

SCHEDULE 3
DESIGN AND CONSTRUCTION SPECIFICATIONS

SURREY OUTPATIENT FACILITY
SURREY, BC

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**SCHEDULE 3
DESIGN AND CONSTRUCTION SPECIFICATIONS**

1. INTERPRETATION

1.1 Definitions

In this Schedule, in addition to the definitions set out in Schedule 1 of this Agreement:

“Authority Supplied End-Use Equipment” has the meaning set out in Section 8.6 of this Schedule;

“Building” means the building and the Parking Structure to be constructed on the Site under this Agreement, and includes all additions and improvements thereto from time to time;

“Communication Systems” means the communications systems described in Section 7.16 of this Schedule;

“Data Room” means the website established by the Authority containing documents related to the Project;

“End-Use Equipment” has the meaning set out in Section 8.1 of this Schedule;

“Facility Functional Program” has the meaning set out in Section 3.1(d)(1) of this Schedule;

“IBI+HDR Indicative Design” has the meaning set out in Section 3.1(b)(1) of this Schedule;

“Information Technology Equipment” has the meaning set out in Section 8.1 of this Schedule;

“IT and Communication Systems Design” has the meaning set out in Appendix 3F of this Schedule;

“IT and Communications Systems Design Consultation Protocol” has the meaning set out in Appendix 3F;

“IT/Communications Representative” has the meaning set out in Appendix 3F;

“IT/Tel Infrastructure” has the meaning set out in Section 8.1 of this Schedule;

“Parking Structure” has the meaning set out in Section 4.3(a)(1)(B) of this Schedule;

“Project Co’s End-Use Equipment” has the meaning set out in Section 8.1 of this Schedule;

“Quality Assurance Program” has the meaning set out in Section 5.2 of this Schedule;

“Quality System” has the meaning set out in Section 5.1 of this Schedule; and

“Security Risk Analysis” has the meaning set out in Section 7.16(q)(1)(A);

“SMH” means the Surrey Memorial Hospital;

“Space Program Summary” has the meaning set out in Section 3.1(c)(1) of this Schedule; and

“Sterling Functional Program” has the meaning set out in Section 3.1(a)(1) of this Schedule.

2. GENERAL

2.1 Standards

General Standard of Design and Construction

- (a) Project Co will undertake all Design and Construction:
 - (1) in accordance with the standards set out in this Schedule;
 - (2) in compliance with all applicable Laws;
 - (3) having regard for the concerns, need and interests of:
 - (A) all persons who will be Facility Users; and
 - (B) all Governmental Authorities;
 - (4) in accordance with Good Industry Practice; and
 - (5) to the same standards that an experienced, prudent, and knowledgeable long term owner of a good standard health care facility in North America, whether to be operated publicly or privately, would employ.
- (b) If one or more of the above standards is applicable then the highest of such standard will apply.
- (c) Without limiting any of the above and notwithstanding any other provision of this Schedule Project Co will undertake all Design and Construction:
 - (1) to at a minimum meet the requirements of the BC Building Code; and
 - (2) in compliance with codes that are not specifically referred to in this Schedule if required to meet Good Industry Practice or other standards set out above.
- (d) If Project Co wishes to make reference to a code or standard from a jurisdiction outside of Canada then Project Co will demonstrate to the Authority’s satisfaction that such code or standard meets the requirements of this Schedule.
- (e) In these Design and Construction Specifications:
 - (1) all references to “UL” will be deemed to mean “Underwriters' Laboratories of Canada”; and
 - (2) all references to an “ANSI” standard will be deemed to mean the specified “ANSI” standard or an equivalent CSA or IEEE standard.

2.2 Output Specification

- (a) This Schedule is written as an output specification for the purpose of defining what Project Co must achieve in the Design and Construction.
- (b) Notwithstanding anything in the Functional Program, Project Co will design and construct the Facility, including with sufficient space, as necessary for Project Co to perform the Services in accordance with the requirements of this Agreement.
- (c) Project Co will design and construct the structure of the Building so that it has a design life of at least 50 years.

2.3 Principles and Guidelines

- (a) Introduction
 - (1) This Section 2.3 is intended to provide guidance and context for Project Co, with particular reference to Design.
 - (2) Project Co will, as required by this Agreement including Section 2.1 of this Schedule, have regard for the provisions of this Section 2.3, but without limiting such obligations Project Co will not be required to comply strictly with the provisions of this Section 2.3.
 - (3) Nothing in this Section 2.3 will be interpreted to mean that Project Co is relieved of its obligation to comply with all applicable Laws, including the BC Building Code.
- (b) Design principals, and guidelines
 - (1) The Authority's Design Objectives
 - (A) The Authority is looking for a Design that offers advantages over conventional delivery of outpatient services. Most hospitals, including SMH, were specifically designed for the delivery of inpatient care. Accordingly, as health care evolved and outpatient services were introduced, treatment has typically been organized in a way that required patients to visit multiple departments for different components of their care. Patients must also wait for appointments at each department which extends the overall length of treatment for each outpatient episode. The issue is compounded at SMH because the outpatient services are spread out among different floors and levels.
 - (B) The development of the Facility provides an opportunity to re-design processes to improve patient care and the overall patient experience. Rather than using a traditional provider-centered approach, a more integrated, patient-centered model can be developed to take

advantage of synergies, new technology, and enhanced workflow. The Authority expects that good design will lead to better clinical outcomes, increased efficiency, and an improved patient experience. In addition, by integrating primary care services, a more holistic approach to care delivery can be achieved. This added dimension allows services to be customized for the community and to address specific needs such as a growing need for chronic disease management and health education.

(2) Principles of Care

(A) The Authority has identified a "vision", "mission", "commitment", "core principles" and a series of "guiding principles" which it has attempted to follow with respect to the Facility.

(i) Vision

For the Authority the "vision" is the mental concept or image of what the organization is seeking. The Authority's general vision is "Better Health, Best in Health Care", and its vision for the Project is:

To be a recognized leader in the delivery of outpatient health care.

(ii) Mission

For the Authority a "mission" is the aim or purpose of an organization or project. The mission represents objectives or tasks that are stated to be of special significance and which must be carried out for the project to be considered successful. In healthcare, these objectives take on even greater importance since they have the ability to impact people's everyday lives and personal well-being. The Authority's mission statement for the Facility recognizes the impact the Authority will have on both the community and the individual while also considering the needs and desires of care providers working in the Facility.

The Authority's purpose is:

- (ii).1 to deliver high-quality, culturally-sensitive, outpatient health care services; and
- (ii).2 to improve the health and well-being of the people in our community.

(iii) Commitment

In carrying out the Authority's mission, it is critical that the spirit and intent of the Facility is not lost during the planning,

implementation, or operational phases of the Project. To this end, a series of commitments has been made by both staff, physicians, and planners. These commitments are set out below.

The Authority is committed to:

- (iii).1 the seamless integration of outpatient health services into the continuum of care;
- (iii).2 providing inter-disciplinary primary and chronic care;
- (iii).3 a patient-centered approach to health care delivery;
- (iii).4 evidence-based best practice and design;
- (iii).5 exceptional customer service;
- (iii).6 linking with community care providers and hospitals in order to actively integrate the delivery of care;
- (iii).7 creating an atmosphere that embraces healthy lifestyles, facilitates healing, and reflects the diverse needs of the community;
- (iii).8 being on the leading edge of health care delivery through continuous quality improvement, innovation, and a commitment to achieving optimum results;
- (iii).9 operational efficiency; and
- (iii).10 creating an environment where care providers and staff are proud and happy to work.

(iv) Core Principles

The Authority has identified six “core principles” that it has concluded will assist to establish effective care delivery models, clinical support and Design:

- (iv).1 Patient-Centered. The Facility should facilitate the delivery of patient-centered care that seeks to optimize the overall experience of patients and their families.
- (iv).2 Forward-Thinking (Future-Oriented). The Facility should be designed to accommodate future care delivery trends, technologies, and service needs.
- (iv).3 Efficient Use of Resources. The Facility should be designed to maximize the value of each health care dollar spent to in Design and Construction and after Service Commencement.
- (iv).4 Integrated Care Delivery and Knowledge Transfer. The Facility should facilitate the involvement of all appropriate care providers in the diagnosis and treatment of patients and facilitate access by care providers and patients to complete and timely health information.

- (iv).5 Optimized Health Outcomes (Better Health). The design of the Facility should promote healthy lifestyles and optimize health outcomes for patients.
- (iv).6 Strives for Excellence (Best in Health Care). The Facility should facilitate excellence in clinical and support services and a healthy workplace environment.

(3) Guiding Principles

(A) From the core principles set out above the Authority has developed a more detailed set of “guiding principles” that can be used to develop service strategies. These guiding principles essentially create a framework for assessing service strategy decisions against the stated vision, mission, and core principles. These should serve as the common foundation for all planning, design and operation decisions as the development of the Project proceeds.

(i) Patient Centered

- (i).1 Design with the patient’s perspective in mind.
- (i).2 Develop and maintain a healing and aesthetically pleasing environment that is inviting, comfortable and sensitive to diversity.
- (i).3 Improve indoor environmental quality through sustainable design.
- (i).4 Design care processes that optimize patient, client and family satisfactions.
- (i).5 Design so that diversity is not a barrier to health care.
- (i).6 Design parking to provide easy access to the Facility.

(ii) Forward Thinking

- (ii).1 Create a flexible and adaptable design to accommodate future structures, processes, care delivery systems and technological needs.
- (ii).2 Minimize impact on the natural and physical environment.
- (ii).3 Strive to be on the leading edge of health care delivery.
- (ii).4 Incorporate state of the art technology.
- (ii).5 Be proactive in thinking and embrace innovation.
- (ii).6 Improve environmental impact through “green” or “sustainable planning” design, construction, operations and maintenance.

(iii) Efficient Use of Resources

- (iii).1 Build and promote partnerships that improve effectiveness and efficiency.
- (iii).2 Maximize cost effectiveness and the use of available resources.
- (iii).3 Use technologies as a tool to improve cost effectiveness.

- (iii).4 Maximize space through efficient design and shared usage.
- (iii).5 Utilize an optimal performance approach such as LEAN Healthcare.
- (iv) Integrated Care Delivery and Knowledge Transfer
 - (iv).1 Develop and apply integrated resources to enable:
 - (iv).1.1 seamless and sustainable care and support for patients and families;
 - (iv).1.2 effective exchange of information;
 - (iv).1.3 sharing of technology and services; and
 - (iv).1.4 ongoing learning and development of new knowledge.
- (v) Optimized Health Outcomes (Better Health)
 - (v).1 Use technologies as a tool to improve health outcomes.
 - (v).2 Models of care and design will be evidence-based.
 - (v).3 Promote healthy living.
 - (v).4 Quality and safety will be the paramount features of the clinical and non-clinical work environments.
 - (v).5 Provide staff with the physical facilities necessary to allow them to excel in a safe and multi-functional environment.
- (vi) Strive for Excellence (Best in Health Care)
 - (vi).1 Foster a safe, comfortable and productive healthy workplace environment that promotes recruitment, retention and satisfaction.
 - (vi).2 Maintain the individual identities of the Authority while sharing resources and providing seamless services.
 - (vi).3 Adopt best practices and aspire to be leaders.
 - (vi).4 Open to new ideas and creative solutions.
 - (vi).5 Remain patient focused and have the courage to do what is necessary to achieve the Facility's mission, vision and core principles.

(B) Duty of Care

- (i) The Facility should be designed to operate in a safe and efficient manner. This means, amongst other things, that:
 - (i).1 staff can carry out their duties in a safe environment;
 - (i).2 proper response can be given in an emergency situation;
 - (i).3 visitors and patients will be safe in those areas of the Facility to which they have access;
 - (i).4 patients and visitors do not have access to hazardous areas; and

- (i).5 the Facility should be designed so that service interruptions and down-time which may be required for any reason.

2.4 Architectural Design Principles

(a) Urban Design Principles

(1) Project Co will design the Facility so that the Facility:

- (A) is integrated with and sited to preserve existing significant natural features, trees and natural vegetation;
- (B) mitigates the nearby noise from 140th Street and Fraser Highway; and
- (C) provides for smooth transitions between the Site and adjacent properties and between the Site and public sidewalks. Where retaining walls are necessary, they should be consistent in materials and quality to that of the Facility.

(2) In developing the design, Project Co will:

- (A) consider the impact of Site development and placement of the Facility on adjacent neighbours and land uses; preserve visual privacy and sunlight for adjacent properties, and include features that “soften” the Facility’s appearance;
- (B) consider the micro-climatic effects of parking, walkway and Facility location and entrance orientation on patient, staff and visitor comfort and safety;
- (C) consider the existing slope across the Site and its impact on site circulation, Facility location and configuration;
- (D) consider the potential of all existing trees on the Site to reduce the impact of the Facility on its neighbourhood context and to contribute to the healing environment for patients, visitors and staff;
- (E) consider the views to important Facility entrances from 140th Street;
- (F) consider the opportunities for views of the adjacent park and the Green Timbers Urban Forest to the east;
- (G) orient and configure the Facility to formally define but not dominate new open space and pedestrian corridors;
- (H) encourage use of the Site and its amenities by the staff, the visitors and adjacent neighbours;

- (I) capitalize on opportunities for respite and repose to aid in providing a healing environment;
 - (J) reinforce the physical relation of the structures with the major city streets of Fraser Highway, 140th Street and Green Timbers Way; and
 - (K) create a legible site plan and pattern to foster a strong sense of place and identity.
- (3) In developing the design, Project Co will address the following:
- (A) with respect to the form and character of Buildings:
 - (i) General – the exterior of the Building should be articulated to create an architecturally interesting and refined structure. Consider emphasizing the modular requirements of the program in the massing and materials to achieve articulation, visual interest, and human scale;
 - (ii) Landmark – the Facility should be detailed to reinforce its importance as a landmark;
 - (iii) Active uses – provide highly active public areas visible to the street along 140th Street and at ground level throughout the Facility to support informal supervision;
 - (iv) Future expansion – consider locating future expansion and construction access at the east to minimize impact on 140th Street and to facilitate staging for construction;
 - (v) Maximize glazing at exit stairs;
 - (vi) Mechanical/Electrical penthouses should be screened and incorporate architectural elements;
 - (B) with respect to building articulation:
 - (i) the Facility should be highly articulated and transparent to break down its scale, utilizing such components as glazing, canopy and shading systems, as well as exposed structural elements; and
 - (ii) highly visible circulation, “breakout/gathering areas”, and building systems are encouraged;
 - (C) with respect to building materials and colour:

- (i) exterior materials should include some high quality finish materials with colour to reinforce entry areas, vertical circulation elements and semi-public or significant areas in the Facility;
 - (ii) dominant materials should be architectural concrete, clear glass, brick masonry and stone or metal cladding. Generally, stucco should not be a principal building material and is discouraged; and
 - (iii) facade transparency and views into building activities should be provided, especially at grade levels; accordingly, use of mirrored or highly reflective glass is discouraged;
- (D) with respect to roofs:
- (i) landscaping and other “green” treatments of roof areas are encouraged, including provision of useable outdoor open spaces; and
 - (ii) where not landscaped, roof areas should be designed to be attractive when viewed from above and should avoid use of large areas of undifferentiated gravel;
- (E) with respect to awnings, canopies and entries:
- (i) pedestrian interest and comfort at entries should be provided through specifically designed seating, signage, lighting and features that signal the Facility's use; and
 - (ii) entries should be clearly identifiable;
- (F) with respect to lighting:
- (i) particular attention should be given to the lighting of public outdoor spaces and the adjacent private property to create an unobtrusive, human scale lighting concept, with a hierarchy of fixture types designed according to functional and security needs, and reflecting the hierarchy of pedestrian corridors;
 - (ii) light fixtures within the reach of pedestrians should be vandal proof;

- (iii) lighting on pedestrian paths should illuminate not just the path but also the surrounding area adjacent to the path particularly en route to transit connections; and
 - (iv) ease and safety of pedestrian access to public transit should be facilitated by lighting and to adjacent amenity spaces such as the park, plaza, parking and gardens;
- (G) with respect to the public realm and open space:
- (i) the design of the Facility should consider the legibility, quality and consistency of the overall treatment of the public realm, including public open space, pedestrian corridors and streets, to achieve the urban design objective for a unified and attractive built environment;
 - (ii) open spaces should have a hierarchy as follows:
 - (ii).1 public open spaces;
 - (ii).2 semi-private open spaces;
 - (ii).3 private open spaces;
 - (iii) segregation between the different open spaces should be achieved through landscape barriers such as hedges and planting;
 - (iv) the Facility precinct should be an amenable environment for pedestrians, through the use of:
 - (iv).1 coordinated methods of way finding to inform people of routes through the Site to specific buildings and entries or to the major streets transit nodes and adjacent park;
 - (iv).2 pedestrian pathways laid out for easy wayfinding;
 - (iv).3 a coordinated design for street furniture, including benches provided at regular intervals for ease of use particularly for the infirm;
 - (iv).4 continuity of treed walkways for consistent sun/shade protection when desired;
 - (iv).5 pedestrian scale and comfort in landscape and built form;
 - (iv).6 visually connected pathways and integrated plazas, steps and usable landscape features for the enjoyment of staff, visitors and neighbouring residents;
 - (iv).7 minimum grades for drop curbs, raised crossings and drop curbs aligned to pedestrian crossings;
 - (iv).8 distinct pedestrian and vehicular routes with continuity for efficient flow of vehicles and pedestrians;

(iv).9 a variety of scales, locations and orientations to cater to varied outdoor activities and varied experiences of the staff and visitors; and

(iv).10 a good visual and physical connection between indoor and outdoor environments;

(H) with respect to pedestrian corridors:

(i) distinct and continuous pedestrian links should be provided throughout the Site to ease wayfinding and encourage pedestrian traffic;

(ii) conflicts between pedestrian routes and vehicular/bicycle routes should be prevented;

(iii) the main pedestrian thoroughfare through the Site should provide a direct link from 140th through the Site to Green Timbers Urban Forest;

(iv) all three peripheral streets, Green Timbers Way, 140th Street and Fraser Highway adjacent to the Site should be accessible from the internal pedestrian corridor by complimentary pedestrian routes;

(v) pedestrian routes should be enhanced by additional planting and sidewalks for persons with disabilities;

(vi) with respect to disabled access:

(vi).1 the primary pedestrian systems, public open spaces, primary private walkways and principal entrances to the Facility should be accessible to the physically challenged;

(vi).2 access routes should be easily identifiable and integrated into the building/landscape design; and

(vi).3 appropriate signage, markers, or other levels of way finding should be used along access routes to indicate to the physically challenged the route terminus points or any required route changes to ensure convenient universal access throughout the Site;

(I) with respect to landscaping:

(i) the landscape should contribute to the creation of a liveable, healthy and environmentally responsive community;

(ii) large calliper trees, seasonal and coniferous plantings should be used extensively;

- (iii) use of indigenous flora should be considered a priority, in terms of minimizing maintenance;
- (iv) flowering and fruiting trees should be chosen for promoting natural avian habitat;
- (v) a variety of plant material should be used reflecting seasonal change;
- (vi) areas of the Site should be developed for open space and setbacks should be landscaped to include existing trees;
- (vii) open space should be fashioned to minimize water, chemical and fossil fuel use for routine maintenance and should promote a healthy local ecosystem using sustainable measures;
- (viii) permeable surface materials should be incorporated into open space development proposals, and opportunities for retention of surface storm water on Site should be considered;
- (ix) senses of sight, smell and touch should be stimulated by providing elements of healing gardens; and
- (x) the ground plane treatment should be unified through the use of common paving materials, tree grates, lighting and other landscape furniture items;

(b) Adaptability, Flexibility and Expandability:

(1) Adaptability and Flexibility - Project Co will:

- (A) provide a Design layout that will accommodate changes to uses and functions in the Facility with minimal required changes to the Facility's structure and building systems;
- (B) consider the consolidation of modular general space and the segregation of special purpose or highly serviced space;
- (C) utilize building systems and components that facilitate changes in the Facility configuration and changes in servicing;
- (D) locate permanent building elements, such as stairs, elevators and duct shafts, to minimize constraints on changes to the Facility;
- (E) locate building services plant and distribution systems to maximize service system flexibility and ease of maintenance;

- (F) provide adaptability and flexibility in highly technical areas (such as diagnostic and treatment areas), which contain many small rooms with stringent functional and ergonomic requirements affecting the placement of furniture and equipment;
 - (G) consider the following:
 - (i) minimize the number of internal columns;
 - (ii) simple building perimeter and non-restrictive fenestration pattern;
 - (iii) floor to floor heights and servicing systems to allow modifications with minimal disruption to operations;
 - (H) provide capacity in vertical (and horizontal) distribution shafts and plenums to accommodate service system improvements, new equipment, digitization, Picture Archiving and Communication System (PACS), and emerging technologies;
 - (I) accommodate the vertical and horizontal distribution of electrical and mechanical services to allow maintenance and changes to occur with the least disruption to clinical service delivery, particularly where the need for service flexibility is highest;
 - (J) provide building service systems designed to minimize service disruptions to areas adjacent to building maintenance and renovation areas;
 - (K) provide a system where appropriate to accommodate access for raceways for cable and fibre optic connections under each control and computer room in medical imaging;
 - (L) standardize the design and layout of recurrent room types, including washrooms, treatment bays, examination and treatment rooms, clean and soiled utility rooms, equipment rooms and outpatient treatment rooms and patient washrooms;
 - (M) consider sufficient space over diagnostic and treatment areas for the most highly serviced and/or operationally critical components to minimize disruption to clinical service while changes are being made; and
 - (N) consider the ongoing adaptation and reuse of the Facility as it relates to sustainable building design.
- (2) Expandability - Project Co will:

- (A) provide for expansions of the structure of the Building excluding the Parking Structure (including at minimum a 30% expansion) with minimal disruption or impact on the existing Facility layout;
- (B) design the mechanical, electrical and other building systems to the extent practical so that they are capable of efficient expansion if the Building is expanded as set out in (A) above;
- (C) design the Facility so that all areas are capable of expansion to meet future needs, especially surgical services, medical imaging and other diagnostic and treatment areas;
- (D) locate primary circulation corridors to allow expansion without increasing the complexity of the circulation system as a whole; and
- (E) consider locating administrative and other non-clinical 'soft' functions adjacent to clinical areas that are likely to need to expand.

(c) Building Design

(1) Evidence - Based Design

- (A) The health care environment has substantial effects on patient health and safety, care efficiency, and staff effectiveness and morale. To ease these effects, evidence-based health care design creates environments that are therapeutic, supportive of family involvement, efficient for staff performance and restorative for workers under stress.
- (B) Evidence-based design can improve the health care environment in three key ways by:
 - (i) enhancing patient safety by reducing infection, risk, injuries from falls, and medical errors;
 - (ii) eliminating environmental stressors, such as noise, that negatively affect outcomes and staff performance; and
 - (iii) reducing stress and promoting healing by making the Facility more pleasant, comfortable, and supportive for patients, their families and staff.
- (C) Project Co will use proven architectural methods for improving patient outcomes, safety, and satisfaction, as well as staff retention and service efficiency and Project Co will consider the following recommendations where applicable in the Facility:

- (i) improve indoor air quality with well-designed ventilation systems and air filters to prevent nosocomial infection;
- (ii) use sound-absorbing ceiling tiles and carpeting to reduce noise which will lower stress for patients and staff alike;
- (iii) provide better lighting and access to natural light to reduce stress and improve patient safety;
- (iv) create pleasant, comfortable, and informative environments to relieve stress and promote satisfaction among patients, their families, and staff;
- (v) make the Facility easier—and less stressful—for patients and their families to navigate; and
- (vi) design the Facility to help staff do their jobs.

(2) Performance Optimization

- (A) Project Co will design the Facility in such a way as to enhance the efficiency and effectiveness of workflow and processes within both clinical and non-clinical service delivery. Important aspects of this include:
 - (i) putting the patient first;
 - (ii) defining value in terms of the patient;
 - (iii) adding only value; and
 - (iv) eliminating waste and inefficiencies;
- (B) Project Co will use a tried and tested, industry applicable methodology (such as the LEAN Healthcare methodology or an appropriate equivalent) to support the delivery of the above concepts in improving the safety, quality, delivery and efficiency of the Facility.

(3) Ergonomics

- (A) The following quotation from the document “*OSHA Ergonomics: The Study of Work, 2000*” is consistent with the Authority ergonomics philosophy:

“Ergonomics is an important consideration. Ergonomics is the science of designing the job to fit the worker, rather than physically forcing the worker’s body to fit the job. Adapting tasks, workstations, tools and

equipment to fit the worker can help reduce physical stress on a worker's body and eliminating many potentially serious, disabling work-related musculoskeletal disorders (MSDs)."

- (B) In designing the Facility, Project Co will:
- (i) provide detailed design features, which expressly facilitate the physical activities of the staff and patients to increase their safety, efficiency and general well being, and assist in eliminating ergonomic risk factors;
 - (ii) provide for all patient care and treatment spaces (including washrooms) to accommodate lifting and transfer devices; and
 - (iii) provide ergonomics design, consistent with Good Industry Practice, of all work spaces including millwork, lighting, and finishes to eliminate strain and injury to health care workers.

(4) Design Standards for Universal Accessibility

- (A) In designing the Facility, Project Co will provide easy access to wheelchairs/stretchers close to the entrance of the Building; and ensure that all patient-occupied spaces are designed for disabled access and assistance by nursing staff;
- (B) Project Co will consider the following "Universal Design" philosophies in the Design and planning of the Facility:
- (i) Equitable use – the design is useful to people with diverse abilities.
 - (ii) Flexibility in use – the design accommodates a wide range of individual preferences and abilities.
 - (iii) Simple and intuitive - use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
 - (iv) Perceptible information – the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

- (v) Tolerance for error – the design minimizes hazards and the adverse consequences of accidental or unintended actions.
- (vi) Low physical effort – the design can be used efficiently and comfortably and with a minimum of fatigue.
- (vii) Size and space for approach and use – appropriate size and space is provided for approach, reach, manipulation, and use regardless of user’s body size, posture or mobility.

(5) Building Type

(A) The Building will contain a wide range of functions and requirements. Functions can be categorized into five basic groupings:

- (i) public;
- (ii) diagnostic and Treatment (“D & T”);
- (iii) outpatient treatment;
- (iv) office;
- (v) operational support;

(B) Basic Building requirements include:

- (i) mechanical, electrical and telecommunication system servicing requirements as per the table below;
- (ii) the need for system servicing flexibility as per the table below;
- (iii) the need for spatial configuration flexibility as per the table below;

Type of Space in Building	Mechanical, Electrical and Telecomm. System Servicing	Servicing Flexibility	Spatial Flexibility
Public	Low	Low	Low
D & T	High	High	High
Outpatient treatment	Moderate	Moderate	Moderate
Office	Low	Low	High
Operational support	Varies	Low	Moderate

where:

- (iii).1 the general project grid is 9m x 9m with a peripheral of 9m x 4.5m;
- (iii).2 under all columns:
 - (iii).2.1 “Low” means typical office building standards;
 - (iii).2.2 “Moderate” means typical ambulatory care building standards; and
 - (iii).2.3 “High” means typical acute care hospital building standards.

(C) Project Co will consider the following principles in the selection of building systems for each functional grouping:

- (i) Consider buildings with construction systems adapted to function specific servicing, height, post-disaster and other technical requirements.
- (ii) Outpatient treatment modules contain a number of standard room types. Standardization assists caregivers in quickly accessing critical equipment. Standard room modules often do not align with the structural grid, such that interior and perimeter columns interfere with door, bed, furniture, equipment placing and washroom layout, impinging on function. Minimize or eliminate interior columns within outpatient treatment modules and limit the intrusion of perimeter columns. Match standard room modules to the structural grid wherever possible. A structural grid of not less than 9 metres is required.

(d) Interior Design

(1) Indoor Environmental Quality:

(A) Healing environment:

- (i) Patients and their families are under both physical and psychological stress.
- (ii) The goal of the healing environment in a health care setting is to reduce stress, which in turn helps to restore vitality. A healing environment is designed out of a thoughtful concern for human needs, and makes visible the same healing qualities that are experienced in nature. Healing architecture uses natural light, sound and music, color, pattern, air quality, nature and views of nature, art, and aesthetic form as tools for creating a spirit-reinforcing

environment that will encourage and cheer patients of all ages and their families.

- (iii) Three factors have been found to reduce stress in patients, visitors and staff: (1) a sense of control, (2) access to social support, and (3) access to positive distractions. In designing the Building, Project Co will:
 - (iii).1 provide maximum independence for patients by allowing patients to control noise, light and the degree of privacy provided in their immediate environment;
 - (iii).2 provide a quiet, comfortable environment conducive to patient relaxation;
 - (iii).3 provide non-intrusive night lighting in care spaces where possible;
 - (iii).4 provide patient care areas that are configured to promote comfort and intimacy for patients, family centered care, and confidentiality between patients, caregivers and families;
 - (iii).5 provide patient care areas that are designed to maintain dignity and allow for patient privacy while facilitating the observation of patients by staff;
 - (iii).6 provide a gradual continuum from community to privacy;
 - (iii).7 provide views from/to nature and/or community where possible (all public waiting areas should provide views towards the natural landscaping);
 - (iii).8 provide sheltered and safe grade and roof level accessible gardens, courtyards and terraces with wheelchair accessible surfaces;
 - (iii).9 provide wide views to accessible gardens, courtyards and terraces from adjacent program areas, where possible;
 - (iii).10 provide shading over seating areas within accessible garden and terrace areas, using trellises, canopies and/or trees;
 - (iii).11 provide native indigenous plant species where possible in the Site landscaping;
 - (iii).12 provide discreet garden maintenance equipment storage adjacent to landlocked or rooftop garden areas;
 - (iii).13 consider the use of natural materials such as wood throughout public and patient care areas;
 - (iii).14 consider and acknowledge ethnic diversity; and
 - (iii).15 consider the introduction of positive distractions that engage all five senses, offer variety and delight.

(2) Indoor Air Quality

- (A) Indoor air quality is important to the well being of patients, visitors and staff. Indoor air quality depends on the provision of adequate fresh, clean air, effective natural or mechanical ventilation and the absence of volatile organic compounds and other indoor contaminants from off-gassing materials, the handling of wastes and toxics produced by work processes, the selection of cleaning agents and the management of building operations and maintenance. In designing the Building, Project Co will:
- (i) provide benign indoor materials and maintenance processes;
 - (ii) provide and maintain proper pressure relationships, air exchange rates, and filtration efficiencies for ventilation systems in surgical suites and throughout the Building;
 - (iii) provide physical isolation and separate ventilation under negative pressure for enclosed copy rooms and all other work areas associated with chemical use; and
 - (iv) provide operable windows in all exterior facing offices where possible.
 - (v) consider the provision of natural available ventilation to patient and staff areas where practically and clinically possible; and
 - (vi) consider the use of displacement ventilation systems that could provide improved air quality, patient and staff comfort and reduced operational costs.

(3) Daylight:

- (A) Natural light is an important element in the workplace and in the creation of a therapeutic environment. Project Co will design the Facility so that natural light is provided in all patient areas, except where it conflicts with clinical requirements. The above are deemed to be minimum requirements but do not take precedence over statutory requirements. Refer to Section 7.15 for appropriate Lux levels in selected locations.
- (B) In designing the Facility, Project Co will:
- (i) provide daylighting to as much of the indoor environment as possible, including public areas and amenities, primary and secondary public circulation

paths, patient waiting, patient care and staff work areas.

(4) Color Philosophy:

- (A) The goal of effective colour application in the health care setting is to enhance the environment with the appropriate use of full-spectrum coloration.
- (B) Color can be used to calm, encourage and cheer the patient. Adequate daylight with natural finishes and a correct proportion and balance of colors can create relaxing or stimulating environments as care and treatment protocols require. Patients and staff needing to remain in a limited area for a protracted period require exposure to a wide palette of colors from across the color spectrum to retain visual acuity, remain alert and reduce their sense of confinement. In designing the Facility, Project Co will:
- (i) provide departmental color palettes appropriate for the emotional and psychological needs of their patients;
 - (ii) provide natural color palettes that contribute to the creation of a healing environment;
 - (iii) provide distribution of ambient full-spectral color within typical staff and patient environments;
 - (iv) provide balanced color temperature in all areas, using ambient color temperatures tending to cool to keep the environment fresh; and
 - (v) provide an appropriate number of colours by avoiding departmental 'color schemes' that have too few colors and avoiding designation of departments and patient care areas by their ambient color so that a single color does not dominate over too wide an area.
- (C) Project Co will, where appropriate:
- (i) consider the selection of permanent materials that are color balanced and polychromatic so that color and material selection is not limited in the future;
 - (ii) consider the psychological effects of colors – for example that cooler colors have been found to hasten the passage of time, and anthroposophist

theories of the healing effects of color temperature on various illness types;

- (iii) consider the palette, distribution, and intensity of ambient color, accent color, and wayfinding color; and
- (iv) consider interior colour schemes that avoid glare-creating finishes.

(5) Use of Art:

- (A) Art can improve the quality of the environment by reinforcing the impression of a caring environment and by creating a sense of place though strong ties to the local community. Art can be a positive distraction for patients and promote social interaction and social support as well as patients' and staff's sense of ownership. Art can facilitate wayfinding.
- (B) Project Co will work closely with the Authority to coordinate and manage artwork that is owned and provided by the Authority. Artwork will form an integral element of the development design proposals. Project Co will identify the most effective and appropriate locations for major and minor works of art throughout the Facility. Art provided and installed by the Authority will fit within the design parameters of building systems and not require modifications or change to the same.
- (C) In designing the Facility, Project Co will:
 - (i) provide assumptions for review by the Authority during design development with regards to space and location to accommodate art;
 - (ii) provide seismic restraint of art objects where required; and
 - (iii) provide lighting to enhance the display of all works of art and the necessary structural support and/or protective measures required for particular works.
- (D) Project Co will, where appropriate and cost effective:
 - (i) consider the development of major public pathways as galleries with hanging and display systems that can accommodate complete size and spacing flexibility in mounting; and

- (ii) consider the provision of an art program to invite community artists to display their work on a permanent and temporary basis within the buildings and on the Site.
- (6) Elder Friendly
 - (A) Elder Friendly design affects the independent function and safety of older adults.
 - (B) Project Co will take physical design components under consideration when designing the Facility in order to provide older patients with independent function ability and safety.
 - (C) The following components were selected according to factors that are known to contribute adverse affects on functional ability and safety in older adults, and to identify additional physical design elements that go beyond industrial building codes and standards. These design components, together with corresponding recommendations for elder friendliness, can be found in “Code Plus, Physical Design Components for an Elder Friendly Hospital, January 2006”, a copy of which is located in the Data Room.
 - (i) lighting;
 - (ii) colour;
 - (iii) flooring and walls;
 - (iv) hallways, doors and windows;
 - (v) handrails;
 - (vi) wayfinding and signage;
 - (vii) walkways, ramps and stairways;
 - (viii) acoustic considerations;
 - (ix) special considerations;
 - (x) parking;
 - (xi) equipment;
 - (xii) furniture;
 - (xiii) elevators; and
 - (xiv) washrooms.

3. FUNCTIONAL PROGRAM

3.1 Priority of Programs

- (a) Sterling Functional Program and Adjacency Diagrams
 - (1) Attached as Appendix 3A to this Schedule is the "Surrey Health Services Capacity Initiative Outpatient Facility Planning Functional Program" dated April 30, 2007 prepared by Sterling Planning Alliance, including Appendices 1.0, 2.0, 3.0 and 9.0 and the Addendum dated June 22, 2007 regarding Pharmacy Services (the "**Sterling Functional Program**"). Appendices 4.0, 5.0, 6.0 and 7.0 to the "Surrey Health Services Capacity Initiative Outpatient Facility Planning Functional Program" are not included as part of this Agreement.
 - (2) In preparing the Sterling Functional Program Sterling Planning Alliance undertook a consultation process with potential users of the Facility, and developed recommended adjacencies, all as described in the Sterling Functional Program.
- (b) IBI+HDR Indicative Design and Fit Test
 - (1) The Authority's architectural consultants, IBI+HDR Health Care, undertook an indicative design for the Facility, based on the Sterling Functional Program, as part of the planning required for the Authority's application to re-zone the Lands, and to perform a "fit test" to investigate whether the programming as described in the Sterling Function Program can be accommodated on the Site. The IBI+HDR indicative design (the "**IBI+HDR Indicative Design**") is described in concept plans attached as Appendix 3B to this Schedule.
- (c) Functional Space Summaries
 - (1) In preparing the IBI+HDR Indicative Design IBI+HDR consulted further with potential users of the Facility and refined the Sterling Functional Program, as summarized in Appendix 3C attached to this Schedule (the "**Space Program Summary**").
- (d) Final Functional Program
 - (1) The functional program (the "**Facility Functional Program**") is made up of the following three documents:
 - (A) the Sterling Functional Program;
 - (B) the IBI+HDR Indicative Design (with particular reference to adjacencies);
 - (C) and the Space Program Summary.

- (2) The following will apply to the Facility Functional Program:
- (A) Project Co will design the Facility in accordance with the requirements of this Agreement based on the Facility Functional Program, considering all three documents that make up the Facility Functional Program; and
 - (B) the three documents that make up the Facility Functional Program were developed sequentially in the order listed in 3.1(d)(1) and should be read as complimentary, except that if and to the extent that there is a conflict between one of three documents that make up the Facility Functional Program, the documents will have the following priority:
 - (i) the Space Program Summary will have the highest priority;
 - (ii) the IBI+HDR Indicative Design will have the next highest priority;
 - (iii) the Sterling Functional Program have the lowest priority.

Notwithstanding Section 3(c) of Schedule 1 [Definitions and Interpretation], if there is any conflict between the Space Program Summary and the "Final Schedule of Area - August 15, 2008" included as Part 4 of the Proposal Extracts (Design and Construction) in relation to:

- a) room numbering;
- b) the number of rooms; or
- c) room sizes,

then the "Final Schedule of Area - August 15, 2008" included as Part 4 of the Proposal Extracts (Design and Construction) will govern.

4. DESIGN REQUIREMENTS

4.1 Site

(a) Project Co will:

- (1) ensure that the completed Facility and all Construction is confined within the areas shown as "Work Area Boundary "A" on IBI+HDR Health Care drawing 15.2, a copy of which is included in Appendix 3D and conduct such surveys and install boundary marking as may be required to comply with this Section;
- (2) not enter onto or disturb any soil in the area of the Site that is identified as "Dedication (for DFO)" on IBI+HDR Health Care drawing 15.2, a copy of which is included in Appendix 3D (for clarity, the area identified as "Dedication (for DFO)" on IBI+Health Care drawing 15.2 includes all of the area between the south-eastern boundary of Work Area Boundary "A" and the creek that is located southeast of Work Area Boundary "A". Project Co acknowledges that the Authority intends to:
 - (A) enter into, and register against title to the Lands, a restrictive covenant agreement relating to the "Dedication (for DFO)" area; and
 - (B) construct a fence along the south-eastern boundary of Work Area Boundary "A" to separate the "Dedication (for DFO)" area from the Site). Project Co will not remove, damage or disturb this fence during construction of the Facility;
- (3) not remove, damage or destroy any of the existing trees along Green Timbers Way as shown on IBI+HDR Health Care drawing 15.6, a copy of which is included in Appendix 3D, except for trees marked on that drawing as 6, 7, 13, 14, 24, 25, 26 and 27, which Project Co may uproot and replant in a new location on the Site as may be required to permit access to the Site from Green Timbers Way; and
- (4) take account of the potential for future development of the balance of the Site, as shown for illustration on IBI+HDR Health Care drawing 15.3, a copy of which is included in Appendix 3D.

4.2 Vehicular Access

The design of the Facility will:

- (a) Provide a minimum of two vehicular accesses to the Site for vehicles approaching from both the north and the south along 140th Street:
 - (1) one access will be provided from Green Timbers Way, no more than 65 metres in from 140th Street (measured along the property line); and

- (2) the second access will be provided from 140th Street.
- (b) Provide appropriate accesses to the Site to meet the needs of ambulances to the Site for emergencies, staff and visitor traffic, and service and delivery vehicles.
- (c) Consider both current and public transportation in providing appropriate pedestrian access to and from the Site to meet the needs of staff and patients whom utilize public transportation.
- (d) Minimize general and service vehicle traffic interference with emergency vehicle access to the Site. Provide functional separation of:
 - (1) emergency vehicles,
 - (2) visitors and staff traffic; and
 - (3) delivery vehicles to the loading bays for deliveries and pick-up at the Facility.
- (e) At the important Building entrances:
 - (1) provide design that minimizes conflicts between vehicles and pedestrians;
 - (2) provide a passenger-side drop-off zone protected from inclement weather for 5 vehicles at main entrance. Provide rain shelter to within 300mm of curb minimum; and
 - (3) Provide a taxi cueing area for 3 taxis within view of the main entrance that does not interfere with the main entrance passenger drop-off zone. Provide a taxi cueing area for 2 taxis within view of the Building entrance that does not interfere with the Building's passenger drop-off zone.
- (f) Provide appropriate vehicular and pedestrian access between the upper and lower levels of the Site.
- (g) Provide one or more service entrances and a minimum of two loading docks protected from inclement weather able to accommodate the level unloading of semi-tractor trailers.

4.3 Parking

- (a) The design will provide all the necessary parking requirements for the Facility, which will include:
 - (1) at least 600 parking spaces, including:
 - (A) Surface Parking - a minimum of 130 surface parking stalls (including a minimum of 5 handicap parking stalls) within close proximity to the main entrance of the Building; and

- (B) Underground Parking – the balance of the required parking stalls (including a minimum of 15 handicap parking stalls) in a below grade parking structure (the “**Parking Structure**”) either under the Facility or in a stand-alone parking structure.
- (b) Surface Parking at Grade
- (1) Reduce the visual impacts of large parking lot areas by:
 - (A) dividing the parking area into smaller parking lots; and
 - (B) plant shrubs and small trees to define circulation routes for pedestrians and vehicles.
- (c) Parking Structure
- (1) Portions of the Parking Structure that are above ground, if any:
 - (A) will be designed with similar building-design characteristics to the Building, with similar materials, lighting, colors and architectural elements as the Building;
 - (B) will incorporate canopy for weather protection over walkways around the perimeter and will provide direct access between the Building and the Parking Structure with weather protection;
 - (C) will have an exterior façade that maintains a horizontal line throughout (any sloping of the interior structure for ramping will not be repeated or visible on the exterior façade);
 - (D) will have an exterior façade that includes a wall or other screening of sufficient height to screen parked vehicles (all screening will be visually pleasing and durable); and
 - (E) will be integrated with the landscaping and will be landscaped around its perimeter to reduce its scale. The Parking Structure will not dominate the existing urban landscape including the existing heritage trees or the Green Timber Urban Forest.
 - (2) If the Parking Structure is a separate building, then the Parking Structure will have a dedicated elevator or elevators. Elevator and stair shafts will be distinct architectural elements.
 - (3) if a stand-alone Parking Structure is used, elevators will be located along the exterior periphery of the Parking Structure, and the elevator lobby will be visible from the main entry of the Building at each level. The back of the elevator cab and shaft will be made of glass or other similar transparent material that will allow maximum visibility and surveillance from the exterior.

- (4) Stairways will be located at the periphery of the stand-alone Parking Structure and oriented so the stairways are visible from public areas, streets and Building at each level. Glass or similar transparent materials will be used to provide maximum visibility and surveillance from the exterior and interior of the Parking Structure.
- (5) The Parking Structure will be able to be secured and locked when not in use.
- (6) Access to the Parking Structure will be designed so as not to obstruct free flow of traffic in and out of the Site or onto adjacent streets. Entrances and exits will be located so that each is separated from the other and clearly identifiable to reduce traffic movement conflicts.
- (7) Provide adequate provision for ingress and egress to all parking spaces to ensure ease of mobility, ample manoeuvring clearances, and safety of vehicles and pedestrians.
- (8) Provide separate access points for all vehicle and pedestrian traffic to avoid movement conflicts.
- (9) Standard Crime and Safety (CPTED) Conditions:
 - (A) reduce opportunities for graffiti through the use of vines and coatings;
 - (B) reduce opportunities for hiding spaces:
 - (C) ensure the interior is well lit and paint walls and ceilings light colors.
 - (D) provide glazing with a fire separation equivalency between parking areas and exit stairs.
- (10) All parking spaces will be clearly marked and numbered.
- (11) Wayfinding strategies including signage will be used to allow each floor to be identifiable and to assist in orientation and ease of finding/identifying parking stalls.
- (12) Vehicle ramps will not exceed 10% slope.
- (13) Parking will be laid out such that it does not require a vehicle to back up for more than 10m.
- (14) Maximum allowable slope or cross-fall is 5% applicable to both the parking stalls and access aisles.
- (15) Roof top parking will include landscaping to reduce visual impact of a large parking lot from the Building.
- (16) All rooftop lighting will be direct towards parking surfaces only.

- (d) Set parking lot layouts in an orderly and logical design to minimize confusion and excessive internal circulation. Parking facilities should be well-lit and walkways and shelters will be planned in conjunction with the parking areas to minimize pedestrian/vehicular conflicts.
- (e) Provide appropriate number of motorcycle parking spaces and bicycle parking area, with adequate bicycle security.
- (f) Identify and take into account key adjacencies relating to parking including:
 - (1) direct access from the main entrance and patient parking;
 - (2) locating the specimen processing area directly adjacent to the laboratory and the packaging and delivery area close to a main level drive up area to expedite courier access and to increase efficiency overall;
 - (3) locate parking areas close to major patient and staff destinations;
 - (4) design and locate parking and/or drop-off areas so that distraught drivers can park and leave their car without blocking circulation;
 - (5) patient and visitor parking will be located in closer proximity to major public entrances than staff parking;
 - (6) access to staff parking areas can be less direct than those for other types of traffic, since the staff will be familiar with the Building. However, these routes should be able to handle greater volumes of concentrated traffic than other routes, particularly during shift changes; and
 - (7) close-in staff parking should be available for evening and night shift workers to provide an increased sense of security for these employees. The amount of such close-in parking should be in the order of 25% of the total staff parking.

4.4 Orientation (Wayfinding, Signage, Accessibility)

- (a) Wayfinding:
 - (1) A visit to a medical facility is often made in anxious or worrisome circumstances and within an unfamiliar environment. Patients and visitors entering the Facility may be disoriented or anxious and many will be older patients who may have diminished cognitive and physical abilities. It is important to reduce the anxiety level of patients and their families by making it as easy as possible for them to navigate their journeys to and from the Facility and their specific destination(s) within it. Ease of wayfinding increases the efficiency of health care delivery by reducing the staff time required to give directions to patients and visitors.
 - (2) Wayfinding is the technique of guiding people through the Facility with the least effort, and should address the needs of clients/patients, visitors and staff. Spaces will be designed to create privacy where required and direct visitors

through defined areas. Wayfinding should provide opportunities for all Facility users to reach their destinations without getting lost or traversing through areas that are private.

- (3) The wayfinding design of the Facility should provide a simple configuration of the Facility's circulation systems and functions so that wayfinding is inherently easy and the importance of additional signage reduced, and should:
- (A) Relate the building massing, public entrance(s) and primary circulation systems to its community context.
 - (B) Reveal as much of the basic form and major circulation elements of the Building from the main entrance as possible, as well as the relation of the main entrance back to the Site and its context.
 - (C) Locate primary public circulation paths to reinforce the wayfinder's understanding of the basic form of the Building on all floors.
 - (D) Locate destinations such as major departmental entrances and patient services along the most important primary public circulation paths. Make departmental entrances and waiting areas as open as possible from circulation paths so wayfinder's retain confidence that they are still "on track".
 - (E) Use views to the outside and other wayfinding elements that clearly tell the visitor when they are leaving one building element and entering another.
 - (F) Provide significant recognizable, easily named and identified elements in important and easily found locations that can become 'meeting points' for patients and visitors.
 - (G) Locate personal guidance and building graphics/signage in highly visible locations nearby at major entrances to introduce the interior circulation system to the user.
 - (H) Design elevator lobbies, major departmental entrances and other major destinations to be visually distinctive from adjacent corridor areas.
 - (I) Design major public and secondary public paths to look distinctly different from service routes and other non-public routes.
 - (J) Design staff areas to look significantly different from public areas.
 - (K) Provide signage to clearly identify public telephones in areas accessible to visitors.

(b) Signage:

- (1) Provide highly visible and simple signage - including having building plan directories oriented to the Facility. Direct visitors to departments, not buildings, and avoid multi-layered naming hierarchies.
- (2) Internal directional signs will:
 - (A) Include a main directory installed at the main entrance and smaller subdirectories at other entrances. The main directory and subdirectories will indicate the location of every area and department that is intended be accessible from that entrance.
 - (B) Be installed to provide a continuous trail from entrances to each of the reception/information points listed on the directories.
 - (C) Be installed at each point at which a directional decision is required.
 - (D) Be clearly visible as it is approached.
 - (E) Use consistent terminology.
- (3) Door signage will:
 - (A) Be coordinated with directional signage and wayfinding.
 - (B) Indicate restrictions on entry and warn of hazards.
- (4) Door numbering will:
 - (A) Not be obscured by the emergency systems and “Code Blue” system call.
 - (B) Identify every room.
 - (C) Be located in a consistent location for every room.
- (5) External directional signage will:
 - (A) Clearly indicate where public is to access the Building for various services.
 - (B) Be well illuminated or backlit and readily visible at night.
 - (C) Be located at each point of access to the Site and at key internal Site intersections and points.
 - (D) Provide continuous trail from points where signage is accessed to final destination.
- (6) Illuminated external Building signage will:

- (A) Clearly indicate to pedestrian and drivers the location of Building and location of vehicular access.
 - (B) Be internally illuminated.
 - (C) Be located adjacent to the roadway as per City of Surrey requirements.
 - (D) Indicate the location of vehicular entrances for various types of vehicles.
- (7) Other signage requirements as per Good Industry Practice will include:
- (A) Safety signage
 - (B) Fire evacuation signage
- (c) Elevators:
- (1) Provide high capacity, Building appropriate elevators with performance characteristics to increase overall operational efficiency. Consider the following factors contributing to high elevator usage in the Building when designing the elevators:
 - (A) Higher floor to floor heights.
 - (B) An abundance of wheeled traffic.
 - (C) High occupancy levels
 - (D) The mobility challenges faced by patients and visitors.
 - (2) Locate passenger elevators serving patients, visitors and staff where they are visible and directly accessible from both the main entry and from the most important circulation path on each floor.
 - (3) Group passenger elevators in each public elevator location to maximize system performance.
 - (4) Designate a patient transfer or 'hot' elevator(s) to provide discreet but direct vertical links with minimal stretcher turns between vital clinical services and patient discharge/pick-up at ground level.
 - (5) Locate service elevators to minimize interference with patient, visitor and staff movement and to maximize the efficiency of cart movement to and from Material Management.

- (6) Provide appropriately sized dedicated embarkation areas in front of all designated patient transfer and service elevators that are out of sight from major public circulation routes.
 - (7) Provide appropriately sized dedicated embarkation area in front of all passenger elevators.
- (d) Exit stairs:
- (1) Locate exit stairs strategically for the convenience of staff moving between related clinical departments.
 - (2) Locate exit stairs conveniently accessible from circulation routes.
 - (3) Avoid stair locations that negatively impact planning flexibility or constrain desirable views from patient care and staff work areas.
 - (4) Provide daylighting and views from stairwells for orientation and amenity, and into stairwells for staff security at night.
- (e) Convenience stairs:
- (1) Consider the provision of convenience stairs where appropriate, located strategically to reduce elevator use by staff, visitors and patients.
- (f) Primary public paths:
- (1) Allow primary public paths to be extended to fully integrate with future Site expansion.
 - (2) Consider, where appropriate and cost effective, an internal circulation system configuration that avoids the use of primary public paths for patient stretcher and material movement.
- (g) Secondary paths:
- (1) Locate secondary public circulation paths perpendicular to primary paths, so that the entire public circulation system can be seen and understood from the primary path system.
 - (2) Provide the remainder of clinical department entrances and patient services along secondary paths.
 - (3) Minimize use of secondary public paths for patient stretchers and material movement.
- (h) Internal departmental paths:

- (1) Provide a strong relation of internal departmental paths to primary and secondary public paths.
 - (2) Avoid code-allowable dead-ended local routes within departments that overly isolate patients and staff.
 - (3) Consider, where appropriate and cost effective, interconnected local routes between adjoining departments for convenient 'back of house' staff and wheeled patient movements and material distribution.
- (i) Building Accessibility:
- (1) The Building will likely require multiple entries serving various functional needs. The design of the Building will:
 - (A) Provide a main entrance, complete with vestibule for environmental control, for direct access to the wide range of outpatient services within the Building. This entrance will also serve to provide a volunteer and family driver drop-off. Provide access to public amenities for the high daily volume of patients and visitors to these areas.
 - (B) Provide for easy identification of and access to public entrances.
 - (C) Provide service vehicle loading/unloading area(s) and Building entrances that are distinct and screened from other entrances.
 - (D) Locate parking stalls for persons with disabilities convenient to all public entrances and where parkers do not have to cross vehicle paths.
 - (E) Pedestrian routes must not exceed 5% slope.
 - (F) Provide access to the Facility for fire fighting personnel and equipment as required by Governmental Authorities.
 - (G) Provide protection for pedestrians from inclement weather with shelters, canopies, arcades and windbreaks at all public entrances and transit stops. Entry points to the Building and Parking Structure must be weather protected in the form of building overhangs, canopies or awnings.
 - (H) All entrances must be readily available to pedestrians, wheelchairs and those attending in vehicles. Provide adequately sized vestibules to suit the function at all entrances.

4.5 LEED Requirement

- (a) At a minimum, Project Co will undertake the Design and Construction so that the Building is certified to the Canada Green Building Council's Leadership in Energy and Environmental Design LEED Canada-NC 1.0 (or latest version) Gold standard. It is the responsibility of Project Co to compile and submit the required documentation for certification.
- (1) LEED Credit Points:
- (A) Project Co is required to achieve, at a minimum, the following LEED credit points for the Building:
- (i) Energy & Atmosphere Credit 1.1 - 1.4 – Optimize Energy Performance 38 percent.
 - (ii) Energy & Atmosphere Credit 3 – Best Practice Commissioning.
 - (iii) Energy & Atmosphere Credit 4 – Ozone Protection.
 - (iv) Innovation & Design Process Credit 4 – LEED Accredited Professional.
- (b) Project Co is encouraged to use building materials and mechanical equipment that promote healthy indoor air quality. The building materials used to construct the facility and the products used to maintain them should be low in volatile organic chemicals. Mechanical equipment should provide adequate amounts of outdoor air into the building and prevent CO2 levels from becoming elevated.
- (c) Materials that are locally available and high in recycled content are also recommended. Concrete reinforcement, structural steel and decking with high-recycled content and concrete mix containing post-industrial waste such as; fly ash, furnace slag and/or silica fume are suggested. Utilizing FSC Certified wood for at least 50% of the formwork is also to be considered.
- (d) Below is a sample of the LEED Canada NC 1.0 Project Checklist with suggested credits to be achieved for the Project.

		1
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1		

Credit 2.2	Renewable Energy, 10%	1
Credit 2.3	Renewable Energy, 20%	1
Credit 3	Best Practice Commissioning	1
Credit 4	Ozone Protection	1
Credit 5	Measurement & Verification	1
Credit 6	Green Power	1

6	2	6
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Materials & Resources

14 Points

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Prereq 1	Storage & Collection of Recyclables	Required
Credit 1.1	Building Reuse: Maintain 75% of Existing Walls, Floors, and Roof	1
Credit 1.2	Building Reuse: Maintain 95% of Existing Walls, Floors, and Roof	1
Credit 1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements	1
Credit 2.1	Construction Waste Management: Divert 50% from Landfill	1
Credit 2.2	Construction Waste Management: Divert 75% from Landfill	1
Credit 3.1	Resource Reuse: 5%	1
Credit 3.2	Resource Reuse: 10%	1
Credit 4.1	Recycled Content: 7.5% (post-consumer + ½ post-industrial)	1
Credit 4.2	Recycled Content: 15% (post-consumer + ½ post-industrial)	1
Credit 5.1	Regional Materials: 10% Extracted and Manufactured Regionally	1
Credit 5.2	Regional Materials: 20% Extracted and Manufactured Regionally	1
Credit 6	Rapidly Renewable Materials	1
Credit 7	Certified Wood	1
Credit 8	Durable Building	1

C T N

11	2	2
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Indoor Environmental Quality

15 Points

Y		
Y		
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Prereq 1	Minimum IAQ Performance	Required
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
Credit 1	Carbon Dioxide (CO₂) Monitoring	1
Credit 2	Ventilation Effectiveness	1
Credit 3.1	Construction IAQ Management Plan: During Construction	1
Credit 3.2	Construction IAQ Management Plan: Testing Before Occupancy	1
Credit 4.1	Low-Emitting Materials: Adhesives & Sealants	1
Credit 4.2	Low-Emitting Materials: Paints and Coating	1
Credit 4.3	Low-Emitting Materials: Carpet	1
Credit 4.4	Low-Emitting Materials: Composite Wood and Laminate Adhesives	1

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Credit 5	Indoor Chemical & Pollutant Source Control	1
Credit 6.1	Controllability of Systems: Perimeter Spaces	1
Credit 6.2	Controllability of Systems: Non-Perimeter Spaces	1
Credit 7.1	Thermal Comfort: Compliance	1
Credit 7.2	Thermal Comfort: Monitoring	1
Credit 8.1	Daylight & Views: Daylight 75% of Spaces	1
Credit 8.2	Daylight & Views: Views 90% of Spaces	1

5			Innovation & Design Process	5 Points
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Credit 1.1	Innovation in Design: Green Building Education	1
Credit 1.2	Innovation in Design: Community Consultation	1
Credit 1.3	Innovation in Design: 100% Energy Star Certified Appliances	1
Credit 1.4	Innovation in Design: Exemplary Performance EAc6	1
Credit 2	LEED® Accredited Professional	1

42	5		Confirmed and Targeted Sub-Total	70 Points
	47		Project Totals (pre-certification estimates)	

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-70 points

4.6 Safety and Security / Disaster

(a) Exterior:

(1) The location, layout and lighting of Site entrances, walkway, parking areas and building entrances and the provision of 'eyes on the street' from within the Building will affect the personal safety of patients, visitors and staff. The design of the Building should:

(A) Conform to Crime Prevention Through Environmental Design (CPTED) principles in Site layout, building design, landscaping and lighting:

- (i) natural surveillance;
- (ii) hierarchy of space;
- (iii) territoriality;
- (iv) target hardening; and
- (v) access control.

(B) Provide appropriate lighting levels and light sources along walkways, in parking areas and at building entrances that reduce glare and

shadow contrast and optimize safety. Exterior lighting will avoid light pollution, be direct so as to no shine into adjacent properties and use Good Industry Practice in Site illumination design.

- (C) Optimize views to staff and public parking areas and walkways from the following locations:
 - (i) entry and public areas;
 - (ii) global circulation routes;
 - (iii) staff work areas; and
 - (iv) 24/7 inhabited portion of the Building.
 - (D) Provide landscaping that maintains knee to head height visibility throughout developed areas on and around the Site.
 - (E) Provide emergency call-stations within the visitor and staff parking areas near the perimeter, all in close proximity to lamp standard locations.
 - (F) All significant changes in grade will be dealt with in a safe and secure manner, including by isolation of Site facilities and slipperiness of roadways and walkways.
- (b) Interior:
- (1) The layout and design of the Building interior will affect the personal safety of patients, visitors and staff and the security of their effects. The design of the Building will:
 - (A) Optimize views and visibility from the most highly used segments of the public and primary circulation areas to as much of the design as possible.
 - (B) Provide 'eyes on corridors' by glazing corridor walls and doors where function allows.
 - (C) Avoid isolating 24/7 occupied functions, if any, within areas that are closed weekends, evenings and nights.
 - (D) Locate public washrooms and public change rooms to that they are accessible directly from high-use public areas and circulation paths.

4.7 Disaster Preparedness

- (a) Include within the design of the Building an Emergency Operations Centre (EOC) in accordance with the BCERMS and the FHERMS requirements. Communications devices

in the EOC will include, but not be limited to, satellite TV and satellite telephone. The EOC is to be located in the largest conference room at ground level.

- (b) Provisions for Disaster:
- (1) The design of the Facility will provide adequate seismic restraint for equipment and non-structural items in accordance with CSA S832-01 Guidelines for Seismic Risk Reduction of Operational and Functional Components.
 - (2) Where appropriate and cost effective, consider the concept of “mitigation” (design concepts that enhance occupant safety during seismic events) as it applies to security and emergency preparedness in the planning and design of the Facility.
 - (3) The structural design of the Facility will be to the post disaster standard and will be in accordance with the following:
 - (A) seismic design will address the parts and portions of the Facility including architectural appendages and the restraint of mechanical and electrical items attached to the Facility; and
 - (B) the importance factor used in the calculation of seismic forces on these parts will be in accordance with the Building Code requirements for a post disaster structure.

The balance of the design of the Facility is not required to be to a post disaster standard.
 - (4) The Facility will provide for:
 - (A) a domestic water inlet connections on the exterior of the Building for supply of water through tanker truck connections;
 - (B) a sanitary sewer pump out connection on the main sewer line leaving the Building for removal of sanitary sewer material by pump-out trucks;
 - (C) seismically protected bulk storage tanks and piping for medical oxygen and nitrous oxide, or a gas truck inlet connection for oxygen at the Building wall; and
 - (D) fuel oil inlet connections on the exterior of the power plant for fuel oil tanker truck connection.

4.8 Infection Control

- (a) Project Co will utilize Good Industry Practice for the purpose of achieving a safe environment for all patients, staff and visitors in the Building.

(b) General Criteria:

- (1) Provide Design, planning, material selection and Construction to take account of and facilitate infection control in accordance with Good Industry Practice, including consideration of the infection control guidelines and policies which the Authority has identified below:
- (A) Guidelines for Design and Construction of Health Care Facilities, AIA, 2006;
 - (B) CSA Z317.13-03 Infection Control during Construction or Renovation of Health Care Facilities;
 - (C) Infection Prevention and Control Best Practices for Long Term Care, Home and Community Care including Health Care Offices and Ambulatory Clinics June, 2007;
 - (D) Best Practices for cleaning, disinfecting and sterilization in all health care settings, 2006;
 - (E) Construction Related Nosocomial Infection in Health Care Facilities, 2001;
 - (F) Guidelines for Environmental Infection Control in Health Care Facilities, CDC/MMWR, 2003;
 - (G) Role of Infection Control during Construction in Health Care Facilities, APIC, 2000;
 - (H) CSA Special requirements for plumbing installation in Health Care facilities (R2002) Z317.1.99;
 - (I) CSA Warehousing, Storage, and transportation of clean and sterile medical devices Z314.15.03 (2003);
 - (J) ORNAC Recommended standards and guidelines for perioperative practice 2003;
 - (K) Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings, 2005;
 - (L) Infection Control Construction Agreement; and
 - (M) Communique #2007-01 Reprocessing of Medical Devices & Patient Care Equipment.

(c) Negative Pressure Rooms

- (1) Negative Pressure Rooms (as per applicable CSA standards) will be incorporated into the design and constructed on each level of the Building to handle clinical needs as well as emergency situations. Project Co will provide the following rooms unless agreed otherwise by the Authority:
- (A) Level 1 – one Negative Pressure Room in either the Respiratory Diagnostics/Rehab area or the Medical Day Care area.
 - (B) Level 2 – one Negative Pressure Room in the Diagnostic Imaging Centre, preferably a room that is located close to the perimeter. If possible, the room should be one that does not have diagnostic equipment (i.e., prep room or holding area would be preferable).
 - (C) Level 3 – one Negative Pressure Room in any of the clinics except Perinatal. The designated room should be one of the Exam Rooms and should not have diagnostic equipment associated with it, such as EEG or EMG.
 - (D) Level 4 – One Negative Pressure Room in the Surgery/Procedure Centre; specifically in the PACU (post anesthetic care unit –stage 1).
 - (E) In addition, to the requirement of having one Negative Pressure Room on each level, as described above, all Bronchoscopy rooms throughout the Building are to have negative pressure capacity (typically, these will all be located on Level 4).

(d) Handwashing Sink Standards

To optimize hand hygiene and reduce the risk of microbial contamination and biofilm buildup, the Design of sinks will meet the following minimum standards:

- (1) Taps:
- (A) Sinks primarily used by staff in patient care areas should be hands free (no hand contact required with taps). This could be accomplished by electronic eye, knee or foot controls.
 - (B) Patient and public washrooms will have sensor operated taps.
 - (C) If electronic eye is used, the activation area should be nearer the base of the faucet and not close to water outflow area.
 - (D) The activation mechanism should provide consistent and reliable service.
 - (E) In areas where temperature control is required, manual taps are acceptable.
 - (F) Manual taps must have a blade handle length between 4"-6".

- (2) Faucets
 - (A) No aerators on faucets. Aerators can easily become contaminated by external sources and quickly develop a build up of biofilm. A gooseneck faucet is preferred. Avoid the use of low profile faucets which may result in hand contact with underside of faucet and subsequent contamination.
- (3) Sinks:
 - (A) Size and depth of the sink basin are not directly correlated with splashing but rather a combination of factors such as drain location, faucet positioning, pressure of water, etc. may be more integral in determining amount of splash over to surrounding area. The basin should be *at least* 6 ¾ inches at the deepest part, e.g., no airplane or bar sinks.
 - (B) Depth from spout to drain needs to be such that the depth allows placement of hands under running water without contacting faucet or splash back from drain.
 - (C) A stand alone sink is preferred to minimize collection of standing water around the sink and microbial contamination of grout.
 - (D) If a sink is to be inset in a counter ensure use of non-laminate materials.
 - (E) Sinks are not to have overflows.
- (4) Miscellaneous:
 - (A) Trap location should be offset from drain to minimize splash back from under sink plumbing where biofilm development is most likely to occur.
 - (B) Placement of sink should provide convenient access to soap and paper towel dispensers.
 - (C) Patient disposal bedpan and urinal cleaning system are done by macerators, FHA standards are "Verna Care".

4.9 Retail

(a) General

- (1) The purpose of the retail services component of the Building is to provide appropriate amenities at the Site to meet the needs of staff, visitors and patients of the Building. It is expected that the retail services will include (at a minimum) a retail outpatient pharmacy and coffee shop/food service outlet.

- (2) All retail areas must be suitable for leasing to third parties, on usual commercial terms and conditions, including separate metering and mechanical/electrical connections.
 - (3) All retail areas, including dining areas, must be wheelchair accessible.
- (b) Retail Outpatient Pharmacy
- (1) It is anticipated that the Building will have both a hospital pharmacy operated by the Authority (to provide support to the clinical programs) and a retail outpatient pharmacy operated by a third party retailer (to provide general community pharmacy services to staff and visitors as well as to provide a broad range of services to outpatients).
 - (2) Because of the limited hospital pharmacy capacity that will be available and because of the complex care needs of the patient population, the Authority anticipates the retail outpatient pharmacy will need to provide a broader scope of practice than is typical of a general community pharmacy.
 - (3) The retail outpatient pharmacy must be licensed by and designed in accordance with the requirements of the College of Pharmacists of British Columbia. The dispensing area must be separate from the retail area and able to be secured. An acoustically private area adjacent to the dispensing area must be provided for patient counselling. A securable storage area must be provided adjacent to the dispensing area.
- (c) Coffee Shop/Food Service Outlet
- (1) The coffee shop/food service outlet will be conveniently located off the main lobby and will include a seating/dining area to accommodate patrons. To minimize disturbance from food odours, the food service outlet will be somewhat removed from clinical areas.
 - (2) The seating area should be well lit and, to the extent possible, acoustically separated from the kitchen area. Tables and other furniture and fixtures must be appropriate for wheelchair users.
 - (3) The design should be conducive to self-service and encourage self-bussing of tables with soiled tray return bays at all exits.
 - (4) A separate staff entrance to the food storage/preparation area must be provided for supply delivery and waste removal.
 - (5) Appropriate kitchen facilities must be provided for food delivery, storage and preparation.

- (6) Flooring must be appropriate for high traffic and wear areas and permit easy movement of heavy equipment. Floors must be non-skid, impervious to moisture and grease, resistant to solvents, and durable.
 - (7) Walls must be washable, hard, smooth, and impervious.
 - (8) Sufficient storage space, separate and secured from public areas, must be provided for coffee shop/food service outlet supplies and equipment.
- (d) Vending Machines and ATMs
- (1) Appropriate space must be allocated for one ATM in the lobby area and a minimum of three vending machines throughout the Building.

4.10 Other Spaces

(a) Customer Service Centre

It is anticipated that the Building will have a customer service centre located near the main entry to the Building that enables patient to “self register”, and cubicles located inside the customer service centre area to assist patients privately with a “Full” registration.

(b) Education Centre

It is anticipated that the Building will have an education centre with space for classes and seminars for both the patient population and the SMH residency program.

(c) Volunteer Centre

It is anticipated that the Building will have a fully equipped volunteer centre to support the services of volunteers. The Facility is expected to have between 75-100 volunteers that are expected to play a wide variety of roles including:

- (1) wayfinding, patient/family support in the individual clinics;
- (2) peer support/education program support;
- (3) volunteer support for the cardiology, diabetes and other clinics;
- (4) deliver the "Living with Chronic Disease" peer education program;
- (5) keep waiting areas stocked with magazines;
- (6) provide spiritual support as necessary; and
- (7) assist with the coordination of a patient education resource library.

The Facility will also host volunteers from other agencies accompanying or providing transportation for some patients.

(d) Administrative Office Suite

It is anticipated that the Building will have an administrative office suite with executive offices for staff supporting the Facility and a conference room that may also be used as the disaster command center if the need arises.

(e) Allied Patient Services Area

It is anticipated that the Building will have an allied patient services area with offices for social workers, pharmacists and nutritionists who will provide services to patients in the Facility but who are not part of the Authority's multidisciplinary team.

5. QUALITY MANAGEMENT

5.1 Quality System

A “**Quality System**” means Project Co’s organizational structure, procedures, processes and resources necessary to implement a comprehensive, planned and systematic program, designed and implemented by Project Co pursuant to this Agreement, to ensure that the standards of quality control, quality management and quality assurance required by this Agreement are achieved by Project Co in every material aspect of the Design and Construction.

5.2 Quality Assurance Program

Project Co’s quality assurance program (the “**Quality Assurance Program**”) will:

- (a) detail Project Co's measures required to complete all aspects of the Design and Construction pursuant to its Quality System and in accordance with the requirements of this Agreement including the Schedule 2 [Design and Construction Protocols] and this Schedule (including Section 2.1 of this Schedule) and in compliance with ISO 9001 2000 (or equivalent procedures acceptable to Project Co's Quality Consultant), as updated from time to time;
- (b) detail Project Co's measures required to obtain LEED Gold Certification for the Building as required by Section 4.6 of Schedule 2 [Design and Construction Protocols];
- (c) address and be applicable to all aspects of the Design and Construction;
- (d) provide for a graded approach to quality in which the appropriate level of quality assurance requirements for various elements of the Design and Construction are defined;
- (e) describe or comply with the following:
 - (1) the required quality level for each process or activity involved in the Design and Construction and the means of achieving it;
 - (2) the steps to ensure that everyone participating in the Design or Construction is committed to the Quality Assurance Program;
 - (3) the steps to ensure that the management and organizational structure and responsibilities are defined and understood by everyone participating in the Design or Construction;
 - (4) require that all persons participating in the Design or Construction are competent to do their required tasks;
 - (5) require that individuals involved with the Quality Assurance Program will be held accountable for their work;
 - (6) provide that the right people will have the right information at the right time;

- (7) provide that relevant experience for each process or activity will be sought and used;
- (8) Design and Construction activities are planned and controlled;
- (9) the right items, processes, and practices will be used;
- (10) materials and services are verified to confirm that they are correct; persons giving verification will be sufficiently qualified and will be independent from those who perform or install the materials or services;
- (11) peer reviews and inspections will be performed on structured planned basis on all elements of Design and Construction and:
 - (A) errors and deficiencies will be identified and recorded;
 - (B) errors and deficiencies remedied or corrected and a record maintained of the remedy or correction, and
- (12) maintain records as required by this Agreement including ISO9001 standards.
- (f) provide for independent design verification prior to the issue of documents to the Authority for review;
- (g) provide that professionals of record will carry out on-site inspections, review materials testing and inspector's reports, undertake required surveying, measuring, and verification of materials and construction methods to ensure conformance with the Reviewed Drawings and Specifications; and
- (h) provide that professionals of record will provide a letter of assurance that is an attestation that the Design and Construction has been performed in accordance with the Reviewed Drawings and Specifications.

6. TECHNICAL REQUIREMENTS

6.1 Site Development

- (a) Municipal Off-Site Services
 - (1) General:
 - (A) The off-Site servicing will, at Service Commencement, be sufficient not only for the development of the Facility but also to complete future development of the Site to a density of a floor space ratio on the Site of 2.5;
 - (B) The Design and the Construction of the off-Site servicing will be to the standard as may be required by the City pursuant to:

- (i) the City's regulatory authority; and
 - (ii) the servicing agreements entered into with the City relating to the Project.
- (2) Site Development:
- (A) Sanitary Sewers:
 - (i) Project Co will complete any upgrades required to the City's off-Site sanitary system so that it has the adequate capacity to accommodate development of the Site in accordance with Section 6.1(a)(1)(A).
 - (B) Storm Sewers and Drainage:
 - (i) Project Co will design the storm water management system to provide discharge into the City system equal to or less than current run-off from the Site.
 - (ii) The Site and Facility storm water management system may be integrated with the City's off-Site system. Project Co will complete any upgrades required to the City's off-Site storm water management system so that it has the adequate capacity to accommodate development of the Site in accordance with Section 6.1(a)(1)(A).
 - (C) Watermains:
 - (i) Project Co will determine whether the City's off-Site watermain system has the adequate capacity to accommodate the Site development or whether an upgrade will be required.
 - (D) Roadworks:
 - (i) The Site will be designed such that the access points are as follows (including for illustration the roadway intersections on IBI+HDR Health Care drawing 15.1, a copy of which is included in Appendix 3D):
 - (i).1 Mid-block 140th Street driveway with right-in, right-out and left in (south to east movement).
 - (i).2 Via a new Green Timbers Way/140th Street intersection which will be located near the existing intersection; to be signalized.
 - (i).3 Driveways off Green Timbers Way as required accessing Site elements, e.g. parking, loading etc.
 - (E) Design/Construction

- (i) By City of Surrey:
 - (i).1 At this time it is anticipated that the following elements will be designed and constructed as part of the City of Surrey's 140th Street project:
 - (i).1.1 Green Timbers Way/140th Street intersection improvements.
 - (ii) By Project Co who will be responsible for the following:
 - (ii).1 On-Site driveways connected to 140th Street (per above).
 - (ii).2 On-Site driveway connected to Green Timbers Way.

(3) Green Timbers Way

- (A) The Green Timbers Way Works will be designed and constructed according to the latest version of the City of Surrey's Design Criteria Manual (DCM) Supplementary Master Municipal Construction Documents (SMMCD) and Pavement Marking Manual (PMM) as follows:

- (i) roadway design - DCM Section 6.0;
- (ii) asphaltic concrete pavement – DCM Section 6.0 and SMMCD SS 2.10 (for asphalt thickness see drawing SSD-R.28 in SMMCD);
- (iii) drainage – DCM Section 5.0 and SMMCD SS 2.15;
- (iv) curb and gutter – DCM Section 6.0 and SMMCD SS 2.12;
- (v) sidewalks - DCM Section 6.0 and SMMCD SS 2.12;
- (vi) street lighting – DCM Section 6.0 and SMMCD SS 2.21;
- (vii) pavement marking – PMM; and
- (viii) signage – TAC: Manual of Uniform Traffic Control Devices for Canada (MUTCD).

(b) On-Site Services

(1) General Approach:

- (A) On-Site services refer to the services that will be located on the Site outside of the new building footprint.
- (B) All on-Site services will meet or exceed the quality requirements for the corresponding off-Site City works.

- (C) Any variation in road structure from City standards must be supported by a report from a qualified geotechnical consultant.
- (2) Sanitary Sewers:
- (A) Must connect to the City sanitary sewer system.
- (3) Storm Sewers and Drainage:
- (A) Design may provide for on-Site detention of storm water run-off to reduce demand on City storm water system.
 - (B) Design must protect the Site against a 100 year storm event in accordance with BL8830.
- (4) Watermains and Appurtenances:
- (A) Design to meet domestic and fire fighting capacity requirements for the Facility as well as future potential development of the Site.
 - (B) Design with redundancy by way of a looped system with at least two connection points to the City water system.
- (5) Fire Hydrant(s) will be provided to NFPA 24.
- (A) The system will include backflow preventers to protect the City system and the on-Site developments from contamination.
- (6) Roadworks:
- (A) The on-Site vehicular road system will permit travel between on-Site vehicular areas, including parking areas, loading areas, emergency vehicle areas, and drop off areas, without use of City roads except Green Timbers Way.
 - (B) On-Site vehicle circulation plans must be based on a traffic and parking analysis prepared by a qualified traffic engineer.
 - (C) The traffic analysis must address lane width, one or two way traffic flow, separation of different types of vehicle traffic, separation of vehicle and pedestrian traffic.
 - (D) The on-Site roadways will include the pavement, curb and gutters, sidewalks, walkways, signage, pavement marking, and traffic calming devices.
- (7) Street lighting:

- (A) On-Site roadway, walkways and parking areas must be lighted to provide safety for vehicle and pedestrian traffic
- (8) Electrical and Telecommunications Wiring, Gas Services:
 - (A) The on-Site services will include electrical and communications wiring and gas services as required by the intended land use.

6.2 Building Envelope

- (a) Exterior Walls and Wall Systems
 - (1) General Approach:
 - (A) The exterior walls and exterior wall systems:
 - (i) Will comprise the exterior envelope of the building and will define the internal space.
 - (ii) May be part of the building structure or independent of the building structure.
 - (2) Performance Criteria:
 - (A) The exterior walls will:
 - (i) be designed and constructed using rain screen or cavity wall construction systems to enable any water which has penetrated to finish layer or skin to exit before entering the wall composition or assembly into the interior space;
 - (ii) prevent water penetration by integrating sills, thresholds, lintels, flashings and flashing systems, sealants, waterproof membranes, and other barriers into the construction in conformance with industry best construction practices, and appropriate to the climate and geography of the Site;
 - (iii) prevent air leakage and water vapour transmission through external walls by incorporating air barrier and vapour barrier systems;
 - (iv) prevent corrosion or deterioration of building construction and finishing materials during Construction;
 - (v) have thermal insulation to resist cold and heat transfer through the exterior walls to create interior environmental conditions suitable to the needs of the Facility;

- (vi) resist damage from dimensional changes caused by temperature related reactions of building materials;
 - (vii) resist damage caused by forces generated by differential settlement or other foundation related movement;
 - (viii) resist the transmission of external airborne sounds detrimental to the needs of the Facility and the delivery of the health care services;
 - (ix) transmit light and visibility as required to provide natural light and views to the exterior to create an open atmosphere and a safe and comfortable environment; and
 - (x) have insulated windows that will be glazed with sealed, double glazed low-E units.
- (B) Project Co will retain the services of a Building Envelope Professional (BEP) whose credentials as a BEP are recognized by the Architectural Institute of British Columbia or the Association of Professional Engineers and Geoscientists of British Columbia, to advise on the building envelope design, materials and construction and to approve, sign and seal details of its composition and construction. A registered professional working in the capacity of BEP will:
- (i) possess the necessary education, training and experience to properly perform the responsibilities of this specialty role (which includes successful completion of the BEP courses available through the AIBC);
 - (ii) have a thorough understanding of the principles of building science and be fully knowledgeable about recent developments in the theory and practice of building envelope design and construction;
 - (iii) possess the ability and tenacity to diligently carry out the enhanced field review/quality assurance role of the BEP;
 - (iv) refer to AIBC Bulletin 34 Building Envelope Services: Appropriate Professional Practice or other applicable documents available through the AIBC or the Association of Professional Engineers and Geoscientists of British Columbia.
- (b) Roofs and Roof Systems
- (1) General Approach:
- (A) The roofs and roof systems will:

- (i) Comprise the external and complete horizontal barrier to weather and climate.
- (2) Performance Criteria:
- (A) The roofs and roof systems will:
 - (i) prevent air leakage and water vapour transmission through and into the roof systems by incorporating air barrier and vapour barrier systems;
 - (ii) prevent corrosion or deterioration of building construction and finishing materials;
 - (iii) contain thermal insulation to resist cold and heat transfer through the roof and roof systems to create interior environmental conditions suitable to the needs of the Facility;
 - (iv) resist damage from dimensional changes caused by temperature related reactions of building materials;
 - (v) transmit light as may be required to provide natural light to interior areas not adjacent or accessible to exterior walls;
 - (vi) withstand local wind uplift in accordance with CAN/ULC S126-M86 for Class 'C' roof covering; and
 - (vii) conform to the latest guarantee and standards of the Roofing Contractors Association of British Columbia Guarantee Corp (RGC) as published in the RGC Roofing Practices Manual and include required Inspections by the RCABC.
 - (viii) The integrity of the roof membrane will be maintained at all roof penetrations.

6.3 Interior Building Components

- (a) Internal Walls and Partitions
 - (1) General Approach:
 - (A) The interior walls and partition systems will:
 - (i) define the interior spaces of the Building and may be part of the building structure or independent of the building structure;
 - (ii) define the functions and activities inherent with the use and occupancy of the interior spaces;

- (iii) provide acoustic separations as required for the specific functions to be carried out in the spaces affected; and
- (iv) provide separations required for fire safety and protection.

(2) Performance Criteria:

- (A) The internal walls and partitions will have seismic resistance capabilities that conform to the requirements of the Building Code and CSA S832-01 Guidelines for Seismic Risk reduction of Operational and Function.
- (B) Interior walls and partitions, partition systems and interior finishes will be designed and selected to comply with the requirements for the particular area in which they are to be installed, which includes, but is not limited to:
 - (i) Ease of maintenance/repair and cleanable.
 - (ii) Does not support microbial growth.
 - (iii) Nonporous-smooth.
 - (iv) Inflammable - Class I fire rating or better.
 - (v) Durability.
 - (vi) Sustainability.
 - (vii) Low VOC (no off-gassing).
 - (viii) Low smoke toxicity.
 - (ix) Ease of installation, demolition, and replacement.
 - (x) Non-problematic substrate and/or assemblies.
 - (xi) Resilient, impact resistant.
 - (xii) Control of reflectivity/glare.
 - (xiii) Non-toxic/non-allergenic.
 - (xiv) Aesthetic and design qualities to provide a healing environment for the benefit of patients, staff and public.
 - (xv) Infection Control.

(b) Finished Ceilings

(1) General Approach:

- (A) the ceiling systems will be part of the definition of interior spaces and may be accessible or inaccessible in total or in part.
- (B) Accessible ceiling systems may provide access to the ceiling spaces throughout the system or at specific and particular locations.
- (C) Finished ceiling systems will:
 - (i) comprise a major component of the acoustic or sound attenuation function as required in the spaces in which they are installed;
 - (ii) form a component of fire resistance rated separations for areas requiring such separation; and
 - (iii) be of a height that is appropriate for the particular room use, including any equipment therein, and in addition finished ceiling height will be at least 2.70 meters above the finished floor in all areas except that ceiling heights in small, normally unoccupied spaces such as storage closets may be lower.

(2) Performance Criteria:

- (A) Ceiling systems and ceiling finishes will be designed and selected to comply with the requirements for the particular area in which they are installed, which may include, but is not limited to:
 - (i) Cleaning, maintenance and infection control.
 - (ii) Flexibility and access to the spaces above ceilings.
 - (iii) Compatibility with Mechanical, Plumbing, Electrical, Communications services and fixtures.
 - (iv) Compatibility with ceiling attached equipment, or systems such as patient lifts, curtain track, IV tracks and TV monitors.
 - (v) Aesthetic and design qualities to provide a healing environment for the patients, staff and public.
 - (vi) Ceilings, including exposed structure in areas normally occupied by patients or staff in food preparation and food storage areas, will be cleanable with routine housekeeping equipment. Acoustic and lay-in ceiling, where used, will not interfere with infection control.
 - (vii) In dietary areas and in other areas where dust fallout may present a problem, suspended ceilings will be provided.
 - (viii) Semi-restricted areas:

(viii).1 If lay-in ceiling is provided, it will be gasketed or clipped down to prevent the passage of particles from the cavity above the ceiling plane into the semi-restricted environment. Perforated, tegular, serrated cut, or highly textured tiles are not acceptable.

(ix) Restricted areas: Ceiling finishes in restricted areas such as operating rooms will be monolithic, scrubbable, and capable of withstanding chemicals. Cracks or perforations in these ceilings are not allowed.

(c) Floor Finishes

(1) General Approach:

- (A) The floor and floor systems will be a component of the definition of interior space and will be finished to be complementary and integral to the functional and aesthetic requirements of the interior space.
- (B) Floor finishes will be selected to suit types and concentration of pedestrian or vehicular and wheel traffic or both.
- (C) Flooring designs and patterns will comprise a major component of the “way finding” system of the Building.
- (D) Floor systems will be selected such that they provide adequate noise control for the area in which they are installed.

(2) Performance Criteria:

- (A) Cleaning, maintenance and infection control including the frequency and quality of joints and also including ease of replacement if and when required.
- (B) Imperviousness to concentrations of moisture anticipated to be existing on the floors and duration of that moisture.
- (C) Permanence and durability and resistance to concentrated service traffic both pedestrian and wheel vehicular.
- (D) Patterns and textures compatible with the requirements for pedestrian safety including the exiting and other relevant requirements of Building Code.
- (E) Floor materials will be easily cleanable and appropriately wear-resistant for the location.
- (F) Floors subject to traffic while wet, such as shower and bath areas, kitchens, and similar work areas will have a non-slip surface.

- (G) The floors and wall bases of all operating rooms will be monolithic and joint free.
- (H) The floors and wall bases of kitchens, soiled workrooms, and other areas subject to frequent wet cleaning will also be homogenous, but may have tightly sealed joints.
- (I) All floor surfaces in clinical areas will be constructed of materials that allow the easy movement of all required wheeled equipment.

6.4 Structural Design Principles

(a) Basic Requirements:

- (1) Project Co's Structural Engineer-of-Record will be a professional engineer licensed to practice in the in the Province of British Columbia with demonstrated experience in undertaking the structural design of buildings similar in size and complexity to those proposed for the Facility.
- (2) The Structural Design, including minimum design loads and general provisions and material specifications, will satisfy the more stringent requirements of the Building Code, other applicable or referenced design standards, loading criteria required by equipment suppliers or construction technique and the principles detailed in this Section.
- (3) Prior to applying for a building permit for the Facility Project Co will have a qualified second Professional Engineer licensed in the Province of British Columbia perform a concept review satisfying the requirements of the Association of Professional Engineers and Geo-scientists of British Columbia Quality Management By-law.
- (4) Project Co's structural engineer-of-record will perform field review of the Construction at sufficient frequency, and review of the reports of the inspection and testing agencies appointed and paid by Project Co, to verify that the building structures of the Facility have been built in substantial conformance to the issued for construction structural drawings and any authorized amendments thereto.

(b) Design Codes and Standards:

- (1) The design, fabrication and erection of all structural systems for the Building and Parking Structure will conform to all applicable standards, including but not limited to:
 - (A) CSA Standard A23.3-04, Design of Concrete Structures for Buildings.
 - (B) CSA Standard S413-2007, Parking Structures.
 - (C) CSA Standard S16-01, Limit State Design of Steel Structures.

- (D) CSA Standard S304-04, Masonry Design for Buildings (Limit State Design).
 - (E) CSA Standard O86.1-01 (R2006), Engineering Design in Wood (Limit State Design)
 - (F) CSA Standard S136-01, North American Specifications for the Design of Cold-Formed Steel Structural Members.
- (c) Flexibility for Future Change of the Building:
- (1) General:
 - (A) Project Co will recognize that as a result of changes in treatment protocols, equipment and technology and programs over useful life of the Facility, the provision of a structural system with sufficient robustness and flexibility to accommodate changes in usage of space and building service requirements is essential.
 - (B) The structural system proposed must be able to accommodate concentrated loading from equipment which may locally exceed the minimum specified live load but that will result in an average bay live load within the minimum specified live load without necessary field modifications of the building structure.
 - (C) The proposed structural system for the Facility should be capable of accommodating any future minor modifications to the structure without the use of welding or other processes which would produce noxious fumes, without the use of x-ray or nuclear isotope equipment and with a minimum of vibration to result in a minimum disruption to the ongoing operations of the Facility.
 - (D) For concrete structures the structural system will be able to accommodate holes at construction, or drilled at a future time, a minimum diameter of 250 mm at 300mm and 750 mm from the column face on any two opposite sides of any column and two 200 mm diameter holes at 600 mm at any location on the floor plate.
 - (E) For steel structures the structural system will be able to accommodate holes at construction, or drilled at a future time, a minimum diameter of 250 mm at 300 mm and 750 mm from the column on any two diagonal directions of any column and two 200 mm diameter holes at 600 mm at any location on the floor plate within the clear space between the beams, trusses or girders with minimum additional framing.
- (d) Design Loads:

- (1) The rules in this section deal with minimum load requirements as they relate to ongoing use and occupancy and future flexibility requirements of the Building.
- (2) The design of the structural system will comply with the minimum, superimposed dead and live load requirements of the Building Code for all spaces, except as follows.
 - (A) Required design loads for all typical areas, including diagnostic areas, treatment areas, OR suites, meeting rooms and offices, etc.:
 - (i) Live Load (Basement and first storey) 4.8 kPa.
 - (ii) Live Load (floors above first storey) 3.6 kPa.
 - (iii) Superimposed dead load partition allowance 1.2 kPa.
 - (B) Required design loads for all mechanical and electrical equipment areas:
 - (i) Minimum live load (greater if required by Specific equipment): 7.2 kPa.
 - (ii) Minimum superimposed dead load (greater if required by equipment bases, floating Floors, etc.): 1.0 kPa.
 - (iii) Design loads must include allowance for specialized medical equipment, which may exceed either Building Code loading requirements or loading requirements specified above, including any requirements for vibration isolation pads.
- (e) Structural Analysis Method:
 - (1) Perform the structural analysis of the Facility generally in accordance with the provisions of Building Code, section 4.1.8.7; however, and as a minimum, it is essential that a Dynamic Analysis Procedure (Response Spectrum Acceleration Analysis) in accordance with the provisions of Building Code Section 4.1.8.12 be used.
 - (2) As a minimum, perform an Equivalent Static Force Procedure in accordance with Building Code Section 4.1.8.11 for the Parking Structure.
 - (3) The structural analysis of the Facility will include a three dimensional analysis accounting for all vertical and lateral loads together with all applicable load combinations, carried out using a computer software program consistent with Good Industry Practice.

- (f) Deflection:
- (1) The rules in this section describe acceptable limits for floor structure deflections for the Building.
 - (2) The structural system must comply with the requirements of the NBC Commentary A: "Serviceability Criteria for Deflections and Vibrations" and in addition will meet the following deflection criteria:
 - (A) Floor Surfaces:
 - (i) Max. live load deflection: span/360.
 - (ii) Long term dead + live load: span/240.
 - (iii) Not to exceed 25 mm at any point.
 - (B) Slab edge:
 - (i) Max. live load deflection: Span/500.
 - (ii) Not to exceed 15 mm at any point.
- (g) Structural Systems
- (1) This section sets out the rules for structural systems as they relate to the structural systems of the Facility.
 - (A) The structural system will consist of cast-in-place concrete flat slab or cast-in-place concrete two-way slab and beams or cast-in-place concrete slab on structural steel frame, either composite or non-composite.
 - (B) The preferred system for the suspended floor structures for the Facility consists of cast-in-place concrete, flat slab construction. Any other proposed floor systems must be tested for flexibility against the flat slab system for considerations of load sharing, floor to floor heights, ceiling space available for services, fire rating implications, and impact on overall building height.
 - (C) Lateral loads for the Facility will be resisted by ductile shear walls or bracing located at stair and elevator wall locations, or at the building perimeter, only. Shear walls or bracing may not be located within interior floor spaces.
 - (D) Lateral loads for the Parking Structure will be resisted by shear walls or bracing located close to the centre of the structure.

- (E) A supplementary geo-technical investigation must be performed and used as a basis for the design of the superstructure, foundations and slabs-on-grade.
- (F) The Facility will be designed as a Post-Disaster building in accordance with the Building Code.
- (G) The Parking Structure will be categorized as "Normal" in accordance with the Building Code.

6.5 Vibration Design Principles for Facility

- (a) Design Principles for Vibration Isolation and Control are as follows:
 - (1) Project Co acknowledges that there are numerous pieces of Equipment used in the Facility which may be sensitive to even low levels of vibration including electron microscopes, magnetic resonance imagers (MRI), spectrometers and micro-surgery machines.
 - (2) Ensure that the acoustic and vibration consultant retained by Project Co is a professional engineer licensed to practice in the Province of British Columbia with demonstrated experience in providing recommendations and analysis for acoustic and vibration performance for buildings similar in function, size and complexity to the Facility.
 - (3) Ensure that the design of the structural, mechanical and electrical systems of the Facility complies with the more stringent requirements of the NBC Commentary A: Serviceability Criteria for Deflection and Vibrations, the requirements of equipment manufacturers and the principles detailed in this Section to result in the control of the vibration of the structure of the Facility and the Equipment such that performance of the Equipment is not adversely affected.
 - (4) Undertake space planning to maximize the separation between vibration sensitive Equipment and sources of vibration, particularly mechanical or electrical rooms.
 - (5) Address continuous vibration in terms of the RMS value of the frequency-weighted acceleration in the floors of occupied areas. Table 6 lists the requirements for various typical areas of the Building and the maximum vibration velocity allowed – note that the corresponding floor stiffness applies only to footfalls within the floor space in consideration.
 - (6) Demonstrate using structural analyses, including time history as appropriate, that the vibration response of the proposed building structure at the location of the space or Equipment in question will not exceed the values specified in Table 6.

- (7) Select the damping ratio, based on generally accepted practice, to reflect appropriately the structural system, the influence of non-structural elements and the effect of building occupants.
- (8) Undertake field testing of the vibration response of the structure at the location of critical Equipment or spaces to demonstrate that the as-constructed condition will satisfy the required maximum vibration response.

Table-6: Acceptable Vibration Levels for Various Typical Facility Spaces

Occupancy or Equipment Requirements	Vibrational Velocity (1)		Floor Stiffness $KF_n^{(2)}$
	$\mu\text{in/s}$	$\mu\text{m/s}$	kips/in-sec
Mechanical rooms on an unoccupied floor above or below an occupied floor	4000	1000	Not Applicable
Office areas, waiting rooms and corridors	1600	400	250-1500
Mechanical Rooms on the same floor as an occupied area	1200	300	Not Applicable
Computer areas; patient areas (daytime) – threshold of human perception	8000	200	500-3000
Operating rooms and critical work areas; bench microscopes up to 100 x magnification	4000	100	1000-6000
Bench microscopes up to 400 x magnification; optical and other precision balances; optical comparators	2000	50	2000-12000
Microsurgery, eye surgery; Bench microscopes at magnification greater than 400x; optical equipment on isolation tables	1000	25	4000-25000
Magnetic resonance imagers	500	12	8000-50000
Mass spectrometers	250	6	16000-100000
1) Value of constant velocity regions measured in one-third octave bands of frequency range 8 to 100 Hz. Based on ASHRAE, AISC and ISO Criteria.			
2) KF_n depends on walker weight and gait. Ranges indicated reflect average to conservative designs. Average walker (150 lbs, 75 steps/min). Conservative walker (185lbs, 100 steps/min)			

- (9) Where space utilization dictates otherwise, place such vibration sensitive Equipment on a massive, stiff structure such as a thick reinforced concrete slab.
- (10) Avoid locating vibration sensitive Equipment or spaces on spans greater than 9m unless significant structures can be accommodated.
- (11) Avoid placing vibration sensitive Equipment on light-weight, or long-span floor structures.
- (12) Whenever possible, isolate the major sources of vibration at the source as opposed to isolation of the vibration sensitive Equipment itself.
- (13) Other Considerations:
- (A) Be aware that additional mass may be required to provide an inertial base for adequate isolation of building or Equipment and the structure must account for this additional dead load.

- (B) Be aware that the extreme sensitivity of some pieces of Equipment may require isolation of the instrumentation from any sources of vibration including building mechanical or electrical equipment or other sources of vibration such as footfalls and environmental vibration such as road traffic.
 - (C) Refer to Equipment requirements and provide such isolation where required.
- (b) Building Services Vibration Control:
- (1) Wherever possible mechanical and electrical equipment will be placed on slab-on-grade away from vibration-sensitive uses and if placed on framed structure, ensure that the floor (or ceiling) structure is sufficiently stiff and massive to result in the required vibration performance of the structure.
 - (2) Ensure appropriate vibration isolation of mechanical and electrical equipment including fans, pumps, compressors, transformers, switchgear, chillers and the diesel generator sets to result in vibrational velocities of the building structure not greater than those specified in Table 6. Be aware that this typically requires that the floor stiffness (defined in terms of static deflection) exceed the isolator stiffness by a factor of 10.
 - (3) Ensure that all equipment isolation mounts are chosen on the basis of achieving a minimum 98% vibration isolation efficiency at the lowest operating speed.
 - (4) Where structural floor deflection will exceed 1/10 of the determined static deflection of the isolator, increase the isolator static deflection to maintain this minimum ratio of the floor to isolator deflection.
 - (5) Mount equipment subject to large initial vibration on start-up, or large equipment which rotates relatively slowly (less than 1000 rpm) on a suitable concrete inertia block - be aware that specific equipment isolation requirements varies significantly by equipment type and capacity and conform to manufacturer's recommendations.
 - (6) Provide a minimum allowance of at least 38 mm between isolated equipment (including support frames and inertia blocks) and the building structure, but as required to suit seismic and servicing requirements.
 - (7) Other Considerations:
 - (A) Mount major equipment on at least 100 mm thick housekeeping pads to provide additional local mass and stiffness in supporting isolated equipment.

- (B) Wherever possible provide flexible connections as close as possible to the equipment for pipes, ducts and conduits connected to vibrating mechanical equipment.
- (C) Provide vibration isolation mounts for all supports for pipes connected to vibration isolated building machinery for a distance of 100 pipe diameters or 15 m from the isolated machinery, whichever is greater, and within the first 40 diameters ensure that the hangers have a static deflection of at least 1/2 of the deflection provided for the attached equipment. Consideration should also be given to equip pumps, including those for hydraulic elevators, on both inlet and outlet with flexible pipe connections to reduce fluid-borne vibration transmission.

6.6 Building Systems

(a) Mechanical Services

(1) General Approach:

- (A) The mechanical systems for the Building will be designed, built and operated to provide a healing, safe and comfortable environment for the patients, families and staff.
- (B) Mechanical systems will be flexible and adaptable for future expansion and technological changes.
- (C) Mechanical systems will be highly energy efficient and will be chosen to minimize impact on the natural and physical environment.
- (D) Mechanical systems will be designed and constructed to provide operational reliability for the Facility.

(2) Performance Criteria:

- (A) The mechanical systems will:
 - (i) conform to Building Code, applicable CSA Standards, ASHRAE Standards, NFPA Standards;
 - (ii) be operated and maintained to maximize energy efficiency, indoor air quality and occupant comfort; and
 - (iii) provide adequate redundancy and standby capacity to ensure continuous operation of all critical areas in the Facility.

(b) Electrical Services

(1) General Approach:

- (A) The electrical systems for the Facility will be designed, built and operated to provide a healing, safe and comfortable environment for the patients, families and staff.
 - (B) The electrical systems will:
 - (i) function to assist the programs provided in the Facility in a reliable cost effective manner;
 - (ii) be provided and installed to offer a true life cycle value to the Authority while still providing the quality normally used in a permanent health care facilities;
 - (iii) be installed to promote energy efficiency and LEED principles where applicable.
 - (C) Communications systems will be integrated where this integration provides an efficiency advantage, operational advantage, and cost advantage.
- (2) Performance Criteria:
- (A) The electrical installation will conform to Building Code, the Canadian Electrical Code, CSA Standards and NFPA 70 and NFPA 99 Standards, latest applicable edition.

6.7 Radiation Protection

- (a) Radiation Protection
 - (1) General Approach:
 - (A) Provide radiation protection shielding in walls, doors, windows, floors and ceilings (as required to protect staff and patients) in all rooms or other spaces that are designed to contain equipment or materials that will emit harmful radiation, including rooms or spaces for radiography, mammography, ultrasound, magnetic resonance imaging (MRI), lithotripsy, cystoscopy or nuclear medicine (including radioactive materials storage) and the interventional room, that are designed to contain such equipment or materials at Service Commencement.
 - (B) Radiation protection will be provided by incorporation of a lead sheet of appropriate weight and thickness laminated into the walls and door assemblies, and installation of leaded glass specifically manufactured for radiation shielding purposes and installed into the window assemblies.
 - (C) radio frequency and electromagnetic shielding (as distinct from radiation shielding as described in 6.7(a)(1)(A) and 6.7(a)(1)(B)) depend on the

make and model of equipment selected through the medical equipment procurement process, and accordingly the cost to design and construct the radio frequency and electromagnetic shielding is included in the Equipment Cash Allowance.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to the following standards:
- (i) Radiation shielding will meet requirements of B.C. Centre for Disease Control - Radiation Protection Services.
 - (ii) Health Canada Safety Code 20A, X-Ray Equipment in Medical Diagnosis Part A: Recommended Safety Procedures for Installation and Use, latest edition.
 - (iii) Canadian Nuclear Safety Commission (CNSC) regulations and design principles; I.E. radiation signage, alerts, wall thickness and lead shielding.
 - (iv) Doors and frames scheduled in locations requiring radiation protection will be lead lined doors in conformance with AWMAC Quality Standards and labelled with lead thickness fabricated within the door.

(3) Performance of Work:

- (A) Install shielding around the perimeter of rooms to height of 2100 mm complete with joint overlaps, and around service outlets.
- (B) Provide radiation shielded glazing and frames for observation panels.
- (C) Radiation shielding for radiography, mammography, nuclear medicine facilities, radioactive material storage rooms and other areas requiring lead sheet shielding will have:
- (i) Radiation shielded doors will be fabricated using a single layer of sheet lead in centre of the doors with wood core laminated on each side of lead sheet. Cores to be bonded using poured lead dowels at edges.
 - (ii) Radiation shielded door frames will be lead lined pressed steel door frames.
 - (iii) Lead glass or lead louvers in radiation shielded doors will be equivalent to lead sheet thickness laminated onto the gypsum wallboard for adjacent walls.

- (iv) Lead laminated gypsum wallboard will consist of a single, unpierced lead sheet laminated to the wallboard.
- (v) Sheet lead applied directly to partition metal or steel studs or both will be installed to provide a continuous and complete radiation protective shield.

6.8 Acoustics

(a) Acoustics:

- (1) The design of the Facility will:
 - (A) Provide room shapes, workstation configurations, and sound absorptive finishes appropriate to the interior acoustic and reverberation requirements for the intended use of the room.
 - (B) Provide the required degree of sound isolation between the exterior and the interior, as well as between interior spaces within the Facility through space planning and building materials.
 - (C) Provide control of building services and footfall vibration so that the function of vibration-sensitive uses and spaces is not disturbed or affected.
 - (D) Provide control of building services noise through space planning to address the adjacency/proximity of mechanical and electrical spaces to minimize their effect on noise sensitive areas.
 - (E) Provide wall, roof and floor assemblies with acoustic performance in accordance with the requirements listed in Section 6.8(a)(4) (Sound Transmission Limitations). Walls with door or window openings will not be required to meet the requirements listed in Section 6.8(a)(4) (Sound Transmission Limitations) to the extent such openings reduce acoustic performance but will otherwise be designed and constructed to the same standard as walls that do not have doors or windows.
 - (F) Provide control of background noise in accordance with Section 6.8(a)(5) in terms of Noise Criterion (NC) or Room Criterion (RC).
 - (G) Provide control of indoor sound exposure to exterior noise sources in accordance with Section 6.8(a)(6). These guidelines will be used in conjunction with Project Co's noise impact assessment report.
- (2) Provide an acoustic consultant as part of the design team to ensure effective application of the above-noted requirements.
- (3) Where appropriate and cost effective:

- (A) Consider off-Site noise from 140th Street and Fraser Highway when designing operable windows and vents and in the location of exterior amenity spaces.
- (B) Consider proximity to external vibration sources to minimize their impact on vibration-sensitive uses and spaces when designing space planning and siting.

(4) Sound Transmission Limitations.

Space Adjacencies	STC Class ¹ - Walls	STC Class ¹ - Floors
Outpatient treatment room to outpatient treatment room	45	45
Public space to outpatient treatment room ²	45	45
Service areas to outpatient treatment rooms ³	45	45
Outpatient treatment room to access corridor ⁴	40	45
Exam/consultation room to exam/consultation room- Ambulatory Care	45	-
Exam/consultation room to Exam/consultation room – typical	45	-
Exam/consultation to public space	40	-
Exam/consultation room to wait room	45	-
Toilet room to public space	45	-
Conference rooms to public space	45	-
Conference rooms to outpatient treatment rooms	45	-
Staff lounges to outpatient treatment rooms	45	-
Staff lounges to public space	40	-

Notes for Table

1. Sound Transmission Class (STC) tests will be done on the wall and ceiling construction conditions on Site, using a methodology in general accordance with ASTM E336 Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
2. Public space includes corridors (except outpatient treatment room access corridors), lobbies, dining rooms, recreation rooms, and similar space.
3. Service areas include kitchens, elevators, elevator machine rooms, laundries, Parking Structure, maintenance rooms, boiler and mechanical equipment rooms, and similar spaces of high noise. Mechanical equipment located on the same floor or above outpatient treatment rooms, offices, nurses stations, and similar occupied spaces will be effectively isolated from the floor.
4. Outpatient treatment room access corridors contain composite walls with doors/windows and have direct access to outpatient treatment rooms.

(5) Recommended Background Noise Criterion (NC) Levels:

Space Type	Recommended NC or RC
Outpatient Services	40
Operating Rooms	35
Medical Imaging	40
Pharmacy Services	40
Laboratory Medicine	40
Sterile Processing Services	40
Education- Offices	40
Education - Classrooms	35
Administration (Board Rooms)	35
Administration (offices, computer rooms, reception)	40
General Support Areas	40

(6) Exterior Environmental Noise Source Guidelines:

Space Type	Sound Pressure Limit (dBA)
Operating rooms, patient/recovery rooms/areas	45
Private offices, waiting rooms	45
General offices, reception, television rooms, lobby and corridors	50

7. BUILDING MATERIALS

7.1 Division 1 - Site Work

(a) Excavation, Backfill and Grading

(1) Quality Requirements:

(A) Excavations will be designed and inspected by a Geotechnical engineer registered in British Columbia.

(2) Performance of work:

(A) Backfill with materials and to compaction requirements as specified by the Geotechnical engineer, to the levels to meet the Site grading requirements.

(b) Site Paving

(1) Quality assurance:

(A) Asphalt paving to conform to Good Industry Practice.

(B) Comply with the requirements of the Master Municipal Specifications.

(2) Performance of the work:

(A) Provide concrete curbs and other paving edging.

(c) Landscaping

(1) Quality assurance:

(A) Design to the BCNTA/BCSLA Landscape standards.

(B) Landscape materials to comply with the CNTA Nursery Stock Standards.

7.2 Division 3 - Concrete

(a) Material Requirements

(1) Portland Cement: CSA A3000, Type as required. Flyash and Cementitious Hydraulic Slag: to CSA A3000.

(2) Aggregates: CSA A23.1.

(A) For Parking Garage Slab-on-Grade: Abrasion loss not to exceed 35%.

(d) Pre-Cast Architectural Concrete

(1) Material Requirements:

(A) Project Co will comply with all applicable standards including, but not limited to:

- (i) CAN/CSA-A23.4 Precast Concrete - Materials and Construction.
- (ii) CAN/CSA-A23.1 Concrete Materials and Methods of Concrete Construction.
- (iii) CSA W59 Welding of Steel Structures (Metal Arc Welding).
- (iv) CSA G30.5 Welded Steel Wire Fabric for Concrete Reinforcement.

(2) Performance of work:

(A) Architectural pre-cast concrete will meet the requirements of CSA A251 for Class AC products.

7.3 Division 4 - Masonry

(a) Basic Requirements

- (1) Painted or unpainted concrete unit masonry will not be considered an acceptable exposed finish in staff, public and clinical areas.
- (2) Stone masonry will be considered as a finish veneer to concrete walls or concrete masonry walls. Exterior wall systems in such applications will be a rain screen or cavity wall system.

(b) Quality Requirements

(1) Masonry

(A) Concrete masonry units and reinforced masonry will conform to the following standards:

- (i) CSA A165 Series 94 Concrete Masonry Units.
- (ii) CSA A179 Mortar and Grout for Unit Masonry.
- (iii) CSA A370 Connectors for Masonry.
- (iv) CSA A371 Masonry Construction for Buildings.

- (v) CSA G30.3 Cold Drawn Steel Wire for Concrete Reinforcement.
- (vi) CSA G30.18 Billet-Steel Bars for Concrete Reinforcement.
- (vii) CSA S304.1 Masonry Design for Buildings.

(2) Masonry and Stone Veneer

(A) Masonry and stone veneer and anchorage will conform to the following standards as applicable:

- (i) CSA A165 Concrete Masonry Units.
- (ii) CSA A82.1 Burned Clay Brick.
- (iii) CSA A82.8 Hollow Clay Brick.
- (iv) CSA A179 Mortar and Grout for Unit Masonry.
- (v) CSA A370 Connectors for Masonry.
- (vi) CSA A371 Masonry Construction for Buildings.
- (vii) CSA S304.1 Masonry Design for Buildings.
- (viii) ASTM 568 Limestone Dimension Stone.
- (ix) ASTM 615 Granite Dimension Stone.

(c) Performance

- (1) Masonry practices and work standards will comply with Canadian Masonry Contractors Association (CMCA) Masonry Practices Manual and with CSA S304.1 and CSA A371.
- (2) Water repellent coating will be applied to exterior stone veneer. Coating will be clear, colorless, penetrating, non-yellowing, silane-siloxane or silane type with not less than 8% solids.

7.4 Division 5 - Metals

(a) Material Requirements:

- (1) Structural Steel: CAN/CSA-G40.20/G40.21-04, Grade 350W.
- (2) Cold Formed sections: CSA S136-01.
- (3) High-Strength Bolts and Nuts: ASTM A325 and ASTM A490.

- (4) Unfinished Bolts: ASTM A307 regular hexagon-bolt types.
 - (5) Shop Coat Paint: CISC/CPMS Standard 1-73a, a quick drying one coat paint for use on structural steel.
 - (6) Hot dip galvanizing: galvanizing steel, where indicated, to CAN/CSA-G164 M92 (R2003).
 - (7) Composite Steel Floor Deck: CSSBI 12M-96.
 - (8) Steel Roof Deck: CSSBI 10M-96
 - (9) Zinc-Rich Paint: Organic, ready Mixed to CAN/CGSB-1.181-99.
 - (10) Headed Stud Shear Connectors: Through-deck stud welded shear connectors complying with ASTM A108, Grade 1015 or 1020, cold finished carbon steel with dimensions complying with AISC specifications.
- (b) Inspection and Testing:
- (1) Inspection and Testing Company must be certified by Canadian Welding Bureau, in Category 1, Buildings, under CSA W178.1
- (c) Erection
- (1) Bolting will conform to "RCSC Specification for Structural Joints using ASTM A325 or A490 Bolts".
 - (2) Welding will conform to W47.1-03, Certification of Companies for Fusion Welding of Steel".
- (d) Erection Tolerances:
- (1) Erect structural steel and metal decks in accordance with requirements of referenced standards including CSA S16, CSA S136, and CSA S413.
 - (2) Tolerances: In accordance with CSA S16 and additionally as follows:
 - (A) Brick or stone support angles 3 mm.
 - (B) Members supporting window frames, doors, louvers directly 3 mm.
- (e) Metal Fabrications:
- (1) Quality Assurance:
 - (A) Building will be designed in compliance with applicable standards including but not limited to:

- (i) ASTM A269-04 Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- (ii) ASTM A53-04a Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- (iii) ASTM A307-04 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- (iv) CAN/CGSB 1.40-97 Anticorrosive Structural Steel Alkyd Primer.
- (v) CAN/CGSB 1.108-89 Bituminous Solvent Type Paint.
- (vi) CAN/CGSB 1.181-92 Ready Mixed, Organic Zinc-Rich Coating.
- (vii) CAN/CSA G40.20/G40.21-98 General Requirements for Rolled or Welded Structural Quality Steel.
- (viii) CAN/CSA G164-92 Hot-Dip Galvanizing of Irregularly Shaped Articles.

(2) Performance of work:

- (A) Exterior guardrails/handrails: Galvanized and Painted.
- (B) Interior guardrails/handrails: Painted steel.
- (C) Exterior Steel: Galvanized and Painted.
- (D) Exterior anchoring: Stainless steel.

7.5 Division 6 - Wood And Plastics

(a) Basic Requirements

(1) General Approach:

- (A) National Lumber Grading Authority Rules.
- (B) Size, grading and inspection to CSA 0141.
- (C) Species gout to CSA 086.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) CAN/CSA 0141-91 (R1999) Softwood Lumber.
 - (ii) CAN/CSA G164-M92 (R1998) Hot Dipped Galvanizing of Irregular Shaped Articles.
 - (iii) CSA 080 Series 01 Wood Preservation.
 - (iv) Lumber grades will conform to NLGA Standard Grading Rules.
 - (v) Forest Stewardship Council's Principles and Criteria.

- (b) Interior and Exterior Architectural Woodwork and Carpentry
 - (1) General Approach:
 - (A) Two (2) year Guaranty and Inspection Program (GIS).
 - (2) Quality Requirements:
 - (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Forest Stewardship Council's Principles and Criteria.
 - (ii) AWMAC Quality Standards for Architectural Woodwork (2003) - Custom Grade.
 - (iii) CAN/CSA B111-74 (R1998) Wire Nails, Spikes and Staples.
 - (iv) CSA 0115-82 (R2001) Hardwood and Decorative Plywood.
 - (v) National Hardwood Lumber Association (NHHLA).
 - (3) Performance of work:
 - (A) Architectural woodwork will include all clear, kiln dried, dressed or resawn material exposed to view in a finished building interior and exterior, including cabinets, casework, frames, paneling, trim and other wood-related products.
 - (B) All millwork materials and workmanship will conform to the architectural woodwork specifications as set forth in the Quality Standards Manual for Architectural Woodwork of the Architectural

Woodwork Manufacturers Association of Canada (AWMAC), latest edition, for minimum "Custom Grade".

- (C) All shelving standards and shelf supports will be seismic resistant type.
- (D) Composite wood products will have no added urea-formaldehyde resins. No particle board will be allowed on the job Site.

(c) Finish Carpentry and Architectural Woodwork

(1) General Approach

- (A) As a minimum, all exposed millwork surfaces must have plastic laminate surfacing as may be required to resist the caustic action of chemicals or agents typically used in a health care environment.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Design, fabrication, materials and workmanship will conform to Architectural Woodwork Manufacturer's Association of Canada (AWMAC) Quality Standards Manual (latest edition) for minimum "Custom Grade".
 - (ii) Installation methods and locations for finish hardware will conform to Door and Hardware Institute (DHI) standards.

(3) Performance of Work:

- (A) Finish carpentry and architectural woodwork including cabinet work and millwork but excluding laboratory casework, which will be included in Division 12, will conform to the quality requirements indicated above.

(d) Glue-Laminated Structural Units

(1) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Forest Stewardship Council's Principles and Criteria.

7.6 Division 7 - Thermal And Moisture Protection

(a) Dampproofing and Waterproofing

(1) Quality Requirements:

(A) Building will be designed in compliance with applicable standards including but not limited to:

- (i) CAN/CGSB 37022-88 Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Damp-proofing and Waterproofing and for Roof Coatings.
- (ii) CAN/CGSB 37016-M89 Filled, Cutback Asphalt for Damp-proofing and Waterproofing.
- (iii) CAN/CGSB 37-GP-56M AMEND. Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- (iv) Static Type Mineral Colloid Asphalt Emulsion: Conforming to CGSB 37-GP-2M.
- (v) CGSB 37-GP-3M .3-M89 Application of Emulsified Asphalts for Damp-proofing and Waterproofing.
- (vi) CGSB 37-GP-36M 12Ma Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.

(2) Performance of work:

(A) Waterproof below ground/grade walls where recommended by Geotechnical Consultant.

(B) Waterproofing Materials for exterior face of foundation walls below grade will conform to following:

- (i) Self-Adhesive Membrane: Self-adhering membrane of rubberized asphalt integrally bonded to high density, cross-laminated, polyethylene sheeting.
- (ii) SBS Modified Membrane: SBS modified bituminous membrane with 180 g/m² non-woven polyester reinforcing, bottom surface suitable for torch application to substrate, conforming to CGSB 37-GP-56M.

- (C) Ensure sufficient coverage of foundation wall surfaces to repel moisture and prevent transmission through or ingress into the foundation walls.
- (D) Dampproofing will prevent the penetration of moisture through foundation walls not subject to hydrostatic pressure.

(b) Traffic Coatings

(1) Quality Requirements:

- (A) Building will be designed in compliance with applicable standards including but not limited to:

- (i) Traffic deck coating materials will conform to CSA S413.94 - Parking Structure with membrane system to pass ASTM C957 crack-bridging test.

(2) Performance of work:

- (A) Traffic deck coating system will provide complete waterproof membrane and will prevent corrosive effects of de-icing salts conforming to CSA S413.

(c) Thermal Protection

(1) Quality Requirements:

- (A) Foamed plastic insulation will be CFC and HCFC free.
- (B) The Building will provide consistent environmental quality to the enclosed spaces having regard for the seasonal conditions of the Project and will comply with applicable standards including but not limited to:

- (i) Insulation will conform to the following standards:
 - (i).1 Extruded Polystyrene: CAN/ULC-S701, Type 4, RSI 0.88 per 25 mm.
 - (i).2 Expanded Polystyrene: CAN/ULC-S701, Type 2, RSI 0.70 per 25 mm.
 - (i).3 Polyisocyanurate: CAN/ULC-S704, faced insulation, LTTR RSI 1.05 per 25 mm.
 - (i).4 Batt Insulation (Thermal): CAN/ILC-S702, Type 1, glass fibre, RSI 0.70 per 25 mm.
 - (i).5 Batt Insulation (Acoustic): CAN/ULC-S702, Type 1, glass fibre.

(2) Performance of work:

- (A) Sprayed Thermal Insulation: A spray-on, inorganic, non-combustible mineral fiber or glass fiber with bonding adhesive impregnated during manufacture. Sprayed insulation will not contain asbestos, free crystalline silica, or other combustible fibers. When applied 25 mm thick, the insulation will have minimum RSI 0.70 thermal value.
 - (B) ULC rated fire hazard classification for sprayed insulation will be in accordance with CAN/ULC-S102:
 - (i) Flame Spread: 25 or less.
 - (ii) Smoke Developed: 0.
 - (iii) Fuel Contributed: 0.
 - (C) Sprayed Foam Insulation: Sprayed polyurethane foam insulation, LTTTR RSI 1.05 per 25 mm, conforming to the following standards:
 - (i) CAN/ULC-S705.1 Spray Applied Rigid Polyurethane Cellular Plastic Thermal Insulation.
 - (ii) CAN/ULC-S102 Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - (iii) CAN/CGSB 51.39 Spray Application of Rigid Polyurethane Cellular Plastic Thermal Insulation for Building Construction.
 - (iv) CCMC 12932-R Air Barrier System.
 - (D) Mineral Fiber Insulation: Incombustible semi-rigid or rigid insulation listed by ULC when tested in accordance with CAN4-S114. Flame Spread Rating of 5 and Smoke Developed 0 when tested in accordance with CAN/ULC-S102.
- (d) Air Barriers
- (1) Performance:
 - (A) Air barrier assemblies will be designed to limit air exfiltration and infiltration through materials of the assembly, joints in the assembly, joints in components of the wall assembly and junctions with other building elements including the roof.
- (e) Vapor Retarder
- (1) Quality Requirements:

- (A) The Building will be designed in compliance with applicable standards including but not limited to:
 - (i) Conform to CAN/CGSB-51.374, Type II, minimum 0.152 mm thick.
- (f) Membrane Roofing Systems
 - (1) General Approach:
 - (A) Roofing systems will include:
 - (i) Interior access systems to roof areas.
 - (ii) Protection of the roof system from pedestrian traffic and solar radiation.
 - (2) Quality Requirements:
 - (A) The Building will be designed in compliance with applicable standards including but not limited to:
 - (i) Roofing Contractor's Association of British Columbia (RCABC).
 - (ii) CAN/CGSB 37-GP-56M AMEND. Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
 - (3) Performance of work:
 - (A) Materials and workmanship for exposed and protected roof membrane systems will conform to the guarantee standards of the Roofing Contractors Association of BC (RCABC) as published in the "RCABC Roofing Practices Manual" (Latest edition).
 - (B) Roof Insulation; Will conform to the following standards:
 - (i) Extruded Expanded Polystyrene: Conform to CAN/ULC-S701-97, Type 4.
 - (ii) Expanded Polystyrene: Conform to CAN/ULC-S701-97, Type 2.
 - (iii) Polyisocyanurate: Conform to CAN/ILC-S704-01 (faced polyisocyanurate).
 - (C) Insulation products will be as listed in RGC Acceptable Materials List of the RGC Roofing Practices Manual.

- (D) Roof Membranes: Will be as listed in RGC Acceptable Materials List of the RGC Roofing Practices Manual for:
 - (i) Flexible Membrane - SBS Modified (2 ply system).
 - (ii) Use Energy Star compliant and high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408).

- (g) Sheet Metal Roofing
 - (1) Quality Requirements:
 - (A) The Building will be designed in compliance with applicable standards including but not limited to:
 - (i) Preformed metal roofing will conform to the latest Guarantee Standards of the Roofing Contractors Association of British Columbia (RGC), as published in the "RGC Roofing Practices Manual" for a five (5) year guarantee.
 - (ii) EPA Energy Star Roofing Guidelines.
 - (2) Performance of work:
 - (A) Metal cladding and roofing systems will provide clear internal paths of drainage in order to drain any trapped moisture to the exterior, discharging moisture in a manner avoiding staining of architectural finishes, collecting in puddles, formation of icicles and dripping on pedestrians.
 - (B) Use Energy Star compliant and high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408).

- (h) Sheet Metal Flashing and Trim
 - (1) Quality Requirements:
 - (A) The Building will be designed in compliance with applicable standards including but not limited to:
 - (i) Sheet metal for flashings will conform to RGC Roofing Practices Manual.
 - (i) Fireproofing, Firestopping and Smoke Seals
 - (1) Quality Requirements:

- (A) The Building will be designed in compliance with applicable standards including but not limited to:
- (i) ULC S115-1995 (R2001) Fire Tests of Firestop Systems
 - (ii) Sprayed cementitious fireproofing will conform to the following standards:
 - (ii).1 CAN/ULC-S101M Standard Methods of Fire Endurance Tests of Building Construction and Materials (latest edition).
 - (ii).2 ULC - List of Equipment and Material - Fire Resistance Ratings (latest edition).
 - (ii).3 WH Certification Listings (latest edition).
 - (ii).4 ASTM E59 Effect of Deflection on Sprayed Fire Resistive Materials Applied to Structural Members.
 - (ii).5 ASTM E736 Cohesion/Adhesion of Sprayed Fire Resistive Materials Applied to Structural Members.
 - (ii).6 ASTM E859-82 Air Erosion of Sprayed Fire Resistive Materials Applied to Structural Members.
 - (ii).7 ASTM E761 Compressive Strength of Sprayed Fire Resistive Materials Applied to Structural Members.
- (j) Joint Sealants
- (1) Quality Requirements:
- (A) The Building will be designed in compliance with applicable standards including but not limited to:
- (i) CAN/CGSB 19.13-M87 Sealing Compound, One-Component, Elastomeric, Chemical Curing.
 - (ii) CAN/CGSB 19.24-M90 Multi-component, Chemical-Curing Sealing Compound.
 - (iii) ASTM C920-05 Standard Specification for Elastomeric Joint Sealants.
 - (iv) Acoustical Sealant: Nonhardening.
- (2) Performance of work:
- (A) Exterior sealants as per Building Envelope Consultants recommendations.

- (B) One part mildew resistant silicone sealant in wet areas and dissimilar materials, interior applications. Color white against white fixtures; clear in all other locations.
 - (C) Non-hardening acoustical sealant in sound rated gypsum board partitions and all end lap joints in polyethylene vapor barriers.
 - (D) Interior sealants will be low volatile organic compound emitting.
- (k) Control
- (1) Performance of the work:
 - (A) Provide flush mounted joint covers.

7.7 Division 8 - Doors and Windows

- (a) Basic Requirements
 - (1) Size Requirements for Doors:
 - (A) Doors will be sized in accordance with the requirements applicable standards and the following schedule of minimum door sizes.
 - (i) Doors through which stretchers, carts, or large mobile equipment pass on a regular basis will have a minimum width of 1100 mm. to allow ease and speed of movement. The maximum width of single doors will be 1100 mm.
 - (ii) Provide double doors into rooms where large pieces of equipment will be moved in or out during the lifetime of the Building and where such equipment will not pass through 1100 mm. single doors.
 - (iii) Door openings must accommodate movement of equipment.
 - (iv) Provide double doors in corridors and into major rooms to ease access where patients in beds or stretchers will be attended to or accompanied by a large number of medical staff.
 - (v) Generally doors to patient areas other than those referred to above and including doors to water closets and change room cubicles will have a minimum width of 915 mm.
 - (v).1 W.C. and change cubicle doors: 610 mm wide.

- (vi) No door or door leaf will be less than 2150 mm high unless specifically required for access to services or other purposes where height is restricted.

(2) Other Requirements for Doors

- (A) Doors into Surgery Department areas through which cart, stretcher, or bed traffic is anticipated on a routine basis, will be automatically activated by electronic device or by manual push button, located to allow emergency access without the necessity to stop movement.
- (B) All other doors through which cart, stretcher, or bed traffic is anticipated on a routine basis or through which frequent patient or staff traffic is routine, will be capable of being held in an open position by the use of appropriate hardware or will be automatically activated.
- (C) Door sizes and designs will be applied consistently to rooms of similar use, location and configuration.
- (D) Doors will not swing into corridors in a manner that may obstruct traffic flow or reduce the corridor width, except doors to spaces such as small closets which are used infrequently and are not subject to occupancy.
- (E) Doors will have appropriate hinges, edge protection and face protection to minimize damage and resultant disruptive maintenance to the doors.
- (F) Doors and frames will have a suitable finish which prevents dirt and finger print accumulation, and is easily cleanable.
- (G) The extent of glazing in a door, or the size and quantity of sidelights, will be consistent and balanced between the degree of observation required and the privacy requirements of the occupants of the room. Where possible and appropriate the preference is to provide glazing in an adjacent sidelight as opposed to within the door itself.
- (H) Glazing in doors and sidelights will allow patient observation and safety of operation of the spaces they serve. Blinds or window coverings suitable and appropriate for the level of privacy intended and required will be provided.
- (I) Doors and door frames will have the capability to withstand the varying and high levels of humidity and impact that occur typically within a hospital and in specific rooms within the hospital and maintain the inherent aesthetic and functional capacities.

- (J) Exterior door frames will be fully welded, pressed steel, insulated and thermally broken.
- (K) In areas such as Security, Pharmacy Services and Laboratory Medicine entrances where security is considered paramount, appropriate location, configuration, materials, construction and detailing is required to ensure safety and security.
- (L) Co-ordinate heights of glazing with adjacent wall protection, handrails, and other required accessories to achieve functional and aesthetic coordination.

(b) Hollow Metal Doors and Frames

(1) Minimum Standards:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Canadian Steel Door and Frame Manufacturer's Association (CSDFMA).

(2) Performance of Work:

- (A) Interior metal doors will be flush faced construction.
- (B) Pressed metal frames will be fully welded construction and exterior door frames will be thermally broken

(c) Wood Doors

(1) Minimum Standards:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Wood doors will conform to the Custom Grade Standards as set out in the Quality Standards for Architectural Woodwork (current edition) published by the Architectural Woodwork Manufacturer's Association of Canada (AWMAC) .
 - (ii) Doors requiring fire resistance ratings will be fabricated and tested in accordance with ULC or Warnock Hersey requirements and have the appropriate ULC or Warnock Hersey fire resistance labels attached.

(2) Performance of Work:

- (A) Wood doors will be flush Custom Grade quality, solid particleboard core or of a similar quality.
 - (B) Stiles, rails and face will be glued to the core with Type II water resistant adhesive to minimize de-lamination or disassembly as a result of moisture ingress.
 - (C) Face veneer to be B Grade hardwood veneer with AWMAC No. 3 edge and with transparent finish or appropriate finish surface to suit the intended use.
 - (D) Fire resistance rated doors to be constructed with a homogeneous incombustible mineral core and AWMAC Quality Standards Option 5 blocking.
- (d) Aluminum Entrances and Storefront
- (1) Minimum Standards:
 - (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Aluminum Association (AA) DAF 45-03 Designation System for Aluminum Finishes.
 - (ii) American Architectural Manufacturers' Association (AAMA) Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.
 - (iii) ASTM E283-04 Test Method for Determining rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.
 - (iv) CAN/CGSB 1.40-89 Primer, Structural Steel, Oil Alkyd Type.
 - (v) CAN/CGSB 12.1-90 Tempered or Laminated Safety Glass.
 - (vi) Insulated Glass Manufacturers' Association of Canada (IGMAC) Standards.
 - (vii) ASTM E547-00 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.

- (viii) CAN3/CSA S157-83 (R2002) Strength Design in Aluminum.
- (ix) CAN/CSA A440 Windows.
- (x) CAN/CGSB 1.40-89 Primer, Structural Steel, Oil Alkyd Type.
- (xi) CAN/CGSB 12.1-90 Tempered or Laminated Safety Glass.
- (xii) Insulated Glass Manufacturers' Association of Canada (IGMAC) Standards.

(2) Performance of Work:

- (A) Aluminum entrance and storefront framing will be thermally broken, flush glazed, aluminum sections, to accept insulating glass units.
- (B) Thermally broken aluminum entrance and storefront framing will incorporate drained and vented system with a complete air and vapor seal, allowing any moisture entering the framing to drain to the exterior and also allow air into the pressuring chamber.
- (C) Aluminium swing entrance doors will be heavy duty commercial or institutional grade and may be automatically operated, motion detector controlled.
- (D) Aluminum finish for exposed aluminum surfaces will be applied in the manufacturing process and will be permanent and resistant to corrosion caused by exposure to weather and climate.

(e) Specialty Doors

(1) Overhead Rolling Service Doors:

(A) Performance of Work:

- (i) Curtain slats will be interlocking flat slats complete with bottom bar and contact type bottom astragal.
- (ii) Motor operation to be provided on doors.

(2) Overhead Rolling Grilles:

(A) Performance of Work:

- (i) Overhead rolling grille curtains will be fabricated with metal components assembled to allow visual access to areas being secured.
 - (ii) Grille guides to be complete with aluminum or steel guides fabricated to withstand vertical and lateral loads, counterbalance by helical torsion springs and sound deadened.
 - (iii) Grilles will be motor operated.
- (3) Overhead Rolling Counter Shutters
 - (A) Performance of Work:
 - (i) Shutter curtains will be fabricated with extruded aluminum, galvanized steel or stainless steel interlocking flat slats, complete with guides of similar materials.
 - (ii) Shutters will have manual operation and locking capability.
- (f) Aluminum Curtain Walls, Aluminum Entrance Doors and Aluminum Windows
 - (1) Quality Requirements:
 - (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Aluminum Association (AA) DAF45-03 Designation System for Aluminum Finishes.
 - (2) Performance of Work:
 - (A) Curtain wall framing will incorporate a drained and vented system with a complete air and vapor seal, allowing any water entering the framing/system and the glazing detail cavities to drain to the exterior and also allow air into the pressuring chamber.
 - (B) The design of the curtain wall framing, aluminum entrance doors and aluminum windows will incorporate a thermal-break system.
 - (C) Automatic sliding doors will conform to following performance requirements:
 - (i) Accommodate medium to heavy pedestrian traffic.

- (ii) Capable of operating within temperature ranges existing at the Building.
 - (D) Automatic swing doors will conform to following performance requirements:
 - (i) Automatic door equipment will accommodate medium to heavy pedestrian traffic.
 - (ii) Capable of operating within temperature ranges existing at the Building.
 - (iii) Motion and presence detection system will be unaffected by ambient light or ultrasonic frequencies.
- (g) Skylights
 - (1) Quality Requirements:
 - (A) Skylights will conform to the requirements of Building Envelope, Exterior Walls and Wall Systems.
 - (2) Performance of Work:
 - (A) Exposed aluminium finishes will be permanent and resistant to corrosion resulting from exposure to weather and climate.
- (h) Glass and Glazing
 - (1) Minimum Standards:
 - (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) ANSI/ASTM E330-02 Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - (ii) CAN/CGSB 12.1-90 Tempered or Laminated Safety Glass.
 - (iii) CAN/CGSB 12.3-91 Flat, Clear Float Glass.
 - (iv) CAN/CGSB 12.5-86 Mirror, Silvered.
 - (v) CAN/CGSB 12.8-97 Insulating Glass Units.
 - (vi) CAN/CGSB 12.9-91 Spandrel Glass.

- (vii) CAN/CGSB 12.11-90 Wire Safety Glass.
- (viii) FGMA Glazing Manual (1997).
- (ix) LSGA Laminated Glass Design Guide (2000).
- (x) Materials and workmanship will conform to Glazing Contractors Association of B.C. (GCA) Glazing Systems Specifications Manual and Insulating Glass Manufacturers Association of Canada (IGMAC) Guidelines.
- (xi) Glass and glazing work also to conform to good glazing practice as described in the IGMAC "Glazing Recommendations for Sealed Insulating glass Units", IGMAC "Sloped Glazing Guidelines", and the GANA "Glazing Manual".
- (xii) Glass and glazing will conform to the requirements of Section 6.2(a).

(2) Performance of Work:

(A) Laminated safety glass will be used in single glazed skylights, or as the inboard light of a double glazed skylight.

(B) Mirrors:

- (i) Full wall mirror: Mirrors will be Type 1A in accordance with CAN/CGSB-12.5. Full wall unframed mirrors will be 6 mm thick minimum float glass backed with electrolytically applied copper plating. All edges will be ground smooth and polished.
- (ii) Wall mounted posture mirror: Mirrors will be framed type; one piece, stainless steel channel frame with a No. 1 quality, 6 mm thick float glass mirror backed with electrolytically applied copper plating. Back to be galvanized steel.

(i) Finish Hardware

(1) Minimum Standards:

(A) Project Co will comply with all applicable standards including, but not limited to:

- (i) CAN/CGSB 69.17-86 Bored and Preassembled Locks and Latches.
 - (ii) CAN/CGSB 69.18-90 / ANSI/BHMA A156.1-81 Butts and Hinges.
 - (iii) CAN/CGSB 69.19-93 / ANSI/BHMA A156.3-84 Exit Devices.
 - (iv) CAN/CGSB 69.20-90 / ANSI/BHMA A156.4-86 Door Controls (Closers).
 - (v) CAN/CGSB 69.21-90 / Auxiliary Locks and Associated Products.
 - (vi) CAN/CGSB 69.22-90 / ANSI/BHMA A156.6-86 Architectural Door Trim.
 - (vii) CAN/CGSB 69.29-93 / ANSI/BHMA A156.13 Mortise Locks and Latches.
 - (viii) CAN/CGSB 69.30-93 / ANSI/BHMA A156.14-99 Sliding and folding Door Hardware.
 - (ix) CAN/CGSB 69.35-89 / ANSI/BHMA A156.19-84 Power Assist and Low Energy Power Operated Doors.
- (B) Finish hardware supplier will be an established contract builders hardware firm who will have in its employ one or more AHC (Architectural Hardware Consultant) who are members in good standing of the DHI (Door and Hardware Institute) and who will be responsible for the complete hardware contract.
- (C) Finish hardware, where applicable, will be ULC listed for fire rating.
- (2) Performance of Work:
- (A) Finish hardware will be heavy duty commercial quality hardware. Locksets and latchsets will be fully mortised type and lever handles will be solid material.
 - (B) Deadbolts: Minimum requirements - ANSI A156.2, series 4000, grade 1 c/w mortised faceplate bolt & 6 pin cylinders.
 - (C) Locksets: Minimum requirements - ANSI A156.2, series 4000, grade 2 c/w mortised faceplate & 6 pin cylinders. Provide multi level keying.

- (D) Latchsets: Minimum requirements - ANSI A156.2, series 4000, grade 2 c/w mortised faceplate latch & 6 pin cylinders.
- (E) Provide master and grandmaster keying system, including all keys required by Authority personnel. The number of keys required will be determined in the user consultation process as described in Appendix 2F [User Consultation Process] but will be no less than 4 keys for each lock.
- (F) Finishes for exterior hardware to be stainless steel with corrosion resistant parts.
- (G) All exit doors to be ULC listed for accident hazard and fire exit and to be tested in accordance with ANSI A156.3, Grade 1.
- (H) All closers to ULC listed and certified under ANSI A156.4, Grade 1.

7.8 Division 9 - Finishes

(a) Basic Requirements

- (1) Interior wall, floor and ceiling finishes and assemblies to support finishes will be suitable for the requirements of the Building.
 - (A) Finishes will be selected to allow ease of cleaning and maintenance.
 - (B) Finishes and systems of installation in areas where water is anticipated to be present due to cleaning or as a product of procedures and process will be such as to allow water to collect and exist without causing damage to the finish or substrate.
 - (C) Infection control will be a priority factor in the selection of finishes for all patient care areas.
 - (D) Acoustic characteristics of finish materials will be a priority consideration in those areas identified as requiring sound attenuation and or sound transmission control.

(b) Interior Wall Framing

- (1) General Approach:
 - (A) Interior wall framing will be standard steel studs assembled to support mechanical and electrical services, medical gas services and wall and ceiling attachments required in fully functioning Building.
- (2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
- (i) Specifications and Standards Manual published by the Association of Wall and Ceiling Contractors of BC (AWCC).
 - (ii) ASTM C1396-04 Specification for Gypsum Board.
 - (iii) ASTM C475-02 Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - (iv) ASTM C514-04 Specification for Nails for the Application of Gypsum Board.
 - (v) ASTM C1047-05 Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - (vi) ASTM C1178-04e1 Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- (B) Materials and workmanship for steel studs and furring and gypsum board ceiling suspension systems will conform to Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual (latest edition), Section 9.7 – Interior Steel Studs and Furring.
- (C) Ceiling suspension systems for gypsum board ceiling will conform to AWCC Specification Standards Manual, Section 9.7, Item 5. Maximum spans for steel studs used as ceiling joists will conform to Table 9.7/7 in the Standards Manual.

(3) Performance of Work:

- (A) Steel stud framing construction will accommodate electrical, plumbing and other services in the partition cavity. Reinforce steel stud framing and provide backing as required to support fixtures, wall cabinets, handrails, grab bars, Authority's furnished and installed equipment and furnishings, and other such items requiring wall fixing.

(c) Gypsum Board

(1) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:

- (i) Specifications and Standards Manual published by the Association of Wall and Ceiling Contractors of BC (AWCC).
 - (ii) ASTM C1396-04 Specification for Gypsum Board.
 - (iii) ASTM C475-02 Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - (iv) ASTM C514-04 Specification for Nails for the Application of Gypsum Board.
 - (v) ASTM C1047-05 Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - (vi) ASTM C1178-04e1 Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- (B) Materials and workmanship for gypsum board and accessories will conform to the Association of Wall and Ceiling Contractors of B.C. (AWCC) Wall & Ceiling Specification Standards Manual (latest edition), Section 9.6.
- (2) Performance of Work:
- (A) Reinforced cementitious board or cementitious backer unit (CBU) will be used behind ceramic wall tile in showers or other wet areas.
 - (B) Abuse-resistant gypsum board will be provided where required for increased resistance to abrasion, indentation and penetration for interior walls and ceilings.
 - (C) Glass mat surfaced gypsum sheathing board will be used wherever exterior gypsum sheathing is required at exterior walls.
 - (D) Gypsum board wall and ceiling assemblies required to provide fire resistance ratings will be ULC or Warnock Hersey listed.
 - (E) Airborne sound insulation will be provided for gypsum board/steel stud assembly to close off air leaks and flanking paths by which noise can go around the assembly. Assemblies will be airtight. Recessed wall fixtures such as cabinets or electrical, telephone and television outlets, which perforate the gypsum board surface will not be located back-to-back. Any opening for fixtures will be carefully cut to proper size and piping penetrations will be appropriately sealed. Conduit/duct/piping penetrations will be sealed with tape and fill at the plenum barrier. The entire perimeter of a sound insulating assembly will be made airtight to prevent sound flanking. An

acoustic caulking compound or acoustical sealant will be used to seal between the assembly and all dissimilar surfaces (including at window mullions) in accordance with the recommendations of the acoustic consultant.

(d) Ceramic Tile Work

(1) Quality Requirements:

(A) Project Co will comply with all applicable standards including those standards listed below.

- (i) Terrazzo, Tile & Marble Association of Canada (TTMAC).
- (ii) ANSI A118.1-1999 Dry Set Portland Cement.
- (iii) ANSI A136.1-1999 Organic Adhesive.
- (iv) CAN/CGSB 75.1-88 Tile, Ceramic.
- (v) CAN/CGSB A5-93 Portland Cement.
- (vi) ASTM C144-99 Specification for Masonry Aggregates.
- (vii) ASTM C207-91 (R1992) Specification for Hydrated Line.

(B) Materials and workmanship for ceramic tile work will conform to Terrazzo Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual (latest edition).

(2) Performance of Work:

(A) Ceramic tile will meet the following performance standards as applicable:

- (i) Static Coefficient of Friction: Floor tile installed on wet and exterior surfaces will have the following values as determined by testing identical products per ASTM C1028.
 - (i).1 Level Surfaces: Not less than 0.50 for wet and dry conditions.
 - (i).2 Step Treads: Not less than 0.60 for wet and dry conditions.
 - (i).3 Ramp Surfaces: Not less than 0.60 for wet and dry conditions.

- (B) Exterior tiles will be frost resistant and will have a moisture absorption rating of 3.0% or less.

(e) Acoustical Ceilings

(1) General Approach:

- (A) Acoustic ceiling tiles in a suspension system will be installed where applicable to provide the levels of sound attenuation for particular applications as may be required. Provide NRC as follows:
 - (i) Normal NRC: 0.55 minimum for General application.
 - (ii) High NRC: 0.85 minimum for Conference Rooms.
- (B) Ceiling tiles in a suspension system will provide accessibility to the ceiling spaces where regular or particular access is required to mechanical, electrical or other service systems.

(2) Performance of Work:

- (A) Components for ceiling suspension system will be “intermediate” system manufactured to meet ASTM C635 Suspension Systems for Acoustical Tile and Lay-In Ceilings, and will be formed from commercial quality zinc coated cold rolled steel, and to meet specifications for seismic restraint.
- (B) Temperature and humidity affect acoustical panel and tile dimensional and planar stability. Standard acoustical panels and tiles designed for installation within the normal occupancy condition range of 150 C to 290 C and maximum 70% RH. When the service use temperature and RH are expected to exceed these ranges, consider the use of acoustical units specifically designed for these applications.

(f) Flooring

(1) General Approach:

- (A) Flooring finishes will be provided as required to comply with the functional and aesthetic parameters of the Authority as follows:
 - (i) The selection process for flooring materials will include considerations of cleaning and maintenance, pedestrian and rolling traffic, acoustics, infection control and aesthetics.
 - (ii) Flooring in areas where water is expected to collect as a result of the functions and processes inherent in

the use of the area will be water resistant and slip resistant and will prevent water or moisture transmission to the substrate. Termination of the flooring at the walls in the form of “flash coves” may be required in these areas.

- (iii) Flooring over which wheeled or service vehicle traffic is anticipated and where wear and damage may result will be heavy duty materials suitable for that purpose.
- (iv) Flooring in areas subject to moisture and heat over extended periods of time will be permanent heavy duty integral materials such as seamless epoxy quartz flooring.
- (v) Flooring in patient areas and staff areas where cart or stretcher traffic is expected or where cleaning on a regular or emergency basis is necessary will be resilient sheet materials and flush cove base with a minimum of seams and joints and the product and installation will be of a quality suitable for that purpose.
- (vi) Flooring in sterile medical and procedure areas such as operating rooms will be impervious, readily cleanable materials with a minimum of seams and joints with complimentary or matching wall cladding and flash cove materials.
- (vii) Flooring in public washrooms, staff washrooms, patient washrooms will be impervious to water and have a slip resistant finish.
- (viii) Resilient tile products will be considered as flooring in service corridors and service areas.
- (ix) Finish materials on stair treads and risers in stairs or stairwells used by the public or patient care staff will be of resilient materials purpose manufactured.
- (x) Carpet finishes will be considered in patient and staff areas where relaxation and comfort are primary considerations. These would include patient/public lounges, staff lounges, staff offices and areas of similar function.

- (xi) Carpet finishes will be considered as flooring at public corridors or rooms where acoustic attenuation is a priority consideration and where cleanability is a secondary consideration.
- (2) Quality Requirements:
- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Materials and workmanship for resilient flooring and carpeting will conform to the National Floor Covering Association (NFCA) Specification Standards Manual.
- (3) Performance of Work:
- (A) Resilient Flooring:
 - (i) Slip resistant sheet vinyl will have Static Coefficient of Friction of 0.6 on level surfaces and 0.8 on ramps. Exposed surface will provide anti-bacterial activity against gram-positive and gram-negative micro-organisms. All seams will be welded.
 - (ii) Linoleum sheet flooring will be a homogenous sheet linoleum of primarily natural materials, consisting of linseed oil, wood flour and resin binders mixed and calendared onto a natural jute backing. All seams will be welded.
 - (iii) Rubber flooring tile will be formulated with 100% virgin elastomers, reinforcing agents, soil-resisting agents and migrating waxes compounded to afford the end user benefits of long durability, excellent cleaning characteristics and exceptional slip retardance. Stud designs will have chamfered edges with a sharply defined edge at the top, for higher slip resistance, easier cleaning and superior maintenance and low vibration design to minimize vibration and noise.
 - (B) Carpets:
 - (i) Carpet will maintain static generation at less than 3.5 KV at 210C and 20% RH throughout the life of the product.
 - (C) Seamless Quartz Epoxy Flooring:

- (i) Seamless epoxy flooring will be 100% solids, zero VOC, solvent free system comprised of a two-component epoxy primer, a two-component epoxy resin and curing agent, colored quartz aggregate broadcast into both primer and undercoat and a high performance UV resistant two-component, clear epoxy sealer. Bases will be integral cove bases.

(g) Painting and Protective Coatings

(1) General Approach:

- (A) Exterior masonry materials such as brick and concrete block will be treated with water repellent coatings to prevent water ingress into or through the material.
- (B) Where indoor air quality is an issue, use only MPI listed materials having minimum volatile organic compound level.
- (C) Exterior and interior materials subject to corrosion from exposure to moisture or other corrosive agent and where painting is deemed to be insufficient protection will receive a special protective coating. Such materials include exterior and interior structural and miscellaneous steel and galvanized steel.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Architectural Painting Specification Manual, Master Painters Institute (MPI).

(h) Special Wall Coverings

(1) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Materials and workmanship will conform to the Master Painters Institute (MPI) Architectural Painting Specification Manual (latest edition).

7.9 Division 10 - Specialties

(a) Tackboards and Whiteboards

(1) General Approach:

- (A) Writing and pinup surfaces will be provided in staff and patient areas for display, communications, notices, and other information transfer purposes.
- (B) Tackboard surfaces will be of a type and quality to allow pin penetration of the surface materials while allowing reasonable resistance to deterioration.
- (C) Whiteboard surfaces will be of a type to allow use of felt type writing instruments and allow erasing and cleaning with minimum effort.

(2) Performance of Work:

- (A) Tackboards and whiteboards will be complete with manufactured frames and accessory trays as and where required.
- (B) Whiteboard writing surface will be porcelain ceramic on steel surface with maximum contrast and glare control and reflectivity, and will be scratch and abrasion resistant.
- (C) Lamination adhesive used for tackboards and whiteboards will be non-toxic water based adhesive.

(b) Compartments and Cubicles

(1) General Approach:

- (A) Compartments and cubicles including toilet partitions, change cubicle and shower partitions will provide privacy and security.
- (B) Compartment/cubicle doors, where used, will be of material matching the partitions and will be complete with permanent, purpose made hardware.
- (C) Curtain track and curtain may be used in lieu of door where and as appropriate.
- (D) Change Compartments will be complete with a mirror, size and location to be determined by Project Co in consultation with the Authority.

(2) Quality Requirements:

- (A) Toilet Partitions:
 - (i) Sheet metal where used for toilet partitions will be galvanized steel conforming to ASTM A653 with minimum ZF001 (A01) zinc coating. Finish for steel surfaces will be polyester baked enamel.

- (ii) Stainless steel used for partitions will be Type 304 conforming to ASTM A240 with No. 4 finish.
- (iii) Plastic laminate used for partitions will be Grade 10/HGS GP50 scuff resistant high pressure laminate, conforming to NEMA LD-3.
- (iv) Fiber reinforced plastic (fiberglass) will be moisture resistant.

(B) Shower Partitions

- (i) Partitions for showers will be solid phenolic laminated thick stock, factory laminated with decorative finish both faces of core and conforming to CAN3A172 or NEMA LD3.

(c) Wall Guards and Corner Guards, Handrails, Wall Protection, Door Edge and Door Frame Protection

(1) General Approach:

- (A) Protect walls from damage due to impact with wall and corner guards, bumper guards and handrails.
- (B) Wall Bumper Guards: Provide wall bumper guards at 230 mm above finish floor and handrail/wall bumper guard at 915 mm above finish floor in Surgery suite and at locations requiring movement of stretchers.
- (C) Wall Protection: Apply sheet wall protection 1200 mm high above finish floor and bumper guards to wall areas in service area corridors where impact damage is anticipated from material handling carts damage.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) If vinyl acrylic is used for bumper guards, crash rails, handrails and corner guards, it will be high impact resistant extrusion conforming to ASTM D4226 and with anti-microbial additive. Vinyl acrylic extrusions will be chemical and stain resistant in accordance with ASTM D1308.
 - (ii) Wall protection will be high impact stain resistant vinyl acrylic conforming to ASTM D4226 with anti-

microbial additives. Wall protection vinyl acrylic will be chemical and stain resistant in accordance with ASTM D1308.

(3) Performance of Work:

- (A) Vinyl acrylic wall protection handrails and corner guard products will be stain resistant to pen marks, paint and graffiti, and will withstand commercial cleaners without fading or staining. These products will also contain anti-microbial additives to retard mildew and bacterial growth.

(d) Elevated Access Flooring

(1) General Approach:

(A) Elevated access flooring:

- (i) Access through the floor may be required for electronic and data cabling, outlets, junctions, etc., in areas where such services are required, in heavy concentration.
- (ii) Where flexibility of access points is required over a floor area or portion of a floor area rather than a focused single access or distributed single access points into a sub-floor space.

(2) Quality Requirements:

(A) Project Co will comply with all applicable standards including, but not limited to:

- (i) Panel-to-understructure (metal to metal) connections will provide less than 10 ohms resistance without grounding clips.
- (ii) Test methods for concentrated, ultimate, rolling, overturning moment, and axial loads will be in accordance with the "Recommended Test Procedures for Access Floors" as published by the Ceilings and Interiors Systems Construction Association (CISCA).
- (iii) The electrical resistance of the access floor system will be tested in accordance with NFPA 99.

(3) Performance of Work:

- (A) The access floor system will consist of an assembly of modular square floor panels laid out on a grid system supported by and secured to appropriate understructure.

(e) Building Signage

(1) General Approach:

- (A) International symbols will be used where and as applicable.
- (B) Required signage in addition to code required signage will be as follows:
 - (i) Exterior building Main Entrance identification sign.
 - (ii) Main Entrance Directory.
 - (iii) Department Signage and Wayfinding.
 - (iv) Parking Structure Signage.

(f) Metal Lockers

(1) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to the following:
 - (i) Sheet metal where used for metal lockers will be galvanized steel conforming to ASTM A653 with ZF001 (A01) zinc coating.
 - (ii) Finish for steel surfaces will be polyester baked enamel.

(2) Performance of Work:

- (A) Staff lockers will be single, double or multiple tier metal lockers complete with handlebox and pull with provision for locking with padlock, number plates, and coat hooks.
- (B) Patient lockers will be single, double or multiple tier metal lockers. Such patient lockers will be coin and key locking operation.
- (C) Ventilation will be provided on the locker front at top and bottom of lockers.

(g) Washroom Accessories

(A) Washroom accessories will include but are not limited to the following:

(i) Staff and Public Washrooms:

- (i).1 Soap dispensers.
- (i).2 Toilet paper dispensers.
- (i).3 Sanitary napkin dispenser.
- (i).4 Sanitary napkin disposals.
- (i).5 Paper towel dispensers.
- (i).6 Paper towel disposals.
- (i).7 Mirrors.
- (i).8 Handicap grab bars.
- (i).9 Coat hooks.

(ii) Patient Washrooms:

- (ii).1 Soap dispensers.
- (ii).2 Toilet paper dispensers.
- (ii).3 Handicap grab bars.
- (ii).4 Paper towel dispensers and receptacles.
- (ii).5 Mirror.
- (ii).6 Coat hook.

(iii) Shower rooms or showers in washrooms will be provided with:

- (iii).1 Shower curtain track or rod as appropriate.
- (iii).2 Handicap grab bars.
- (iii).3 Fold down shower seat.

(2) Performance of Work:

- (A) Accessories will be best grade, entirely free from imperfections in manufacture and finish.
- (B) Fixings will be concealed type for security and to discourage tampering.

(h) Privacy Curtain Tracks

(1) General Approach:

- (A) Patient bed locations will have the capability to provide visual privacy for the patient when and as required. Such capability may be provided by curtains suspended from ceiling mounted curtain tracks.

(2) Performance of Work:

- (A) Cubicle tracks will be extruded, anodized aluminum, entirely enclosed, except for slot in bottom.

- (i) Projection Screens
 - (1) General Approach:
 - (A) Screens to be fully recessed heavy duty type for electrical and manual operation.
 - (B) Provide projection screens with electric operation in Video Conference rooms and large Conference Rooms.
 - (C) Provide projection screens with manual operation in small meeting rooms designed for seating 10 or less staff.
 - (2) Quality Requirements:
 - (A) Project Co will comply with all applicable standards including, but not limited to the following:
 - (i) Screen to be listed by Underwriter's Laboratories and CSA
- (j) Specialty Items
 - (1) Bicycle Racks:
 - (A) Provide racks for interior bike storage room as required.
 - (B) Provide exterior bike racks.
 - (2) Hand Sanitizer:
 - (A) Provide 400 stations.
 - (3) Sharps Containers – as required.

7.10 Division 11 - Equipment

- (a) Patient Lifts
 - (1) Provide patient lift systems in locations including, but not limited to, bath and tub rooms, treatment rooms, operating rooms and other rooms or areas as required by the specific and particular requirements of the Building.
 - (2) Ensure that the lift or lift system has the capability to access all parts of the patient station or area in which it is located.
- (b) Fall Protection System
 - (1) General Approach:

- (A) System to be provided will be a safety tie-back and life line anchors and life line system and associated equipment for safe building maintenance operations, and window washing.
 - (B) Installed system will be concealed from street level view.
- (2) Quality Requirements:
- (A) Project Co will comply with all applicable standards including those standards listed below.
 - (i) Fall protection system will conform to requirements of CAN/CSA-Z91 and CAN/CSA-Z271.

7.11 Division 12 - Furnishings

(a) Window Coverings

(1) General Approach

- (A) Window coverings will allow control of exterior light entering the room during daylight hours and provide privacy during daylight and non-daylight hours.
- (B) Window coverings may be required to provide black out functions and if so required, materials, tracks, seals and operation will be appropriate to this purpose.

(2) Performance of Work:

(A) Window Shade Systems:

- (i) Shading fabric will be PVC or vinyl coated polyester or fiberglass yarn. Fabric will be waterproof, washable, rot proof, flame resistant, fungal and bacteria resistant, colorfast to light and will control heat gain and provide external visibility and reduction of glare.

(B) Venetian Blinds:

- (i) Venetian blinds will be hand operated, horizontal louver blinds with spring tempered aluminum alloy slats with baked enamel finish.
- (ii) Blinds will have high tenacity woven polyester fibre lift cords, electro-galvanized coated head channel and bottom rail, and cord lock.

(C) Vertical Blinds:

- (i) Vertical blinds will be mono-control single cord vertical blind system to provide rotating and traversing action. Vanes to be aluminum alloy with baked enamel finish, or fabric. Fabric will be waterproof, washable, Vertical blinds will be mono-control single cord vertical blind system rot proof, flame resistant, color fast to light, and fungal and bacteria resistant.

(b) Casework

(1) General Approach:

- (A) Design and manufacture casework for laboratories, treatment rooms, patient care areas, medical and surgical procedures areas, workstations staff work areas and other related areas for the specific and particular functions to be performed by the casework.
- (B) Casework will be modular and consistent throughout the Building for the functions to be performed by the casework.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to:
 - (i) Wood cabinet work materials and workmanship for laboratory casework will conform to the Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), for Custom Grade, as a minimum standard and to reference standards.
 - (ii) Adhesives will be non-toxic, non-solvent glue to comply with AWMAC Quality Standards Manual. Adhesive will meet requirements of Canadian 'Eco-Logo' program or equivalent and will have a Total Volatile Organic Carbon (TVOC) emissive content of 20 gr/litre.
 - (iii) Casework anchorage will be designed and installed to conform to seismic restraint.
 - (iv) Steel for cabinet construction for laboratory casework will be levelled prime quality furniture grade cold rolled steel.

(3) Performance of Work:

(A) Cabinets:

- (i) Cabinet parts and sub-assemblies (doors, drawers, tracks and back panels) will be interchangeable with like size cabinets.
- (ii) Cabinets will be constructed so that a standard height drawer can be removed and two 1/2 height drawers installed in its place.

(B) Wood Laboratory Casework:

- (i) Cabinetwork and framing system will be constructed of prime grade selected materials to conform to AWMAC Custom Grade; Flush Overlay Cabinet construction.
- (ii) Cabinets and cases will be fabricated as self-contained modules and in accordance with Good Industry Practice in the wood laboratory furniture industry. Exterior and interior surfaces will be finished to allow for relocation without the need of additional finishing.
- (iii) Units will be of concealed fasteners, or glued and screwed construction, making each unit rigid and self-supporting for use interchangeably in an assembly or for single unit use.
- (iv) Plastic laminate countertops and backsplash will be self-edge type, finished on all exposed surfaces with GP Laboratory Grade plastic laminate, with no metal trim and will be permanently fixed in place.
- (v) Natural finish for exposed surfaces will be a polymerizing two-component catalytic conversion varnish system specially formulated for chemical reagent resistance. The individual components will be chemically compatible to assure perfect adhesion and a top quality, durable finish.

(C) Steel Laboratory Casework:

- (i) Cabinet carcasses will be constructed with integrally formed front and back stiles. Stiles to be formed to receive flush fitted doors and drawers and inner

channel posts. Top and bottom rails set back. Intermediate rails, where necessary, will be channel shaped and set behind and concealed by the drawer fronts and doors.

- (ii) Box channel inner posts will be slotted to receive adjustable shelf hardware and mechanically fitted to cabinet stiles. Front inner posts will be removable. Removable backs will be fitted to all base cupboard units. Backs to be removable without tools. Drawer units will be without backs.
- (iii) Shelves will be supplied in cupboard units except sink units. Shelves will be adjustable with boxed edge construction. Each base cabinet will have recessed base equipped with levelling devices at each corner.
- (iv) Solid hinged doors will be double panel construction and sound deadened with compressed fibrous material. The front panel will be channel formed on four sides to receive flush fitted, mechanically connected inner panel. Hinge positions will be reinforced with heavy duty concealed tapping plates. Drawer bodies will be one piece construction with the top edge flanged and hemmed. Bodies welded to the inner drawer front. Drawer fronts will be double pan construction sound deadened with compressed fibrous material.
- (v) Steel surfaces for laboratory cabinets will receive a coating integrally bound to metal surfaces to produce a high resistance to corrosion, marring and scratching, capable of withstanding normal handling, connection procedures during installation and maintenance, cleaning and handling under laboratory use. Coating will be a chemical resistant polyester baking enamel with chemical and abrasion resistance.

(D) Stainless Steel Casework:

- (i) Casework will be fabricated from Type 316, No. 4 finish stainless steel.
- (ii) Corners will be welded, ground, polished and crevice-free. Joints and welds will be polished to a

uniform No. 4 satin finish. No filler or solders will be used. Straight lengths will be one piece with all seams, including field joints, welded.

- (iii) Tops will be sound-deadened and reinforced with waterproof plywood core, bonded to tops with waterproof contact cement. Underside of top (plywood core) will be sealed with a waterproof finish. The front edges of the tops will be marine edge. Backsplash will be formed as an integral part of the tops and will be radiused construction where the backsplash occurs in the top. All backsplashes will be bonded to a plywood core, bonded the same as specified for the tops. Countertops and front aprons will be fabricated out of one piece of stainless steel. Counter and sink assemblies will be welded into single units without seams or joints. Backsplashes, tops and sinks will be drilled to receive plumbing and electrical fittings.
- (iv) Integral sinks will be of all-welded rounded corners, seamless construction with all traces of welding removed. Stainless steel sinks will be welded integrally into tops without seams or joints. Tops for sinks and adjacent drain boards will be sloped to sinks. Sinks will be complete with drain outlets with removable stainless steel strainer.

(E) Leg Frame Laboratory Casework System:

- (i) The leg frame system will provide complete independent rigid support for all overhead shelving, undercounter suspended cabinets, service cover panels, countertops, sinks and fittings including all mechanical and electrical line work, as necessary to make the assembly operational.
- (ii) The concept will permit the addition, relocation or removal of suspended base cabinets, the removal of the entire leg frame module including base cabinet and countertop, leaving intact the separate service strip with all its service fittings, service lines and cover panels as a finished operational component. The countertop height will be adjustable, where necessary, without the addition of framing components.

- (iii) The framing modules will be based on basic standard cabinet modules.
 - (iv) Steel frame will comprise vertical wall channels, and independent self-contained pipe chase and leg sets which will allow for the removal and/or interchange of work surfaces, and suspended under-counter mounted cabinets and upper shelving.
 - (v) System will be fabricated from prime quality furniture grade cold rolled steel. All components to be formed to create a rigid interlocking structure. All services to be fully accessible through removable cover panels, no special assembly tools are required. All legs to have leveler bolt. Suspended cabinets to be interchangeable and can be easily moved from workstation to workstation. Adjustable leg frame modules will be capable of adjusting countertop heights in 25 mm. increments from 750 mm. height to 1100 mm. height.
 - (vi) Finish for steel surfaces to be as specified under Section 7.11(b)(3)(C)(v) above.
- (F) Miscellaneous Accessories:
- (i) Laboratory casework will include but is not limited to the following accessory items as applicable:
 - (i).1 Countertops and backsplashes
 - (i).2 Service fittings.
 - (i).3 Drying racks.
 - (i).4 Pegboards.
 - (i).5 Acid storage cabinets.
 - (i).6 Solvent storage cabinets.
 - (i).7 Glassware drying cabinets.
 - (i).8 Framed sliding glass doors.
 - (i).9 Sliding glass doors.
 - (i).10 Open storage units.
 - (i).11 Emergency eye wash.
 - (i).12 Emergency shower head.
 - (i).13 Safety shower station.
 - (i).14 Bin cabinets.
 - (i).15 File drawer cabinets.
 - (i).16 Mobile cabinets.

7.12 Division 13 - Special Construction

Not Used.

7.13 Division 14 - Conveying Systems

(a) Elevators

(1) Quality Requirements:

(A) Project Co will comply with all applicable standards including, but not limited to:

(i) Building will be designed in compliance with applicable standards including but not limited to:

(i).1 ANSI/NEMA MGI-1993 Motors and Generators.

(i).2 CAN/CSA B44-94 Safety Code for Elevators.

(ii) Project Co. will meet the performance requirements specified in the Permanent Vertical Transportation Analysis Report dated July 27, 2007 by Lerch Bates, a copy of which is attached as Appendix 3E.

(2) Performance of Work:

(A) Passenger and Staff/Service Elevators: Other than parking elevators will be Traction "Non-Hydraulic" type.

(B) Elevators will be provided with:

(i) Emergency voice communications from the elevator cab to a monitoring station.

(ii) Emergency recall provisions.

(iii) Standby or emergency power requirements.

(C) Elevators used for conveyance of clean and soiled materials to and from operating room areas, central sterilization areas, obstetrics areas and other similar facilities will have interior finishes suitable for such use.

(D) Elevators so designated by the Authority for cardiac (code blue) control use will have the capability to function for that emergency purpose only to the exclusion of all other uses.

(E) Cab finishes to be custom design incorporating glass over wood veneer.

- (F) Cab sizes: Service elevator to meet bed size standards.
- (b) Pneumatic Tube System
- (1) General Approach:
 - (A) The system will be a computer controlled pneumatic tube materials distribution system consisting of tubing, stations, transfer units, blower packages, carriers and a control system.
 - (2) Performance of Work:
 - (A) The system will be configured of groups of stations (zones) connected together by interzone tubes. Each station will be connected to the system by a single tube to a transfer unit.
 - (B) The system will include at least 10 stations at locations determined in the user consultation process as described in Appendix 2F [User Consultation Process].
 - (C) Each zone will contain its own blower and function independently.
 - (D) The dispatching, routing and storage of carriers will be directed by a system control centre to provide automatic unattended transmission of carriers between two stations.
 - (E) The system will provide shortest route vacuum pressure travel.
 - (F) The modular design of the system components will permit changes in the number of stations and zones or both as the Authority requirements change.
 - (G) Minimum 6 inch diameter (refer to Facility Functional Program for locations).

7.14 Division 15 - Mechanical

- (a) Basic Requirements
 - (1) General Approach:
 - (A) The latest proven technology will be implemented in the design of the mechanical system in conjunction with the needs and capabilities of the Building.
 - (B) The building will be orientated on the Site such that sewage does not need to be pumped to connect to public utilities.

- (C) The Site will be graded such that rain water will not intrude upon mechanical spaces.
- (2) Quality Requirements:
- (A) Mechanical systems and equipment for Building will be designed in compliance with current edition of applicable standards including but not limited to:
 - (i) ASHRAE Guideline 1.
 - (ii) ASHRAE Standard 90.1.
 - (ii).1 The mechanical systems' energy consumption will exceed this standard by a minimum of 21%.
 - (iii) CSA Z-7396.1-06.
 - (iv) CAN/CSA Z-317.1 and 2.
 - (v) Bulletins and directives issued by City of Surrey as applicable to this project.
- (3) Performance of work:
- (A) Provide complete HVAC, plumbing, medical gas, and fire protection systems for all spaces of the Building.
 - (B) Provide capacity in distribution equipment to serve any shelled spaces of the Building. Extend ductwork and piping to these spaces for future fit-up.
 - (C) Provide access panels as required for access to mechanical equipment, valves, dampers, and other mechanical components requiring service in inaccessible locations.
 - (D) Provide 100 mm reinforced concrete pads for all floor-mounted mechanical equipment.
 - (E) Under no circumstances in any area of the Facility will any domestic water piping be installed within a concrete slab or below a floor slab on grade. For certainty, this restriction does not apply to sanitary or storm water piping.
 - (F) The Facility's domestic water service, boiler system, chilled water system, domestic hot water system, fire sprinkler, and medical gas systems will be designed with sufficient capacity to meet the Facility's needs at the Service Commencement Date and the layout of such systems will be designed with sufficient space to permit the future expansion of such systems to provide 30% additional capacity.

(b) Environmental Conditions

(1) General Approach:

- (A) The mechanical system will be designed to provide the environmental conditions related to space temperature, space relative humidity, pressure relationship, air changes, filtration level, and background noise level.
- (B) All mechanical systems will comply with acoustical requirements outlined in referenced standards and ASHRAE recommendations.
- (C) All mechanical systems will be vibration isolated to prevent noise and vibration to the structure or other components of the Facility. Comply with ASHRAE recommendations for vibration isolation.

(2) Quality Requirements:

- (A) 2003 ASHRAE Handbook, HVAC Applications, Chapter 47, Sound and Vibration Control.

(3) Performance of Work:

- (A) The HVAC systems will be designed to the following outdoor Conditions:
 - (i) Winter: -10 deg C DB
 - (ii) Summer: 29 deg C DB, 20 deg C WB.
- (B) The HVAC systems will be designed to meet as a minimum all indoor conditions as defined CSA Z317.2 standards.
- (C) Equipment rooms associated with medical imaging equipment or other medical equipment generate significant amount of heat and are sensitive to elevated temperatures will have adequate cooling, humidification, and ventilation to meet the required design criteria and the equipment manufacturer's recommendations.
- (D) The operating rooms will be served by 100% outside air units with heat recovery. The effectiveness of the heat recovery will be designed to meet energy efficiency goals of project.
- (E) All motor driven equipment along with connecting piping and ductwork will have vibration isolation installed in strict accordance with equipment and vibration isolator manufacturer's recommendations.

(c) Water Treatment Systems

(1) General Approach:

- (A) Water, glycol and other fluids used within mechanical systems will be treated to prevent corrosion, algae growth, build up of deposits, disease, bacteria and will prolong the equipment life.

(2) Quality Requirements:

- (A) Domestic water systems will be to AWWA standards. Water quality will be as provided by the Fraser Valley Regional District.
- (B) Chemicals used in treating the mechanical systems will be environmentally friendly.
- (C) System cleaning degreasing, testing and treatment work will be performed by an agency specializing in this type of work.

(3) Performance of Work:

- (A) Provide for cleaning, degreasing and chemical treatment of hot water heating, glycol, chilled water, condenser water, steam and condensate, air washer and cooling tower systems.
- (B) Provide for flushing and disinfection of domestic water systems.
- (C) Provide solution pumps, chemical mixing/storage tanks, chemical pot feeders, impulse water meters, test kits and other equipment necessary for initial cleaning, degreasing and chemical treatment and for ongoing testing and treatment of the systems.

(d) Outside Utilities

(1) General Approach:

- (A) All utility work will be fully coordinated with local utility service providers.

(2) Performance of Work:

(A) Natural Gas:

- (i) Provide natural gas service to building to serve heating equipment. Natural gas piping will be connected to public utilities.

(B) Oxygen and Nitrous Oxide:

- (i) The Building will utilize medical oxygen from an on-Site bulk storage tank(s). The tanks should be sized

such that they will be required to be refilled no more than once a week. (The Authority's oxygen supplier has indicated that the oxygen storage requirements might be met with a tank with capacity of up to 1500 gal for bulk storage and 500 gal for reserve.) Reserve bottles will be high pressure type. Nitrous Oxide will be provided by high pressure cylinders piped through the Facility.

- (ii) Exterior medical gas tanks will be located so as to be filled by semi-trailer delivery truck. Access and medical gas tank installation will be in strict accordance with medical gas supplier recommendations and requirements.

(C) Domestic Water:

- (i) The Domestic water service will have dual service connected to public utilities. Each service will connect to separate location on public utility grid such each service is separated by valves in public main.

(D) Fire Protection:

- (i) The fire protection system will have single serve connected to public utilities.

(E) Fuel Oil:

- (i) Provide two on-Site storage tanks, one propane tank dedicated to the boilers and domestic water heaters and one oil tank dedicated to the emergency generators. The tanks will be sized to provide minimum of 72 hours of service as defined by NFPA 110 (which for certainty is not required to provide for the potential 30% expansion referred to in Section 2.4(b)(2)(A) of this Schedule). The oil tank will, if necessary to comply with Good Industry Practice, have duplex pumps with one pump being standby.
- (ii) If an underground tank(s) is used it will be double wall type and vacuum monitored with leak detection alarms.

(F) Sanitary and Storm Sewer:

- (i) The sanitary and storm sewer will connect to public utilities. The primary storm water drainage will not

daylight on the Site and will directly connect to the storm sewer.

(e) Boiler Plant

(1) General Approach:

- (A) The facility will have a complete boiler system providing all heating needs for space heating, domestic hot water, sterilization, and any other process load for equipment.

(2) Performance of Work:

(A) Boilers:

- (i) The Building will be served by a combination of steam boilers, heating water boilers and water to water heat pumps to serve all of the Facility's needs (which for certainty is not required to include the potential 30% expansion referred to in Section 2.4(b)(2)(A) of this Schedule) as identified. The system will have 100% redundancy such that upon failure of any one boiler, the remaining boilers will serve 100% of the facility's needs. A minimum of three boilers will be provided such that any one boiler does not serve more than 50% of the facility's peak space heating load.
- (ii) The system will serve the following functions:
- (ii).1 Space heating.
- (ii).2 Domestic water heating.
- (iii) The boilers will be dual fuel type, capable of operating on natural gas or propane. Electric heat will NOT be used.
- (iv) Minimum boiler operating efficiency: 90% at all firing levels.

(B) Domestic Water Heaters:

- (i) The Building will be served by two domestic water heat exchangers, each sized for 75% of the load (which for certainty is not required to include the potential 30% expansion referred to in Section 2.4(b)(2)(A) of this Schedule).

- (ii) The system will operate at 60 degC and utilize thermostatic mixing devices to deliver tempered water to the plumbing fixtures as dictated by code.

(C) Heating Water System:

- (i) The system will have a minimum of two heating water system pumps, each sized for 100% of the load. Consideration should be given for variable speed drives to meet efficiency goals of project.

(D) Ancillary Equipment:

- (i) High pressure steam rated at 700 kPa will be provided for sterilizing equipment through dedicated steam generator.
- (ii) The steam system will have accessories for a complete functional system. Boiler feed pumps will have the same level of redundancy as the boilers.

(f) Chiller Plant

(1) General Approach:

- (A) The Building will have a complete chilled water system designed to provide all space cooling needs for the Building and heat gain for all equipment located in the Building.

(2) Performance of Work:

(A) Heat Pump

- (i) The facility will be served by a minimum of two water to water heat pumps coupled with outdoor multiple dry fluid coolers.
- (i).1 Upon failure of the one of the water to water heat pumps, the remaining water to water heat pump(s) will serve 75% of the cooling requirements for the surgery department, and 50% of the cooling requirements for the balance of the facility.
- (ii) The system will provide all space cooling functions not serviced by other means.
- (iii) CFC and HCFC based refrigerants will not be used in the refrigeration equipment.

(B) Pumping:

- (i) The redundancy level of the pumps will match that of the water to water heat pumps.
 - (ii) The system will have glycol feed system with feed pump, storage drum, and automated controls.
- (C) Cooling Towers for Water Cooled Systems.
- (i) The cooling tower design, placement, and operation will comply with ASHRAE Guideline 12 (latest version), Minimizing the Risk of Legionellae Associated with Building Water Systems.
 - (ii) Locate cooling towers to ensure absolutely no potential of cooling tower discharge from entering the building through outside air intakes and other openings into the facility.
 - (iii) Cooling tower performance will be certified in accordance with CTI Standard STD-201, latest version.
 - (iv) Provide complete chemical treatment system to automatically control scale and to maintain acceptable biocide levels in accordance with manufacturer's recommendations and Good Industry Practice.
- (D) Supplemental Cooling:
- (i) Each elevator equipment room will have dedicated ventilation systems to provide cooling for space.
 - (ii) Each radiology computer rooms will have dedicated computer room air conditioning units to provide cooling for space.
 - (iii) Provide communication rooms with air cooling systems that are operational 24 hours a day, 7 days a week. The main communication room system will have 100% redundancy such that if one air conditioning unit fails, the remaining unit(s) will satisfy 100% of the cooling load.
 - (iv) Cooling equipment will NOT be located over the top of computer equipment, radiology equipment, or other electronic equipment.

- (v) Provide supplemental cooling equipment as necessary to achieve required space temperature and humidity conditions in operating rooms.
 - (vi) All systems for supplemental cooling will have year around cooling capability with economizer functions as required by ASHRAE 90.1.
- (g) Heating and Cooling Piping
- (1) General Approach:
 - (A) The facility will have a complete heating and cooling piping system to support all required heating and cooling functions.
 - (2) Performance of Work:
 - (A) Steam and Condensate:
 - (i) The system will have adequate trapping to remove system condensate.
 - (ii) Provide adequate valving, strainers, gauges, and other pipeline components to adequately service every piece of equipment and steam trap. Each piece of equipment will be individually serviceable.
 - (iii) All piping connections will meet or exceed manufacturer's recommendations.
 - (iv) In addition to equipment isolation valves, provide sufficient valving at each floor to allow a maximum of 1000 sq m of building space to be isolated at on time.
 - (v) Provide compensation for entire system.
 - (B) Heating and Cooling Piping:
 - (i) Provide adequate valving, strainers, gauges, and other pipeline components to adequately service every piece of equipment.
 - (ii) All piping connections will meet or exceed manufacturer's recommendations.
 - (iii) In addition to equipment isolation valves, provide sufficient valving at each floor to allow a maximum of 1000 sq m of building space to be isolated at on time.

- (iv) Hydronic unit heaters will be provided in mechanical spaces and stairways.
- (v) For heating piping, provide compensation for entire system.

(h) Air Handling Systems

(1) General Approach:

- (A) The facility will have complete air handling systems to provide all space conditioning needs to meet specified environmental conditions.

(2) Performance of Work:

(A) General:

- (i) Provide continuous and reliable air handling systems consisting of multiple units for all areas of the Facility, designed for 75% redundancy at the surgery department and dual fan motor and belt redundancy for areas other than the surgery department. Air handling systems for the OR will consist of multiple units operating on 100% outside air.
- (ii) Humidifier: Provide humidification as required to meet CSA Z317.2-01.

(i) Air Distribution Systems

(1) General Approach:

- (A) Provide complete air distribution system for all supply, return, and exhaust air. The return system will be totally ducted for all systems.

(2) Performance of Work:

- (A) All ductwork will be G90 galvanized steel (unless noted otherwise) constructed per SMACNA HVAC duct construction standards.
- (B) Central Sterile moisture laden exhaust air duct will be 304 stainless steel with sealed joints.
- (C) All high pressure duct systems will require pressure testing in accordance with SMACNA standards.
- (D) Duct velocities will be limited such that sound pressure levels are below acceptable noise levels.

- (E) The entrance vestibules of the building will be pressurized to reduce infiltration and maintain comfortable environment within occupied space.
- (j) Air Terminal Units
- (1) General Approach:
 - (A) The system will have air terminal units/boxes capable of maintaining stable environmental controls.
 - (2) Performance of Work:
 - (A) Use of variable volume air terminal units will be limited to non-medical spaces.
 - (B) All terminal units will incorporate hydronic reheat coils. Exceptions include electrical rooms.
 - (C) Units will be pressure independent, electronically controlled, and factory assembled.
 - (D) Each unit will have 3 FT sound attenuator and foil faced rigid insulation for hospital applications.
 - (E) Operating rooms and isolation rooms will have a dedicated supply box, and tracking exhaust box. Each operating room will also have secondary humidifier.
 - (F) Radiology rooms, conference rooms, waiting rooms and special use spaces will have a dedicated box.
 - (G) Each Exam or treatment room will be served by a dedicated terminal box.
 - (H) Office spaces will be grouped three offices per box.
 - (I) General use spaces (storage spaces, corridors, mixed occupancy, etc.) will have one box per 100 sq. m.
 - (J) Exterior spaces with different solar exposures will not be on same box.
 - (K) Where variable volume control is implemented, a tracking air terminal unit will be installed in the return or exhaust air stream where required by code.
 - (L) Each electrical room and communication room will have dedicated air terminal unit. Where supplemental computer room air conditioning

units are provided for space cooling, the air terminal unit will be sized a minimum of 25% of the design cooling load for the space with the computer room air conditioning unit providing 100% of the design cooling load for the space.

- (M) For Class 1 areas, the terminal units will be located outside of the space it serves.

(k) Exhaust Systems

(1) General Approach:

- (A) The system will have exhaust fans designed to remove contaminants from the building as dictated by applicable codes.

(2) Performance of Work:

- (A) The central sterilizing equipment will have dedicated exhaust systems.

(l) Plumbing Systems

(1) General Approach:

- (A) Provide a complete plumbing system with all necessary components including domestic water distribution.

(2) Performance of Work:

- (A) Domestic water distribution systems:

- (i) The water distribution system for the building will be served by multiple pressure zones as appropriate for the height of the building to meet plumbing code requirements and any special equipment or fixture needs. Provide regulators as appropriate. Regulators will be capable of satisfactory operation at minimum flow conditions up to design flow rate.
- (ii) If necessary, provide packaged domestic booster pump system with duplex variable speed booster pump systems. Each pump will be sized for 50% capacity.
- (iii) Nominal 60 degC water will be supplied by the steam fired domestic water heaters fired water heaters. Handwashing and shower fixtures will have point-of-use thermostatic mixing valves.

- (iv) For the domestic hot water systems, provide recirculating system with duplex pumps. One pump will be standby. System will be properly configured with thermostatic mixing valve to prevent overheating of system. A recirculating connection will be provided within a minimum of 10 m of each fixture or piece of equipment. Closer locations will be provided when recommended by equipment manufacturers or required by code.
- (v) The domestic water piping will be type L copper with soldered joints. High temperature solder (brazed) joints will be used for piping 63 cm and larger. Use of grooved mechanical joints can also be used.
- (vi) In addition to equipment, fixture, and restroom group isolation valves, provide sufficient valving at each floor to allow a maximum of 1000 sq m of building space to be isolated at on time.
- (vii) The parking garage will have provisions to drain all levels of the parking garage. Hose connections will be provided such that all surfaces can be reached with a 30 m long hose. The wash down system will be completely drainable for winterization.

(B) Plumbing Fixtures and Trim:

- (i) Fixtures will be compliant with Plumbing Code and CSA..
- (ii) Sensor operated faucets will be used for all staff hand washing stations and public restrooms. Sensor operated water closets will be used for public restrooms. Manual wristblade faucets may be used in patient restrooms.
- (iii) All laboratory plumbing fixtures and trim subject to acid will be acid resistant.
- (iv) Faucets will use laminar flow control devices. Aerators will not be used.

(m) Insulation

(1) General Approach:

- (A) All mechanical systems will be insulated to achieve thermal performance in accordance with ASHRAE 90.1 and to prevent surface condensation.

(2) Performance of Work:

- (A) All ductwork and piping systems will be insulated in accordance with ASHRAE 90.1.
- (B) In addition to code required locations, all domestic water piping, non-potable water piping, air conditioning condensate and all horizontal storm piping will be insulated, except that:
 - (i) insulation for horizontal storm piping is not required in the unheated below grade areas of the Parking Structure;
 - (ii) insulation for horizontal storm piping is required for any above grade unheated areas of the Parking Structure; and
 - (iii) all air conditioning condensate requires insulation regardless of whether or not the piping is in unheated space.
- (C) All insulation systems will be complete with vapor barrier to prevent condensation.
- (D) For piping systems, PVC fitting and valves covers will be used.
- (E) Exposed ductwork in mechanical and electrical rooms will have Class 1 reinforced vinyl jacketing to provide additional protection against damage.
- (F) All insulated piping and ductwork exposed to weather will have aluminum jacketing.

(n) Medical Gas Systems

(1) General Approach:

- (A) The Facility will have a complete medical gas distribution system to satisfy all clinical and process needs of the Facility, including:
 - (i) medical gases such as oxygen, nitrous oxide and compressed air; and
 - (ii) suction

to rooms and areas of the Building in accordance with Appendix 3N. For clarity, Appendix 3N as attached to this Schedule is indicative of medical gas requirements for the Facility but is inaccurate with respect to the number of rooms and room numbering. Appendix 3N will be adjusted and finalized pursuant to the user consultation procedure as described in Appendix 2F [User Consultation Procedure].

(2) Performance of Work:

- (A) Medical gas systems and alarms will comply with CSA Standard Z-7396.1-06.
- (B) Medical vacuum pump system will have the capability to expand to a quadraplex system in the future.
- (C) The Facility will have a passive anaesthesia gas scavenging system ("AGSS"). Provide a mechanical exhaust system to accept an AGSS connection at each anesthetizing location. The operating pressure of the exhaust system will be sufficient to operate the AGSS. Each exhaust connection will have passive AGSS outlet design to accommodate hose connection in room.
- (D) An oil less, triplex medical air compressor system will be located in the penthouse.
- (E) The facility will have manifolds for medical nitrogen. The manifolds will be located in a dedicated room at the main level.
- (F) All medical gas systems will be certified in accordance with CSA standards by an independent testing agency.
- (G) A separate duplex oil-less air compressor with desiccant dryer will be provided for non-medical use.
- (H) All equipment will be air-cooled. Water cooled equipment will not be used.
- (I) All medical gas outlets will be DISS type. Quick connect outlets will not be used.

(o) Specialty Fire Protection Systems

(1) Performance of Work:

- (A) Building fire protection piping system:
 - (i) The following sensitive equipment areas will be served by a double interlocked pre-action system

with galvanized piping:

- (i).1 all CT imaging rooms and control rooms;
- (i).2 all MRI imaging rooms and control rooms; and
- (i).3 the main communication room.

- (ii) Sprinklers in ceilings of finished areas will be concealed pendant type. When located in ceiling tiles, heads will be centered in tile.

(p) Specialty Systems

(1) General Approach:

- (A) Provide specialty systems including, but not limited to, acid waste and vent, radioactive waste and vent, laboratory air, laboratory vacuum, natural gas and laser cooling water as required.

(2) Quality Requirements

- (i) Acid waste, vent, piping and fittings will be suitable for the pH level of the waste product.
- (ii) Radioactive waste including but not limited to waste from chemotherapy; isotopes, vent piping and fittings will be to the Canadian Nuclear Safety Commission (CNSC) requirements and local radiation protection guidelines.

(3) Performance of Work:

- (A) All piping will be designed and installed to suit fall cleaning and disinfection.
- (B) All piping will be supported to the manufacturer's requirements.
- (C) All valves used in the specialty piping system will be compatible with the piping material and ball type.
- (D) Allow for all necessary expansion and contraction of the specialty piping systems.
- (E) All specialty piping will be arranged for ease of operating, accessibility for maintenance, safety and appearance.
- (F) All specialty piping will be provided with appropriate isolation valves.
- (G) All specialty piping will be seismically restrained in accordance with 'SMACNA' guidelines.

- (H) Provide specialty system connections as required to all facility equipment.

(q) Controls

(1) General Approach:

- (A) The Building Management System (BMS) will perform the following functions:
 - (i) Automatically operate, monitor and manage the building mechanical systems to provide a high level of occupant comfort and maintain a healthy and productive environment without interfering with the clinical and patient treatment requirements.
 - (ii) Display building related alarms at the facility management control center and via pager.
 - (iii) Provide a monitoring system including all associated hardware and software. The exact annunciation will be determined in consultation with facility maintenance staff.
 - (iv) Meter and trend data related to flow of electrical power, natural gas and domestic water to the Building.
 - (v) Interface with the building electrical and communication systems including security, fire alarm, lighting, UPS and emergency power systems for monitoring, control and alarming.
 - (vi) Monitor equipment status, temperature, humidity and alarms in clinical areas, freezers, coolers, labs and other medical equipment.
- (B) The BMS system will optimize the system performance under all operating conditions to minimize the Facility energy usage.
- (C) The BMS system configuration will lend itself to accommodate future technological changes with ease and the architecture of the BMS system will permit expansion to the full extent of the IT network that it resides on.
- (D) The BMS system will be web based and will be accessible using common intranet web browser.

(2) Quality Requirements:

- (A) The control system will be one complete package from one controls manufacturer and not an integrated system from different manufacturers.
 - (B) The control system will be supplied by a controls manufacturer who maintains a service force resident in the Province of British Columbia and stocks the spare parts locally.
- (3) Performance of Work:
- (A) All controls for the building mechanical systems will be direct digital type with electronic actuators for control valves and dampers. The system will have two operator workstations with graphics interface illustrating floor plans and system schematics.
 - (B) All control panels will have an additional 20% spare points for future use.
 - (C) The BMS system will be designed and constructed to allow Project Co to meet all of its performance monitoring and reporting requirements under Schedule 4 [Services Protocols and Specifications], including monitoring, controlling and reporting the functionality of the following items:
 - (i) Air Handling Units
 - (ii) Fans
 - (iii) Pumps
 - (iv) Boilers
 - (v) Heat Pumps
 - (vi) Cooling Tower
 - (vii) Heating/Cooling Coils
 - (viii) Heat Exchangers
 - (ix) Expansion Tanks
 - (x) Domestic Hot Water System
 - (xi) Medical Gas Systems
 - (xii) Steam/Condensate System
 - (xiii) Zone temperature for each thermostatic zone; and humidity sensor for each humidity zone .

(xiv) Emergency Generators

(xv) Other Systems:

- (xv).1 Elevator machine rooms temperature and alarm
- (xv).2 Electrical rooms temperature and alarm
- (xv).3 Communication rooms temperature and alarm
- (xv).4 Emergency generator rooms temperature and alarm
- (xv).5 UPS rooms temperature and alarm
- (xv).6 Mechanical rooms temperature and alarm
- (xv).7 Sumps high level alarm
- (xv).8 High CO2 level alarms
- (xv).9 High space temperature alarms
- (xv).10 Medical equipment alarms

(xvi) Electrical Metering

(xvii) Natural Gas and Water Metering

(xviii) Fire Protection System

(r) Commissioning, Testing and Balancing

(1) General Approach:

(A) Provide fundamental commissioning including test and balancing of mechanical systems as required to satisfy LEED Canada 1.0 and to ensure that systems are indeed operating as intended by the design.

(2) Performance of Work:

(A) Comply with ASHRAE Guideline 1.

(B) Test and balance all mechanical systems in accordance with NEBB or AABC standards.

7.15 Division 16 - Electrical

(a) Basic Requirements

(1) General Approach:

(A) All medical electrical equipment and health-care-facility-owned non-medical electrical equipment will comply with requirements of CSA Z32.04 Electrical Safety and Essential Electrical Systems in Health Care Facilities.

(B) The latest proven technology will be implemented in the design of the electrical system in conjunction with the needs and capabilities of the Building staff.

- (C) Redundancy will be incorporated into design so that the impact of any electrical equipment or feeder failure will not leave any outpatient treatment room or area of the Building without at least one active light and one active receptacle.

(2) Quality Requirements:

- (A) Electrical systems and equipment for Facility will be designed in compliance with applicable standards including but not limited to:
 - (i) Electrical Code (CEC), 2006 Edition.
 - (ii) NFPA 99, Standard for Healthcare Facilities, 2005 Edition.
 - (iii) Electrical equipment, raceways, wiring, supports and other installation materials will be listed by CSA or ULC or other testing agency approved and accepted by the Government of B.C. Safety Branch and will bear the seal of the testing agency in clearly visible locations.
 - (iv) CSA Z32.04 Electrical Safety and Essential Electrical Systems in Health Care Facilities, 2004 Edition.
 - (v) IEEE Standard 602-1996, Recommended Practice for Electrical systems in Health Care Facilities.
 - (vi) Provision and installation of electrical systems and equipment will also comply with Standard CAN/CSA-C22.2 No. 0-M91 (R1997) and CAN/CSA C22.2 Standards specifically identified in Appendix A of Standard C22.1-02 for Health Care Products.

(3) Performance of work:

- (A) Provide adequate capacity for future systems as identified.
- (B) Provide capacity in distribution equipment to serve any shelled spaces of the Building. Allow 40 watts/SQM for lights and receptacles in shelled space with 50 percent of load on emergency power. Extend properly sized conduits to these spaces for future fit-up.
- (C) Provide 100 mm reinforced concrete pads for all floor-mounted electrical equipment.
- (D) 600V, 3 phase will be utilized for interior distribution and motor circuits.

- (E) 120/208 volt, 1 and 3 phase will be utilized for distribution to receptacles and small equipment loads.
- (F) Equipment located in damp or wet locations will be NEMA 3R rated.

(b) Raceways

(1) Performance of work:

- (A) All circuiting 120 volt and greater will be installed in raceways with exception of AC 90 for partition walls in non patient areas.
- (B) Raceways will be designed and installed without sharp edges or sharp bends so that cables can be pulled in or laid in and removed without damage to the cables.
- (C) Rigid PVC conduit will be used underground, outdoors, in concrete, and under concrete slabs on grade. RGS conduit will be used in exterior masonry walls, in wet locations, for exposed runs less than 3 m above floor, for feeders over 600 volts and in explosion-proof areas.
- (D) Schedule 40 PVC conduit may be used underground except for patient care areas.
- (E) Steel conduits in contact with earth or a vapor barrier will be PVC coated or protected with 2 coats of asphaltum.
- (F) Provide barriers in raceways as required to isolate systems of different voltages or as required to avoid RF or magnetic interference.
- (G) Conduits will be designed as per CEC.
- (H) Fill of back boxes and junction boxes will not exceed 80 percent of the maximum fill allowed by code.
- (I) Within cable trays and under-floor raceways (designed as per CEC) include 40 percent spare capacity that will be available for future use.
- (J) Provide a minimum of 50 percent spare conduits in underground duct banks (regardless of whether required ducts are at capacity).
- (K) Provide at least two spare 103 mm conduits from main electrical room to each sub-distribution room.
- (L) All conduit in finished areas will be concealed in finished walls and above finished ceilings.

(c) Wire and Cable

(1) Quality Requirements:

- (A) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (B) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (C) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (D) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (E) UL 797 - Electrical Metallic Tubing – Steel.
- (F) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (G) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (H) UL 1 – Standard for Flexible Metal Conduit.
- (I) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (J) UL 514B - Conduit, Tubing, and Cable Fittings.
- (K) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (L) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (M) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (N) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (O) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (P) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (Q) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (R) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (S) UL 797 - Electrical Metallic Tubing – Steel.
- (T) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (U) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (V) UL 1 – Standard for Flexible Metal Conduit.

- (W) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (X) UL 514B - Conduit, Tubing, and Cable Fittings.
- (Y) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (Z) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (AA) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (BB) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (CC) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).

(2) Performance of work:

- (A) Cable sizes and types specified in this Section 7.15(c)(2) are for guidance only. Project Co. may use cables that differ in size or type from that specified in this Section 7.15(c)(2) if such cables comply with the standards specified in Section 7.15(c)(1) and 2.1 of this Agreement.
- (B) All conductors will be non-alloyed copper.
- (C) Exposed wiring will not be allowed unless specifically indicated.
- (D) Label all branch circuits and feeder cables at both ends using tape label to indicate pole number(s).
- (E) Number 8 AWG and larger and motor circuit feeders will be stranded conductors.
- (F) Type XHHW insulation will be used for wet locations, underground and for circuiting from ground fault circuit interrupters.
- (G) Minimum wire size will be # 12 AWG for 120 volt circuits and greater.
- (H) Branch circuits whose length from panel to first outlet exceeds 20 meters for 120 volt circuits will be #10 minimum.
- (I) Branch circuits whose length from panel to first outlet exceeds 50 meters for 347 volt circuits will be #10 minimum.
- (J) MC cable is only allowed outside clinical areas and for lighting drops.
- (K) In patient care areas provide a separate neutral conductor for each single pole circuit when required by CAN/CSA "Z-32-04" Electrical System Standards for Hospitals.

- (L) In areas where significant non-linear load is anticipated, such as open offices or other areas with a high density of personal computers, over-sized neutrals will be specified for panel feeders and each receptacle branch circuit will be served by a dedicated neutral conductor.
 - (M) All neutral conductors will match size of associated phase conductors, except for over-sized neutrals required by 7.15(c)(2)(L) above.
- (d) Wiring Devices
- (1) General Approach:
 - (A) Receptacles will be located throughout the facility as required to meet needs of patients and as required for general use.
 - (B) Lighting switches will be provided as required to provide flexibility for clinical and office spaces.
 - (2) Quality Requirements:
 - (A) Refer to Section 7.15(a)(2).
 - (B) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
 - (C) UL 6 - Electrical Rigid Metal Conduit – Steel.
 - (D) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - (E) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
 - (F) UL 797 - Electrical Metallic Tubing – Steel.
 - (G) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
 - (H) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
 - (I) UL 1 – Standard for Flexible Metal Conduit.
 - (J) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
 - (K) UL 514B - Conduit, Tubing, and Cable Fittings.
 - (L) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
 - (M) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.

- (N) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - (O) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (P) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
 - (Q) UL 6 - Electrical Rigid Metal Conduit – Steel.
 - (R) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - (S) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
 - (T) UL 797 - Electrical Metallic Tubing – Steel.
 - (U) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
 - (V) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
 - (W) UL 1 – Standard for Flexible Metal Conduit.
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 - (AA) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - (BB) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - (CC) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (DD) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (3) Performance of work:
- (A) Duplex convenience receptacles rated at 15A, 125V will be provided in all rooms.
 - (B) A maximum of 6 general use receptacles will be served by one 15 amp circuit.
 - (C) Provide engraved or lamacoid nameplates for identification of individual receptacles and switches.
 - (i) Indicate associated source panel and circuit number.

- (ii) Indicate voltage when greater than 120 volt.
 - (iii) Indicate when outlet is served by UPS.
- (D) Special receptacles for hospital equipment will be provided as required.
- (E) Receptacles connected to vital branch and delayed vital branch will be red, all others will be ivory or white.
- (F) Device plates will be smooth nylon. Device plate will match color of device.
- (G) Receptacles in patient care areas will be hospital grade. Specification grade will be provided in all other locations.
- (H) Provide quantity of receptacles in patient care areas as indicated in CSA Z32-04 or greater where indicated in this specification.
- (I) In each single occupancy office provide three (3) duplex receptacles.
- (J) In each multi-occupancy office provide two (2) duplex receptacles for each desk or workstation and one (1) duplex receptacle spaced every 3 meters of open wall space.
- (K) In each control station provide one (1) double duplex receptacle spaced every meter below work counters in knee space or above counter if no knee space is provided. Half of these receptacles will be served by vital branch.
- (L) In each conference or multi-purpose room provide one (1) duplex receptacle spaced every 2 meters of wall space and one (1) duplex receptacle spaced every meter above work counters. Also provide single receptacles for all dedicated equipment such as microwaves, coffee makers, refrigerators, etc. Provide 120 volt receptacle at ceiling for overhead projector and 16 mm conduit to floor or wall outlet for remote control signal.
- (M) Receptacles will be provided in corridors and passages at 15 meter on center and within 7.5 meters of corridor ends for general use equipment. Alternate location of receptacles from one side of corridor to other
- (N) Each surgery room will have special purpose receptacles for LASER equipment and other special equipment served by vital branch.
- (O) A minimum of five (5) duplex receptacles will be provided at each exam room, two of which will be served by vital branch.

- (P) Provide two (2) double duplex receptacles at each patient treatment bed or stretcher location, one (1) of which will be served by the vital branch.
 - (Q) A minimum of six (6) duplex receptacles will be provided at each clean utility room, half of which will be served by the vital branch.
 - (R) A minimum of four (4) duplex receptacles will be provided at each medication room half of which will be served by the vital branch.
 - (S) One (1) duplex receptacle will be provided for approximately every 35 square meters of service, housekeeping and storage space. Provide a minimum of one (1) duplex per room.
 - (T) Provide one (1) duplex receptacle per wall in each radiology/fluoroscopy, CT Scan, mammography, ultrasound or similar room. Half of receptacles will be served by the vital branch.
 - (U) Receptacles will be provided in other defined functional areas as needed to meet the program requirements.
 - (V) Receptacles will be provided in addition to those described above as required for specific fixed and movable equipment defined in the program.
 - (W) 15A 125V GFCI duplex receptacle will be provided in each elevator pit and machine room, toilet rooms adjacent to lavatory, all receptacles within 1.5 m of sinks and wet treatment rooms.
 - (X) Receptacles in waiting areas will be tamper resistant type.
- (e) Underground Distribution
- (1) General Approach:
 - (A) Provide one or two underground service lines from BC Hydro. If Project Co provides two standby generators (described under Essential Electrical Systems) then only one service line will be required. If only one standby generator is provided then Project Co will provide two completely independent service lines fed by circuits routed to the facility by two different routes and each fed from a different BC Hydro substation transformer.
 - (B) Underground feeders and service conduits will be located to avoid interference with future building expansion(s) and or other underground services.

- (C) Provide underground service conduits as required to serve adjacent neighbors (present and future) due to rework of Green Timbers Way. Coordinate requirements with BC Hydro.
 - (D) BC Hydro green power program will not be considered by the Authority for this project.
- (2) Quality Requirements:
- (A) Comply with BC Hydro requirements.
 - (B) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
 - (C) UL 6 - Electrical Rigid Metal Conduit – Steel.
 - (D) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - (E) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
 - (F) UL 797 - Electrical Metallic Tubing – Steel.
 - (G) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
 - (H) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
 - (I) UL 1 – Standard for Flexible Metal Conduit.
 - (J) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
 - (K) UL 514B - Conduit, Tubing, and Cable Fittings.
 - (L) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
 - (M) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - (N) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - (O) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (P) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
 - (Q) UL 6 - Electrical Rigid Metal Conduit – Steel.
 - (R) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - (S) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).

- (T) UL 797 - Electrical Metallic Tubing – Steel.
- (U) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (V) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (W) UL 1 – Standard for Flexible Metal Conduit.
- (X) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (Y) UL 514B - Conduit, Tubing, and Cable Fittings.
- (Z) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (AA) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (BB) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (CC) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (DD) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).

(3) Performance of work:

- (A) One spare conduit will be provided from the point of service at the property line to the service transformer location to accommodate a future service line for future growth.
- (B) Provide concrete encased PVC conduit duct banks for service conduits and major feeders outside the footprint of the building.
- (C) Provide direct burial PVC conduit for lighting and minor feeders and branch circuits outside the footprint of the building. Provide concrete encasement under roads and parking lots.
- (D) All underground conduits outside the footprint of the building will be marked with identifying tape a minimum of 300 mm above the conduit along the full length of the route.

(f) Service Switchgear (Over 600 Volts)

(1) General Approach:

- (A) Primary service switchgear will be provided served by primary utility line(s) described in Underground Distribution Section above. If one service line is provided one main and two feeder devices will be provided to accommodate two service transformers. If Project Co elects to provide two service lines then service switchgear will

include two main devices with automatic controls to switch from one source to the other if one source fails and two feeder devices to accommodate two service transformers.

(2) Quality Requirements:

- (A) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (B) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (C) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (D) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (E) UL 797 - Electrical Metallic Tubing – Steel.
- (F) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (G) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (H) UL 1 – Standard for Flexible Metal Conduit.
- (I) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (J) UL 514B - Conduit, Tubing, and Cable Fittings.
- (K) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (L) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (M) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (N) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (O) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (P) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (Q) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (R) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (S) UL 797 - Electrical Metallic Tubing – Steel.
- (T) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (U) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.

- (V) UL 1 – Standard for Flexible Metal Conduit.
- (W) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (X) UL 514B - Conduit, Tubing, and Cable Fittings.
- (Y) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (Z) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (AA) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (BB) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (CC) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).

(3) Performance of work:

- (A) Provide indoor or outdoor switchgear as coordinated with the Authority and BC Hydro.
- (B) Provide fused switch load interrupter switchgear. Fuses will be HRC current limiting.

(g) Distribution Equipment (600 Volts and Below)

(1) General Approach:

- (A) Two main transformers fed by service switchgear described in Service Switchgear Section above will be provided.
- (B) Double-ended main 347/600 switchgear with a main-tie-main arrangement will be provided fed by transformers described above. Two main and one tie devices will include key interlock so that only two breakers may be closed at one time..
- (C) A minimum of 40 percent spare capacity (to allow for a potential 30% expansion referred to in Section 2.4(b)(2)(A) of this Schedule plus natural growth), 20 percent spare devices and 20 percent space for future devices will be included when sizing distribution equipment. Designs should include consideration of how fans could be added to transformers in the future to serve the future growth needs in such a way as to prevent a major shutdown of the Facility.
- (D) Electrical distribution equipment rooms will be located to limit feeder lengths so that voltage drop is limited to 3 percent or less on most

feeders, 2 percent or less on most branch circuits and 5 percent total voltage drop from panel to last outlet on circuit.

- (E) Locate main electrical equipment room(s):
 - (i) At or above grade and if at grade locate at high end of building to mitigate potential flooding concerns.
 - (ii) To the extent possible, in an area separate from plumbing and mechanical equipment.
 - (iii) Convenient for use, readily accessible for maintenance and away from traffic lanes.
 - (iv) In dry, ventilated space free of corrosive or explosive fumes, gases or any flammable material.
- (F) Electrical equipment will be designed for ease of maintenance and expansion.
- (G) All electrical equipment rooms will be located to effectively limit transmission of noise, heat or vibration to occupied areas of the facility.
- (H) A networked digital metering system will be provided to monitor electrical loads and quality of power at key points in the facility as indicated below. The metering system will:
 - (i) Provide easily readable locally displayed information.
 - (ii) Store historical data from the metering network and will be capable of generating user configurable electronic and printed reports on demand.
 - (iii) Not be dependant on power from the metered circuit for its operation and will be supported by a backup power source or sources which ensure operation when the metered circuit is de-energized.
- (I) Power factor correction equipment will be provided as needed to avoid penalties from BC Hydro. If provided, capacitors will be coordinated with adjustable frequency drives and other harmonic generating equipment to avoid resonance conditions.

(2) Performance of work:

- (A) Provide outdoor, less flammable liquid filled sub-station type pad mounted transformer(s) subject to requirements of BC Hydro. The substation may also be located indoor with cast core type

transformers. Transformer(s) will have integral primary switch and expulsion fuses. Include intermediate class lightning arrestors integral with each transformer. Services transformers may be located indoors. Any transformers located indoors will be dry type.

- (B) Provide draw-out power circuit breakers for main, tie and feeder breakers for main normal and generator distribution switchgear as applicable.
- (C) Provide properly coordinated distribution system to ensure that faults are isolated by the first device upstream from the fault. Perform a computer generated coordination study to ensure that system is properly coordinated.
- (D) All distribution devices will be properly rated to handle available fault duty at line terminals. Perform a computer generated fault study to ensure that all devices are properly rated.
- (E) Perform a computer generated arc-flash study and post available arc-flash energy and required personnel protective equipment at all distribution equipment.
- (F) Metering will be provided as follows:
 - (i) Service switchgear, main 600 volt switchgear, Vital, Delayed Vital and Conditional switchboards located in main switchboard room will have monitoring provisions for line to line voltage (all phases), line to neutral voltage (all phases), phase amperage (all phases and neutral), KVA, KW, KWH, VAR hours, harmonics and power factor with history and alarm functions and reporting.
 - (ii) All metering points will be monitored by network system.
 - (iii) Provide one work station for metering system at each of maintenance and plant administration respectively.
 - (iv) Electrical consumption data from meters will be transmitted to the building management system.
- (G) Dry type transformers will be provided at electric rooms to supply 120/208 volts for small equipment loads, receptacles and incandescent lighting.
 - (i) Transformers will be mounted on concrete pads or suspended from structure.

- (ii) Install transformers so that removal can be facilitated without removing any other conduit or equipment in room except light fixture serving room.
 - (iii) Provide proper sound and vibration isolation to prevent noticeable transmission of transformer sound or vibration outside of electrical rooms.
- (H) Provide transformation equipment as required for diagnostic imaging equipment. Coordinate requirements with imaging equipment vendors.
- (I) Circuit breaker panelboards will be provided for 600 volt and 208 volt distribution.
 - (i) All panels will be fully rated to handle available fault current ratings. Series rating of breakers and panels is not acceptable.
 - (ii) Panelboards will be provided with oversized neutral where significant non-linear load is anticipated, such as open offices or other areas with a high density of personal computers. In such areas over-sized neutrals will be specified for each branch circuit.
 - (iii) All flush mounted panelboards will have 5 spare $\frac{3}{4}$ IN conduits stubbed into ceiling space above and 2 spare $\frac{3}{4}$ IN conduits stubbed into ceiling space below where applicable.
 - (iv) Electronic grade panelboards will be provided to serve electronic equipment susceptible to electrical transients.
 - (v) Panels will be located on the same floor as the loads served.
- (J) Distribution system components located in public, clinical, administrative or staff area will have finished appearance and will be located to allow ready access for maintenance.
- (K) Motor control centers will be NEMA Class I, Type B and will be provided for groups of four (4) or more motors that require individual motor starters. Otherwise provide individual enclosed motor starters as required.

- (L) Motor starters will be combination magnetic MCP type with integral control power transformers, HOA or start/stop control and at least two auxiliary contacts in addition to seal-in contacts.
- (M) Combination starters will be provided for all motors 1/2 HP and larger that are not already controlled by adjustable frequency drive or provided with integral control package.
- (N) Provide transient protection for the main devices in the main 600 volt switchgear and all panels serving sensitive electrical loads including but not limited to diagnostic equipment, lab equipment, nuclear medicine equipment and adjustable frequency drives.

(h) Power Quality

(1) General Approach:

- (A) An overall power quality which assures suitable conditions for operation of all electrical and electronic equipment throughout Building will be established and maintained
- (B) A wide variety of electrical and electronic equipment types will be in use in the Building. Provide equipment and systems which will mitigate internal and external transients and other electrical anomalies to acceptable limits.

(2) Quality Requirements:

- (A) Power quality will meet or exceed the IEEE established standards for power quality, including but not limited to Harmonic Mitigated transformers provided where deemed necessary by Project Co. and the following:
 - (i) IEEE Standard 519 – Harmonics.
 - (ii) IEEE Standard 1250 - Voltage Quality.
 - (iii) IEEE Standard 1346 - Recommended Practice for Evaluation Electric Power System Compatibility with Electronic Process Equipment
 - (iv) Methods and equipment consistent with IEEE Standard 1159 - Monitoring Electric Power Quality will be provided by installing 1 built-in power quality meter at the Building incoming service. All other system testing will be done by a technician using portable test equipment.

(3) Performance of work:

- (A) Filters, TVSS, etc will be provided for panels serving sensitive electronic equipment from adverse power quality conditions including but not limited to voltage spikes, dips and droops, transients, harmonics, power factor and radio frequency interference
 - (B) Project Co will be able to demonstrate to the Authority at any time that there are no potentially harmful power conditions present and that equipment intended to guard against such conditions is in proper working order.
- (i) Grounding
- (1) Quality Requirements:
 - (A) Refer to Section 7.15(a)(2).
 - (B) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
 - (C) UL 6 - Electrical Rigid Metal Conduit – Steel.
 - (D) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - (E) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
 - (F) UL 797 - Electrical Metallic Tubing – Steel.
 - (G) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
 - (H) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
 - (I) UL 1 – Standard for Flexible Metal Conduit.
 - (J) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
 - (K) UL 514B - Conduit, Tubing, and Cable Fittings.
 - (L) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
 - (M) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - (N) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - (O) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (P) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
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 - (CC) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (DD) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (2) Performance of work:
- (A) Bond grounding electrodes together to form main ground.
 - (B) Provide a properly sized green insulated equipment bonding conductor with all feeder and branch circuits.
 - (C) Provide a ground bus on standoffs in each electrical and telecommunications room.
 - (D) A number 3/0 grounding conductor in conduit will be extended from the main building ground to the ground bus in the nearest electrical sub-distribution room and from there to each additional sub-distribution room.
 - (E) A number 1/0 grounding conductor in conduit will be extended from the main building ground to the ground bus in the main telecommunications room (MDF) and from there to each intermediate distribution (IDF) room.

- (F) All exposed non-current carrying components of communication, radio or television equipment in patient care areas will be bonded to ground using a properly sized equipment bonding conductor.
- (G) Provide proper patient grounding system in patient care areas as described in CSA Z32-04.

(j) Lighting

(1) General Approach:

- (A) Lighting will be of high quality with emphasis on energy efficiency (69 lumens/watt minimum) and high color rendition (.80 Color rendering index minimum for fluorescent fixtures and .70 for metal halide lamps).
- (B) The exterior lighting design will meet or provide lower light levels and uniformity ratios than those recommended by the Illuminating Engineers Society of North America (IESNA).
- (C) Each room or area will have local lighting control.
- (D) Generally each regularly occupied space will have the ability to achieve 2 or more levels of illumination control in addition to the off position.

(2) Quality Requirements:

- (A) Lighting will comply with recommendations of IESNA Publication RP-29, Lighting for Hospitals and Health Care Facilities and CAN/CSA Z317.5 Illumination in Health Care Facilities.
- (B) Lighting will comply with Workers Compensation Board (WCB) regulations and Bulletins.
- (C) Refer to Section 7.15(a)(2) for additional requirements.
- (D) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (E) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (F) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (G) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (H) UL 797 - Electrical Metallic Tubing – Steel.
- (I) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).

- (J) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (K) UL 1 – Standard for Flexible Metal Conduit.
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- (M) UL 514B - Conduit, Tubing, and Cable Fittings.
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- (V) UL 797 - Electrical Metallic Tubing – Steel.
- (W) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (X) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (Y) UL 1 – Standard for Flexible Metal Conduit.
- (Z) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (AA) UL 514B - Conduit, Tubing, and Cable Fittings.
- (BB) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (CC) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (DD) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (EE) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (FF) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).

(3) Performance of work:

- (A) The lighting intensities will be based on the recommendations of the IESNA.
- (B) All lighting fixtures will be premium grade.
- (C) Lighting circuits will be loaded to a maximum of 1600 VA for 120 volt circuits and 4500 VA for 347 volt circuits.
- (D) Fluorescent lighting will be used predominantly. Compact fluorescent lighting will be used for decorative purposes. High efficiency electronic fluorescent ballasts and linear T8 and T5 lamps will be used where possible. Incandescent lighting will not be provided unless explicitly indicated in this specification.
- (E) Fluorescent lamp ballasts will be electronic with a THD of 10 percent and no more than 8 percent for third harmonic. Power factor will be .98 or greater and efficiency will be 90 percent or higher.
- (F) Connect all fluorescent fixtures with flexible conduit whip, or MC cable drop 2 m long maximum.
- (G) Acrylic diffusers will be 100 percent virgin prismatic acrylic, 3.2 mm thick minimum.
- (H) 600 mm x 1200 mm and 300 mm x 1200 mm fluorescent fixtures with two, three or four lamps for general illumination will be provided throughout the facility. Linear fluorescent cove lighting or recessed indirect fixtures will also be used in corridors to limit glare to patients being transported on stretchers.
- (I) Occupancy sensors will be provided in offices, restrooms, support spaces, and storage rooms.
- (J) The lighting in the corridors will be controlled by a networked low voltage relay switching system with programmed ON/OFF operation and local manual override capabilities. Provide local control from nurse control stations and reception desks where applicable.
- (K) Offices, exam rooms, treatment room, pharmacy, laboratory and nurse control stations will have one level control. Rehabilitation area will have two level control.
- (L) Radiology/Fluoroscopy, Mammography and CT Scan rooms will have a combination of fluorescent lighting (on/off control) general room lighting and compact fluorescent lighting (dimnable) to provide subdued lighting during procedures.

- (M) Fluorescent open industrial fixtures with wire guards will be provided in electrical, telecommunications and mechanical rooms controlled by switch at door.
- (N) Vapor-proof compact fluorescent lights with wire guards will be provided in each elevator pit (one per shaft) controlled by switch located adjacent to pit ladder.
- (O) In each minor and major surgery room, selected recessed fluorescent fixtures will be equipped with emergency ballasts with integral battery back-up.
- (P) Low glare, 3 IN deep cell parabolic louvers or recessed indirect will be provided for fluorescent fixtures in exam rooms, offices, reception areas, nurse control stations and other areas where data terminals are utilized.
- (Q) Connections will be made to major operating room light and variable intensity controller in each surgery room.
- (R) Exit signs will be LED type.
- (S) Provide a combination of recessed compact fluorescent down lights and wall washers, linear fluorescent cove or pendant indirect fixtures or both and other specialty type fixtures in public lobbies and waiting areas, administrative conference rooms and meeting spaces.
- (T) Provide fixed linear under-cabinet task lights at 50 percent of millwork and casework counters.
- (U) Provide fluorescent lighting with two level switching control in rehabilitation centre.
- (V) Provide fluorescent lighting with one level switching for general lighting in patient treatment stations.
- (W) Provide daylight control systems to maintain proper lighting levels at perimeter rooms where daylight contribution is significant.
- (X) Lighting control in conference and multi-purpose rooms will be integrated with AV controls to allow multiple settings based on different room functions. Provide at least 4 presets per room.
- (Y) Lighting in open and common areas will be arranged for control by zone and for multiple levels per zone.
- (Z) Provide metal halide lighting for parkade and for exterior Site lighting for roadways, parking lots and walkways (except fluorescent lighting fixtures housing T5 lamps will be used for underground parking).

- (i) Provide a combination of surface mounted parkade lights, pole lights, low level bollard (compact fluorescent bulbs) lights and step lights as required. Provide time clock, photocell and contactors wired back to a central control cabinet with HOA switch for control of Site lighting. Some level of parkade and Site lighting will be arranged to shut down after hours. Control plan will be submitted to the Authority for approval.
 - (ii) Provide wall mounted metal halide exterior lighting at all exits connected to the vital branch. Provide separate exterior photocell control with HOA, contactor(s) and control cabinet.
 - (iii) All parkade and exterior luminaires will be vandal resistant and will comply with IESNA full cutoff requirements.
 - (iv) Minimum maintained illuminance in parkade will be as follows:
 - (iv).1 Ramps, stairways and parking: 40 horizontal lux and 20 vertical lux day or night.
 - (iv).2 Entrance areas: 500 horizontal lux day and 40 horizontal lux at night.
- (k) Essential Electrical Systems
- (1) General Approach:
 - (A) A complete essential electrical system including but not limited to diesel standby generator(s) and accessories, automatic transfer switches and distribution equipment will be provided to back up lighting, equipment and receptacles in the facility as indicated in the event of a power outage.
 - (B) Project Co will have option of providing one standby generator if two completely independent BC Hydro service lines are provided as described in Underground Distribution section of the specification or two (2) standby generators, each sized to handle the facility vital branch load.
 - (2) Quality Requirements:
 - (A) Standby generators will comply with local regulations for noise and emissions.

- (B) Provision and installation of fuel system will comply with CSA B139 and ULC CAN4-S601.
- (C) Refer to Section 7.15(a)(2) for additional requirements.
- (D) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (E) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (F) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (G) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (H) UL 797 - Electrical Metallic Tubing – Steel.
- (I) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (J) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
- (K) UL 1 – Standard for Flexible Metal Conduit.
- (L) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
- (M) UL 514B - Conduit, Tubing, and Cable Fittings.
- (N) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
- (O) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
- (P) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
- (Q) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
- (R) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (S) UL 6 - Electrical Rigid Metal Conduit – Steel.
- (T) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
- (U) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
- (V) UL 797 - Electrical Metallic Tubing – Steel.
- (W) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
- (X) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.

- (Y) UL 1 – Standard for Flexible Metal Conduit.
 - (Z) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
 - (AA) UL 514B - Conduit, Tubing, and Cable Fittings.
 - (BB) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
 - (CC) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - (DD) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - (EE) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (FF) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (3) Performance of work:
- (A) Provide diesel generator(s) (number 2 diesel) to provide backup for the facility. Design system so that vital branch is energized within 10 seconds or less. If two generators are provided paralleling switchgear will be provided with load shed/load add capability.
 - (B) Generator(s) will be sized to handle calculated load plus 10 percent on a continuous basis.
 - (C) On Site fuel storage will be provided to operate generator(s) for 72 hours at 80 percent of rated load.
 - (D) Generator installation will be designed so that sound and vibration are not perceptible to occupants of the facility outside the generator location.
 - (E) Provide a digital system to monitor and record generator alarm and load conditions. Provide remote alarm panels located at maintenance and main reception desk respectively. Alarm conditions will also be monitored by the building management system.
 - (F) Provide combination bypass/isolation transfer switches with in phase monitoring (open transition or closed transition as indicated) to serve essential loads as indicated and as required by CSA Z32-04 including but not limited to the following:
 - (i) Vital branch loads (closed transition transfer switch(es)):
 - (i).1 Path of egress lighting.
 - (i).2 Exit signs.

- (i).3 Stair and ramp lights.
 - (i).4 Selected receptacles and lights at generator location.
 - (i).5 Medical gas alarm panels.
 - (i).6 Elevator cab and machine room lighting.
 - (i).7 Fire alarm and medical gas alarm systems.
 - (i).8 Telecommunications systems.
 - (i).9 Public address systems. .
 - (i).10 75 percent of receptacles and lights in surgery rooms.
 - (i).11 50 percent of lights and outlets in nurse control stations, sterile core, central sterile and patient care areas other than surgery rooms..
 - (i).12 Selected equipment as deemed necessary for patient care.
 - (i).13 Nurse call system power supplies.
 - (i).14 Medical vacuum pumping systems.
 - (i).15 75 percent of receptacles and lights in laboratories.
 - (i).16 Pharmacy dispensing areas.
 - (i).17 Equipment to be served by emergency where indicated on equipment list.
 - (i).18 Other selected task lighting, receptacles and equipment as required by CEC.
- (ii) Delayed vital branch loads(open transition transfer switch(es)):
 - (ii).1 Ventilation systems serving surgery rooms.
 - (ii).2 Sump pumps and sewage ejector pumps.
 - (ii).3 Medical air pumping systems.
 - (ii).4 Fire pump and jockey pump if provided. (via integral transfer switch).
 - (ii).5 Fume hoods.
 - (ii).6 One elevator in each elevator bank.
 - (ii).7 Selected sterilizing equipment.
 - (ii).8 Alarmed freezers and refrigerators.
 - (ii).9 Other selected equipment as required by CEC.
- (iii) Conditional branch loads (open transition transfer switch(es)):
 - (iii).1 Ventilation systems serving surgery rooms.
 - (iii).2 Sump pumps and sewage ejector pumps.
 - (iii).3 Ventilation systems serving post-operative recovery rooms.
 - (iii).4 Selected Radiology, Mammography, MRI and CT Scan equipment.
 - (iii).5 Selected heating system equipment.
 - (iii).6 Selected refrigeration equipment.
 - (iii).7 Cooling equipment for surgery rooms.

(iii).8 Cooling equipment for telecommunications rooms.

(iii).9 Other selected equipment as required by CEC.

(I) Uninterruptible Power Supply Systems

(1) General Approach:

(A) Provide Uninterruptible Power Supply (UPS) systems for those loads that cannot be interrupted under any circumstances.

(2) Quality Requirements:

(A) Refer to Section 7.15(a)(2).

(B) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).

(C) UL 6 - Electrical Rigid Metal Conduit – Steel.

(D) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

(E) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).

(F) UL 797 - Electrical Metallic Tubing – Steel.

(G) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).

(H) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.

(I) UL 1 – Standard for Flexible Metal Conduit.

(J) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.

(K) UL 514B - Conduit, Tubing, and Cable Fittings.

(L) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.

(M) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.

(N) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.

(O) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.

(P) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).

(Q) UL 6 - Electrical Rigid Metal Conduit – Steel.

(R) ANSI/NEMA FB-1 – Fittings, Cast metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

- (S) ANSI C80.3 –Steel Electrical Metal Tubing (EMT).
 - (T) UL 797 - Electrical Metallic Tubing – Steel.
 - (U) ANSI C80.6 –Electrical Intermediate Metal Conduit (EIMC).
 - (V) UL 1242 - Standard for Electrical Intermediate Metal Conduit – Steel.
 - (W) UL 1 – Standard for Flexible Metal Conduit.
 - (X) UI 1660 – Standard for Liquid-Tight Flexible Nonmetallic Conduit.
 - (Y) UL 514B - Conduit, Tubing, and Cable Fittings.
 - (Z) UL 2239 - Hardware for the Support of Conduit, Tubing, and Cable.
 - (AA) UL 651 - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - (BB) UL 651A - Type EB and A Rigid PVC Conduit and HDPE Conduit.
 - (CC) NEMA TC-2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - (DD) ANSI C80.1 – Rigid Steel Conduit – Zinc Coated (GCR).
- (3) Operating Requirements:
- (A) UPS systems will be provided but not limited to the following systems:
 - (i) PBX equipment.
 - (ii) Wireless communications systems.
 - (iii) Where indicated in equipment list.
 - (iv) Building automation system.
 - (v) Data center equipment if provided.
 - (B) The Authority will provide stand alone UPS for loads 1KW and smaller. Such UPS systems will have 20 percent spare capacity minimum.
 - (C) For base building loads 1kW or smaller requiring uninterrupted power provide stand alone UPS or a centralized UPS. Such UPS systems will have 20 percent spare capacity minimum.

- (D) Where a number of loads that require UPS are located in close proximity provide a central UPS with distribution panel to serve these loads.
- (E) UPS systems will receive their primary power from the essential electrical system.
- (F) UPS systems will have adequate batteries to carry rated load for 15 minutes or more where indicated.
- (G) Provide remote alarm for each UPS system located in maintenance department to indicate when battery capacity has dropped below 5 minutes. UPS alarm will also be monitored by building management system.
- (H) UPS systems rated larger than 1.5 KW will have:
 - (i) External maintenance bypass switch for servicing.
 - (ii) Internal static bypass switch to bypass UPS in the event of UPS failure.
 - (iii) Two battery strings (full redundant batteries).

7.16 Division 17 - Communications Systems

(a) Basic Requirements

(1) General Approach:

- (A) The communication systems in the Building must accommodate all media types including data, voice, video and paging.
- (B) Project Co will provide a common pathway for all communications systems wiring referenced in this Section 7.16, including the Building Management System, with barriers to segregate or shield different systems as required, and Project Co will:
 - (i) provide appropriate barriers in the form of separate physical networks, VLANs and/or other security appliances as appropriate;
 - (ii) co-operate with and consider input from the Authority in designing the network; and
 - (iii) coordinate the requirements of the individual communications systems as established by the vendors of such systems.

(2) Design Requirements

- (A) Project Co will Design all communications systems in the Building in accordance with the IT and Communications Systems Design Consultation Protocol as set out in Appendix 3F.

(3) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to the following:
- (i) the latest technology for transferring, securing, and storing information available as of the date of installation of the communications system will be used in the Facility;
 - (ii) Project will comply with the Canadian Electrical Code (CEC).
 - (iii) Project will comply with all applicable CSA Standards including but not limited to CSA C22.2, CSA Z32.99.
 - (iv) All equipment and materials will be certified and clearly sealed by CSA or ULC or other testing agency approved and accepted by the Safety Engineering Services (SES).
 - (v) The Authority's Structured Cabling Standards attached as Appendix 3J.
 - (vi) The Authority's Telephone Standards attached as Appendix 3K.
 - (vii) The Authority's Wireless Infrastructure Standard attached as Appendix 3L.
 - (viii) The Authority's Wireless Communications Policy attached as Appendix 3M.

If any applicable standards conflict then the more stringent will apply.

- (B) The communications systems must be proven technology for use in facilities similar to the Building.
- (C) The Communications systems must be easy to operate, and easy to maintain, adaptable to change, and are expandable to accommodate growth.

(b) Integration with the Authority

(1) General Approach:

- (A) The systems to be integrated include but are not necessarily limited to video conferencing, telephones, all networks, patient entertainment, patient education, access control, CCTV, timing, intrusion detection, and specialized clinical equipment such as picture archiving and communication systems (PACS), electronic registration, and dictation systems.
- (B) The communication systems in the Building must integrate with the other Authority's communication systems at other buildings and with Province-wide communication systems between health authorities. The Authority and Project Co will cooperate to define the appropriate WAN connectivity required.
- (C) The proposed telephone system must be able to seamlessly integrate with the Authority communications systems.
- (D) The communication systems must permit and facilitate the secure transmission, storage, and retrieval of electronic health records within the Building and from / to all other Authority facilities.
- (E) The communication systems in the Building must be compatible with the Authority's service providers as of the date of installation of the systems and be designed to integrate with the service providers' equipment and, as appropriate, to utilize the Authority's existing service agreements by extending them to the Building. (See Appendix 3I). The Authority will make its existing service agreements available to Project Co to the extent allowable under the terms of such agreements.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to those standards listed below.
 - (i) All applicable IEEE, CSA, TIA / EIA, and BICSI standards.

(c) Fire Alarm System

(1) General Approach:

- (A) The Facility will have a complete two stage (general and evacuation), supervised, 24 VDC fire detection and alarm system that includes addressable, intelligent, automatic and manual initiation devices and audio/visual alarm devices with voice evacuation capabilities will be provided. Alarm activation will be initiated by manual pull stations,

smoke detection, and fire sprinkler water flow devices. Alarm indication will consist of visual and combination visual/audible devices.

(2) Quality Requirements:

(i) The fire alarm system in the Facility will, without limiting other applicable standards and codes, comply with:

(i).1 Can/UL S524 Standard for Installation of Fire Alarm Systems.

(i).2 Can/UL S537 Standard for Verification of Fire Alarm Systems.

(i).3 Applicable NFPA Codes.

(i).4 Elevator Code CAN3-B44.

(3) Operating Requirements:

(A) Install all fire alarm wiring in conduit. Provide two hour rated cable where required to meet survivability requirements of NFPA 72.

(B) Provide smoke detectors as required by code. Smoke detectors will be addressable, self correcting analog type to maintain consistent sensitivity.

(C) Pull stations will be provided at all exit doors and entrances to exit stairs as required.

(D) Visual notification appliances will be provided at all corridors, public spaces, public, patient and staff toilets and common use spaces.

(E) Speakers will be provided throughout the Facility as required. Speaker system will be available to announce alarm conditions and for use as a public address announcements. Provide microphone at main reception desk, with telephone interface, for use of the speaker system. See 7.16(g) for additional public address system requirements.

(F) Audible alarm and visual notification appliances will be combination devices where applicable.

(G) Heat sensors will be provided at the top of elevator shafts and in elevator machine rooms adjacent to sprinkler heads and will be wired to shunt trip associated elevator source circuit breaker when activated.

- (H) LED type indicators will be provided for remote indication that a heat and/or smoke sensor has been activated in a lockable room (located outside room adjacent to door), in an elevator shaft (located at elevator lobby ceiling) or duct sensors that are not readily visible (located on ceiling or at visible location nearest to sensor installation).
- (I) Provide a computer work station in maintenance department.
- (J) Provide graphic annunciator at main reception area.
- (K) Provide gell electrolyte type batteries with overcharge protection for FACP and all transponders. Provide solid state battery charger(s) with capacity to recharge entire battery system in 4 hours. Batteries will have capacity to operate entire system except magnetic door holders for five minutes with 25 percent spare capacity.
- (L) Provide a minimum of 2 isolation modules per floor for alarm circuits to isolate wire to wire shorts.
- (M) Operation:

The fire system will:

- (i) Indicate general alarm and trouble conditions at fire alarm control panel (FACP), remote annunciators and printers.
- (ii) Close fire and smoke doors on activation of alarm condition.
- (iii) Initiate smoke control systems to control fans and dampers.
- (iv) Initiate transmission of alarm signal to remote emergency response centre (Europeplex or equivalent approved by the Authority).
- (v) Pre-programmed messages will be transmitted over overhead paging system to annunciate origin of alarm. Any program sources on paging system will be muted while alarm messages are transmitted.
- (vi) Provide and connect interface to the Authority "Connects All" system.

(d) Interface with Authority Network

(1) General Approach:

- (A) The Facility technology and communications systems that are in a digital format may operate on the Facility network and integrate with the Authority applications, subject to requirements of this Agreement.
- (B) The Authority intends that electronic patient information should be available at the bedside to assist clinical staff in performing their duties, on portable devices, run over the wired or wireless network. It is the intent that the portable device display information such as code blue, video conferencing, patient / staff education, and patient monitoring where this creates efficiencies for clinical staff. These systems are to integrate with the IT applications and run over the common network platform.

(2) Quality Requirements:

- (A) In addition to other applicable standards and codes
 - (i) The technology and communications system are to be IP compatible and run over a standard Ethernet network.
 - (ii) Databases for these systems will be HL7 compatible with an SQL open system architecture to allow key fields to be read from and written to the Authority's information technology software applications.

(3) Operating Requirements:

- (A) Servers for the technology and communication systems will be Microsoft compliant (version acceptable to the Authority) and will be from a common manufacturer where possible.
- (B) The servers will be the latest technology, as of the date of installation (Intel processor latest model or similar acceptable to the Authority) and will interface to the Ethernet network via a 100mB network interface card.

(e) Nurse Call Systems

(1) General Approach:

- (A) Provide nurse call systems for each clinical department.

(2) Quality Requirements:

- (A) In addition to applicable standards and codes comply with:
 - (i) Installation will comply with CSA C22.2 and CSA Z32.99.

- (ii) All systems will be from a single manufacturer and be the same model number from that manufacturer.

(3) Operating Requirements:

- (A) Provide full feature audio/visual nurse call systems in all patient exam and treatment rooms for major departments including but not limited to:
 - (i) MRI-CT.
 - (ii) Ultra-sound/Bone/Mammography/Densitometry.
 - (iii) Radiography and Casting.
 - (iv) Perinatal Care Clinic.
 - (v) Chronic Disease Management.
 - (vi) Primary Care Clinic.
 - (vii) Medical/Surgical Clinic.
 - (viii) Endoscopy Suite.
 - (ix) Recovery.
 - (x) Nuclear Medicine.
 - (xi) Cardiac Care.
- (B) Provide basic audio/visual nurse call systems with the following features and capabilities:
 - (i) Two-way voice communication between master control station(s) and patient and staff locations.
 - (ii) Tone and light system with multi-lamp dome lights above doors to patient locations, multi-lamp zone lights at corridor intersections and duty stations at staff work locations.
 - (iii) Staff emergency system with buttons located at all patient locations.
 - (iv) Emergency pull cord stations at all patient toilet and dressing locations.
 - (v) Provide the ability to program up to 3 levels of priority for each patient station.

- (vi) Provide code blue (cardiac arrest) capability. Provide a code blue button at each nurse station or reception desk associated with clinical spaces. Provide remote indication of specific department at a central control panel located at the main reception desk of the facility or other location as directed by Authority. Need to interface with the Authority's "Connexall" system for additional monitoring and vectoring of calls.
 - (vii) Utilize standard Cat 6 (or greater based on standard in place) cabling and connectors for nurse call cabling as applicable.
- (C) Provide adequate duty stations for each nurse call system to ensure that tones are heard throughout each department and at following locations minimum:
- (i) Clean work rooms.
 - (ii) Soiled work rooms.
 - (iii) Medication rooms.
 - (iv) Nourishment rooms.
 - (v) Equipment storage rooms.
 - (vi) Exam/treatment rooms.
 - (vii) Nurse stations.
- (D) Equipment supplier will meet with staff to get input for programming system functions prior to programming the systems.
- (E) Nurse call terminal cabinets will be located in telecommunication rooms.
- (f) Wireless Staff Communications Systems
- (1) General Approach:
- (A) Authority staff will need wireless portable communication devices for fast effective two-way voice communication. Project Co may use a different system for its own communication such as portable radios if it is not cost effective or practical to provide a common system.
 - (B) The wireless system will function throughout the entire Building (subject to requirements of applicable Laws). The wireless system

will include additional antennas in sensitive areas such as operation theatres, medical imaging and radiology rooms as may be required to comply with this Section.

- (C) The wireless system will integrate with the main telephone PABX system, voice mail system, dictation system, RFID system, maintenance radios, security and the other data network system. It will be able to access Meditech applications. Each wireless device will offer the full functionality of a standard hardwired telephone handset.
- (D) Several systems such as telephone, wireless telephone, and intercom have similar functionality and offer opportunity for cost savings. Project Co should promote cost efficiencies by reducing redundancy in functions across systems.

(2) Quality Requirements:

- (A) In addition to applicable standards and codes:
 - (i) The wireless staff communication system will meet the IEEE 802.11x standards and allow sufficient bandwidth to display clinical data.
 - (ii) The wireless staff communication system will be the latest proven technology from a recognized leader in the industry providing all necessary functionality.
 - (iii) The wireless staff communication system will provide standard telephone features as well as IP addressing and voice over IP.
 - (iv) The wireless signalling is to be at a frequency or amplitude to not interfere with any medical equipment.
 - (v) Wireless data security encryption techniques are to be employed by the system.

(3) Operating Requirements:

- (A) Project Co will provide a complete wireless staff to staff communication system that will allow staff to place calls from wireless handheld devices and initiate a two-way voice conversation.
- (B) System to consist of a head end CPU, application server, antennae base stations, line cards, software and wireless handheld devices.

Antennae base stations are to be located in concealed areas throughout the Building to provide full coverage with no dead spots.

- (C) System is to connect directly to the PABX telephone switch to allow each wireless handheld communication device the same functionality as a wired phone. Project Co to include additional line cards for the PABX to provide the functionality. All wireless handheld devices will be able to have outside telephone access.
 - (D) Provide infrastructure for RFID patient and asset tracking system.
 - (E) System server to include application software for full programming as well as gateway software to integrate with alarm systems to announce all necessary local alarms on the wireless handset.
 - (F) Wireless handheld devices to automatically log onto system. No manual intervention is required.
 - (G) As part of the IT and Communications Systems Design Consultation Protocol Project Co will meet with clinical staff and determine programming requirements such as phone groups, personal profiles, extensions, long distance access, dialling plan, text messaging, web access, email access, encryption requirements and fully program system.
 - (H) Locate wireless CPU in main communication room along with applications servers. All antennae base stations to mount concealed in ceilings throughout the Building. Power system will be backed up by the Building's uninterruptible power supply.
 - (I) Wiring for system to be part of the structured cabling plant.
 - (J) Provide adequate power outlets for wireless device charging stations inside each department.
- (g) Public Address System
- (1) General Approach:
 - (A) A paging system will be provided in the Building integrated with the building fire alarm system. This system is intended to be used for emergency pages only. Other communications systems will be used for routine communications between staff and patients.
 - (2) Quality Requirements:
 - (i) In addition to other applicable standards and codes, comply with:

Can/UL S524 Standard for Installation of Fire Alarm Systems.

(i).1 Can/UL S537 Standard for Verification of Fire Alarm Systems.

(i).2 Applicable NFPA Codes.

(3) Operational Requirements:

(A) Provide complete speaker coverage of facility so that emergency pages can be heard everywhere in the facility.

(B) Provide sound levels as follows throughout the facility:

(i) Normal paging: 60 dB minimum.

(ii) Fire alarm messages: 75 dB minimum.

(iii) Music programming: 54 dB minimum.

(iv) Paging sound levels will be at least 10 dB above ambient noise levels in mechanical rooms and similar locations.

(C) Provide equipment including but not limited to:

(i) Paging amplifiers.

(ii) Flush ceiling speakers in finished areas.

(iii) Trumpet type speakers in mechanical and other high ambient locations.

(iv) Telephone interface module.

(v) Microphone(s).

(vi) Zone paging modules.

(vii) Mixers.

(D) Amplifiers will be sized to handle total load plus 20 percent spare capacity.

(E) Provide telephone access for paging with a maximum delay of 1 second between accessing system and ability to transmit page.

(h) Mechanical Control Systems Interface

(1) General Approach:

- (A) The Building will include a fully functional building management system whose primary function will be to control the mechanical systems within the Building, which will:
- (i) display building related alarms at a central control centre;
 - (ii) interface with the Building electrical and communication systems;
 - (iii) where cost effective, be utilized to annunciate security alarms, freezer alarms, lab alarms, medical equipment alarms, UPS, generator, and switchgear alarm, and control the building and Site lighting (for energy management reasons) via its software program'
 - (iv) be used for energy management functions as well as energy related data acquisition and trending. The digital meters monitoring the electrical power systems are to be connected to this system.
- (i) Structured Cabling
- (1) General Approach:
- (A) A cabling infrastructure is required throughout the Building that allows computers, telephones, video conferencing equipment and other digital End-Use Equipment to access the various IT, Telecommunication, and digital video networks.
 - (B) The cabling infrastructure does not differentiate on the type of End-Use Equipment that connects to it. The cabling infrastructure is to be universal and allow all forms of End-Use Equipment access to the different system types.
 - (C) The cabling infrastructure is to be designed by a Registered Communications Distribution Designer (RCDD) and is to be category 6A.
 - (D) All cables are to terminate in communication rooms sized in accordance with the TIA / EIA standard.
 - (E) Maximum cable distance from room outlet to communication room will be as set out in the Appendix 3J [Structured Cabling Standards];
 - (F) Communication rooms are to serve the floor they are on and are to be placed to maximize the area they serve.

- (G) Cable types to be unshielded twisted pair and fibre optic multimode and single mode. The bandwidth requirements and distance limitations will determine the type of cable installed.
- (2) Quality Requirements:
- (A) In additional to applicable standards and codes:
- (i) The conduits, pathways, room layouts, and design are to comply with the TIA / EIA569-B Commercial Building Standard for Telecommunications Pathway and Spaces, latest version.
 - (ii) The cabling design and installation will comply with the TIA / EIA – 568B.1, B.2 and B.3 Commercial Building Cabling Standards and Optical Fibre Cabling Standards.
 - (iii) Testing of the fibre optic cable will meet the TIA / EIA 526-7, 14 standards for Optical Power Loss measurement of single mode and multimode fibre cable plant.
 - (iv) The management and administration of the cabling plant will be done in accordance with the TIA / EIA 606A standard – the Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - (v) The grounding of the conduit pathways and components is to meet the TIA / EIA 607A Standard – Commercial Building Grounding and Bonding Requirements for Telecommunication.
 - (vi) The structured cabling system will be a complete end-to-end Belden system, and will be installed and tested by the Authority's pre-approved Belden certified contractor.
 - (vii) The Project Co will provide a manufacturer's extended product, performance, application, and labour warranty that will warrant all passive components used in the technology infrastructure. Additionally, this warranty will cover components not manufactured by the technology infrastructure Manufacturer, but approved by the technology infrastructure manufacturer for use in the technology infrastructure.

(3) Performance of work:

- (A) Project Co is to provide and install a complete structured cabling solution throughout the Building. Provide Category 6A, 7 or greater standard.
- (B) Provide dual WAN service to Building fed from different sides of the Building and from different telco central offices to minimize possibility of service interruption. WAN service will be Gigabit Ethernet.
- (C) A star wired cabling approach will be utilized to wire all outlet locations back to the floor communication rooms and all communication rooms back to the main communications room.
- (D) All rooms that have or are anticipated to have data, phone, video, or other End-Use Equipment will have cable system drops ran back to the communication rooms. It is anticipated that only storage, clean/dirty supply rooms, and some corridors will not have cable system drops.
- (E) All communications rooms that have cable system drops will have at minimum 10% additional drops, all conduit pathways will have spare capacity at least as per code, and all communication rooms will have physical space to allow future installation of equipment as per Section 8.4(b)(5). All cabling will be run in conduit and cable tray.
- (F) All ceiling spaces will have cable system drops for wireless network access points, information display systems, and other ceiling mounted digital devices.
- (G) Belden FX2000 Fibre optic cabling will be utilized to connect communication rooms to the main communications room. Both multimode (local to main communications room) and single mode (Telus demarcation to main communications room) fibre will be provided. Provide at minimum 100% spare fibre strand terminations in each communication room. Fibre optic cabling will also be provided for rooms requiring video streaming, in digital operating rooms and area where bandwidth requirements necessitate it be used.
- (H) All cable drops will be terminated at both ends. The proper flame spread rating will be provided for the cabling system.
- (I) Multi-conductor twisted pair telephone style riser cables and multi-standard fibre cables will be run from the main telephone room to each communication room to connect the telephone switch to the telephone handsets. Provide 100% spare capacity in each communication room.

- (J) Equipment cables for all End-Use Equipment will be provided in sufficient quantity to make each device operational plus 10% spare. Cross-connect cables, harness cables and equipment cords will allow complete connection from end to end.
 - (K) A cable management labelling software and electronic drawing system (Autocad Version to be approved by the Authority) will be implemented by Project Co to track and manage the cable plant. Project Co will make the cable management system, including update privileges, available to the Authority before Service Commencement.
 - (L) Self-registration systems, electronic directional systems and patient education kiosks may be provided in reception areas. Provide floor data outlets and floor power to connect these floor mounted systems as requested.
 - (M) Specialized systems requiring multiple drops will have sufficient drops at each location to ensure system operation.
 - (N) Provide cable for all public phones, minimum 1 per lobby area per department throughout the Building.
 - (O) A dedicated outlet will be provided for all Authority end-use fixed equipment. In no case will a personal computer be wired through an IP telephone.
- (j) Video Conferencing
- (1) General Approach:
 - (A) The Building will have a full video conferencing systems and video conferencing building infrastructure in all rooms requiring audio/video conferencing.
 - (B) The audio / video conferencing systems will be designed and configured by audio visual professionals with expertise and experience in the application and use of audio/video conferencing systems.
 - (2) Quality Requirements:
 - (A) In additional to applicable standards and codes:
 - (i) The audio and video conferencing systems will comply with the latest IP based video conferencing standards or the latest high speed common standard.

- (ii) The H.323 internet video conferencing standard and web broadcasting will allow computers on the network set up for videoconferencing to broadcast internally or externally over the network.
 - (iii) The audio and video clarity within the rooms in the Building will be of high quality. The location of microphones, video cameras, video monitors, and the design of the lighting systems and sound attenuation in the room will optimize the performance of the video conferencing system.
- (3) Performance of work:
 - (A) Provisions will be made for video conferencing for one conference room per floor and for each of three (3) education rooms in the education department.
 - (B) Each major surgery room will have infrastructure to support digital video/audio equipment.
 - (C) All video conferencing locations and major surgery rooms will be supplied by both copper and fiber optic cabling.
 - (D) Video conferencing systems will be supplied and installed by Project Co. Simple fixed systems will be provided in conference rooms complete with monitors, cameras, microphones, automatic microphone controllers, amplifiers, speakers, video controllers, remote controls, codecs and network connections.
 - (E) Larger conference rooms are to be configured for a higher end conference system complete with multiple cameras, multiple monitors, multiple microphones, automatic mic selection, a podium connection with a portable podium master system, a touch screen room control and audio / visual control system, video multiplexers, controlled dimmed lighting, spot lighting, ceiling microphone, multiple input sources, recording capability, document feeds, network PC connections, centralized speaker system, a codec, amplifiers, if the room is divided multiple room configuration system and isolation from room to room, audio equalization, echo cancellation and multiple network connection points.
 - (F) The major operating rooms will have infrastructure to allow audio / video streaming to other facilities. Cameras, camera controllers, LCD displays and video display controllers, PC based control systems, network connections, microphones, speakers, digital audio / video recorders, automated voice response system or wireless tablet control system will allow the clinical staff the ability to send live

pictures of the procedure to other facilities, record the procedures and access PACS, the Electronic Health Record (EHR), and clinical vital sign / patient monitoring systems to demonstrate the results the procedure has had for the patient.

(k) Patient Entertainment System

(1) General Approach:

- (A) Patients and the public require access to entertainment when required to wait for procedures or while recovering from a procedure. Entertainment is one coping strategy that patients can use to reduce the stress of a health care facility visit.
- (B) Project Co will provide entertainment devices consisting of televisions as output only devices capable of providing television programming and patient education system programming described below.
- (C) Project Co will provide television programming throughout the Building at no charge to patients, Authority staff and the public except that Project Co may provide pay television in specific areas as may be approved for pay television by the Authority. If Project Co proposes to provide pay television in any areas of the Building then Project Co will submit a list of such proposed areas to the Authority for its consideration.
- (D) For televisions in waiting areas, Authority staff will control the channels via remote control and will be able to change program channels or television inputs for access to patient education programming.

(2) Quality Requirements:

- (A) Project Co will comply with all applicable standards including, but not limited to those standards listed below:
 - (i) the patient entertainment system will be manufactured by an industry leader and all components will be of that manufacturer; and
 - (ii) the patient entertainment system will meet the CRTC standards and operate in the 8dbmv to 16dbmv range.

(3) Performance of work:

- (A) Project Co will provide television outlets in all waiting areas.

- (B) All TVs listed in the Equipment List are to be connected to the local cable system. Project Co will arrange for the installation of Shaw cable service (basic cable package) throughout the Facility. For clarity, Project Co will be responsible for the costs of cable installation and the Authority will be responsible for the ongoing cost of the Shaw cable service.
 - (C) Public area TVs will require access to patient education and local TV channels only. They will not require access to any enhanced entertainment options.
 - (D) All cabling will be via the structured cabling system if the patient entertainment system is a digital system, or a coax cabling system if the patient entertainment system is a broadband system.
 - (E) The system will access the network allowing the Authority to display education materials and other clinical applications on the display/computer/TV.
- (I) Patient Education System
- (1) General Approach:
 - (A) The Authority intends to provide the application services, programs and electronic educational material that will be displayed via the network on either televisions, personal computers.
 - (B) Project Co will provide the infrastructure, end-use devices and connection to the network.
 - (2) Quality Requirements:
 - (A) Project Co will comply with all applicable standards including, but not limited to those standards listed below.
 - (i) All Building network standards referenced in Section 8.4.
 - (3) Performance of work:
 - (A) The Authority will provide the head end components for this system on the Authority's servers. Project Co will provide infrastructure and End-Use Equipment in at least one location in each department as part of patient entertainment system that will allow these applications to be displayed to patients.
 - (B) Project Co will provide outlets for kiosks in all waiting areas in each medical department in the Building. Kiosks will be provided by the Authority.

- (4) Patient education programming will be available on waiting room televisions where programming content is compatible with the television system.
- (m) Clock System
- (1) General Approach:
- (A) A synchronized wireless GPS type clock system will be provided to assure that accurate consistent time is available at key control and clinical spaces in the Building.
- (2) Quality Requirements:
- (A) The master time controllers and all clocks will be provided by a recognized industry leader and all components will be of the same manufacturer.
- (3) Performance of work:
- (A) Provide master clock that receives signal from atomic clock in Boulder, Colorado via satellite.
- (B) Provide battery-operated analog secondary clocks that receive correction signals from master clock. Batteries will be rated to last 5 years.
- (C) Secondary clocks will be at least 300 mm in diameter and will have 24 hour numbering with hours 1-12 in large numbers on outer ring and hours 13-24 in smaller numbers on inner ring and sweep second hand.
- (D) Locate secondary clocks at:
- (i) Each patient area including but not limited to treatment rooms, exam/treatment rooms, surgery rooms, procedure rooms, imaging rooms and corridors. Exam rooms smaller than 12 m² are excluded.
- (ii) Conference rooms, multi-purpose rooms, nursing control stations, reception desks and staff work rooms.
- (E) Provide Elapsed Time Clocks similar to secondary clocks at selected locations including but not limited to minor and major surgery rooms and endoscopy rooms. Provide with local reset and connect to 120V receptacle circuit.
- (F) Provide satellite transmitters as required to get signal to all clocks in the Building.

(n) Not Used

(o) Central Dictation

(1) General Approach:

(A) The central dictation system for the Building will form part of the overall centralized system of the Authority. The file server and storage server is located off Site in the server farm.

(B) All telephones in the Building will be able to access the dictation system.

(2) Performance of work:

(A) All telephones will allow staff the ability to dictate onto the central Authority's dictation systems. An access code will be needed to access the dictation system. All dictation stations will be provided with a full featured phone and connect to the PABX via the structured cabling system.

(p) Intercommunication System

(1) General Approach:

(A) Local Intercom systems are required at locked entrance doors that delivery personnel or the public will need access through.

(B) An all-master intercom system will be provided for use in Surgery/Procedure Centre and Diagnostic Centre to the Building point to point, hands-free communication within the departments.

(2) Quality Requirements:

(A) The local intercom systems will be manufactured by recognized industry leaders in the intercom business.

(B) All wiring for the intercom system will be part of the structured cabling system.

(3) Performance of work:

(A) Project Co will provide local intercom systems at all locations requiring public or delivery access that may be locked. These systems will connect to the telephone system to allow the intercom to dial up the telephone at the nearest manned reception area. The telephone system will be able to remotely unlock the door.

- (B) A video intercom system will be provided at all entrance locations needing more security as determined in accordance with the Security Risk Analysis.
- (C) Provide programmable all-master intercom system with the following capabilities:
 - (i) Loud-speaking full-duplex, hands-free operation.
 - (ii) Two or three-digit number series.
 - (iii) Line lockout: A fault on line blocks only extension line concerned.
 - (iv) Camp-on busy: Automatic recall when busy extension becomes free.
 - (v) Priority feature: Incoming calls prevented from being connected "direct-in" and are announced by repeated call tone and flashing pilot lamp until manually accepted.
 - (vi) All-call: All extensions can initiate or receive all-call.
 - (vii) Three-way conference call capability.
 - (viii) Ability to create multiple groups on the same system with blocked access as required by users.
 - (ix) Minimum of 8 channels or more to ensure no busy signals based on number of stations in system. Provide additional channels after building is occupied if staff experience busy signals.
- (D) Provide desk loud-speaking master station with handset at locations including but not limited to:
 - (i) Each imaging reception desk.
 - (ii) Each imaging control room.
 - (iii) Endoscopy central charting.
 - (iv) Surgery communications/control station.
- (E) Provide flush wall loud-speaking master station without handset at locations including but not limited to:
 - (i) Radiography rooms.
 - (ii) Bone densitometry rooms.

- (iii) Imaging tech workstations.
 - (iv) CT major imaging rooms.
 - (v) MRI imaging rooms.
 - (vi) Nuclear imaging rooms.
 - (vii) Mammography rooms.
 - (viii) Ultrasound rooms.
 - (ix) Echocardiology rooms.
 - (x) EGG/Holter room.
 - (xi) Cardiac stress training rooms.
 - (xii) Physician offices/reading rooms.
 - (xiii) Operating rooms.
 - (xiv) Lithotripsy.
 - (xv) Minor surgery/procedure rooms.
 - (xvi) Endoscopy procedure rooms.
 - (xvii) Central sterilization.
- (q) Security Systems (CCTV, Access Control, Intrusion Detection, Panic Duress, Incident Reporting System)
- (1) General Approach:
 - (A) At an early stage of the Design process Project Co will undertake comprehensive threat and risk assessment analysis (a “**Security Risk Analysis**”) to identify specific risks and vulnerabilities to people, property and the Authority associated with the Facility and the surrounding community, and will prepare and deliver a written report to the Authority describing how the Design will reflect the security needs to the satisfaction of the Authority, acting reasonably.
 - (B) Project Co will provide a fully network integrated security program to protect staff, patients, and property. As part of this security program, at a minimum Project Co will provide a closed circuit television system to record events, an access control system to restrict access to secure areas to authorized staff only, intrusion detection systems to prevent theft, a Building wide panic duress system (wired and

wireless) to protect staff, and an electronic incident reporting system to record events.

- (C) These systems are the responsibility of Project Co security management program and are to be designed, provided, and installed by Project Co.
 - (D) The CCTV system is to allow web based access to all live and recorded images. This will enable the Authority to view the image.
 - (E) All security systems to reside on a V-LAN as part of the Authority's information technology infrastructure via the structured cabling system and network devices to allow the Authority the opportunity to review events and monitor the status of these systems from off Site locations.
 - (F) Staff education and training is an essential part of any security program. Authority staff are to be fully trained by Project Co staff on the use, operation, and location of all security devices.
 - (G) The system will be fully accessible through the Authority's network.
 - (H) The overall system will be scaleable to allow for future additions and interconnections of many devices and subsystems from different manufacturers.
 - (I) Program the new system to integrate with Authority's existing Andover Controls Continuum product line and infrastructure. Coordinate requirements with Authority security staff.
- (2) Quality Requirements:
- (A) Project Co will comply with all applicable standards including, but not limited to those standards listed below.
 - (B) All systems to be the latest proven technology supplied by industry leading manufacturers in the security industry.
 - (C) Placement of all security systems will be in accordance with risk levels identified in the Security Risk Analysis.
 - (D) All security systems will be interconnected as appropriate in accordance with Good Industry Practice and standards specified in this Agreement.
 - (E) Security systems to be interconnected to the fire alarm system where required.

- (F) Security systems to be in compliance with the Authority's Electronic Security Systems Standard Specification set out in Appendix 3G and Protection Services Intrusion and Panic Alarm Systems Installation and Programming Standards set out in Appendix 3H.
- (3) Performance of work:
- (A) It is the responsibility of Project Co to design, provide and install, the security systems to meet the objectives of their security programs. The Authority will identify their needs as one aspect of the security system requirements. Project Co to meet with Authority to obtain this information. Proposed security programs will be submitted to Authority for review and final approval prior to implementation.
 - (B) Access Control:
 - (i) An access control system will be provided for the Building and parkade that is PC based, capable of integral photo identification card system (badging workstation and associated camera not required), can lock and unlock doors via time schedule, utilizes proximity field effect technology, has sufficient capacity to handle at minimum 25,000 regional employees down to the field panel level, can grant or restrict access to employees via a programmable classification system, and run over a standard TCP / IP Ethernet network.
 - (ii) The system will utilize a file server and allow multiple workstations to access this file server for control and annunciation purposes. All alarms will be annunciated at the Building management call centre / alarm management centre location at minimum.
 - (iii) Location of access control doors and door alarms to be determined by Project Co but at minimum will ensure perimeter protection of the Building, select elevators, critical departments, those departments where the majority of staff do not require access and those departments that shutdown after regular working hours such as Ambulatory Care.
 - (iv) Provide a minimum of 500 proximity cards for the Authority staff. Consult with the Authority on card numbering sequence before ordering cards. Cards will be blank HID ISO Prox II prepared and ready for printing.
 - (v) The access control system will be complete with mapping capability, which will be implemented.

- (vi) Each card access controlled door will have a local sounder to enunciate door held open and door forced open alarms.
 - (vii) The access control system will function at the field controller level without connection to the PC Host or gateway.
 - (viii) All field controllers will be connected by TCP/IP using the structured cabling plant.
 - (ix) The access control system will have the capability to lock down departments in the event of an emergency or per an established schedule.
 - (x) The access control system will use proximity type readers and will be capable of reusing existing cards presently distributed across the Authority on the Andover Controls platform.
- (C) CCTV System:
- (i) A CCTV system is required throughout the Building including but not limited to main entry and exit points, pharmacy access points and in the parking areas to record events.
 - (ii) The system must be able to record clear images of individuals, which would allow distinction of gender, ethnicity, age category, etc. At a minimum, the system will include superdynamic digital cameras.
 - (iii) The system will be a digital CCTV system consisting of digital color CCTV cameras, color monitors located as needed, digital PC based video recorder complete with software that controls all parameters of each individual camera, pan tilt zoom functionality, frame by frame recording, pre and post alarm recording, motion detection, sequence switching, multiplexing, adjustable frame speeds, and will record all cameras 24-hours per day, 7 days a week in real time.
 - (iv) The system will have capacity to record all cameras and store those recordings for 30 days at four frames per second minimum. Provide file servers, workstations, and optical storage devices and connect to network. System will have network and web access for remote monitoring. System will be of sufficient quality to be used as court evidence in Canada.
 - (v) The system will be a software-based virtual matrix using the structured cable plant for transmission and recording of images.

- (vi) Provide the appropriate encoding/decoding capability to support 2 way (video and control) communications with any and all CCTV camera, individually and/or in predetermined clusters via the security Ethernet infrastructure.
- (vii) All cameras will be IP addressable or use protocol converters as required. This will depend on performances, cost and quality of IP camera at the time of system engineering and will be determined no less than 360 days from the time of substantial inspection.
 - (vii).1 Recording:
 - (vii).1.1 Recording of CCTV images will be on hard drives with archiving to DVD optical drives.
 - (vii).1.2 The system will allow for 30 days storage at minimum of 4 images per second.
 - (vii).1.3 The system will have the ability to choose the recording rates and quality for each camera.
 - (vii).1.4 The systems will have activity detection.
 - (vii).1.5 The recording system will have smart search capabilities.
 - (vii).1.6 The CCTV will integrate with access control, panic stations, intercoms and intrusion detection to allow for higher recording rates during alarm conditions.
 - (vii).2 Display and review:
 - (vii).2.1 The CCTV system images will be network-accessible using predefined user authentication.
 - (vii).2.2 The CCTV display and review system will be a network-based client application allowing for authorized users to remotely view, control and manage all aspects of the CCTV system across the network.
 - (vii).2.3 Display and review for all the cameras will be accessible through dual screen workstations in the Facility's security office and the backup position in the facilities management call centre.
 - (vii).3 Cameras:
 - (vii).3.1 CCTV cameras will be high-resolution color, low light capable with a minimum of 420 lines of horizontal resolution. Mounting will be appropriate for the environment, unobtrusive, matching colour with hidden cabling.
 - (vii).3.2 Fixed cameras will be inherently vandal – resistant wall mounted and / or mounted at protective locations and heights.

- (vii).3.3 PTZ cameras will be high-speed color domes with low light capability. They will rotate 360 degrees in less than 3 seconds. The domes will be capable of mounting on poles, parapets and walls and will include required hardware. The domes will have the ability to mask portions of view through software and remote programming of the camera.

(D) Intrusion Detection Systems:

- (i) Intrusion detection systems will be installed in all areas where protection of physical assets is critical including but not limited to all locations indicated under access control system described above and narcotics lockers.
- (ii) Intrusion detection will consist of local alarm controllers, local keypads, motion sensors, glass break sensors where necessary, door contacts and other initiating devices as needed.
- (iii) Each system will be controlled by a keypad located inside the department or area being protected.
- (iv) Local alarm controllers will be integrated with the access control system as well as reporting off Site via standard telephone lines to the Authority's central monitoring Building and / or to the Authority's choice of central monitoring Building providers. Each panel will report via its own phone line through a B2 analogue DID.

(E) Panic Duress System:

- (i) A wired and wireless panic duress system will be provided for staff with buttons to initiate calls in the following areas:
 - (i).1 Each department nurse station, sub care station and communication centre.
 - (i).2 Each department reception desk.
 - (i).3 Isolated work stations (night use).
 - (i).4 Each interview room.
 - (i).5 Imaging exam rooms.
 - (i).6 Staff locker rooms.
 - (i).7 Parking lots and parkade. Locate so that a button is within 30 meters of a person anywhere in the parking lot or parkade. Parking lot duress alarms may be located on light poles.
 - (i).8 In selected corridors and areas as directed by the Authority.

- (ii) Project Co will utilize wireless and wired systems in tandem and will place wired and wireless systems in appropriate areas determined in accordance with the level of security risk identified for a given area in the Security Risk Analysis. Where utilized, wireless systems should include 4 to 6 pendants per Authority department.
 - (iii) The system will be Rf or infrared based, enunciate the location of the alarm at the Authority call centre and enunciate a local audible and visual alarm sufficient so that it may be seen and heard by all staff throughout all areas of the applicable Authority department.
- (F) Incident Recording and Reporting:
- (i) An electronic incident reporting system will be provided consisting of a PC and software that Project Co will utilize to record all security incidents at the Building. The software will be a standard database system that allows any number of reports to be generated at the request of Project Co or Authority management.
 - (ii) All security alarms will be logged for a period of 30 days minimum. The logging system will be capable of external archiving/backup on CD in order to extend the event info storage duration.
 - (iii) Security recording will provided as a minimum the following information for each alarm:
 - (iii).1 Date.
 - (iii).2 Time.
 - (iii).3 Device Identification.
 - (iii).4 Descriptive Code.
 - (iii).5 User/Cardholder ID (when applicable).
 - (iii).6 Acknowledgement and action taken (when applicable).
 - (iv) Provide access to the applicable reporting capabilities included with the Continuum platform.

The access control system will be compatible with the existing Authority's systems to allow existing Authority cards to work on the system at the Building and allow new cards for the Building to work on systems in the rest of the Authority's regions. Project Co to program existing cards in the new facilities system.

8. IT/TEL SERVICES

8.1 Definitions

“**Authority Supplied End-Use Equipment**” has the meaning set out in Section 8.6;

“**End-Use Equipment**” means equipment that is not part of the IT/Tel Infrastructure which may be connected to the IT/Tel Infrastructure, including personal computers, laptop computers, tablet PCs, printers, photocopiers, facsimile machines, medication barcode scanners/CRT, and PDAs;

“**Information Technology Equipment**” means infrastructure, equipment and software related to:

- (a) network infrastructure, including: switches; routers; and cables;
- (b) wireless network (802.11 a/b/g), including: access points; and switches;
- (c) telephone system, including: PBX and all associated peripheral devices;
- (d) video conferencing (mobile and fixed); and
- (e) RFID infrastructure,

except Information Technology Equipment does not include infrastructure, equipment and software related to:

- (f) the Authority's network security devices;
- (g) the Authority's servers, including domain controller and SMS server; and
- (h) Authority Supplied End-Use Equipment.

“**IT/Tel Infrastructure**” means information technology and communications infrastructure consisting of network, cabling infrastructure, wireless network, telephone system, video conferencing, and RFID infrastructure; and

“**Project Co's End-Use Equipment**” means End-Use Equipment that Project Co connects to the IT/Tel Infrastructure for its own use related to performance of Project Co's obligations under this Agreement.

8.2 Principles and Guidelines

- (a) IT/Tel Output Specifications
 - (1) This Section 8 is written as an output specification for the purpose of defining what Project Co must achieve in the Design and Construction of the IT/Tel Infrastructure at the Facility.
 - (2) Section 8.2(b) of this Schedule is intended to provide guidance and context for Project Co, with particular reference to Design.

- (3) Project Co will, as required by this Agreement, have regard for the provisions of Section 8.2(b) of this Schedule, but without limiting such obligations, Project Co will not be required to comply strictly with all provisions of Section 8.2(b).
- (4) Nothing in this Schedule will be interpreted to mean that Project Co is relieved of its obligation to comply with all applicable Laws, including the BC Building Code.

(b) Principles and Guidelines

- (1) The Authority has an information management directional plan consisting of 3 core deliverables: provision and management of the technology, management and delivery of information and management and support for the core business. Project Co will provide the Information Technology Equipment to support this plan using technology that seamlessly integrates with the Authority.
- (2) The Authority's patient health record is predominantly electronic in nature and a substantial amount of information related to patients is digital or has the ability to be converted to digital and reside on the network.
- (3) The full electronic health record (EHR) is the ultimate goal of the Authority when it comes to gathering, storing and transmitting patient information. The intent of the EHR is to allow health care providers the ability to make more accurate, faster decisions on courses of action for patients, provide efficiencies for staff and patients to reduce costs, and provide better privacy and security of the patient record by controlling where it is stored.
- (4) The Authority's primary Health Care Information System (HCIS) software application package is Meditech Magic for North areas and Meditech Client Server for South and East areas. Meditech Magic is a telnet based application and has to run on a secure, low latency network. All applications used at the Building for clinical purposes will be provided by the Authority and hosted on servers in off-Site data centers. The management of all the Authority employees and patient information is the responsibility of the Authority.
- (5) The Authority has two main data centers located off-Site where the core applications, communications services and storage facilities exist. These data centers will house the majority of server and storage infrastructure. The Building will not have a significant server installation.
- (6) The Authority is in process of considering RFID based systems for a variety of business and clinical requirements. It is not, however, yet ready to specify details or standards for RFID. The Authority does require RFID infrastructure in the Building and plans to work with Project Co to design and implement an RFID based infrastructure that will meet the Authority's evolving needs. It is

anticipated that, by the time of the Building opening, the Authority will have fielded RFID based systems in other facilities.

- (7) Telecommunications is a key element in the provision of healthcare and wellness for patients and staff at the Authority. With the increasing demands on outpatient care and home care, the telecommunications systems must support these clinical objectives. The Authority has established common technology platforms for its telecommunications services including abbreviated dial plans, centrally managed systems, provision of call center and networked voicemail systems.

8.3 Overall

(a) General/Responsibility

- (1) Project Co will provide and install all IT/Tel Infrastructure and all Information Technology Equipment required for the operation of the Building in accordance with this Agreement. Project Co will be responsible for the performance of all Information Technology Equipment.
- (2) The Authority requires that, unless the Authority consent, which consent will not be unreasonably withheld, Project Co will procure Information Technology Equipment from the list of Approved/Preferred Vendors & Technology Products set out in Appendix 3I.
- (3) Project Co will train the Authority's IT specialist(s) designated by the Authority on configuration/setup and testing of the Information Technology Equipment.

(b) Design Requirements

- (1) Project Co will Design the IT/Tel Infrastructure in accordance with the IT and Communications Systems Design Consultation Protocol as set out in Appendix 3F.

(c) Performance Requirements

- (1) All Information Technology Equipment provided by Project Co must, to the greatest extent practical, be accessible for and amenable to future modifications.
- (2) Items critical for patient life safety will have built-in redundancy. Project Co will provide redundancy at each wall jack location and will connect physically adjacent ports to different switches within the same communications closet.
- (3) IP Protocol will be used for both voice and data equipment.
- (4) All Information Technology Equipment will be the latest version of the equipment at the time of installation.

- (5) Project Co will maintain the manufacturer's warranties on all of Project Co supplied Information Technology Equipment and ensure that the warranties are assignable to the Authority.
- (6) The Information Technology Equipment provided by Project Co for the Authority must support all applications run generally by the Authority, which include but are not limited to Meditech, PACS and Microsoft Office.
- (7) All applications, software modules and related software installed by Project Co for use at the Building, which are expected to be co-located on the same network infrastructure, are required to operate in a manner that does not interfere with the operation or performance of, or reduce the security or privacy of, any Authority applications or equipment.

8.4 Network Equipment

- (a) General/Responsibility
 - (1) Three main network types will be installed in the Building:
 - (A) Administrative network - (core health users) which will include the following applications: patient information systems; Meditech, PACS, financial information systems; HR information systems; electronic communications systems including e-mail, video conferencing and VoIP phones and end-user resources including home drives and shared enterprise resources. The administrative servers will be supplied by the Authority and are located off-Site. The network equipment will provide wide area network connections to these server farms to secure access to all levels of required information.
 - (B) Building systems network - which will include building management systems, security systems, alarm management systems and internal/external overhead paging type communications systems. These systems will be provided by Project Co and, where they are required to use administrative network infrastructure, Project Co will collaborate with the Authority.
 - (C) Clinical network - which consists of any network dedicated to patient care as a requirement as set out by the vendor. Clinical network includes some imaging equipment and other clinical units with patient monitoring requirements. Project Co will provide networks as specified by the appropriate vendors. In most cases this dedicated infrastructure is a purchase requirement and relates to the treatment and/or monitoring of patients.

- (2) Project Co will utilize the Authority's contracted service provider for the wide area network connections and equipment provision. The current provider is Telus and the WAN service will at minimum be the service provided to existing facilities of similar size and function.
 - (3) The Authority will provide and manage all firewalls, security and IDS/IPS systems.
 - (4) The Authority will be responsible for all network management licensing.
- (b) Design Requirements
- (1) Redundancy and security must be taken into account in all network designs.
 - (2) The network equipment will be open architecture.
 - (3) Project Co will retain Certified Network Engineer trained on the network equipment provided by Project Co.
 - (4) Project Co will work with the Authority in creating an operational plan for the network complete with management strategy and resource requirements for maintenance.
 - (5) Project Co will include a main information services communications/server room within the Building in which local servers supplied by the Authority and the main core internal backbone network equipment (network "core") are to be installed in consultation with the Authority. The Authority will provide a list of equipment to Project Co for the purposes of space, power and environmental control planning. The Authority's main information services communications/server room requirements include:
 - (A) 5 racks;
 - (B) 10KW redundant power per rack, for a total of 50KW on diesel generator feed;
 - (C) 10GB redundant fibre per rack. Minimum of 12 pairs of fibre to the core per rack; and
 - (D) APC 3000 series racks or current Authority standard at time of acquisition.
 - (6) Project Co will, in consultation with the Authority, prepare a network plan showing:
 - (A) the network core,
 - (B) the edge communication devices;
 - (C) the applications;

- (D) all connecting End-Use Equipment; and
 - (E) each separate network, VLAN and interconnecting segments.
- (7) The network design will take into account the security requirements at the time of design. The network design will be based firstly on security, secondly on manageability and lastly on integration.
- (8) The core network equipment will be redundant 3COM 5500G's or current 3COM equivalent at the time of procurement .
- (9) The Building will include communications rooms as required to service voice/video/data requirements of the Building.
- (A) Each communication room will require full redundant 3COM layer 2/3 switches to service the LAN;
 - (B) Each communication room will be connected via physically separate pathways to the Building's main communications room and the "core".
 - (C) End-Use Equipment will be connected to the edge communications closet layer 2 switch and a 10/100/1000 base T Ethernet 802.3 protocols run on Cat 6 (or greater based on standard in place) twisted pair, which will connect to the redundant 3COM layer 2/3 switches in the same communications room.
 - (D) The edge communication rooms will also support the 3COM 802.11a/b/g wireless access points and VoIP telephones, both of which require POE functionality and standards based QoS traffic prioritization.
- (10) VLAN separation will occur at the edge layer 2 switches, at the edge layer 2/3 switches and in the core layer 2/3/4 switches.
- (c) Performance Requirements
- (1) As protection against network equipment downtime, Project Co will design all the network equipment with redundant physical routing with a second fiber or copper cable route located outside the building to be available for use if the primary cable within the building is damaged. Connections should either be on different sides of the Building, or be separated by at least a distance equal to 75% of the longest side of the Building, and the two connections can terminate in one demarcation room.
 - (2) The core network will support all the network traffic required to operate the Building. The network will be designed initially and installed with a minimum 40% capacity for future growth during periods of peak network traffic volumes.

Project Co will consult with the Authority to determine volume forecasts taking into account general end user groups, edge closet to core links and core network volume estimates for four daily peak periods; morning, lunch, end of day and evening system backup.

- (3) Network equipment will support converged communications, a combination of the three media types of voice, video and data and all equipment will support the prioritization of traffic. The systems will include the main telephone system, video conferencing, CCTV, dictation, fax, transcriptions and all information systems.
- (4) Network equipment will function as part of the existing global network management system and will conform to standards and methods used by the Authority across its various sites.
- (5) Structured cabling will conform to the Structured Cabling Standards set out in Appendix 3J.
- (6) Provision and installation of network equipment will be in accordance with all applicable IEEE and EIA/TIA standards including the 802.1 and 802.3 standards.
- (7) The Building will have a complete structured cabling and complete wireless network infrastructure that will allow the use of all forms of wired or wireless communication devices that are available commonly used in facilities similar to the Building. The network equipment provided by Project Co will support this infrastructure and the Authority Supplied End-Use Equipment, and will deliver information where it is needed.
- (8) The Project Co will provide an RFID based system and corresponding infrastructure for a range of potential applications, including but not limited to, tracking of Authority-specified equipment and/or assets, patient wandering or use in patient identification. The system will have the capability to interface with other systems such as security systems for reporting of assets or personnel location for each system type.
- (9) Network ports supplied with three drops will have two active ones.
- (10) All switch infrastructures will support multiple VLAN functionality and multiple subnet per vlan.

8.5 Telephone Equipment

- (a) General/Responsibility
 - (1) Project Co will design, provide and install a new telephone system consisting of a new PBX, new telephone handsets and all necessary input/output modules for a full functioning telephone system at the Building.

- (2) Project Co will have a public telephone company provide and install pay phones in all lobbies and departments in the Building.
 - (3) The PBX system can be used for all of the Authority's needs and Project Co's needs. If Project Co intends to use this PBX for its telecommunication needs, Project Co will include additional capacity and functionality as required, including SMDR.
 - (4) Project Co will provide the required telephony inventory and spare parts. (The Authority anticipates that the Facility will require in the order of 400 wired telephones and 150 wireless phones, of which all will be IP phones. Of the wired phones, the Authority anticipates that approximately 20-25% will be multi-line and the balance will be single line).
- (b) Design Requirements
- (1) The PBX will have redundant CPUs, have a full UPS system to operate the entire PBX and handsets for a period of at least twenty minutes.
 - (2) The system will provide moves, adds and changes (MAC) software for remote changes for the PBX system.
- (c) Performance Requirements
- (1) The telephone system will conform to Authority's Telephone Standards set out in Appendix 3K.
 - (2) The Building must be engineered to support the Authority's IP phone technology, both wired and wireless.
 - (3) Convergence of media sources and the new PBX at the Building will support voice/data/video convergence.
 - (4) The voice equipment will comply with all BICSI/IEEE and EIA/TIA standards.
 - (5) The voice equipment will be fully integrated with, and will operate seamlessly with, the Authority's existing voice network.
 - (6) All voice equipment will be CSA and ULC approved.
 - (7) All telephone equipment will integrate seamlessly with existing Authority infrastructure.
 - (8) All standard PBX and voice mail features are to be provided as well as networking and integration of this telephone system and voice mail system with the Authority telephone and centralized voice mail systems. No local voice mail is required.

- (9) The current PBX systems in the Authority are either Nortel Meridian 1 (CS1000) or NEC SV7000. These or the equivalent Nortel or NEC equipment at the time of procurement will be used. The new numbering plan is to be integrated with the Authority's existing numbering plan.
- (10) The PBX must be provisioned in order to integrate with the following services - IP technology, computer telephone integration, speech recognition, unified messaging, integrated 802.11a based wireless telephone, connection to the existing coordinated dialling plan, interactive voice response, automatic call distribution, system administration software, music on hold, centralized networked voice mail, call center functionality, centralized attendant - and connect to the Authority service providers (Telus) digital WAN network system. The Authority will be responsible for telephony related licensing.
- (11) The PBX will be integrated to:
- (A) the Public Address (overhead paging) system.;
 - (B) the AuthoiDictaphone dictation system to allow any phone handset to act as a dictation station. The Dictaphone system is not located at the Building. It is located in one of the main data centers at another site;
 - (C) the new wireless phone system to allow the wireless handsets the same functionality as the wired handsets.
- (12) The telephone system will meet the following requirements:
- (A) Provide at minimum PRI service connectivity to match the existing sites of similar size to the Building plus 10% spare capacity. PRI will have the following features:
 - (i) station level billing; and
 - (ii) NI2 signalling.
 - (B) Provide analog trunks as a back-up for the PRI.
 - (C) All locals to support all telephones and any PDA's identified in the Equipment List, both wired and wireless, plus 10% spare.
 - (D) All single line sets identified in the Equipment List plus 5% spare.
 - (E) All multiline sets identified in the Equipment List plus 5% spare.
 - (F) All consoles identified in the Equipment List plus one spare.
 - (G) 48 analog ports for specialized equipment such as fax, modem, identified in Equipment List plus 5% spare.

- (H) System will be integrated with the Authority's telephony network via IP trunking.

8.6 Authority's End-Use Equipment

- (a) General/Responsibility
 - (1) The Authority will provide all of its own non-clinical End-Use Equipment except for the telephone equipment to be provided by Project Co under Section 8.6 (the "**Authority Supplied End-Use Equipment**").
 - (2) Project Co will :
 - (A) include the installation of the Authority Supplied End-Use Equipment as part of the Move-in Schedule;
 - (B) assist the Authority to define locations for the Authority Supplied End-Use Equipment to ensure that appropriate numbers of wired network drops are provided; and
 - (C) provide jack number information to the Authority to facilitate placement of the Authority Supplied End-Use Equipment.

8.7 Project Co's Own Equipment

- (a) General/Responsibility
 - (1) Project Co will provide all of Project Co's End-Use Equipment and communications equipment (including wireless devices) to provide a fully operational Building.
 - (2) Project Co will not connect any of Project Co's End-Use Equipment or communications equipment to the Authority's network, both wired and wireless, without prior written approval from the Authority. Project Co is responsible for paying any additional cost required to be used on or by Project Co's End-Use Equipment or communications equipment.
 - (3) The Authority will install any of Project Co's End-Use Equipment that has been approved for connection to the Authority's network.
- (b) Performance Requirements
 - (1) It is the desire of the Authority to have a single communications infrastructure but where required this infrastructure may be physically separated with approval of the Authority.
 - (2) If Project Co elects to reside on the Authority's network, Project Co will conform to all Authority network, end-use standards and be subject to the Authority's Total Cost of Ownership (TCO) model.

8.8 Wireless Infrastructure

(a) General/Responsibility

- (1) Project Co. will provide the wireless infrastructure to service 802.11b (2.4Ghz DSSS), 802.11g (2.4Ghz OFDM) and 802.11a (5Ghz OFDM) wireless communications and data transfer requirements for access by wireless devices to data and voice services within the Building and across the Authority via the Authority WAN.
- (2) Project Co is responsible for the setup and testing of all aspects of the wireless network and will provide heat maps for the Site indicating the channel coverage, signal level, data rate and noise floor for 802.11b, 802.11g and 802.11a wireless networks.
- (3) Project Co will turn over the wireless network management tool configuration file to the Authority's information services group at the completion of the wireless network testing.
- (4) Project Co's support for integration with existing wireless management systems and wireless IDS/IPS systems is mandatory.
- (5) Any wireless infrastructure or devices used by Project Co will not interfere with the Authority's wireless infrastructure or devices.

(b) Design Requirements

- (1) All wireless network components will be 3COM as are currently managed by the Authority. Provide all required modular components in each switch to support all protocols and functionality as designed.
- (2) Project Co will work with the Authority in creating an operational plan for the wireless network complete with management strategy alerts notification and resource requirements for maintenance.
- (3) Project Co will carry on their team a certified network engineer trained on the wireless network provided by Project Co.
- (4) The 3COM Access Points will be part of a wireless switch infrastructure and will be serviced by 10/100/1000 base T Ethernet ports. The edge closet switch backbone to the core network room will provide enough bandwidth to allow wireless services to function as designed. The wireless switches will reside in the core communications room and be serviced by Gigabit Ethernet services as required by the wireless switches. The wireless switches must be deployed in a redundant fashion, with redundant power supplies, Ethernet feeds and switches. Closets must be dual 10GB to the core switches. All uplinks must terminate in a redundant core switch fabric. Ports on layer 2/3

edge switches must be capable of 10/100/1000, regardless of what is connected to them.

- (5) The access points will support redundant POE connections and be connected to two physically separate POE switches.
- (6) The wireless switches will be deployed such that there is at a minimum 5% spare access point licenses per switch and an overall minimum of 15% spare access point licenses.
- (7) The total port count for the Building will include the ports allocated for the Wireless Network access points. The list of layer 2/3 switch ports will be provided indicating the ports connected to a given access point, and the power load on the switch with the remaining available POE power on the switch. The wireless network documentation will include a list of access points with the switch id and port number indicated in a spreadsheet.

(c) Performance Requirements

- (1) The wireless network will incorporate 25% redundancy and security controls must be present for all services accessible via wireless network at the Building. WPA encryption will be the minimum standard for all wireless devices at the Building.
- (2) The wireless network must support the five main services which will be active at the Building;
 - (A) The Authority administrative data services. These services do not require prioritization and will be on the default VLAN;
 - (B) The Authority voice services which consist of 802.11a push to talk devices with multicast requirement. Voice traffic will be prioritized on the wireless and wired LAN. WMM and SVP protocols must be supported by the wireless infrastructure. Voice traffic must be on a separate VLAN;
 - (C) Clinical wireless devices which consist of all handheld or mobile (cart based) wireless medical devices and include, but are not limited to, barcode scanners, bed site lab test equipment, mobile imaging systems and vital statistics gathering systems. Clinical devices must be on a separate VLAN;
 - (D) Equipment and patient location systems which use a triangulation method to locate devices that beacon a signal at regular intervals. If the Building uses location technology, the network design must be reviewed and approved by the equipment and patient location vendor; and

- (E) Non-Authority equipment.
- (3) The wireless network must be compatible with all wireless devices that the Authority requires for use in the Building and Project Co will consider the following in the design of the wireless network:
- (A) Voice services: - the Building must be reviewed for voice service density. Separate networks must be designed for full function wireless phones and single button voice badges (ie. Vocera). Areas such as nursing stations and cafeterias must be identified and wireless infrastructure deployed to support maximum estimated device density. Push to talk functionality for plant services and housekeeping will affect the handset to AP ratio. Project Co to describe these design considerations in the wireless network documentation.
 - (B) Clinical device services: - Project Co will consult the vendors for clinical devices to ensure minimum signal strength and data throughput is provided in the areas in which they will be used. Wireless clinical devices will have priority over administrative and facilities management devices, but not over voice devices.
 - (C) Administrative devices: - include notebooks, PDAs, tablets and hand held scanning devices. The wireless network must be designed to provide maximum throughput for these devices but ensure that they do not infringe on the available capacity or bandwidth available to the voice and clinical devices. Estimates for per AP bandwidth use must be included in the overall wireless network design document provided by Project Co in cooperation with the Authority.

Some of these networks will require some integration with each other. This integration is the responsibility of and is provided by the Authority.

- (4) Provision and installation of network equipment will be in accordance with all applicable IEEE and EIA/TIA standards including the 802.1, 802.11 and 802.3 standards.
- (5) Wireless network equipment will function as part of the existing network management tools and methods within the Authority.
- (6) The Building will have a complete structured cabling infrastructure that will allow the installation of POE wireless access points. The 3COM network equipment provided by Project Co will support this infrastructure and the Authority-supplied End-Use Equipment, and will deliver information where it is needed as directed by the Authority.

- (7) The wireless network will provide data rates consistent with the strictest specifications provided by the wireless End-Use Equipment.
- (8) The wireless network will provide channel dB separation consistent with the strictest specifications provided by the wireless End-Use Equipment.
- (9) The wireless network will provide an RF environment consistent with the noise floor and signal strength requirements (SNR) and consistent with the strictest specifications provided by the wireless End-Use Equipment.
- (10) All wireless switch infrastructure will support multiple VLAN functionality and multiple subnets per VLAN.

APPENDIX 3A

STERLING FUNCTIONAL PROGRAM

APPENDIX 3B

CONCEPT PLANS

List of attached concept plan drawings:

Drawing No.	Title
15.4.1	Level 1 Concept Plan
15.4.2	Level 2 Concept Plan
15.4.3	Level 3 Concept Plan
15.4.4	Level 4 Concept Plan

APPENDIX 3C
SPACE SUMMARY

APPENDIX 3D

SITE DRAWINGS

List of attached drawings:

Drawing No.	Title
15.1	Civil Works
15.2	Work Area Boundary
15.3	Master Plan
15.6	Existing Tree Diagram
15.8	GT Way Road Concept

APPENDIX 3E

PRELIMINARY VERTICAL TRANSPORTATION ANALYSIS REPORT

APPENDIX 3F

IT AND COMMUNICATIONS SYSTEMS DESIGN CONSULTATION PROTOCOL

1. Both parties will within 5 Business Days of the Effective Date designate in writing a person (the “**IT/Communications Representative**”) to be the party’s single point of contact with respect to the Design of the IT/Tel Infrastructure at the Building and all Communication Systems (collectively, the “**IT and Communication Systems Design**”).
2. Project Co’s IT/Communications Representative, the Authority’s IT/Communications Representative, and any person or persons designated by the Authority’s IT/Communications Representative will, within 30 Business Days of the Effective Date, settle a protocol (the “**IT and Communication Systems Design Consultation Protocol**”) for consultation between the parties to ensure the final IT and Communication Systems Design meets the needs of the users of the Building. The IT and Communication Systems Design Consultation Protocol will describe:
 - (a) the nature and timing, related to the IT and Communication Systems Design process, of consultations between the parties;
 - (b) the nature and level of detail of drawing and specifications that will be provided to the Authority’s IT/Communications Representative prior to and as part of the consultation;
 - (c) the number of consultation meetings, and the notice requirements to set meetings, including delivery of IT and Communication Systems Design information in advance for consideration by the Authority’s IT/Communications Representative;
 - (d) minutes and record keeping for the consultation meetings; and
 - (e) the manner in which disputes can be resolved and the IT and Communication Systems Design finalized.
3. The parties will have further consultations with respect to the IT and Communication Systems Design if any amendments to the IT and Communication Systems Design are proposed or required by reason of a change in Laws, a requirement by the City or result from the IT and Communication Systems Design process , which, in any of the foregoing cases, will have a material effect on the users of the Building.

APPENDIX 3G

ELECTRONIC SECURITY SYSTEMS STANDARD SPECIFICATION

APPENDIX 3H

PROTECTION SERVICES INTRUSION AND PANIC ALARM SYSTEMS INSTALLATION AND PROGRAMMING STANDARDS

(Section 7.16(q)(2)(D) of Schedule 3)

1.0	Scope – Intrusion Alarm Systems
1.1	n/a
1.2	Each door that leads to the protected space shall have a door contact installed.
1.3	Areas within the protected space shall be covered by dual tech motion detectors. A minimum of 4 motion detectors for every 1000 square feet (93 square metres) are required.
1.4	Glass break detectors are to be installed where the space is at ground level or if the glass is accessible from the exterior by way of roof top, ladder, stairs, etc.
1.5	One keypad to be installed at each designated entry door to the space within the protected space.
1.6	One keypad (minimum) is required for each partition.
1.7	The alarm system is to be monitored by Intercon Security, unless otherwise noted.
2.0	Intrusion Alarm Panel – Installation and Devices
2.1	All devices, including wiring, to be installed and field tested to comply with manufacturers specifications.
2.2	Control panel to be DSC 864, DSC Maxsys or DSC approved equal by the Authority.
2.3	Keypads to be DSC 5500Z LCD.
2.4	The system may require partitioning. The panel provided shall accommodate all required partitions.
2.5	Provide all required relay boards, expansion modules, additional power supplies and/or additional equipment to ensure system is fully functioning to manufacturer's specifications.
2.6	Motion detectors to be dual-tech.
2.7	Glass breaks to be Sentrol 5810A Shatterpro 2.
2.8	Wireless intrusion devices are not acceptable, unless approved in writing, by the Authority.

2.9	Door contacts to be concealed wherever possible. Fill voids with silicone.
2.10	Window contacts to be concealed unless otherwise instructed in writing by the Authority. Fill void with silicon.
2.11	The panel shall be mounted in a secure location within the protected space of the alarm system.
2.12	The panel power supply shall be a minimum 37 VA. It shall be hard-wired to dedicated, non-switched source. Plug in transformers are not acceptable.
2.13	Back up battery to be installed.
2.14	Home run all devices to the alarm panel. Do not gang or group devices.
2.15	All cabling to be clearly and permanently marked at each end.
2.16	A copy of all applicable zones and zone descriptors shall be left inside the alarm panel. This list is to be neat and legible.
2.17	All position eight (8) jacks shall be installed with a tamper loop, ahead of the demark block and installed to Telus standards.
2.18	In installations where there is an access system also being installed within the space, provide one dry contact output when the system state changes to armed. Provide wiring from intrusion alarm control panel to access control field panel for connection by others.
2.19	No splices shall be permitted in the wiring except where a connection is made to a device.
2.20	System shall have an interior siren that can be clearly heard at any point in the protected areas. More than one siren may be required.
2.21	Strobe (blue) shall be installed for each partition, with location to be decided in consultation with the Authority.
2.22	System to have a dedicated direct in dial phone number. Alarm system is not to share a line with any other device, such as a fax machine. Security contractor is required to provide cabling to the designated telephone demark location. Termination may also be required.
2.23	All field devices, including door contacts, window contacts, motion detectors, glass break detectors and panic buttons to be clearly labeled identifying the zone number. Labeling to appear professional using a Dymo label maker, or similar.
2.24	A laminated device diagram to be posted at each keypad clearly identifying all applicable zones, including panic alarm locations. For multiple partition systems, the diagram should apply only to the applicable partition.

3.0	Intrusion alarm programming
3.1	Programming of the system to be completed in full by the contractor, in consultation with the Authority.
3.2	System to be monitored by an external ULC central station mutually agreed upon by Project Co and the Authority at the time of implementation. Project Co to include all costs associated with setting up the alarm account and the verification of system programming, including verifying all zones.
3.3	System to be set up to utilize DSC DLS software with download access code to be provided by the Authority.
3.4	The contractor shall program the following: <ul style="list-style-type: none"> - user code required to bypass zones - bell restoral after 4 minutes. - home-away enabled
3.5	Auto arming is to be activated, with time(s) to be determined in consultation with the Authority.
3.6	Keypad panic and fire are not to be enabled.
3.7	L.E.D.'s on motion detectors are to remain active.
3.8	Installer lockout code is not to be enabled.
3.9	All zone descriptors to be programmed in plain English text. Zone descriptors are to be discussed with Authority prior to programming and may not be based on architectural drawings.
3.10	Upon alarm activation, all applicable partition keypads shall display the applicable alarming zone(s).
4.0	Scope – Panic/Duress Alarm Systems
4.1	The protected space is to be provided with a complete panic/duress alarm system in accordance as outlined in this specification and associated drawings.
4.2	Panic alarm system to consist of hard wired and wireless devices.
4.3	The panic/duress system is to be installed via the intrusion alarm panel. See Intrusion alarm specifications.

5.0	Panic/Duress Alarm System - Installation and Devices
5.1	The panic alarm system to be installed via the intrusion alarm panel. See Intrusion alarm specifications.
5.2	All devices to be installed and field tested to comply with manufacturers specifications.
5.3	Wall mounted duress buttons to be Camden CM 3050 R 12
5.4	Under desk or cabinet buttons to be United HUB 2B latching button.
5.5	Covers are to mounted over each wall mounted panic button – Model STI 6505 clear with wording “Security Emergency”
5.6	Hard wired Alarm zones shall identify the specific device location – no grouping of devices.
5.7	Exact locations to be determined in consultation with the Authority.
5.8	Mounted wireless buttons do not constitute a hard wired button and are not acceptable.
5.9	Wireless buttons to be Visonic WT201. Provide a minimum of 6 units.
5.10	Provide adequate wireless receivers to ensure pendant signals are received throughout the entire space. A minimum of two receivers are required. In addition, provide a minimum of one receiver for every 2500 square feet (232 square metres).
5.11	Provide all necessary input output, expansion boards and power supplies necessary to accommodate individual zoning of each panic device.
5.12	Installation of all panic system components to be installed as per manufacturers instructions.
5.13	All field devices, including door contacts, window contacts, motion detectors, glass break detectors and panic buttons to be clearly labeled identifying the zone number. Labeling to appear professional using a Dymo label maker, or similar.
5.14	A laminated device diagram to be posted at each keypad clearly identifying all applicable zones, including panic alarm locations. For multiple partition systems, the diagram should apply only to the applicable partition.
6.0	Panic Alarm System - Programming
6.1	Programming of the system to be completed in full by the contractor, in consultation with the Authority.
6.2	System to be ULC monitored by Intercon Security unless otherwise noted. Project Co to include all costs associated with setting up the alarm account.

6.3	System to be set up to utilize DSC DLS software with download access code to be provided by the Authority.
6.4	Each panic device to be zoned independently at the intrusion panel.
	All zone descriptors to be programmed in plain English text. Zone descriptors are to be discussed with the Authority prior to programming and may not be based on architectural drawings.
6.5	Upon panic alarm activation, all applicable partition keypads shall display the applicable alarming zone(s).
6.6	Panic device activations are to be silent at the alarm keypad, unless otherwise instructed in writing by the Authority.
6.7	Panic device activations are not to activate audible intrusion siren or strobe, unless otherwise instructed in writing by the Authority.
7.0	Training
7.1	The contractor to provide one sixty minute training session to area staff.
7.2	The contractor to work in consultation with the Authority to determine an appropriate time.
8.0	Permits and Licensing
8.1	The contractor must be licensed by all authorities having jurisdiction to install applicable alarm systems and devices.
8.3	Copies of all permits to be available upon request by Fraser Health.
9.0	Documentation
9.1	Contractor to provide a standard 1"- 2" binder with the following: <ul style="list-style-type: none"> - Table of contents - Manufacturers cut-sheets for all devices - All installation manuals - All operating manuals - All required permits - Fully completed programming worksheets for intrusion, panic/duress and associated systems. - All documentation to be neat, legible and of professional quality.

APPENDIX 3I

APPROVED/PREFERRED VENDORS & TECHNOLOGY PRODUCTS

Introduction

The Authority has ongoing relationships with a number of vendors and, in some instances, has standardized on specific vendor products to support our technology operations. The Authority's approved and preferred vendors by technology category is set out below.

Network Infrastructure

Vendor - 3COM

Products: Switches

Switch Type	Description	Model Number
3Com® Switch 4500 26-Port	26-Port stackable 10/100 switch for cost-effective deployment of secure converged networks.	3CR17561-91
3Com® Switch 4500 50-Port	50-Port stackable 10/100 switch for cost-effective deployment of secure converged networks	3CR17562-91
3Com® Switch 4500 PWR 26-Port	26-Port stackable 10/100 Power over Ethernet switch for cost-effective deployment of secure converged networks	3CR17571-91
3Com® Switch 4500 PWR 50-Port	50-Port stackable 10/100 Power over Ethernet switch for cost-effective deployment of secure converged networks	3CR17572-91
3Com® Switch 4500G 24-Port	24-port stackable 10/100/1000 switch for cost-effective deployment of secure converged networks	3CR17761-91
3Com® Switch 4500G 48-Port	48-port stackable 10/100/1000 switch for cost-effective deployment of secure converged networks	3CR17762-91
3Com® Switch 4500G PWR 24-Port	24-port stackable 10/100/1000 Power over Ethernet switch for cost-effective deployment of secure converged networks	3CR17771-91
3Com® Switch 4500G PWR	48-port stackable 10/100/1000	3CR17772-91

48-Port	Power over Ethernet switch for cost-effective deployment of secure converged networks.	
3Com® Switch 4500G 2-Port 10-Gigabit Module (XFP)	10-Gigabit Ethernet module for use in the Switch 4500G; XFP-based.	3C17766
3Com® Switch 4500G 2-Port 10-Gigabit Local Connection Module	10-Gigabit Ethernet module for use in the Switch 4500G; uses CX4 cables	3C17767
3Com® Switch 5500-SI 52-Port	52-port premium stackable 10/100 switch for enhanced network security, performance and reliability	3CR17152-91
3Com® Switch 5500-EI 28-Port	28-port premium XRN® Technology stackable 10/100 Layer 2/3/4 switch for demanding network applications requiring the highest "five 9s" network uptime.	3CR17161-91
3Com® Switch 5500-EI 52-Port	52-port premium XRN® Technology stackable 10/100 Layer 2/3/4 switch for demanding network applications requiring the highest "five 9s" network uptime.	3CR17162-91
3Com® Switch 5500-EI PWR 28-Port	8-port premium XRN® Technology stackable 10/100 Layer 2/3/4 switch for demanding network applications requiring the highest "five 9s" network uptime; supports Power over Ethernet.	3CR17171-91
3Com® Switch 5500-EI PWR 52-Port	2-port premium XRN® Technology stackable 10/100 Layer 2/3/4 switch for demanding network applications requiring the highest "five 9s" network uptime; supports Power over Ethernet.	3CR17172-91
3Com® Switch 5500-EI 28-Port FX	28-port premium XRN® Technology stackable 100BASE-X Layer 2/3/4 switch	3CR17181-91

	for demanding network applications requiring the highest "five 9s" network uptime; provides the security and reach of a fiber-based switch.	
3Com® Switch 5500G-EI 24-Port	24-port premium XRN® Technology stackable Gigabit / 10-Gigabit Layer 2/3/4 switch for demanding network applications requiring "five 9s" network uptime.	3CR17250-91
3Com® Switch 5500G-EI 48-Port	48-port premium XRN® Technology stackable Gigabit /10-Gigabit Layer 2/3/4 switch for demanding network applications requiring "five 9s" network uptime.	3CR17251-91
3Com® Switch 5500G-EI PWR 24-Port	24-port premium XRN® Technology stackable Gigabit /10-Gigabit Layer 2/3/4 switch for demanding network applications requiring "five 9s" network uptime; supports Power over Ethernet.	3CR17252-91
3Com® Switch 5500G-EI PWR 48-Port	48-port premium XRN® Technology stackable Gigabit /10-Gigabit Layer 2/3/4 switch for demanding network applications requiring "five 9s" network uptime; supports Power over Ethernet.	3CR17253-91
3Com® Switch 5500G-EI 24-Port SFP	24-port premium XRN® Technology SFP-based stackable Gigabit / 10-Gigabit Layer 2/3/4 switch for demanding network applications requiring "five 9s" network uptime.	3CR17258-91
3Com® Switch 5500G-EI 8-Port 1000BASE-X Module	Application Media Module for 3Com Switch 5500G-EI; eight SFP-based Gigabit ports.	3C17260
3Com® Switch 5500G-EI 1-Port 10G Module	Application Media Module for 3Com Switch 5500G-EI; one 10-Gigabit (XENPAK) port.	3C17261
3Com® Switch 5500G-EI 2-	Application Media Module for	3C17268

Port 10G Module	3Com Switch 5500G-EI; two 10-Gigabit (XFP) ports.	
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Cabling Infrastructure

Vendor – Telus

Products: Wide area network. For redundancy provide connections to vendor at two physically separate locations into the Building and from two different telco central offices.

Servers

Vendor: – Hewlett Packard

Products: Domain Controller
 DL360 G5
 2 GB Memory
 2 X 72 GB SAS Drives – Raid 1
 Redundant Power Supply
 3 Gigabyte Network Interfaces
 Two Power Plugs
 Integrated Lights Out Advanced Pack
 4 year Onsite 24X7 Warranty
 OS License (Windows 2003 Standard R2)
 MS Systems Management Server License
 Active Directory Smart Plug-In License
 Veritas NetBackup License
 McAfee Antivirus License
 OpenView Operation Agent License

SMS Server

DL380 G5
 2 GB Memory
 2 X 72 GB SAS Drives – Raid 1
 6 X 146 GB (300 GB when available) SAS Drives – Raid 5
 Redundant Power Supply
 3 Gigabyte Network Interfaces
 Two Power Plugs
 Integrated Lights Out Advanced Pack
 4 year Onsite 24X7 Warranty
 OS License (Windows 2003 Standard R2)
 MS Systems Management Server License
 Active Directory Smart Plug-In License
 Veritas NetBackup License
 McAfee Antivirus License

OpenView Operation Agent License

GE DAS

DL360 G6

2GB memory

Two embedded NC373i Multifunction Gigabit Network Adapters

2 x 72GB 10K Serial Attached SCSI (SAS)

Integrated Lights-Out 2 (iLO 2) embedded

1 full-length and 1 low-profile x8 PCI-Express slots

Slimline DVD-ROM/CD-RW combo drive

9 fans; N+1 fan redundancy

128MB Battery-Backed Write Cache with Battery Housing

HP Smart Array E200i Controller FIO

Red Hat Enterprise Linux License

Veritas NetBackup License

McAfee Antivirus License

OpenView Operation Agent License

Telecommunications

(d) PBX Specifications

Nortel PBX spec

Model: Nortel CS 1000 Communication Server 1000

Vendor: TELUS

Licensing options required: VOIP / Digital (TDM) / Analogue / ACD
License

Maintenance options: Maintenance and support agreement required.

NEC PBX spec

Model: NEC UNIVERGE SV7000

Vendor: NEC

Licensing options required: VOIP License

Maintenance options: Maintenance and support agreement required.

(e) Desktop sets - Wired

Nortel handsets

Models:

Vendor: TELUS

Licensing options:

Maintenance options:

NEC handsets

Models: DtermIP, Dterm Series

Vendor: NEC

Licensing options: VOIP License

Maintenance options: Pert port maintenance agreement currently in place.
Covers phone and infrastructure.

Wireless Phones – 802.11 based

802.11a/b/g tri mode phone

Manufacturer : Nortel

Model : 6120

Options :

Standard, extended and super extended battery options

Belt Clips – Model Number

Battery Chargers – single and gang chargers – Nortel

Nortel Programming cradle

Licensing options required

Maintenance options required

Voice Processor : Nortel SVP (need model numbers)

Manufacturer : NEC

Model :

Options :

Standard, extended and super extended battery options

Belt Clips – Model Number

Battery Chargers – single and gang chargers – NEC

NEC Programming cradle

Licensing options required

Maintenance options required

Video Conferencing

Vendor - Polycom

Products: Mobile VC
 NEC Projector including ceiling mount
 Motorized or non motorized projection screen
 Mobile Video conferencing cart
 Polycom video conferencing equipment
 VSX7000S Camera and Codec & Remote Control
 Full sound system & speakers
 VTX1000 Soundstation
 42 Inch Plasma screen X2 (soon to be HD Displays)
 Laptop/projector connection cable
 Licensing
 VCR/DVD Player

Fixed VC
 NEC Projector including ceiling mount
 Motorized or non motorized projection screen
 Mobile Video conferencing cart
 Polycom video conferencing equipment
 VSX7000S Camera and Codec & Remote Control
 Full sound system & speakers
 VTX1000 Soundstation
 42 Inch Plasma screen X2
 Laptop/projector connection cable
 Licensing
 VCR/DVD Player

End-Use Equipment

Vendor – Hewlett Packard

Products: Desktop
 HP DC5700 P4-Core 2 Duo 1.86GHz
 80GB HARD DRIVE
 1GB MEMORY
 DVDROM
 HP KEYBOARD
 MICROSOFT WHEEL MOUSE
 NO FLOPPY
 HP L1740 17" LCD MONITOR

Laptop
 HP NC6320 T2500 2.0GHZ/60GB/512MB/15.0" XPP/DVD-CDRW

Laptop - Desktop Alternative FHALT029
 HP NC6320 T2500 2.0GHZ/60GB/512MB/15.0" XPP/DVD-CDRW
 HP BASIC DOCKING STATION
 HP L1740 17IN LCD FLAT PANEL DISPLAY
 HP USB STD KEYBOARD
 MICROSOFT OPTICAL WHEEL MOUSE
 TARGUS TRADEMARK NOTEPAC CARRYING CASE

Tablet PC
 HP TC4400 TABLET PC Intel T2500 2.0GHZ/512MB/60GB 12.1" DISPLAY

Printers
 Models: LJ 4101 MFP, LJ 4345xm MFP, LJ 9040 MFP, LJ 9050 MFP, CLJ 4730
 MFP, LJ 4350TN, LJ 4250TN, LJ 5100TN, LJ 9050N, CLJ 2550N, CLJ 3800DTN, CLJ
 4650N, CLJ 5550DTN, Officejet 9100, DesignJet 500PS, DesignJet 1055cm, BIJ
 2300DTN, BIJ 2800DTN, BIJ 3000DTN

Vendor – Microsoft

Products: Microsoft Windows XP SP2 (current desktop Operating System)
 Microsoft Office 2003 SP2 (current Office product)

Vendor – Adobe

Product: Adobe Acrobat Reader 8.x (current product)

Health Care Information System

Vendor – Meditech

Products: Standard Meditech modules and data stores are deployed at all Authority acute care facilities. The authority is evolving to have all patient information stored centrally within and maintained by Meditech systems.

Wireless Network – 802.11a/b/g Equipment

Product: Access points
 Manufacturer : 3Com
 Approved Model : 3CRWX375075A
 Common name : AP3750
 Radio support : 2.4Ghz and 5Ghz - Dual 802.11a and 802.11b/g radios, internal antenna

Wireless switches:

12 Access points or less per site:
 Manufacturer : 3Com
 Approved Model : 3CRWX120695A
 Common name : WX1200

13 Access points or more per site
 Manufacturer : 3Com
 Approved Model : 3CRWX440095A
 Common name : WX4400
 Licensing requirements : per 24 additional access points : 3CWX4400L24A
 Power supply – redundant PS for WX4400 : 3CWX4400RPSA

Management software for wireless switches:

Manufacturer : 3Com
 Model : 3Com Wireless Switch Manager (up to 10 switches) 3CWXM10A

APPENDIX 3J

STRUCTURED CABLING STANDARDS

APPENDIX 3K

TELEPHONE STANDARDS

Introduction Fraser Health is the amalgamation of three former Health regions called Fraser Valley (Fraser Health East), Simon Fraser (Fraser Health North), and South Fraser (Fraser Health South). Before the amalgamation these three previous regions have their own telephone system standard.

Fraser Health East standardized on NEC telephone systems. NEC 2400 telephone systems are being used at the four major hospitals namely; MSA, Chilliwack General, Mission Memorial and Fraser Canyon. Community offices which include; Home Health, Public Health, Mental Health, Dialysis and other administration and programs that are under Fraser Health are using NEC2000 Telephones systems or DRUs depending on number of telephone lines required and location. These phone systems are capable of providing analog lines for fax, alarm and modem lines.

NEC's new SV7000 telephone system is now the standard telephone system for new facilities requiring more than 500 telephone lines. ARHCC in Abbotsford will be using the SV7000 telephone system.

Several NEC type of telephone handsets are currently used at these sites. An 8 button, 16 button and a 32 button phones are currently the standard and these could be either digital or IP phones. For new facilities IP phones will be the standard.

Type of phone	Location / Users
Analog	Nursing Station
8 Button	Staff
16 Button	Managers / Secretary/Receptionist/ Nursing Stations
32 Buttons	Secretary/ Receptionist

- Nursing station must have both 16 button and analog phones.

Fraser Health North and South are both standardized on Nortel Meridian telephone systems. Acute sites are using Meridian 1 from option 11 up to option 81 depending on the number of telephone lines required. Royal Columbian and Surrey Memorial hospitals are using Meridian 1 option 81. Eagle Ride, Ridge Meadow, Burnaby, Langley Memorial and Peace Arch hospitals are using Meridian 1 option 61. Delta hospital is using Meridian 1 option 11. Community offices which include; Home Health, Public Health, Mental Health, Dialysis and other administration and programs that are under Fraser Health are using Nortel Meridian 1 option 11, CS1000, Mini Carrier Remote and M9150.

Nortel new PBX product lines are called CS1000E. This will be the standard telephone system for new facilities that will be using Nortel PBX.

Several Nortel telephone handsets are used at these facilities, single line and several types of multi lines telephones both digital and IP phones are being used. IP phones will be the standard for new facilities.

Type of phone	Location / Users
Analog	Nursing Station
M3902 / I2002	Staff
M3903 / I2002	Managers
M3904 / I2004	Secretary/ Receptionist / Nursing Stations

- Nursing station must have both I2004 and analog phones

All phone systems are connected to each other using VoIP technology.

The two centralized voice mail systems being used at Fraser Health East and several voice mail systems being used at both Fraser Health North and South are currently in the process of being upgraded to a new centralized/redundant system.

Telephone systems must be capable of handling Fraser Health new numbering plan, new centralized voice mail, centralized switchboard and IP connectivity to the rest of Fraser Health phone systems.

Hospitals (Acute and Sub-Acute) telephone system and handsets must have at least two hours of backup power. Community offices telephone system and handsets must have a minimum of 1 hour back up power.

APPENDIX 3L

WIRELESS INFRASTRUCTURE STANDARDS

1. **INTRODUCTION**

This standard describes the requirements for deploying wireless technologies related to data and voice devices in the Fraser Health Authority. There are 3 main goals of this document, first to protect the information assets of the FHA, second to protect the privacy of the individual user, and third to ensure infrastructure is deployed to ensure the highest possible availability to the end user. It is the responsibility of the project sponsor to ensure the users are educated on matters related to wireless communications, to explain the benefits and limitations, including the security risks and availability issues.

2. **Scope**

This standard covers 802.11 based wireless data communication devices currently in use on FHA sites or planned for use within the next 12 months. The technical details included in the standard are based on the requirements as published by the relevant vendors. The standard for infrastructure is structured to ensure wireless networks are able to support data and voice technologies for the foreseeable future.

3. **Equipment Standards**

The current wireless infrastructure approved for use at FHA sites is 3Com wireless switch infrastructure based on the following products :

Wireless Switches : WX4400 and WX1200

Wireless Access points : AP3750 dual radio 802.11a/b/g

Fraser health devices currently in use and approved include:

Hewlett Packard laptops and tablets equipped with internal 802.11a and 802.11b/g radios, HP iPaq handhelds with 802.11b/g radios, Symbol handheld scanners

Voice technologies under review :

FHA is currently evaluating voice technologies and has arranged the standard to support the following voice devices : Vocera badges, Nortel and NEC 802.11a/b/g based phones (OEM Spectralink 8000 series), RIM Blackberry 802.11b/g phones

4. **Infrastructure standard**

4.1. **802.11 b/g radios**

All sites will have complete 802.11 2.4Ghz infrastructure and will adhere to the following standards of service:

- 4.1.1. Signal strength : site RSSI for 802.11b data services will not fall below -70dB at any point at the site between 3 feet and 6 feet from the surface of the floor in the intended coverage area. Site RSSI for 802.11g data services will not fall below -60dB at any point at the site between 3 feet and 6 feet from the surface of the floor in the intended coverage area. Signal strength will not exceed -30dBm in any area it is reasonable that staff will be occupying for extended periods of time.

4.1.2. Noise Floor : the site will not have a 2.4Ghz noise floor above -70dB in any area that 802.11b/g wireless devices will be used. Noise floor measurements are to be verified prior to infrastructure deployment.

4.1.3. Channel separation : site channel separation will exceed -20dB in 75% or greater of the site.

4.1.4. Channel plan : the site will be configured on a 3 channel plan for b/g coverage, with consideration being taken for the channels used by interfering devices such as microwave ovens.

4.2. **802.11 a radios**

All sites will have complete 802.11 5Ghz infrastructure and will adhere to the following standards of service:

4.2.1. Signal strength : RSSI for data services will not fall below -60dB at any point at the site between 3 feet and 6 feet from the surface of the floor in the intended coverage area. Signal strength will not exceed -30dBm in any area it is reasonable that staff will be occupying for extended periods of time.

4.2.2. Noise Floor : the site will not have a 5Ghz noise floor above -80dB in any area that wireless devices will be used. Noise floor measurements are to be verified prior to infrastructure deployment.

4.2.3. Channel separation : site co-channel separation will exceed -20dB in 95% or more of the site.

4.2.4. Channel plan : the site will be configured on an 8 channel plan for 802.11a coverage, with consideration being taken for the channels used by interfering devices such as industrial cleaners or electric motors.

4.3. **Physical Installation**

All wireless access points will be flush mount to the ceiling or attached to the ceiling tile using approved mounts. Cabling will be terminated in an approved fashion in the plenum with a 6 meter service loop. From the termination point a patch cable of up to 3m may be used to connect the access point. All cabling will be in compliance with the FHA cabling standard and will support PoE to the access point. All access points will have 2 cable runs to allow for redundant switch connection in the closet.

All wireless switches will be mounted in the central wiring closet or data facility in an approved rack or cabinet and be connected into the LAN with a minimum of :

WX4400 : 2 x 1Gbps interface

WX1200 : 2 x 100Mbps interface

Wireless switches will be connected to an approved UPS in an approved fashion.

5. **Required Documentation**

All wireless LAN deployments must be fully documented. Components to be documented include but are not limited to :

- 5.1. Site floor plans with access point locations, cable numbers, closet connections and switch ports noted
- 5.2. Site floor plans with noise floor, data rate and signal strength overlays, preferably completed using Ekahau site survey tool, completed prior to site go-live, as a baseline
- 5.3. Wireless switch(es) configuration dump

- 5.4. Site specific wireless application documentation and user group contacts
- 5.5. List of neighbours and rogue activity for at least 1 full week prior to go-live
- 5.6. 3Com wireless switch management tool configuration files – complete – and configuration report from same. 3com wireless switch management tool must have floor plans imported and enable device location.
- 5.7. Client setup and configuration how-to documentation for service desk
- 5.8. SLA by application
- 5.9. Troubleshooting guide for service desk
- 5.10. Ops guide for Operations Group monitoring
- 5.11. System recovery procedures – bare metal rebuild
- 5.12. System upgrade procedures – firmware updates and wireless manager upgrades

6. **Wireless Encryption and Authentication**

All infrastructure must comply with the FHA wireless communications policy.

7. **Network Access**

All wireless network services configured must have ACLs applied that limit the wireless user's access to only the services required by that user, specific to address, port and protocol. No any-any rules will be permitted in relation to wireless services.

8. **Use of VLANs**

VLANs may be used for services configured on the wireless network. All VLANs must be documented and the use of said VLANs vetted by the FHA communications group.

9. **System testing**

Infrastructure will be tested completely with syslog detail showing device roaming from each access point installed. System redundancy and recovery procedures will be tested at least once prior to go-live. Any issue or failure in the test process will be documented and the test will be repeated until successful.

10. **Enforcement**

Vendors are responsible for adhering to this standard and will be responsible for costs incurred to satisfy any part of this standard which is not achieved. Given the standard is met successfully at go-live, the vendor will be responsible for taking reasonable measures to correct issues with infrastructure which arise within a year of go-live.

11. **Suitability**

Where environmental issues exist which are found to be beyond the control of either FHA or the vendor, the issues will be documented as exceptions to the standard and signed off by both FHA and the vendor. It is understood that wireless is subject to outside interference which may affect the availability of wireless services, but it is the responsibility of the vendor to discover these issues prior to go-live. Issues discovered after go-live which are external in nature will be evaluated by a 3rd party and the vendor and FHA will work together to find resolution. If it is determined by the 3rd party that the issues existed prior to go-live the vendor will provide resolution to the issue or compensate FHA accordingly for the services or areas affected.

12. Definitions

Term	Definition
Cell	An area surrounding a single access point
Client	Any device associating to the wireless or wired network
Go-live	The date in which a system is being used in a production environment and is considered complete.
Encryption	A method by which data transferred between two entities is deemed illegible by an intercepting body or individual
TAS	Fraser Health Authority Technical Architecture and Security Group

13. Revision History

November 21 2006	FHA draft created
June 30 2007	FHA draft updated

APPENDIX 3M

WIRELESS COMMUNICATIONS POLICY

1. Introduction

This policy describes requirements for access to Fraser Health Authority networks via wireless communication mechanisms. This policy also describes the requirements for creation of new wireless networks and the modification of existing wireless networks. Only wireless systems that meet the criteria of this policy or have been granted an exclusive waiver by Technical Architecture and Security are approved for connectivity to FHA's networks.

2. Scope

This policy covers all wireless data communication devices (e.g., personal computers, cellular phones, PDAs, printers, handheld scanners etc.) connected to any of FHA's internal networks or devices. This includes any form of wireless communication device capable of transmitting packet data. Wireless devices and/or networks without any connectivity to FHA's networks do not fall under the purview of this policy (i.e. isolated wireless phones, ham radio etc).

3. Policy

3.1 Registration of Access Points and Wireless Network Cards

All wireless Access Points / Base Stations / Switches connected to the corporate network must be registered and approved by Technical Architecture and Security. These Access Points / Base Stations are subject to periodic penetration tests and audits. All wireless Network Interface Cards (i.e., PC cards) used in corporate laptop or desktop computers must be registered with Technical Architecture and Security.

3.2 Approved Technology

All wireless LAN access must use corporate-approved vendor products and security configurations. See Technology approval policy.

3.3 Wireless Encryption and Authentication

All computers with wireless LAN devices must utilize a corporate-approved wireless encryption connection method configured to drop all unauthenticated and unencrypted traffic. To comply with this policy, wireless implementations must maintain point to point hardware encryption mechanisms of at least 1024 bits cipher strength. All implementations must support a hardware address that can be registered and tracked, i.e., a MAC address. All implementations must support and employ strong user authentication which checks against a RADIUS service.

3.4 Key Management

Where certificate use is not possible pre-shared keys may be used in conjunction with MAC address based security. The pre-shared keys will be changed on a regular basis, not to exceed 8 weeks.

3.5 Setting the SSID

The SSID will be configured so that it does not contain any identifying information about the organization, such as the company name, division title, employee name, or product identifier. SSIDs will be configured with beaconing disabled.

3.6 Cellular wireless access

Access to FHA networks via cellular modems will be considered identical to access from all other foreign networks. Access via cellular modems and cellular data cards will be facilitated using the Nortel VPN client and the VPN Terminal Server.

4. Enforcement

Any employee found to have violated this policy may be subject to disciplinary action, up to and including termination of employment.

5. Suitability

For data networks, wireless networks should not be considered a replacement for a wired network. It should be seen only as an extension to the existing wired network for general purpose access in areas of transient use such as common areas, meeting rooms and areas with fluctuating user counts.

A wireless access point provides shared bandwidth. As more users connect to the access point, the available bandwidth per user diminishes. Therefore, wireless networks are not appropriate for high bandwidth applications such as video streaming. It is most suited for applications such as email and web browsing.

Where possible, wireless deployments should have ACLs configured to limit access to sensitive and/or confidential information. Where sensitive and/or confidential information is being accessed via wireless encrypted protocols must be employed.

ITS reserves the right to restrict access to services and resources that may be disruptive to the wireless network or pose a significant security threat.

6. Definitions

Terms	Definitions
User Authentication	A method by which the user of a wireless system can be verified as a legitimate FHA user independent of the computer or operating system being used

Device Authentication	A method by which a device attempting to connect to the wireless network is authenticated as a legitimate FHA device
Encryption	A method by which data transferred between two entities is deemed illegible by an intercepting body or individual
TAS	Fraser Health Authority Technical Architecture and Security Group

7. Procedure

7.1 Requesting access to existing wireless network(s):

REASON : to control the growth of the number of users thereby maintaining availability of the wireless network for all users

- 7.1.1 Users requiring wireless access at a designated site are required to submit a request for access form to Helpdesk. The form can be found in appendix A. Included in the request is detail on frequency of use and type of use, submission of a request does not guarantee approval.
- 7.1.2 An e-mail confirmation of receipt will be sent to the user upon receipt of a completed form
- 7.1.3 If approved, following the confirmation will be an e-mail with detail on setup for access to the wireless network
- 7.1.4 If the addition of a user results in the need for the installation of additional hardware the requesting department will be responsible for the costs associated with the additional hardware

7.2 Modification to an existing wireless network:

REASON : to ensure the wireless networks remain consistent in use to avoid changes on-the-fly which may indirectly create security risks or impact availability of wireless services for existing users.

- 7.2.1 Departments requiring change or expansion of existing wireless networks must provide a minimum of 4 weeks notice of the change requirement to TAS
- 7.2.2 If the change or expansion creates unacceptable increased risk the request will be denied
- 7.2.3 Expansion of services requiring resources beyond 8 hours estimated time will require an additional week of lead time, with an additional week for each 20 hours of resources required

7.2.4 Expansion projects will include costs for risk analysis, penetration testing, and associated documentation changes and data entry time where required for MAC address entry and certificate management functions

7.3 Creation of new wireless network

REASON : to ensure new wireless networks are implemented in the most secure way possible and implemented according to policy.

7.3.1 Departments requiring wireless networks are required to submit a project plan in advance of product selection

7.3.2 New wireless networks will be subject to penetration testing and security audits

7.4 Communicate the intended use of wireless networks

REASON : to ensure all users are aware of the intended use of a wireless network to avoid creating unnecessary and unintended risk

7.4.1 The intended use of the wireless service will be communicated to the end user to ensure the wireless service is only used for it's intended purpose.

7.4.2 Modifications to the intended use of the wireless networks will be considered a modification to the wireless network itself and will require prior approval as outlined in 7.2 above.

7.4.3 Wireless networks will be deployed in such a fashion as the services available will be as narrowly defined as possible and therefore will not be the same as those available on the physical wired network. Changes to the intended use may cause issues to be reported erroneously.

8. Revision History

November 30 2005	FHA draft created based on SANS institute template
December 28 2005	FHA draft updated
January 3 2005	FHA draft updated, added procedure section
June 30 2006	FHA draft updated

APPENDIX 3N

MEDICAL GAS REQUIREMENTS