and actual use); and*
- d) *minimize any disruption to the planning process and implementation created by variation from the provisions made in the early planning and design stages and the construction stages.*

5.1.7.3

In the initial stages of planning, the list of necessary furnishings and equipment shall focus on providing a budget costing for planning/budget purposes. However, the list shall also provide sufficient detail to inform early planning and design decisions (particularly those that impact costing). In the early stages, the list of necessary furnishings and equipment shall include:

- a) architectural requirements;
- b) structural implications;
- c) mechanical and electrical requirements;
- d) critical design features; and
- e) infection prevention and control requirements.

5.1.7.4

In subsequent and more detailed stages of planning, detailed design, procurement and installation, the HCF shall develop additional detail for the list of necessary furnishings and equipment. The detailed list shall continue to provide a detailed budget costing for planning/budget purposes. However, it shall also form the basis for the tendering process to advance the procurement of the specific device. At the detailed stage, the key outputs of the list of necessary furnishings and equipment shall include

- a) name, manufacturer, model number;

- b) accessories/optional features required;

Note: Costing estimates should take into account the maintenance and cleaning costs associated with the different materials and textures.

- c) key length, width and height dimensions, along with the weight of the device;
- d) weight-bearing capacity where applicable;
- e) mounting instructions (floor, counter, desk-top, wall-hung, ceiling-mounted, etc.);
- f) architectural requirements;
- g) structural implications;
- h) mechanical and electrical requirements; and
- i) distinction of transfer (i.e. re-use of an existing device), new versus replacement.

5.1.8 Complementary plans

The planning and programming process should include the following additional plans:

- a) accessibility plan;
- b) emergency management plan that meets the requirements of CSA Z1600;
- c) project risk assessment plan;
- d) infection prevention and control strategies;
- e) security operational plan;
- f) facility management operational plan;
- g) sustainability strategy; and
- h) a life-cycle management plan.

These should complement or align with the master plan.

5.1.9 Test fit

5.1.9.1

In existing facilities, the functional program shall be tested prior to finalizing the document at the functional program stage. The “test fit” is a drawing exercise to verify that the requirements of the functional program and operational model can be accommodated within the HCF in the space available. The program shall be adjusted, as necessary, to ensure it will function as intended (e.g., the net-to-grossing factor may be increased to account for existing circumstances). The inclusion of furnishing and equipment in the test fit intended for use in the space is also important at this stage; verification of the capacity to support the list of furnishings and equipment will assist in confirming the functional program.

5.1.9.2

Measurement of HCF areas shall be calculated in accordance with CSA Z317.11.

5.1.10 Operational model

5.1.10.1

The master and functional programs shall incorporate one or more operational models appropriate to the circumstances of the HCF. The HCF planners shall determine the appropriate model(s) in consultation with the site clinical administration and project sponsor and according to the unique circumstances of the project. The following principles will guide the development of an operational model. The services shall:

- a) be operationally efficient;
- b) be accessible to ensure balanced access for patients, visitors, staff, and supplies;

- c) promote safety, injury prevention, and a secure environment for all users (patients, staff, visitors);
- d) support the most current infection prevention and control practices;
- e) be sustainable; and
- f) be balanced with the services offered by other clinical team members and the model of care in effect in these areas.

5.1.10.2

Identification of the appropriate operational model and the planning of the facilities to support the model(s) shall be tempered against the need to plan facilities that will continue to be effective in the future. As the health care delivery environment evolves, so too may the operating models. Sufficient flexibility shall be planned to ensure that the HCF is also sustainable over time. Planning shall provide for flexibility to evolve operational model(s).

5.1.10.3

When the scope and types of services to be provided by the program have been determined, further development of the operational model(s) shall occur, including decisions regarding the service-delivery model, model of care, equipment selection, staffing models, etc. Such development shall be balanced against the need to be flexible, so that therapeutic, technological, organizational, and formal innovations can be introduced in the future, should the issues regarding the service-delivery model, model of care, equipment selection, or staffing models change over time.

5.1.10.4

Many HCFs develop operational models that combine the elements of several models. A "hybrid" service-delivery model may balance several factors for a HCF. Each HCF shall examine the services provided and determine its own model(s).

Note: *To determine which operational models are most appropriate for the HCF, criteria are developed to represent the unique circumstances of the community, and then the various models are evaluated against the criteria.*

5.1.10.5

Planning for patient management shall include the following elements to facilitate support for patient and family-centred care:

- a) Programs and services should be responsive to the diverse needs of the patient population served. Considerations include factors such as culture, ethnicity, race, socio-economic status, physical aspects (such as a higher incidence of obesity), and age.
- b) Waiting and/or registration areas should provide direct access to treatment areas to assist patient and families with wayfinding.
- c) Facilities should support families and other support persons as a member of the multi-disciplinary team.
- d) Treatment areas should be planned to allow patients to receive services from multiple service providers without being moved from area to area (providers will move).
- e) Such development shall be balanced against the need to be flexible, so that therapeutic, technological, organizational, and formal innovations can be introduced in the future, should the issues regarding the service-delivery model, model of care, equipment selection, staffing models change over time.

5.1.10.6

Planning for workflow and patient flow shall include the following elements to facilitate operational efficiencies. These should be balanced with the considerations for patient and family-centred care as outlined in Clause 5.1.10.5.

- a) Departmental adjacencies, arrival points and waiting areas should provide direct access to treatment areas; health providers should not travel to another department/wing of the building to lead patients to the treatment area.
- b) Patient on-line registration or registration close to arrival points in the HCF should be established, and patient travel distances should be minimized.
- c) Treatment areas should be planned to permit health providers to move efficiently between patients and to access charting areas without leaving the treatment area.
- d) Patient care areas should be designed in accordance with ergonomic principles to protect the physical well-being of patients and staff.
- e) Spaces for multi-disciplinary team discussions shall be designed to ensure confidentiality, and privacy from the patient and visitor areas. Consistent with considerations of privacy and confidentiality, these areas should be convenient to the work areas.
Note: Multi-disciplinary team discussions facilitate an inter-professional care model, but privacy is an essential consideration.
- f) Equipment and supplies necessary to deliver the service should be convenient to the treatment space.
- g) Ideally, shared workspace will be provided within any program with a team of health providers to foster communication among the multi-disciplinary team.
- h) There should be a variety of spaces that facilitate optimal communication and collaboration by the interdisciplinary team. These spaces — which may include a combination of centralized and decentralized spaces — should be provided on a group and individual basis and should support confidentiality and privacy.

5.1.11 Site evaluation

5.1.11.1

The health care facility shall ensure that the potential site is in compliance with applicable jurisdictional requirements for HCF construction.

Note: Federal, provincial and municipal environmental acts, regulations and agreements regarding site specific risk assessments can apply.

5.1.11.2

The health care facility shall do a risk assessment for the potential sites based on the site evaluation checklist.

Note: See the bibliography in Annex A for relevant standards on environmental management, site assessment and life-cycle analysis. Refer to Annex C for a sample site assessment checklist.

5.1.11.3

The site evaluation shall include consideration of short and long-term requirements for parking and other required amenities, access to the site, and access to facilities on site.

5.1.12 Existing infrastructure assessment

5.1.12.1

For a renovation or addition to an existing building, there shall be a technical review of building systems and a life-cycle assessment.

Note: See CSA PLUS 317.

5.1.12.2

Depending on the scope and the nature of the project, a physical feasibility study should be conducted for an existing HCF. Prior to master planning, the HCF shall determine whether this type of study is needed.

Notes:

- 1) Refer to CSA PLUS 317 for guidance on the evaluation of existing facilities.
- 2) Refer to Annex C for an example of a site assessment checklist.

5.1.12.3

Based on the site evaluation report, the HCF planner shall explain how the site will be impacted by the development. This shall include information on the impact on the immediate ecosystem/environment and any downstream ecosystems that will be impacted.

5.1.12.4

The master plan shall define long-term strategies for current and future infrastructure. The technical assessment shall include

- a) technical building (refer to CSA PLUS 317). This assessment is intended to identify defects in the existing HCF; and
- b) site analysis (an essential pre-design service that shall include evaluation of an existing or potential site in relation to the building program, budget and construction schedule).

5.1.12.5

Planning shall incorporate strategies to eliminate the deficiencies identified in these assessments.

5.2 Design

5.2.1 Schematic design

5.2.1.1

The schematic design shall

- a) provide users with a site plan to demonstrate access to the HCF from transportation nodes (i.e., ambulance, car, public transit, walking, or bicycle);
- b) provide the users with overall building plan(s) that demonstrate access to the program from the main and support entrances;
- c) clearly demonstrate the separation of public and staff/support access to and from a program area;
- d) document internal circulation patterns to program areas, as well as their connection to the overall building circulation;
- e) define individual spaces as per the functional program to show access, zoning (if required), and internal adjacencies to support areas within the program;
- f) show placement of unique or major pieces of furniture or equipment;

Note: This exercise can help to test the spatial assumptions on the functional program.

- g) show the allocation of program support areas and building support areas;
 - h) outline the role of automated equipment and vehicles in logistics, and the effect on the overall planning, configuration, and use of space;
 - i) provide information concerning civil, structural, mechanical, and electrical building systems; and
- Note:** Key decisions about the building systems are made during this stage and earlier. Such decisions should involve the IDT.
- j) show the naming and numbering of building spaces for user orientation in relation to the numbering of building elements for facilities management purposes.

Notes:

- 1) This exercise can help to avoid the need for future revisions or situations where there are permanently unmatched or redundant information systems.
- 2) Simulation-based mock-ups can be a useful tool for evaluating design approaches at different stages in the process. See Clause 5.2.4.

5.2.1.2

All users or their representatives (and project sponsors when appropriate) shall sign off on the schematic design prior to proceeding to design development.

5.2.2 Design development

Design development shall provide the HCF with the sign-off floor plans and site plan, upon which the additional detailed information is provided and coordinated between all major consultants and users. User review would include detailed elements such as

- a) furniture and equipment layouts, including key technology;
- b) location of infection prevention and control elements [e.g., hand hygiene sinks and waterless hand hygiene stations, storage for personal protective equipment (PPE), airborne isolation rooms];
- c) door swings and/or sliding doors (to address privacy and accessibility issues);
- d) window locations (to address privacy issues);
- e) mechanical systems (HVAC and plumbing) and electrical design;
- f) ceiling plans to coordinate all architectural and engineering disciplines;
- g) interior elevations (including electrical receptacles, data ports, terminal units, etc.);
- h) exterior elevations; and
- i) patient or resident lift/transfer plan and strategy across the site.

The IDT user group or their representatives shall sign off on the design development drawings prior to proceeding to finalized contract documents.

5.2.3 Work planning

Design development shall provide the HCF with planning and scheduling information for project implementation, including

- a) project work phasing plan if appropriate;
 - b) transportation and routing plan during project construction;
 - c) infection control plan for the construction project (see CAN/CSA-Z317.13);
 - d) fire and life safety exiting plan during construction;
- Note:** This refers to the design professional's code compliance plan, not the contractor's implementation plan.
- e) contractors' site and building transportation routes;
 - f) contractors' lay-down and staging area;
 - g) fire and life safety exiting plan during construction; and
 - h) master project schedule — in compliance with the project charter.

5.2.4 Mock-ups

5.2.4.1 General

5.2.4.1.1

Mock-ups should be used to plan areas with multiple interrelated activities, complex traffic flows, repetitive design in room types, as well as rooms with a higher potential for adverse outcomes or known history of contributing to adverse events or worker injuries. Where mock-ups are to be used, they shall be detailed in the project documents.

5.2.4.1.2

Design mock-ups should be done early enough so that design modifications can be made.

Note: Using drawings alone, it might be difficult for some staff members to visualize a space and how they will work within this space. Mock-ups can be useful to confirm that the design and material selections meet the requirements of HCF staff. Depending on the procurement model, it can become increasingly difficult to correct design problems in the later stages of the process, and higher costs and delays can result. The design process should be managed such that important design decisions are made with as much certainty as possible early in the process. In this way, validation of mock-ups can begin at the early stages, and continue throughout the process.

5.2.4.1.3

Mock-up exercises should include participation by all users of the space which can include health care workers, support staff, patients, families, and representatives from key components and disciplines (e.g., infection prevention and control, health and safety, etc.).

5.2.4.1.4

Mock-up exercises may include computer-based virtual mock ups and demonstration centres.

5.2.4.2 Simulation-based mock-up evaluations

5.2.4.2.1

Mock-ups should be assessed through a simulation-based mock-up evaluation.

Note: A framework describing how to plan, design, and evaluate a mock-up is publicly available through the Health Quality Council of Alberta at www.hqca.ca/humanfactors.

5.2.4.2.2

A simulation-based mock-up evaluation should be considered, and if applicable, planned as part of the pre-design stage for inclusion in the design stage.

5.2.4.2.3

The mock-up evaluation should be thoroughly planned to maximize effectiveness. The scope of the evaluation should be outlined during pre-design (during or just after functional programming). It should include evaluation objectives, time and costs required to build and evaluate a mock-up, and identify which phase within the design stage the evaluation should occur. The evaluation should occur before finalizing design decisions that the evaluation is intended to inform.

5.2.4.2.4

Building of the mock-up should align with evaluation timing and objectives. The degree to which a mockup is completed (mock-up fidelity) can vary significantly. The mock-up should be built to an

appropriate level of fidelity to enable testing of evaluation objectives during the appropriate design phase.

5.2.4.2.5

Roles and responsibilities for those involved in the evaluation should be clearly defined. This includes identifying who will be responsible for evaluation design, staging the mock-up, data collection, and data analysis as well as who will participate in the scenario enactments. Availability of expertise (e.g., human factors) should be assessed to identify if individuals external to the organization are needed.

5.2.4.2.6

The simulation scenarios that are created and enacted should test the evaluation objectives. Evaluating a mock-up involves selecting frequent, urgent, and challenging tasks to create simulation scenarios that will test predetermined evaluation objectives. The scenarios are enacted by users of the space within the mock-up, which includes needed supplies and equipment (real or mock-ups).

5.2.4.2.7

Recommendations should be informed by evidence-based data from scenario enactments. Evidence-based data, collected through user feedback and video analysis, is used to identify potential issues and successes with the planned design. The recommendations that are developed should address any identified issues.

5.2.4.3 Construction mock-ups

Construction mock-ups should also be done for complex projects, and for projects working within or adjacent to existing facilities, to ensure that construction can take place as planned, with minimal impact on surrounding services.

5.2.5 Contract documents

5.2.5.1

Contract documents shall be prepared after the design process is complete, and they shall specify what is to be constructed in the project for sign-off by the HCF.

5.2.5.2

The contract document process should not include activities such as the negotiation of changes or the continuation of the design development process. If there are significant design changes at this stage of the process, the designers and the HCF shall return to the earlier stages of design for new sign-off by all the users. For the purposes of this Standard, significant design changes are changes that impact directly on how the services in the functional program are delivered in the design.

5.2.5.3

Contract documents shall include

- a) any special conditions arising from a construction risk analysis conducted in accordance with Clause 5.3.2.3; and
- b) any special phasing requirements arising from the phasing planning.

5.2.6 Classification of areas

The IDT shall be responsible for determining the classification of areas within the HCF (e.g., patient care areas).

5.3 Construction

5.3.1 General

5.3.1.1

The physical systems and installations in the HCF shall be designed, constructed/installed, and commissioned in accordance with the following standards:

- a) CSA Z32 (electrical systems and installations);
- b) C282 (emergency electrical power supply systems);
- c) *Canadian Electrical Code, Part I* (CSA C22.1);
- d) CSA Z7396.1 (medical gas systems);
- e) CSA Z317.1 (plumbing);
- f) CAN/CSA-Z317.2 (HVAC);
- g) CSA Z317.5 (illumination design);
- h) CSA Z317.10 (handling of waste);
- i) CSA Z317.11 (area measurement);
- j) CAN/CSA-Z317.13 (infection control during construction, renovation, and maintenance);
- k) CSA Z317.14 (wayfinding);
- l) CAN/CSA-Z8001 (commissioning); and
- m) CSA EXP06-15 (materials and technologies for infection prevention and control).

Any additional CSA standards applying to HCFs shall also be followed.

Note: Legal requirements can also apply (e.g., federal, provincial/territorial, and local regulations). The HCF should identify requirements of these and other governing agencies (e.g., worker safety authorities) that could have jurisdiction early in the process.

5.3.1.2

The HCF shall designate a facility project manager to act as the owner's representative in negotiations and communications with the design and construction teams. The facility project manager should have the experience necessary and be given sufficient authority to make decisions on behalf of the owner or to expedite the owner's decisions.

Note: Regardless of the model of construction delivery, the facility project manager can coordinate site-specific issues and coordinate the owner's decision-making process and to act as the communication point person on behalf of the HCF.

5.3.2 Risk management planning and mitigation

5.3.2.1

A risk assessment and risk control plan shall be developed by the HCF and coordinated with the IDT and other designates to review all the potential risks posed by a construction project on the operation of the current HCF and/or the impact on the future occupied facility.

5.3.2.2

Risk assessments should be performed by a team including

- a) the people who may be creating the potential risks;
- b) the people who may be impacted by the potential risks;
- c) the people who may be able to mitigate the potential risks; and
- d) the people who may be involved in managing the risks throughout construction.

Note: Depending on the scale and scope of the project, this function may be assigned to a multidisciplinary team.

5.3.2.3

A risk control plan shall include plans to remove the risks where possible and to minimize those risks that cannot be removed.

5.3.2.4

For any risks that need to be managed throughout the construction process, a monitoring plan shall be developed which shall include

- a) monitoring strategies, including monitoring devices and monitoring locations;
- b) acceptable limits for monitored elements;
- c) actions to be taken when monitored items fall outside of acceptable limits; and
- d) communication plans for any event outside of acceptable limits.

Note: A risk control plan may be as simple as a construction phasing plan developed to minimize the impact of a renovation project on the functionality of an existing HCF. It may also be as elaborate as multiple physical monitoring devices (for such risks as sound, vibration, dust generation, etc.), reporting mechanisms and report frequencies, all with specified parameter targets and action plans when any target is measured to be outside of the targeted range.

5.3.3 Construction staging and project phasing

5.3.3.1

If staged construction work is required, then the construction shall be planned to include sequenced activity to minimize disruption of existing services. This staging is essential to ensure a safe environment in occupied areas including required precautions for infection prevention and control. This plan shall be incorporated into the contract documents so that the contractor can include the appropriate cost and schedule for the work.

If the redevelopment of the HCF is planned as a series of phased projects, the construction of each project shall be planned to consider all sequenced phases and their “end-state” at the completion of any individual phase. Where provisions can be made to reduce costs, disruption, or multiple renovations to the same area, that work shall be moved forward as pre-work in an earlier phase.

The duration of time anticipated between phases shall also be considered to ensure the HCF is not left with unachievable or non-sustainable operating models in the interim periods between phases.

A phased redevelopment strategy should include plans for what components of work in later phases should be incorporated into the contract documents of the earlier phases so that the disruption to the HCF is minimized.

5.3.3.2

The construction staging plan shall provide detailed information to address:

- a) areas of work and separation barrier between areas;
- b) sequence of work;
- c) security of site for building occupants;
- d) building services shutdowns;
- e) requirements for control of noise and vibration that result from construction activities;
Note: This concern can be mitigated by scheduled/reduced hours of construction activity.
- f) temporary services (i.e. electrical, plumbing etc.);
- g) technical elements that have to be completed and checked prior to reoccupation (e.g., electronic systems);

- h) safety elements that have to be completed and checked prior to reoccupation (e.g., infection prevention and control and cleanliness provisions); and
- i) reoccupation procedures, including the necessary documents (e.g., occupancy permit) and signatures.

5.3.3.3

Re-occupation of the area shall not occur until the construction is complete and the necessary permits and signatures have been obtained to confirm the safety of the area for reoccupation.

Note: *Based upon the project design and areas of construction, phasing of the work might be necessary to complete the work within occupied areas. Occupants could need to temporarily vacate areas so that the construction can be done. Once the construction is completed then the occupants move back into the space.*

5.3.3.4

The construction staging plan for work on existing active facilities shall include allowances for work stoppage in situations where a procedure or patient condition could be immediately endangered by the construction work. See Clause 5.3.10. Contractors working on existing active facilities shall be made aware that additional time might be needed for stoppages to protect patient safety.

5.3.4 Qualification of contractors and construction personnel

Contractors and construction personnel should have the necessary qualifications and experience to perform their assigned duties as they apply to the construction of HCFs. Contractors shall be prequalified before being considered for projects. The criteria for prequalification should include an assessment of

- a) the company's quality practices, including its policies and procedures for working in HCFs;
- b) documented qualification, training, and education of workers in the tasks to be performed, including necessary tickets or licenses to conduct specialized work (e.g., medical gas system installation);
- c) workers' and construction managers' understanding and evidence of formal training in the principles and practices of infection control and other aspects of patient safety during construction and renovation of HCFs, in accordance with CAN/CSA-Z317.13;
- d) the quality of previous projects; and
- e) the recommendations of previous customers.

Note: *The HCF or its designate can use standardized forms for obtaining information on capacity, skill, and experience of contractors bidding on building construction projects. See CAN/CSA-Z317.13 for examples.*

5.3.5 Contractor orientation

5.3.5.1

Contractors shall attend a site orientation to the particulars of the HCF, including site-specific risks. Provision should be made to ensure that all contractors receive this orientation prior to the start of the work. Orientation should include the following topics as applicable to the project (see CAN/CSA-Z317.13):

- a) site access, parking, elevator use;
- b) deliveries and storage of materials;
- c) debris removal;
- d) permit request and shutdown process;
- e) preventive measures for infection control;
- f) site emergency procedures;

- g) radiation protection; and
- h) mould prevention.

5.3.5.2

The contractor shall submit protocols for safely conducting work in the HCF for review by the HCF.

5.3.5.3

If there are special training requirements for contractors, the project documents shall outline what training is needed and provide the necessary details regarding the scope and content of the training.

Note: Several industry professional organizations provide specialized training in the field of health care construction.

5.3.6 Infection prevention and control

5.3.6.1

All construction work in HCFs shall meet the requirements of CAN/CSA-Z317.13.

Notes:

- 1) Serious health risks for patients, staff, and visitors in HCFs are created during construction by the dispersal of dust particles contaminated with bacteria and fungi.
- 2) Provincial/territorial, local, and federal laws, regulations, and bylaws can apply.

5.3.6.2

The movement of all construction personnel, new materials, and waste through occupied areas of the HCF shall be in accordance with CSA Z317.10 and CAN/CSA-Z317.13.

5.3.7 Noise and vibration management

In existing active facilities, maximum noise and vibration criteria shall be specified in the contract documents.

Protocol to halt/reschedule construction activity shall be determined in advance of construction start.

Provision shall be made to temporarily relocate clinical activity during times when noise and vibration cannot be suppressed sufficiently. If relocation is not possible, alternative measures shall be taken to minimize the adverse effects of noise and vibration on patients (e.g., vibration suppressing technology).

Note: Noise and vibration from construction activity can have an impact on HCF activities and patient care, whether emanating from renovations within the HCF or construction activity adjacent to the HCF.

5.3.8 Dust and odour mitigation

Dust and odour mitigation measures shall be specified in the contract documents. See CAN/CSA-Z317.13.

5.3.9 Service tie-ins and shutdown coordination

All connections and shutdowns of services supplying existing areas of the HCF, either directly or indirectly, shall be coordinated with the owner's representative.

Note: Many building systems provide service to critically ill patients and any interruption of those services could have life safety impact.

The HCF shall outline a procedure for contractors to coordinate any tie-in or shutdown of building services.

Operation of existing services shall be coordinated with the HCF.

5.3.10 Site access management

Access to the site shall be planned to minimize the impact on existing functions of the HCF.

5.3.11 Stop work process

For renovations or additions to existing active HCFs (i.e., where patient care is taking place) there shall be procedures to enable the temporarily stopping of construction work in situations where a medical procedure or patient condition could be immediately endangered by this work. The contractor shall stop work immediately when notified by any person that such a situation exists as an apparent result of construction activity.

Any such work stoppage shall result in a thorough investigation, and follow-up communication between the HCF and the contractor. Resumption of construction activity shall be at the discretion of the HCF.

5.3.12 Signage

A temporary signage and wayfinding system shall be developed in accordance with CSA Z317.14 where construction activities modify normal paths of travel. The temporary signage and wayfinding plan shall be implemented to reroute patients, staff, and families prior to starting construction work.

5.3.13 Temporary provisions for life safety and emergency response

In cases where construction work changes the normal life safety systems or emergency response systems of the HCF, special provisions shall be implemented during construction to maintain life safety and emergency response.

Egress paths and vehicular access can be altered during construction.

5.3.14 Coordination and interferences

Coordination and interference drawings should be modelled in three dimensions prior to start of construction.

Note: Hospitals are intensive in their building services and air requirements exceed normal buildings. Coordination of building services can be a difficult task, due to resulting interferences.

5.3.15 Change management

A process should be developed whereby changes can be reviewed, costed, analyzed, and approved without unnecessary impact on the project.

Note: Due to the complexity of HCF design and the frequent changes in HCF program delivery and equipment, changes to the scope or design of a HCF are inevitable. These can result from:

- a) user program changes;
- b) design issues;
- c) site issues; or
- d) third party influences.

5.3.16 As-built documentation

As-built drawings, operating manuals, maintenance manuals and equipment cut-sheets shall be provided to the HCF in accordance CAN/CSA-Z8001.

5.4 Commissioning

5.4.1 General

The HCF building and site shall be commissioned in accordance with CAN/CSA-Z8001, and the applicable commissioning requirements in the standards specified in Clause 5.3.1.1.

5.4.2 Operational commissioning

Following the construction or renovation of building systems, the installation and commissioning of owner-supplied systems and equipment shall take place in accordance with CAN/CSA-Z8001, and applicable commissioning requirements in the building systems standards specified in Clause 5.3.1.1.

Note: This step brings the facility to a fully operational condition and includes staff orientation and training. It is carried out after the HCF commissioning has been completed.

5.5 Take-over and occupancy

5.5.1 General

The commissioning process shall define the specific tasks related to “take-over” and final space occupancy of the health care facility, to be completed at the end of the construction or renovation.

5.5.2 Take-over

Take-over activities shall be planned by the HCF or their designate so that all necessary non-construction components of the project are considered, in addition to the construction components.

Note: This will facilitate a smooth transition between construction and occupancy.

The take-over activity plan should address the following components:

- a) occupancy permit;
- b) building commissioning (see Clause 5.4.1) completed including correction of deficiencies;
Note: This includes commissioning of systems such as nurse call, emergency power, etc.
- c) signage and wayfinding elements (i.e., installed and complete);
- d) communication plan, including general notices and specific information to the facility occupants;
- e) move-in date(s) (i.e., dates are established and occupants are notified);
- f) keying of doors and millwork (i.e., these are complete, and individual keys have been assigned to the approved users);
- g) communications systems — end devices (e.g., telephone, fax, computer, printer, whether relocated or new);
- h) new furnishings and loose equipment (i.e., delivered and set-up in the specific locations);
Note: This should include inspection for any damage during transit and installation. Orientation and training as required needs to be confirmed including any specific set-up for calibration and the subsequent testing of all devices in-situ.
- i) respiratory therapy (i.e., flow meters, regulators, etc. — fittings are installed and tested for use);
- j) miscellaneous wall-mounted items (i.e., scopes, blood pressure cuff holders, sharps disposal containers are installed); and
- k) staff orientation sessions and manuals for staff occupying the new/renovated facility.

5.5.3 Occupancy

Occupancy activities shall be planned by the HCF or their designate to ensure that the occupancy of the new facility is organized and complete.

The following components should be considered:

- a) moving activities — arranged in phases or as a single event, depending on the project;
- b) disconnection, relocation, and reconnection of reused equipment;
- c) cleaning, and if necessary, disinfection of areas prior to occupancy;
- d) building commissioning (see Clause 5.4.1) — completed including correction of deficiencies ; and
- e) process for users/occupants to record post-occupancy issues:
 - i) deficiencies;
 - ii) warranties; and
 - iii) shortcomings (i.e., problems that exist, but are not due to deficiencies in the execution of the project).

5.6 Post-occupancy evaluation (POE)

5.6.1

A POE shall be conducted. The POE shall examine whether

- a) the HCF as-built is meeting current requirements (especially where service objectives have deviated from the original functional program brief);
- b) the original design is achieving the anticipated outcomes and the extent to which this is achieved; and
- c) there are transferable conclusions that can be shared with other future HCF projects.

5.6.2

Planning and development of evidence-based design hypotheses for POE shall be included in the initial functional planning or scope confirmation for any HCF. A POE should be conducted between 12 and 15 months following occupancy. If the POE requires baseline pretest data, this should be collected between 12 and 15 months prior to any redevelopment.

Note: Post-occupancy evaluation is the process of developing an evaluation framework (including an appropriate evaluation research design and specifying the outcomes of relevance to the redevelopment project), developing data collection materials, executing the data collection, conducting data analysis, and performing and integrating POE into the design of HCFs. The process should engage a range of stakeholders in order to link the HCF users (i.e., patients, families or caregivers, visitors, staff, and community where appropriate), designers, builders, funding agencies, organizational leaders, and staff (clinical and non-clinical) in designing and reporting building performance evaluations. Using performance indicators will help to focus the planning and evaluation towards desired outcomes.

5.6.3

The POE shall include identification of indicators that can be used and tracked to determine unique performance aspects of the built environment.

5.6.4

The POE should also assess the ability of the building to meet anticipated future requirements (i.e., its management of current use and capacity, and its flexibility in meeting future needs), based on the experience to date.

5.6.5

The POE shall include

- a) the development of a framework including an appropriate research design methods to be employed and specification of the outcomes of relevance to the redevelopment project);
- b) the development of data collection, recruitment, and communications materials;

- c) the coordination and execution of data collection;
- d) data analysis and synthesis of findings; and
- e) reporting, including interim updates during the course of the POE and a final report with recommendations.

The POE shall be integrated into the design of HCFs and shall engage a range of stakeholders.

Note: *The scope of the POE should serve to link the HCF users (i.e., patients, families or caregivers, visitors, staff, and community where appropriate).*

6 Site and facility development

6.1 Site requirements

6.1.1 General

The HCF shall be located to

- a) accommodate the needs of its users within the clinical catchment area;
- b) be within reach of utilities and other essential services;
- c) be easily accessed from major transportation routes; and
- d) fit the master plan requirements.

6.1.2 Site design criteria

The design site evaluation shall include examination of the following:

- a) climate (including possible microclimate effects at the proposed site);
- b) topography;
- c) geotechnical/soils;
- d) utilities;
- e) immediate surroundings;
- f) general services;
- g) site history;
- h) land use, ownership, and control;
- i) economic value;
- j) applicable requirements regarding zoning;
- k) sub-division, site plan review, and other local requirements;
- l) convenience and accessibility for users arriving by all means of transportation;
- m) applicable environmental protection requirements;

Note: *Federal, provincial/territorial, and municipal laws and guidelines can apply.*

- n) snow and wind studies;
- o) sun and shade studies;
- p) environmental site assessments;
- q) flood risk analysis;
- r) other hazards (e.g., natural hazards, transportation systems, nearby industry); and
- s) other applicable requirements.

Notes:

- 1) *Environmental site assessments are usually performed to meet regulatory requirements.*
- 2) *An example of a site assessment checklist can be found in Annex C.*
- 3) *Municipal zoning requirements and bylaws can apply.*

6.1.3 Site entry points

6.1.3.1

The HCF should be clearly visible from all directions. Vehicular, transit, bicycle, and pedestrian entrances and paths shall be clearly marked.

6.1.3.2

The site shall provide easily located and intuitive access routes to the following, as applicable to the HCF:

- a) the main entrance;
- b) emergency entrance;
- c) ambulatory entrance(s);
- d) staff entrance(s);
- e) accessible parking areas;
- f) general parking areas for patients and staff;
- g) fire routes; and
- h) service entrances and loading docks.

6.1.3.3

The site shall be selected and designed to be consistent with the principles of wayfinding in accordance with CSA Z317.14, including the creation and location of landmarks.

6.1.4 Site circulation

6.1.4.1

The facility shall design site access routes so that staff, physicians, volunteers, and visitors can safely and easily approach, enter, and leave the facility.

For accessibility, pedestrian signals and other components should be reviewed, along with applicable requirements.

Note: *Municipal by-laws can apply.*

6.1.4.2

All types of site access, traffic, and circulation shall be identified, including

- a) pedestrian;
- b) bicycle; and
- c) vehicular, including
 - i) priority/emergency (land and air);
 - ii) public transit; and
 - iii) service vehicles.

6.1.4.3

Access and traffic design shall be developed, including

- a) convenient and efficient access routes for all users;
- b) accommodation of different access types to avoid congestion, interference, and conflict; and
- c) separation of traffic types where necessary.

6.1.5 Pedestrian circulation

6.1.5.1

Pedestrian routes to and between buildings shall be as direct as practicable to reduce the temptation to use or create unnecessary routes. Public routes for family and visitors should be separated as much as possible from the routes provided for HCF staff and operations.

6.1.5.2

Pedestrian routes shall be

- a) easily identifiable;
- b) clearly separated from vehicular routes;
- c) free of obstacles at all times of the year;
- d) well-lit, with clear sight lines; and
- e) designed to allow for snow removal, ice removal, and maintenance as needed.

6.1.5.3

All pedestrian routes to the main entrance and/or other accessible entrances shall provide a safe, direct, level, and obstacle free path of travel for persons with mobility or visual limitations.

6.1.5.4

A pedestrian pathway shall be provided at the primary parking entrances/exits that is separate from the traffic lanes and provides a safe pedestrian crossing within parking lot areas.

6.1.5.5

Detectable (visual and tactile) warnings shall be provided at pedestrian crossings in accordance with CSA B651 and other applicable requirements.

Note: Provincial/territorial requirements can apply.

6.1.5.6

Accessible walkways, entrances, and parking spaces shall be provided in accordance with CSA B651 and other applicable requirements. Rest stops should be provided along accessible paths of travel from parking spaces to building entries.

Note: Provincial/territorial requirements can apply.

6.1.5.7

The design shall allow for the necessary circulation between the ambulatory care centre and other areas (e.g., cancer centre, dialysis, etc.).

6.1.6 Vehicular circulation

6.1.6.1

The design for vehicle circulation should include a main circulation road to provide vehicular linkage to the HCF's entrances and parking facilities.

6.1.6.2

Drop-off locations shall be at each major point of public entry. The entrances should be designed and located to provide shelter, while remaining uncluttered and accessible.

6.1.6.3

Separate routes and/or waiting areas should be provided near the main entrance for taxis and public transit service vehicles. Bike paths should be provided and these should be distinct from automotive and pedestrian routes to minimize the risk of collisions.

6.1.6.4

Separate waiting areas should be provided near the emergency entrance for police and ambulance vehicles.

6.1.6.5

A direct route for emergency vehicle access should be used. Conflicts with other vehicular or pedestrian traffic shall be minimized.

6.1.6.6

Appropriate clearances shall be provided at ambulatory and emergency entrances (if emergency services are provided) for simultaneous drop off and pick-up of patients and visitors without blocking the entrances.

6.1.6.7

Planning for parking should take into account the need for concierge service for family bringing pediatric, geriatric, or other patients that cannot easily be brought from public parking areas.

6.1.6.8

Public access to emergency care (if emergency services are provided) shall be distinct from emergency vehicle access and shall be well marked to facilitate entry from public roadways. Public parking lots shall be provided near the emergency entrance and for entrances to ambulatory care services (e.g., cancer centre, dialysis, etc.).

6.1.7 Building entrance criteria**6.1.7.1 General****6.1.7.1.1**

The building entry and approach paths shall be clearly identified. Entries should be appropriate to the scale of the HCF and the services offered.

Note: For example, the design of the entries and approaches to a Class A HCF should help to communicate its role as an important community landmark.

6.1.7.1.2

The building, the entrance canopy, and other entry sequence elements shall effectively draw attention to the main entrance and guide patients and visitors to it without total reliance on signage.

6.1.7.1.3

The entrances to the HCF shall be

- a) consistent with the clinical planning and layout of the HCF;
- b) coordinated with both pedestrian and vehicular access to the site or building;
- c) coordinated with public transportation access points on and near the site;

- d) effectively integrated with the landscape and site design;
- e) designed so as to protect patients, staff, and visitors from inclement weather conditions; and
- f) provided with the necessary lighting and illuminated signage at entrances from dusk to dawn to ensure visual prominence and safety.

6.1.7.2 Main and emergency entrances

6.1.7.2.1

The main entrance and emergency walk-in entrances (if emergency services are provided) shall be in locations where they can be quickly and easily identified.

6.1.7.2.2

The design of the entrances should consider taking advantage of the natural topography of the site to ensure entries have at-grade points of access.

6.1.7.2.3

Entrance canopies shall

- a) address both pedestrian and vehicular drop-off conditions;
- b) be visually identifiable upon approaching the building;
- c) be provided with prominent and legible signage;
- d) be provided with a vehicular pull-in area with passenger side at the curb for dropping-off and picking-up patients and visitors without obscuring the entrance area or traffic;
- e) be outside waiting areas and provided with appropriate landscaped amenities;
- f) provide for visual monitoring of forecourt by HCF staff;
- g) provide for accessible parking nearby; and
- h) provide for suitable night lighting and safe wayfinding.

Each entrance canopy should have a clear and distinct design with appropriate signage.

6.1.7.3 Ambulance bay

6.1.7.3.1

The emergency ambulance bay (in HCFs with emergency services) shall be located and designed to accommodate the average number of incoming ambulances expected on site. Consideration should be given to the possible need for additional accommodation for ambulances kept on site for dispatch to outgoing assignments.

Notes:

- 1) *The need to accommodate additional ambulances and police vehicles can be determined through discussions with the local authorities responsible for emergency services.*
- 2) *The need to accommodate ambulance buses and other large emergency vehicles should be considered by the hospital based on past experience of the experiences of similar facilities.*
- 3) *Outpatient centres/ambulatory clinics may provide an ambulance bay for pick-up only in the event a patient requires transfer to or from another HCF. Outpatient facilities typically have a pick up location and should not require a separate ambulance bay.*
- 4) *HCFs might need to accommodate non-emergent ambulance pick-up/drop off for patient transfers to or from another HCF. These may be combined with or be independent of the emergency ambulance bays.*
- 5) *HCFs could need to use the ambulance bay for decontamination of patients from a mass catastrophic event. This potential need to convert the ambulance bay into a decontamination/treatment area should be done based on a risk assessment first.*

6.1.7.3.2

The emergency ambulance bay should be designed so that the ambulances can unload the patient in an environmentally controlled space.

6.1.7.3.3

There shall be sufficient space for each parked ambulance to fully open all ambulance doors or cabinets and remove a patient stretcher without making contact with other ambulances, walls, pillars or equipment.

6.1.7.3.4

A direct route for emergency vehicle access should be used. Conflicts with other vehicular or pedestrian traffic shall be minimized.

6.1.7.3.5

Public access to the emergency care service shall be distinct from emergency vehicle access and shall be well marked to facilitate entry from public roadways.

6.1.7.3.6

If a helipad/heliport is included in the design, it shall comply with applicable requirements. The location of the helipad/heliport shall allow quick and direct access to emergency care.

Notes:

- 1) *Transport Canada's Canadian Aviation Regulations contains requirements for helipads.*
- 2) *In locating the helipad, early consideration should be given to minimizing the effect of aviation exhaust on the HCF's air quality, specifically addressing*
 - a) *the prevailing wind direction;*
 - b) *the location of air intakes; and*
 - c) *the ability of the HVAC system to filter fumes, particulate, and odours from exhaust.*

6.1.7.3.7

There shall be direct access to a soiled utility room for storage of contaminated equipment. This should be located away from high traffic areas.

6.1.7.3.8

There shall be a secure designated clean storage room for ambulance equipment and supplies that does not impede traffic flow.

6.1.7.3.9

There shall be adequate cleaning facilities and equipment provided for the ambulances, including a hose to clean.

6.1.7.3.10

Finishes and surfaces shall be easy to clean. Flooring shall be slip-resistant in both dry and wet conditions, durable, and impervious to oil and grease.

6.1.7.3.11

There should be a designated decontamination shower adjacent to the ambulance bay. The size and configuration of this facility, including the necessary storage, should be in accordance with the functional program for emergency services.

6.1.7.3.12

There shall be emergency power supplied to the lighting and overhead door systems. Overhead doors shall be installed with an emergency manual override system to ensure operability during a power outage or equipment failure.

6.1.7.3.13

There should be a separate charting room with a hand washing sink located adjacent to the ambulance bay for the EMS staff.

6.1.8 Parking

6.1.8.1

The site shall have sufficient parking for the projected volumes of patients, visitors, staff, volunteers, and physicians.

Notes:

- 1) *Parking infrastructure should include provisions to support vehicles other than automobiles (e.g., shelters and secure lock-up facilities for bicycles).*
- 2) *The parking requirements for projected HCF activities might not be aligned with the requirements of the local authority. If so, this should be reconciled in the approvals process.*

6.1.8.2

Public parking lots shall be located near the HCF entrance.

6.1.8.3

Accessible parking spaces shall be given priority and located to minimize the travel distance and grade changes for the primary travel routes to the building entry located closest to the final destination points inside of the building. Building entrances serving accessible parking spaces shall be accessible to bariatric patients and visitors, and persons using wheeled mobility devices. Automatic doors should be provided at these entrances. See CSA B651.

6.1.8.4

The parking area design, including signage, shall be in compliance with CSA B651.

Note: *The actual need for the number of accessible parking spaces for a HCF will often exceed regulatory requirements.*

6.1.8.5

Parking lots should be designated for patients, visitors, and volunteers with consideration for ease of access to emergency and main entranceways.

6.1.8.6

Parking areas shall be well lit with clear sightlines.

6.1.8.7

Consideration should be given to integrating physician parking with general staff parking, with the exception of "on call" spaces for physicians and other medical staff, to maximize the utilization of all lots at peak periods.

6.1.8.8

The following criteria should be considered as part of any decision whether to use surface parking or to build a parking structure:

- a) availability of land;
- b) rate of return on investment of all options;
- c) summer and winter weather conditions;
- d) proximity of parking land to HCF buildings and site access roads;
- e) accessibility for persons with disabilities; and
- f) current demand and anticipated future demand for parking spaces.

6.1.8.9

Parking spaces for persons with disabilities shall be provided in accordance with the anticipated level of need based on the functional program and the demographic base (i.e., patients, staff, and visitors). The parking area design, including signage, shall be in compliance with CSA B651.

Note: *The actual need for accessible parking spaces for a HCF will often exceed regulatory requirements.*

6.1.8.10

Emergency call stations linked to the HCF's security services should be provided in large parking lots, in garages, and along pedestrian walkways that are isolated or pass between buildings.

6.1.8.11

The provision of electrical receptacles should be considered, to supply block heaters (depending on geographical climate conditions) and to charge electric vehicles.

6.1.8.12

Parking lots and related services shall be designed to facilitate snow removal and to prevent damage by snow moving equipment. Snow dumping areas should be provided in areas of significant snowfall and where siting conditions permit. Protective concrete sealers shall be used on concrete walks in prominent areas where de-icing agents will be used.

6.1.8.13

Parking lots and roadways shall be designed to shed and properly dispose of storm water (e.g., to the municipal storm water system).

Note: *Municipal and provincial/territorial laws can apply.*

6.1.8.14

For parking lots and roads where heavy trucks are anticipated, pavement structure should be designed to accommodate the projected traffic and load.

Note: *See the California Bearing Ratio.*

6.1.8.15

Finishing materials used in parking garages should be durable and easy to maintain and clean.

6.1.8.16

Light fixtures in parking garages or on large parking lots should be located to enhance the safety and security of users.

6.1.9 Wayfinding

6.1.9.1

A clear and comprehensive wayfinding system for the site shall be developed and implemented in accordance with CSA Z317.14.

6.1.9.2

Site access and circulation routes (roads, parking lots, parking structures, and pathways) shall be designed to be understandable and to allow for easy and intuitive wayfinding/navigation through the site.

6.1.9.3

The site design, signage, and other wayfinding aids shall

- a) provide clear direction to primary HCF destinations;
- b) identify primary circulation routes;
- c) identify restricted and/or unsafe areas; and
- d) identify areas and facilities that are part of the catastrophic event management plan (e.g., muster stations).

6.1.9.4

Priority routing for wayfinding shall be in the following order:

- a) emergency vehicles;
- b) patients;
- c) staff, physicians, and volunteers; and
- d) service.

6.1.9.5

Site signs shall be located and illuminated with due regard for vehicular and pedestrian sightlines.

6.1.9.6

Landscape design shall support the wayfinding strategy and provide supporting cues.

6.1.10 Outdoor spaces

6.1.10.1

Where required by the functional program, outdoor amenity spaces shall be provided.

6.1.10.2

The design and planning of outdoor areas shall be integrated with the interior floor plan layouts. Access doors to outdoor amenity areas shall be located in close proximity to the HCF programs most likely to use the space.

6.1.10.3

Outdoor spaces shall be designed to allow natural light into the building and provide views to natural features from within the building.

6.1.10.4

The design of outdoor spaces shall ensure privacy for interior spaces.

6.1.10.5

Outdoor spaces shall be accessible for individuals with a disability.

6.1.10.6

Consideration should be given to spaces needed for cultural and spiritual practices that need to take place outdoors.

6.1.10.7

Where outdoor spaces are provided, they should be designed to provide the following conditions:

- a) microclimate with consideration to extending seasonal use;
- b) protection from winds; and
- c) creating optimal high and low sun exposures.

6.1.10.8

Landscaping should be designed so that trees and shrubs do not block views from the building when they mature.

Note: This does not preclude the use of deciduous trees for passive cooling in the summer.

6.1.10.9

Outdoor spaces shall be designed to meet the needs of multiple users, such as staff, patients, physicians, volunteers, and visitors, as well as use by all ages and all levels of ability.

6.1.10.10

The design shall ensure opportunities to maximize the interaction of the HCF building occupants with outdoor areas.

6.1.10.11

Landscaping should be designed so that exterior building maintenance activities (e.g., window washing) can be safely and effectively performed.

6.1.11 Utility services**6.1.11.1**

Facilities shall be located to provide reliable utilities (e.g., water, gas, sewer, electricity, communications, etc.). Where reliable utility services are not available, local or on-site backup services shall be provided.

6.1.11.2

If the HCF is planning to connect to existing utility infrastructure, it shall confirm with the relevant municipalities and utility companies that their systems are adequate to service the site.

Note: Larger HCFs should be located in utility corridors to allow for future development.

6.1.11.3

Early in the design process, the HCF shall consult with the municipality to determine

- a) the adequacy of the water pressure and the possible need for on-site boosting for the fire sprinkler system;
- b) the existence of restrictions on storm water discharge to their storm water drainage system; and
- c) the adequacy of the sewer system to manage the anticipated usage level.

6.1.11.4

Where utilities are to be connected to an existing on-site system, the HCF shall advise the regional health authority and confirm that the existing on-site system can accommodate the additional loads.

6.1.11.5

Capped connections for portable or temporary services shall be provided for use in an emergency or a utility outage.

Note: Utilities that should have connectivity applications during a utility outage or emergency include water pipes, generator tie-in panels for portable generators, medical gas systems, etc.

6.1.11.6

Utility plans shall be consistent with the HCF's sustainability program.

6.1.11.7

Consideration should be given to the security of the facility's supply systems (e.g., water, electricity, communications, medical gases, natural gas, etc.).

6.1.11.8

Communication incoming services should be planned to include two geographically diverse pathways and should include requirements for all types of services (fiber, copper multi-pair, coaxial, wireless, etc.).

6.1.11.9

Communication incoming services demarcation rooms should be secured and specific for only incoming communication services. Termination of incoming services should be designed for separate locations of a minimum of three service providers on wall-mounted locations and enclosed and lockable cabinets. Demarcation rooms should be designed to the same standards as the local telecommunication rooms, including space, environmental services, security, and power.

6.1.12 Emergency exterior decontamination area

Where required by the emergency plan, an area on the exterior perimeter of the emergency service shall be designated as an emergency exterior decontamination area. In smaller facilities, an existing exterior space, such as an ambulance bay, may be used. Emergency exterior decontamination areas shall meet the following requirements:

- a) The emergency exterior decontamination area should be approximately 45 m from the ambulance bay (depending on the constraints of the structures involved). The distance between the decontamination area and the ambulance entrance shall be at least 9.5 m.
- b) The decontamination area shall be in a location where no windows or doors about the defined area or where all doors are securable from the outside and all windows are capable of being shuttered.

- c) The decontamination area shall be equipped with semi-permanent or portable/collapsible structures (partitions, tents, etc.) that will provide shelter from the environment, privacy, and some containment of the contaminant/infectious agent.
- d) Boundaries of this area shall be defined on the paved ground surface with a yellow paint line and the word "DECON" painted within these boundaries.
- e) The decontamination area shall be provided with
 - i) two or more temperature-controlled shower heads, installed at least 2 m apart;
 - ii) a duplex electrical receptacle corresponding to each of the installed shower heads, but located at least 1.25 m from any shower;
 - iii) a separate spigot for attachment of a hose;
 - iv) secured access to the HCF telephone system; and
 - v) exterior lighting that meets applicable requirements for wet areas.

Note: See CSA C22.1, *Canadian Electrical Code, Part I*.

- f) There shall be a ventilation system that maintains negative airflow with relation to the HCF perimeter wall. This system shall draw air within the confines of the decontamination structure and exhaust it directly to the outdoors, not less than 15.25 m away from the decontamination site with no recirculation of air. This system shall be turned off when the decontamination structure is not in use.
- g) If a temporary facility is used, it shall be capable of maintaining negative pressure to the HCF perimeter wall.
- h) Water runoff shall be contained and disposed of safely to ensure that it does not enter community drainage systems. This shall be accomplished either by graded floor structures leading to a drain with a collection system separate from that of the HCF or by the use of plastic pools or specialized decontamination stretchers.

Notes:

- 1) See Clauses 9.7.2.2.10 and 9.7.2.2.11 for requirements for emergency decontamination rooms located inside the HCF.
- 2) If an ambulance bay or other exterior area is designated as a decontamination area, the HCF should be able to heat the space and provide shelter in inclement weather.

6.1.13 Environmental controls

6.1.13.1

Environmental controls shall be used to minimize the impacts of the HCF (e.g., sound, waste, air quality, water, etc.) on surrounding areas, including natural areas.

6.1.13.2

Planning of environmental controls shall include consideration of

- a) waste holding management, recycling, incineration;
- b) hazardous materials (both existing on site and contributed by the operating HCF);
- c) servicing issues;
- d) location of loading dock, waste holding management, recycling, service yard, oil tanks, bulk oxygen, flammable stores, power plant, incineration;
- e) potential impact on site of the energy plant; and
- f) alternative energy sources (e.g., district energy, solar power, biofuel, wind power, heat from waste, etc.).

6.1.13.3

The central plant and loading dock locations shall be planned to prevent transmission of noise, vibration, and exhaust contaminants.

6.1.13.4

Recreation rooms, exercise rooms, equipment rooms, and similar spaces where impact noises could be generated shall not be located directly over patient bed areas or delivery and operating suites, unless special provisions are made to minimize such noise. The noise reduction criteria shown in Table 12.1 shall apply to walls and partitions in patient areas.

6.1.13.5

Rooms containing heat producing equipment, such as boiler or heater rooms or laundries, shall be insulated and ventilated to prevent the floor surface above and/or the adjacent walls of occupied areas from exceeding a temperature of 6 °C above ambient room temperature.

6.1.14 Future expansion**6.1.14.1**

The site (or space in the case of a leased/rental suite) shall be designed to accommodate various forms of HCF expansion to the suite, buildings, or campus.

6.1.14.2

The location and design of site access and circulation routes shall take into consideration future incremental building growth.

6.1.14.3

Site design shall take into consideration a replacement strategy for parking displaced by facility expansion.

6.1.14.4

Site design shall take into consideration the potential effects of future development on the public image and identity of the HCF.

6.1.14.5

The HCF entrances shall be designed to be consistent with strategies for future expansion.

6.2 Facility requirements**6.2.1 Building form and function****6.2.1.1 General**

Note: This Clause deals with qualitative aspects of the building design such as building experience, building image, scale and proportion, and design innovation. Although many of the qualities that these statements specify are difficult to measure and quantify, their impact on successfully meeting the guiding principles of the project are nevertheless significant.

6.2.1.1.1

The building form or facility space shall be designed to provide sufficient space and infrastructure support for the functional program, and to offer a positive building experience to occupants.

6.2.1.1.2

The building form or facility space shall accommodate internal component layouts based on functional/clinical requirements.

6.2.1.1.3

The building form or facility space shall be massed and composed in such a way as to maximize the use of daylight into the interior of the building (unless specific clinical functions require otherwise).

6.2.1.1.4

The building form or facility space shall be integrated with the surrounding site in terms of vehicular traffic patterns, pedestrian circulation, existing context, site servicing, and landscape.

6.2.1.1.5

The building form or facility space and its position shall be designed to allow for future expansion.

6.2.1.2 Entries and access

Note: This Clause is intended to ensure that the design of the HCF addresses the important hierarchy of the entrances in providing amenities for staff, patients, visitors, and the community. The space should be welcoming, reassuring, caring, efficient, and comfortable.

6.2.1.2.1

The main entrance area shall facilitate the following primary functions:

- a) arrival and departure;
- b) dropping off, meeting, and collection;
- c) security, information, and internal communication;
- d) wayfinding; and
- e) waiting.

6.2.1.2.2

The design of the main entrance shall include the following:

- a) located in sight of the information and enquiry desk;
- b) small seating groups with potential for wheelchair users to sit adjacent;
- c) sufficient space for users manoeuvring in wheelchairs or with walking frames;
- d) facilities for children;
- e) information point for leaflets and multi-media;
- f) hand hygiene station(s); and
- g) natural light and views to landscaped outdoor areas.

Note: An enclosed courtyard can help to fulfill the following qualitative criteria:

- a) clear visibility lines; and
- b) daylight.

6.2.1.2.3

All entrances shall incorporate features that limit the tracking of dirt and debris (e.g., built-in dirt traps).

6.2.1.3 Internal environments

Note: This Clause deals with the requirements for designing and planning the building's interior spaces to appropriately meet the facility space standards.

Internal environments shall

- a) provide sufficient space in appropriate configurations to support patient care in accordance with the functional programs;
- b) provide for the necessary patient throughput and circulation; and
- c) provide for adequate patient and building security, and facilitate ease of wayfinding.

Note: See the functional program (Clause 5.1.6) for space requirements.

6.2.1.4 Workflow

6.2.1.4.1

The HCF design shall

- a) ensure that the routes within and between tasks and procedures are as efficient as possible;
- b) avoid cross-flows in corridor traffic; and

Note: Cross traffic in a HCF can be dangerous and inefficient.

- c) optimize the planning and systems support for logistical services, such that
 - i) the movement of patients, staff, and visitors is appropriately planned in relation to the distribution of supplies, storage, and waste disposal, and separated as necessary;
 - ii) circulation routes are clear and well-organized for each type of traffic; and
 - iii) the manual lifting and transportation of supplies, equipment, waste, etc., is minimized.

6.2.1.4.2

The HCF shall conduct a thorough analysis of anticipated internal traffic and movement and the design shall be developed to support efficient movement and to mitigate conflicts among incompatible traffic types.

6.2.1.4.3

Circulation routes should be designed to accommodate motorized and/or mechanized movement of goods and people.

6.2.1.4.4

The design of circulation routes should be flexible to accommodate future changes in the modes of goods and material movement.

6.2.1.5 Views

The design of the HCF shall provide patients, staff, and the public with external views wherever possible.

Note: Exterior views can help maintain patients' mental health and promote healing by providing spatial orientation and connections to the natural world, landmarks, and the community. Exterior views can help all occupants with wayfinding.

6.2.1.6 Internal circulation

6.2.1.6.1 Principal circulation system

Note: This Clause deals with interior services circulation for staff, patients, and visitors. This includes strategies for vertical movement through the building as well as the relationship between exterior areas, interior organization, and navigation through the building.

The principal internal circulation systems shall support the functional program for the HCF and shall be appropriate to the category and or type of HCF.

Circulation systems for staff, inpatients, support services, and equipment shall be designed for convenience and accessibility, and there shall be minimal overlap between these systems and the common circulation paths for ambulatory patients and visitors.

Circulation planning shall take into account the potential use of automation and automated vehicles. See Clause 7.11.

6.2.1.6.2 Patient privacy and dignity

Secondary pathways should be available for transporting patients with dignity and privacy.

There shall be separate elevator groupings for inpatient services, and separation of HCF service functions from those for visitor or outpatient use in order to maintain infection control and protect patient dignity.

Note: Building circulation patterns have a large impact on patient privacy. The design and planning of the HCF should address the prime need for maintaining patient privacy.

6.2.1.6.3 Addresses

The design of the internal circulation system shall provide recognizable addresses for clinical services, non-clinical support programs (e.g., transportation), and additional services (e.g., gift shop) in coordination with building organization and navigation.

The design shall provide for connection of key visitor destinations. For example, outpatient services shall be provided with the opportunity for a “front door” on the main public corridor and a “back door” from an inpatient/service corridor.

6.2.1.7 Public areas

6.2.1.7.1

The principal visitor circulation route shall be designed as a major public entrance space providing communication and circulation within the HCF.

6.2.1.7.2

The principal visitor circulation route shall include natural lighting strategies (i.e., day lighting). The design of the main public concourse should take into consideration the following key points:

- a) clear connections to primary circulation routes;
- b) location of concourse in relation to other HCF services;
- c) generous floor-to-ceiling height;
- d) high spatial quality and efficient design;
- e) interesting natural and artificial lighting;
- f) views out to landscape areas; and

g) incorporation of artworks and interior planting.

The design and planning of the building and site shall provide an appropriate environment for public and retail activities to benefit and support HCF functions.

6.2.1.7.3

The HCF design shall provide

- a) services at the front of the HCF and/or along the main public circulation paths for primary use by the public and outpatients;
- b) community access to facility retail components such as pharmacy and gift shops through the use of a securable storefront address that is not on the principal visitor circulation routes;
- c) places for social interaction for patients, staff, and public;
- d) a sufficient number of public facilities (e.g., shops, cafeterias, information points, etc.); and
- e) public washroom facilities, located in logical, visible places, which include accessible facilities and family friendly facilities (e.g., baby change table).

6.2.1.7.4

Any decision-making process involving plants, flowers, or living walls shall include a risk assessment that takes into consideration the patient population, type of plant, application, and the presence of spraying or standing water. Plants shall be non-toxic, and non-fragrant.

6.2.1.7.5

Plants and planters shall not be located in cancer centres or other locations in which immunosuppressed patients are located unless they are enclosed (glassed in) and not accessible by patients or the public.

6.2.2 Wayfinding — General

The HCF shall develop a documented wayfinding system for all redevelopment projects, including new construction and renovations in accordance with CSA Z317.14 that addresses the following elements:

- a) places — site, architecture planning and design of interior and exterior spaces;
- b) people — human orientation and interaction;
- c) elements — design, signage, technology, and emerging approaches; and
- d) continual improvement — maintenance and follow-up on changing environment.

The wayfinding system shall be fully integrated into the HCF design. A wayfinding system manual shall be developed and training in its use shall be provided so that the consistency of wayfinding information is maintained.

The HCF shall maintain the wayfinding and signage system in accordance with CSA Z317.14.

Note: HCFs are considered one of the most complex and stressful environments navigated by the public. Effective wayfinding is a key method HCFs should use to enhance the experience for patients and visitors. Significant research has been conducted on the impact of user disorientation within HCFs. These studies confirm that user satisfaction rankings are directly attributed to the ability to find one's way easily.

The key to creating an excellent patient experience is focusing on the patient's entire journey — from their home, en route to the HCF, entry, reception, to treatment or procedures and back to the entry, and finally back to their home. All parts of this journey are equally important, as is the time taken to complete the journey.

6.2.3 Future adaptability and expansion — Internal

Note: This Clause deals with the ability of the building design to accommodate various forms of incremental expansion, growth, and replacement over time.

6.2.3.1

All planning processes for new construction of, or renovations or additions to HCFs shall include a statement of expectations regarding future expansion needs. Provisions shall be made for such expansion where possible without compromising the current safety, efficiency, or effectiveness of the HCF.

Note: *Planning for expansion at this stage can help to identify changes that can be made at relatively low cost, and that will avoid the need for substantially higher-cost changes when expansion or future construction is done.*

6.2.3.2

The building shall have a clear site placement strategy in order to leave sufficient space for future renewal on site, without compromising the established facility layout.

6.2.3.3

The design and planning shall illustrate coherent future expansion scenarios that are in harmony with the design and planning concepts of the prime building.

6.2.3.4

The HCF shall be designed to be adaptable; able to respond to a change of use for its building systems and services. Decisions regarding the placement of programs in the HCF shall take into account the possible future expansion of the building (See Clause 7.10).

Note: *Given the rapid pace of change in the health care field, the principles of adaptability, flexibility, and expandability should be kept in mind during any renovation, addition, or new construction.*

6.2.3.5

The HCF shall be designed to be flexible, so that therapeutic, technological, organizational, and formal innovations can be introduced with minimum disruption to ongoing operations.

6.2.3.6

Structured parking shall be located in areas that will not hinder incremental expansion of the facility.

6.2.3.7

The central plant and loading dock locations shall be located and designed such that they do not impede future incremental and structured expansion of the HCF.

6.2.3.8

The organization of the HCF plan shall allow the future continuation of principal circulation routes to connect with incremental HCF expansions.

6.2.3.9

Strategies shall be formulated for potential expansion for the facility or portions of the facility. Plans should include the possibility of horizontal or vertical expansion. If vertical expansion is considered, the plan shall include provisions to ensure that the necessary structure, life safety provisions, and sufficient capacity of vertical transportation are established.

6.2.3.10

The HCF should consider the potential opportunities associated with registration to a structured sustainability program.

Note: *The structured sustainability program should be considered in the context of capital funding guidelines, the environmental goals of the organization, and the potential for energy cost savings and greenhouse gas emission reduction targets.*

6.2.3.11

Expansion plans shall include provisions to enable future access for construction activities and for the expansion of parking space.

6.3 Key relationships and dependencies

6.3.1 General

The planning process shall include consideration of relationships between services in the HCF, and prioritization of the key relationships and dependencies, so that the necessary adjacencies are achieved. Table 6.1 summarizes typical key relationships and Tables 6.2 to 6.30 establish requirements, permissible alternatives, and recommendations regarding adjacencies.

The adjacencies noted in these Tables are listed as either

- a) essential to the performance of the HCF (i.e., required); or
- b) important to the performance of the HCF (recommended).

It is recognized that in the operation of the HCF, all components are linked in the function of patient care.

Note: *Planning for adjacency between related or dependent services can help improve safety and efficiency in the HCF. This Standard recognizes that in projects involving the renovation of existing facilities, absolute compliance with all adjacencies between services might not be possible due to the scale of the HCF, configuration of the site and buildings, existing circumstances, etc. It is also recognized that the influence of new technologies and the implementation of planning tools, such as lean process improvements and value stream mapping, could alter some of these relationships in the future. Moreover, this Standard is written in the context of hospitals/larger health centres. However, these principles may be applied to all HCFs with adaptation for the circumstances.*

Table 6.1
Key relationships and dependencies
(See Clause 6.3.1.)

Key Relationships and Dependencies Matrix		Critical care	Maternal & newborn care	Medical/surgical Inpatient care	Mental health care	Pediatric & adolescent inpatient care	Rehabilitation care	Specialized Inpatient care	Ambulatory care - general	Ambulatory care - renal dialysis	Ambulatory care - oncology	Emergency care	Procedures	Allied health services	Laboratory services	Electrodiagnostic services	Respiratory services	Medical imaging	Pharmacy	Biomedical engineering	Environmental services	Nutrition and food services	Materials management	Plant maintenance	Security & parking	Medical device reprocessing	Building entry & parking	Heliport	Exterior garden/therapy area	Main hospital entry/lobby	Inpatient Continuing Care
		Critical care	Maternal & newborn care	Medical/surgical Inpatient care	Mental health care	Pediatric & adolescent inpatient care	Rehabilitation care	Specialized Inpatient care	Ambulatory care - general	Ambulatory care - renal dialysis	Ambulatory care - oncology	Emergency care	Procedures	Allied health services	Laboratory services	Electrodiagnostic services	Respiratory services	Medical imaging	Pharmacy	Biomedical engineering	Environmental services	Nutrition and food services	Materials management	Plant maintenance	Security & parking	Medical device reprocessing	Building entry & parking	Heliport	Exterior garden/therapy area	Main hospital entry/lobby	Inpatient Continuing Care
Critical care		◊																													
Maternal & newborn care		◊	◊																												
Medical/surgical Inpatient care			◊	◊																											
Mental health care				◊																											
Pediatric & adolescent inpatient care		◊			◊																										
Rehabilitation care						◊																									
Specialized inpatient care				◊			◊																								
Ambulatory care - general					◊			◊																							
Ambulatory care - renal dialysis						◊			◊																						
Ambulatory care - oncology							◊			◊																					
Emergency care		◊			◊				◊																						
Procedures		◊	◊							◊																					
Allied health services						◊					◊																				
Laboratory services		◊	◊	◊	◊	◊					◊																				
Electrodiagnostic services							◊					◊																			
Respiratory services		◊						◊					◊																		
Medical imaging		◊							◊				◊																		
Pharmacy - inpatient		◊	◊	◊	◊	◊	◊	◊				◊	◊																		
Pharmacy - outpatient									◊			◊	◊																		
Biomedical engineering		◊								◊				◊																	
Environmental services											◊																				
Nutrition and food services												◊																			
Materials management													◊																		
Plant maintenance														◊																	
Security & parking															◊																
Medical device reprocessing		◊														◊															
Building entry & parking																	◊														
Heliport																		◊													
Exterior garden/therapy area												◊	◊																		
Main hospital entry/lobby																															
Inpatient Continuing Care																															

Legend

◊ **Essential**
Relationships that are critical to patient safety and clinical performance

■ **Important**
Relationships which are important, but of normal base-level importance to patient safety and clinical performance

Note: This Table is meant to be read only horizontally.

6.3.2 Medical/surgical inpatient care

The key relationships between the medical/surgical inpatient care program and the related programs in Table 6.2 should be considered during planning, and created or maintained when possible.

Note: These relationships are considered to be important to performance, but not critical.

Table 6.2
Medical/surgical inpatient care — Important relationships
(See Clauses 6.3.1 and 6.3.2.)

Medical/surgical inpatient care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Critical care	Patient bedroom	Rapid transfer of patient requiring higher level care	Provide step-up care on inpatient unit
Mental health care	Physicians	Rapid access to medical specialists for consultations	
Emergency care	Patient treatment cubicles	Rapid transfer of admitted patient	
Laboratory services	Accessioning	Rapid transfer of specimens for processing	Provide an automated conveyance system (e.g., pneumatic tube) to transport specimens directly or provide point-of-care testing within the clinical area

6.3.3 Critical care

6.3.3.1

In new construction, the programs in Table 6.3 a) shall be linked to the critical care program, either by proximity or the use of a specified alternative. For additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: *These relationships are considered to be essential to performance.*

Table 6.3 a)
Critical care — Essential relationships
(See Clauses 6.3.1 and 6.3.3.1.)

Critical care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of services
Adult inpatient care	Patient bedroom	Direct transfer of acute patients to intensive care	Provide adjacency to a controlled-access elevator that directly connects these services
Maternal and newborn care	Birthing (LBR/LBRP/CS OR) Nursery	Direct transfer of infants following delivery to neonatal intensive care	Provide access to a controlled-access elevator to directly connect these services

(Continued)

Table 6.3 a) (Concluded)

Critical care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of services
Pediatric and adolescent inpatient care	Patient bedroom	Direct transfer of acute patients to pediatric intensive care	Provide adjacency to a controlled-access elevator that directly connects these services
Emergency care	Trauma/resuscitation room	Direct transfer of critically acute patients from trauma requiring admission to critical care	Provide dedicated elevator in emergency care to directly connect these services
Procedures	Stage one recovery (PACU)	Transfer of acute patients after stage one recovery (PACU) requiring admission to critical care	Provide adjacency to a controlled-access elevator to directly connect these services
Procedures	Operating rooms and interventional imaging rooms	Direct transfer of some patients post-surgery/procedures (bypassing stage one recovery)	Provide access to an elevator to directly connect the services. Elevator may include full services available in a recovery cubicle

6.3.3.2

The key relationships between the critical care program and the related programs in Table 6.3 b) should be considered during planning and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.3 b)
Critical care — Important relationships
(See Clauses 6.3.1 and 6.3.3.2.)

Critical care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Medical/surgical inpatient care	Patient bedroom	Transfer of patient following discharge from critical care	Create step-down (or step-up) beds on the inpatient units
Respiratory services	Respiratory therapy	Access to respiratory therapy equipment (i.e., ventilators) and spare parts plus cleaning area	A satellite RT service may be included in critical care
Laboratory	Specimen accessioning	Urgent access to patients and laboratory results; staff access to patients	Provide point of care testing equipment within critical care

6.3.4 Maternal and newborn care

6.3.4.1

In new construction, the programs in Table 6.4 a) shall be linked to the inpatient component of the maternal and newborn care program, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: These relationships are considered to be essential to performance.

Table 6.4 a)
Maternal and newborn care — Essential relationships
(See Clauses 6.3.1 and 6.3.4.1.)

Maternal and newborn care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Critical care	Neonatal intensive care unit (NICU)	Rapid transfer of patient to more intensive care if needed	Provide dedicated NICU within unit or provide dedicated corridor to NICU and delivery room

6.3.4.2

The key relationships between the inpatient component of the maternal and newborn care program and the related programs in Table 6.4 b) should be considered during planning, and created or maintained when possible.

Note: These relationships are considered to be important to performance, but not critical.

Table 6.4 b)
Maternal and newborn care — Important relationships
(See Clauses 6.3.1 and 6.3.4.2.)

Maternal and newborn care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Procedures	Birthing operating room (caesarean section)	Rapid transfer of patient requiring surgery	Provide dedicated birthing operating room within maternity
Medical device reprocessing (MDR)	Decontamination sterile storage	Transport sterile materials efficiently, quickly, and without contamination, and bypassing public areas	Provide dedicated clean and soiled elevators linking maternity with medical device reprocessing department (MDRD)

6.3.5 Mental health and addictions services

6.3.5.1

In new construction, the program in Table 6.5 a) shall be linked to the mental health and addictions services, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: These relationships are considered to be essential to performance.

Table 6.5 a)
Mental health and addictions services — Essential relationships
(See Clauses 6.3.1 and 6.3.5.1.)

Mental health and addictions services			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of services
Emergency care	Secure/observation room	Rapid transfer of patient following admission	

6.3.5.2

The key relationships between the mental health and addictions services and the related programs in Table 6.5 b) should be considered during planning, and created or maintained when possible.

Note: These relationships are considered to be important to performance, but not critical.

Table 6.5 b)
Mental health and addictions services — Important relationships
(See Clauses 6.3.1 and 6.3.5.2.)

Mental health and addictions services			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Pharmacy	Dispensary	Clinical pharmacists consultation service and medications delivery	Clinical pharmacists located as member of interdisciplinary care team in medical/surgical inpatient care, and automated conveyance system (e.g., pneumatic tube) to transport medications
Exterior garden/therapy area	Garden/therapy area	Controlled movement of patients to secured exterior area for leisure or therapeutic activities	

6.3.6 Pediatric and adolescent inpatient care

6.3.6.1

In new construction, the programs in Table 6.6 a) shall be linked to the pediatric and adolescent inpatient care program, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Notes:

- 1) *These relationships are considered to be essential to performance.*
- 2) *Vertical transportation such as elevators may be used to provide direct linkage where appropriate.*

Table 6.6 a)
Pediatric and adolescent inpatient care — Essential relationships
(See Clauses 6.3.1 and 6.3.6.1.)

Pediatric and adolescent inpatient care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of services
Critical care	NICU and Pediatric Intensive Care Unit	Rapid transfer of patient requiring higher level care	Provide step-up care on inpatient unit
Transportation	Heliport	Rapid transfer of patient requiring higher level care	
Transportation	Elevators	Rapid transfer of patient requiring higher level care	

6.3.6.2

The key relationships between the pediatric and adolescent inpatient care program and the related programs in Table 6.6 b) should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.6 b)
Pediatric and adolescent inpatient care — Important relationships
(See Clauses 6.3.1 and 6.3.6.2.)

Pediatric and adolescent inpatient care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Maternal and newborn care	Postpartum inpatient care	Provide rapid access for access to pediatric specialists for consultation	
Exterior garden/therapy area	Garden/therapy area	Provide convenient patient/family access to exterior play/therapy areas for	Provision of secured rooftop, at grade, or courtyard areas, or

(Continued)

Table 6.6 b) (Concluded)

Pediatric and adolescent inpatient care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
		leisure and mobilization activities	interior garden, therapy area
Emergency care	Pediatric focused exam/ cubical area, Trauma	Rapid transfer of admitted patient	Provide adjacently through controlled elevator
Medical imaging			
Laboratory services	Phlebotomy, other accessing points	Rapid transfer for processing	Pneumatic tube system for transporting of samples suggested
Procedure spaces	Recovery	Rapid transfer of acute patient	Provide thru physical adjacency or elevator
Family support spaces		Washroom, shower, respite, kitchen, laundry, to avoid patient washroom overuse	

6.3.7 Rehabilitation care

6.3.7.1

In new construction, the programs in Table 6.7 a) shall be linked to the rehabilitation care program, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: *These relationships are considered to be essential to performance.*

Table 6.7 a)
Rehabilitation care — Essential relationships
(See Clauses 6.3.1 and 6.3.7.1.)

Rehabilitation care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of services
Exterior garden/therapy area		Provide direct access to exterior for therapy activities	Provision of secured rooftop areas

6.3.7.2

The key relationships between the rehabilitation care program and the related programs in Table 6.7 b) should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.7 b)
Rehabilitation care — Important relationships
(See Clauses 6.3.1 and 6.3.7.2.)

Rehabilitation care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Outpatient/ambulatory		Provide ease of access for patients with limited mobility	
Building entry and parking	Building entry and adjacent parking	Provide ease of access for patients with limited mobility	Provide direct vertical access from elevators from a building entry and parking

6.3.8 Inpatient continuing care

The key relationships between the inpatient continuing care program and the related programs in Table 6.8 should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.8
Inpatient continuing care — Important relationships
(See Clauses 6.3.1 and 6.3.8.)

Inpatient continuing care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Rehabilitation care	All therapy areas	Support efforts to rehabilitate to return home	Provide satellite therapy services within continuing care

6.3.9 Ambulatory care — General

The key relationships between a general ambulatory care program and the related programs in Table 6.9 should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical. In dedicated outpatient/ambulatory care facilities, these relationships can vary.*

Table 6.9
General ambulatory care — Important relationships
(See Clauses 6.3.1 and 6.3.9.)

Ambulatory care — General			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Allied health services	Treatment of ambulatory patients	Majority of services are provided in an ambulatory care setting	
Electrodiagnostic services	Patient testing rooms	Access to ECG and EEG services	Provide satellite services in ambulatory care
Laboratory services	Specimen accessioning	Rapid testing of specimen	Provide “point-of-care” testing in ambulatory care Include automated conveyance system (e.g., pneumatic tube to transport specimens directly to the laboratory for testing)
Pharmacy	Dispensary	Provide medications and counselling	Provide satellite or retail service in ambulatory care

6.3.10 Ambulatory care — Renal dialysis

The key relationships between the renal dialysis ambulatory care program and the related programs in Table 6.10 should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.10
Renal dialysis ambulatory care — Important relationships
(See Clauses 6.3.1 and 6.3.10.)

Ambulatory care — Renal dialysis			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Ambulatory care — General	The area as a whole	Provide access to clinical specialists and expansion during peak periods Sharing of selected support services	
Building entry and parking	Building entry and adjacent parking	Provide ease of access for patients utilizing services 3 to 4 times per week for extended periods until eligible for a kidney transplant	Provide direct vertical access from elevators from a building entry and parking
Exterior garden/therapy area	Garden/therapy area	Provide direct patient/family access to exterior garden/therapy areas for leisure and mobilization activities	Provision of secured rooftop areas

6.3.11 Ambulatory care — Oncology

6.3.11.1

In new construction, the programs in Table 6.11 a) shall be linked to the oncology ambulatory care program, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: These relationships are considered to be essential to performance.

Table 6.11 a)
Oncology ambulatory care — Essential relationships
(See Clauses 6.3.1 and 6.3.11.1.)

Ambulatory care — Oncology			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of services
Pharmacy	Sterile products	To provide direct delivery of chemotherapeutic drugs	A satellite pharmacy may be included with oncology Alternatively, pneumatic tubes or freight elevators could be used.

6.3.11.2

The key relationships between the oncology ambulatory care program and the related programs in Table 6.11 b) should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.11 b)
Oncology ambulatory care — Important relationships
(See Clauses 6.3.1 and 6.3.11.2.)

Ambulatory care — Oncology			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Ambulatory care — General	The area as a whole	Provide access to clinical specialists and expansion during peak periods Sharing of selected support services	
Emergency care	Patient treatment cubicles	Transfer of patient requiring emergency intervention	
Building entry and parking	Building entry and adjacent parking	Provide ease of access for patients utilizing services for extended periods over multiple visits	Provide direct vertical access from elevators from a building entry and parking
Exterior garden/therapy area	Garden/therapy area	Provide direct patient/family access to exterior garden/therapy areas for leisure and mobilization activities	Provision of secured rooftop areas

6.3.12 Emergency care

6.3.12.1

In new construction, the programs in Table 6.12 a) shall be linked to the emergency care program, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: *These relationships are considered to be essential to performance. In urgent care centres (facilities providing unscheduled care to patients with less acute care requirements), these adjacencies might not be applicable (but still desirable).*

Table 6.12 a)
Emergency care — Essential relationships
(See Clauses 6.3.1 and 6.3.12.1.)

Emergency care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Critical care	Inpatient beds	Rapid access to critical care services for patients arriving in emergency care	Provide dedicated elevator in emergency care to directly connect the services
Procedures	Operating rooms	Access to OR for patients requiring emergency surgery	Provide dedicated OR within emergency care or provide dedicated elevator in emergency care to directly connect the services
Laboratory services	Specimen accessioning	Rapid testing of specimen	Provide point-of-care testing in emergency care Include automated conveyance system (e.g., pneumatic tube to transport specimens directly to the laboratory for testing)
Medical imaging	MRI, CT, X-ray, ultrasound	Stat imaging for unscheduled patients arriving	Create satellite imaging area in emergency care
Mental health and addictions	Inpatient beds – mental health	Transfer when needed	
Security and parking	24-hour/fully staffed security area	To provide support to emergency care staff on evenings, and to provide controls to access to the rest of the facility	Where possible, this should be located close to emergency care and should be designed so that the security services have clear visual access of the waiting spaces and public entry to the HCF
Building entry and parking	Separate walk-in entrance and ambulance entrance	Easy controlled access for patients separated from other traffic types	
Heliport		Easy access for helicopter to deliver a patient to trauma/resuscitation room	Provided dedicated elevator in emergency care to directly connect the roof-based heliport

6.3.12.2

The key relationships between the emergency care program and the related programs in Table 6.12 b) should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*

Table 6.12 b)
Emergency care — Important relationships
(See Clauses 6.3.1 and 6.3.12.2.)

Emergency care			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Ambulatory care — Renal dialysis	Dialysis equipment and nephrology clinical services	Access to dialysis equipment and maintenance, and specialized specialist consultation	Provide dedicated dialysis equipment and plumbing in emergency care
Ambulatory care — Oncology	Clinical specialists and chemotherapeutics	Ready access to specialists for consultation and the chemotherapeutics for patients presenting in off-hours	

6.3.13 Procedures

6.3.13.1

In new construction, the programs in Table 6.13 a) shall be linked to programs performing procedures, either by proximity or the use of a specified alternative. In additions or renovations to existing facilities, these links shall be created and maintained whenever possible.

Note: *These relationships are considered to be essential to performance. In outpatient/ambulatory care centres (facilities providing procedures on an outpatient basis only), these adjacencies might not be applicable (but still desirable).*

Table 6.13 a)
Procedures/operating rooms — Essential relationships
(See Clauses 6.3.1 and 6.3.13.1.)

Procedures/operating rooms			
Related program	Element within the program impacting the relationship	Objective	Alternatives to direct adjacency of programs
Critical care	Inpatient beds	Direct transfer of patients requiring surgery or other procedures	Provide direct, restricted access to an elevator to connect these services This arrangement shall be avoided if possible, as the transport of critically ill patients by elevator can create substantial risks. See Clause 12.2.6.3 for elevators for patient transfer
Emergency care	Patient treatment cubicles	Direct transfer of patient requiring emergency surgery	Provide dedicated OR within emergency care or provide dedicated elevator in emergency care to directly connect the services
Laboratory services	Specimen accessioning	Rapid testing of specimens	Provide point-of-care testing in ambulatory care Include automated conveyance system (e.g., pneumatic tube to transport specimens directly to the laboratory for testing)
Medical device reprocessing	Sterile core	Transport sterile materials efficiently, quickly, and without risk of contamination bypassing public areas	Provide dedicated clean elevator linking OR/sterile core and sterile storage area within MDRD
	Soiled holding	For removal of contaminated instruments/for direct transfer to contamination area in MDRD	Provide dedicated soiled elevator linking soiled collection area in OR with decontamination area in MDRD
	Supplies	For non-sterile supplies, linen, etc.	Create small stores area within MDRD

6.3.13.2

The key relationships between programs performing procedures and the related programs in Table 6.13 b) should be considered during planning, and created or maintained when possible.

Note: *These relationships are considered to be important to performance, but not critical.*