Appendix 2C

PROPOSAL EXTRACTS (DESIGN AND CONSTRUCTION)

Vernon Jubilee Hospital

Proposal Extracts 6th / 13th March 2008

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Section 2.1.4 Design Principles

INTRODUCTION

Infusion is pleased to acknowledge, and fully supports, the Authority's project vision. In this section we summarize our response to that vision and our adherence to the guiding principles for the project. We also briefly describe the characteristics of our design which enhance and support the core public service the Authority is tasked with delivering.

2.1.4. a) Describe how the design principles in the proposal will meet the project vision and guiding principles in Section A2.1 of Volume 3 (VJH).

Infusion's proposed Diagnostic and Treatment Centre at Vernon Jubilee Hospital meets and exceeds the Authority's objectives for delivering excellence in health care services to the residents of Kelowna and the catchment area by responding in the following ways to each of the Authority's stated Project Vision and Guiding Principles.

Project Vision – To set new standards of excellence in the delivery of healthcare services, to serve the needs of Vernon and the catchment area, and to have the capacity to meet future needs. The plan will identify and develop synergies between programs and services and will describe a place where people want to be and a place where people choose to work.

Infusion's proposal provides the following distinct value-for money features:

New Standards of Excellence

- Spacious, high-specification accommodation for all programs

Capacity to Meet Future Needs

- All programs on all floors include provision for future expansion area
- 2 future floors are anticipated with 30-bed inpatient units
- The new Emergency Department allows for future horizontal expansion as the community develops
- Former emergency and ambulatory care spaces in the existing Jubilee building are available for future internal development

Synergies Between Programs and Services

- Improved separation of access points for visitors, patients, ambulances and loading traffic reduces sense of crowding on the site
- A new central registration is provided at the main entry of a new building, which improves patient flow for both new and existing building, and separates emergency patients from other visitors

A Place Where People Want to Be and Choose to Work

- Large and lively common areas, green roofs, patios and daylight and views from all areas of the building provide a place where staff will want to work, and a place where visitors want to be because it no longer feels like a "hospital"
- A garden courtyard on Level 1 as a respite and refreshing amenity for outpatients and visitors
- Window views and daylight to all major treatment areas as well as Sterile Processing and OR provide respite and a sense of freshness
- All visible roofs are planted "green roofs"
- A managed construction plan that will be ease the impacts of construction for hospital staff during the construction period and maintain services to the fullest degree
- The new Diagnostic and Treatment building is located on the site to allow for the logical future expansion and growth of the campus to the east and to provide great synergy with the existing building
- Providing a "buffer" zone between the access roads and the new building, allows for generous drop off areas and convenient parking around the entry points
- Sustainable building planning allows for the internal space flexibility: expendability, convertibility and versatility, achieved by linear planning of spaces along the service and public corridors, as well as the modular planning where possible (patient rooms)
- Clear separation of the service and public circulation (corridors and elevators) provides clear separation between the staff and the visitors, improves the way-finding and security within the new building
- A renewed, efficient Main Entry and connection between this building and the existing Hospital, provides areas of orientation, gardens, respite, retail or child-care activity, artwork and donor recognition that did not exist before
- The upper floors of the facility (Maternity/Paediatrics and ICU/CCU) were each given their own floor plates to give security and privacy to these functions, align with the future In-patient unit floor plate sizing. Narrow floor plates provide significantly increased amount of day light and views, thus ensuring for pleasant environment for both staff and patients
- Rooftop gardens provide respite and a refreshing amenity for the maternity, paediatric, and critical care patient units. The compact footprint on the sloped site allows improved separation of entrances for visitors, walk-in emergency, ambulances and service traffic
- A managed construction plan that will be ease the impacts of construction for staff and patients during the construction period

Guiding Principle 1 – The new building will have standardized rooms wherever practical

Standardized room types are used for both the VJH-DTC and the KGH-ACC. This means:

- Improved internal operational flexibility
- Improved future flexibility to adapt or convert rooms from one use to another
- Standardized configurations support easier facility management
- Standardized equipment and furnishings allows interchanging of resources
- Greater staff familiarity of room types and improved operations across both sites
- Equivalent "handing" of rooms is used wherever possible to standardize processes and reduce errors
- The standardised room types are rooted in proven 'best practice' configurations and have been fully designed and reviewed with the users. Future needs that may arise as medical delivery systems change have also been considered
- Corridor and major circulation routes are generally laid one above the other on all floors, along the lines of "racetrack" layouts oriented around major exterior courtyards on all floors
- Shelled spaces in departments are generally located where they can serve as storage and other uses on an interim basis until they are outfitted. Regular-shaped floor plates and rooms allow for future enlargements or internal adjustments
- Alignment and placement horizontally and vertically of department and room spaces within this modular organization acknowledges the possibility of change in the delivery of health care between departments and rooms
- Inpatient units are located above the mechanical floor to allow efficient stacking of similar department and room modules. This allows more flexibility in layout as floor penetrations will not impact healthcare delivery on the floors below the Mechanical floor at Level 4
- Consideration for similar spaces can be applied in areas where overlap of space uses would be beneficial – for example, same-sizing of day-surgery treatment bays
- Shelled and soft spaces are planned to accommodate change as well, and provide useful space even in their interim state
- Modular design provides a framework for applying 'best practice' room types already used and tested

Guiding Principle 2 – Adopt a modular rather than customized design approach to organizing clinical practices to maximize the long-term flexibility of interior space

The simple, regularly-shaped floor plates are organized by centralising building services and vertical circulation and then surrounding those fixed vertical elements with compact departments and simple, rectangular rooms.

Corridor and major circulation routes are generally laid one above the other on all floors, along the lines of "racetrack" layouts oriented around major exterior courtyards on all floors.

Shelled spaces in departments are generally located where they can serve as storage and other uses on an interim basis until they are outfitted.

Overall, the building is planned on 9 x 9 m structural grid with a central services and vertical circulation core – with regular shaped floor plates, departments and rooms. All are organized based on a simple stacking of central core services and vertical circulation.

Main circulation and organization fit into this modular concept allowing simple and cohesive movement through the facility. Alignment of the grid acknowledges the link to the existing site and hospital.

Regular-shaped floor plates and rooms allow for future enlargements or internal adjustments.

Alignment and placement horizontally and vertically of department and room spaces within this modular organization acknowledges the possibility of change in the delivery of health care between departments and rooms.

Inpatient units are located above the mechanical floor to allow efficient stacking of similar department and room modules. This allows more flexibility in layout as floor penetrations will not impact healthcare delivery on the floors below the Mechanical floor at Level 4.

Consideration for similar spaces can be applied in areas where overlap of space uses would be beneficial – for example, same-sizing of day-surgery treatment bays.

Shelled and soft spaces are planned to accommodate change as well, and provide useful space even in their interim state.

Modular design provides a framework for applying 'best practice' room types already used and tested.

Guiding Principle 3 – Provide flexible space that can accommodate future changes to service delivery, technology, and equipment

Generally, all departments are planned on a treatment zone with dispersed staff care centres encircling a core of staff and support services. This type of layout has been shown to work well for the provision of most hospital services. Each of these areas is flexibly planned with wall area, alcoves and infrastructure that can allow for changes in technology and equipment. Our intention is that not every space is filled, to allow for this internal flexibility.

Flexible space design principles include:

- Large, regular-shaped floor plates with minimal interruption
- Simple organization of space including linear main circulation, department locations, planning and room placement
- Co-location of similar services and planning of departments to allow opportunity to integrate service delivery
- Soft and shell space located to allow anticipated future changes in the delivery of health services

- Design of mechanical and electrical zonal distribution systems to allow for simple extensions and modifications to possible areas of change
- Departments are planned be adaptable to alternative staffing models, allowing for supervision of care areas, sub-stations, co-location of staff and use of communication systems to maximize options

Guiding Principle 4 – Focus the program on acute, interventional and clinic activities that cannot be otherwise accommodated in the community

IHA's facility program meets this objective by concentrating the provision of acute, interventional and clinic activities in the DTC. The layout of this project provides for discrete separation of hospital and service traffic to the DTC, enabling increase acute use of DTC facilities.

Guiding principle 5 – Elder-friendly design

The design incorporates the evidence-based Code Plus principles of elder-friendly design and includes:

- Overall building form emphasises main entrance and emergency entry locations for ease of wayfinding
- Covered drop-offs with sun and rain protection and at-grade entries with proximate vehicle lay-by
- Single, covered main entry to all DTC and hospital functions
- Areas for future retail and food service are provided close to the main entry
- Reception area located immediately inside the main entrance
- Highly-visible and proximate elevator core at the main entrance
- Ample elevator size to accommodate those with reduced mobility
- Re-orientation to the out-of-doors and main entry from the public elevator lobbies at all levels. Visitor access points and views identical at every level
- Central location of passenger elevators minimises travel distances to care areas
- Departments positioned to reduce unnecessary travel facility for multi-department visits
- Registration, waiting areas, public washrooms and testing functions immediately off lobby and highly visible
- Visual cues of colour, artwork, signage, floor features and ceiling features assist patients in finding department waiting areas and entries
- Acoustical ceilings and wall panelling in waiting and common areas to reduce noise
- Outpatient clinic floor has direct visual contact to the outdoors from all public circulation and waiting areas
- Simple circulation minimizes wayfinding confusion and travel distances
- Separation of back-of-house from front-of-house activities

- Ambulatory care centre ties into the overall campus circulation and has direct ground level access
- Interior finish colours will respond to the characteristics of older eyes and articulate spaces and points of transition; patterns will be selected to avoid visual confusion
- Interior lighting will be designed to avoid glare and high levels of contrast

Guiding principle 6 – Electronic medical recordkeeping

The Authority is responsible for defining its electronic recordkeeping program and for procuring appropriate systems to support clinical and administrative needs. Electronic medical record-keeping will be fully supported in the ergonomics of staff centres and care stations. To the extent that they are programmed in this project, IT/IS systems will be provided to support this guiding principle.

Guiding principle 7 - Identify the features that will make VJH a unique and attractive environment for patients, clients, staff and that will project an image of quality to the community

The patient and staff environment has been central to Infusion's approach to the design of the facilities. We recognize the endemic issue of staff retention and recruitment facing the entire public healthcare system and realize that an attractive physical environment and responsive support services are fundamental means of appealing to hospital users of all types.

From the healthy and de-institutionalized surroundings to the numerous respite areas, ample daylighting and state-of-the-art clinical facilities, our design does much to encourage healthcare professionals to pursue their careers with Interior Health. For patients, the ease of access and way finding, un-hospital-like surroundings, gardens and quality finishes will be reassuring even to users unfamiliar or nervous with a hospital environment.

We also understand the importance to the long-term future of healthcare in the Interior of a buoyant program delivered by the UBC medical faculty. In separate, purpose-built facilities on the Kelowna General Hospital site staff can teach and students can learn in an optimal environment – distinct and scholarly, yet still part of the vital healthcare campus.

The following features will project an image of quality to the community:

- Quality materials and simple detailing
- Accessible landscape courts and "green" roof gardens
- Ample space at the Main Entry for all functions
- Improved separation of access points for visitors and patient, ambulances and loading traffic
- Community-based art and sculpture program
- Pedestrian-friendly site and entry lighting

Infusion is committed to participating fully in the life of the communities in which it works. We have a long-term place in our communities as an employer and supporter of public services. As noted elsewhere in the submission, we intend to make available half of any third-party revenues above forecast that Infusion receives from retail and other commercial sources in the facilities to support local community arts, cultural, sports and youth initiatives agreed with the hospitals.

We would anticipate that our community initiatives may include supporting local artists and commissioning community artwork for display. We have contacted the Vernon Public Art Gallery and discussed establishing a display area where local artists, with the Committee's support, can exhibit their works, while discreetly promoting their work by identifying their contact details. We have also contacted the Hospital Foundation to discuss whether they own works of art which they would like to exhibit in designated areas of the new facilities.

The overall building design with large and lively common areas, landscaped courtyard, green roofs, patios, daylight and views from all areas of the building provides a pleasant environment for staff and visitors. The main entry and ground floor are glazed and open, creating transparency and a feeling of inclusiveness. Design features, building materials and building concept together provide the sense of a healing environment rather then the traditional "hospital".

The following features will project an image of quality to the community:

- Sustainable building concept with energy and environment friendly solutions (LEED Gold certification standards applied)
- Quality materials and sophisticated detailing. We are exploring the option of unique BC pine-beetle wood application for the exterior wood screens and interior wood paneling
- A new "front door" for all hospital functions
- Accessible roof gardens and patios for staff and visitors
- Ample space at the main entry for all arrival and departure functions
- Improved separation of access points for visitors and patient, ambulances and loading traffic
- Pedestrian-friendly site and entry lighting

b) Identify and describe those features of the design and construction of the facilities that enhance the Authority's provision of the Clinical Services and Non-Clinical Services, especially those which may increase the efficiency and effectiveness while reducing the cost of the provision of those services or which may otherwise provide downstream benefits to the Authority in their day-to-day activities.

The provision of clinical and non-clinical services is optimised by careful and effective space planning. The plan optimises room relationships and ensures that clinical and non-clinical services can be provided in the most cost-efficient way.

The layout of the clinical areas is designed to ease patient and staff flows and to protect the privacy and dignity of patients undergoing treatment. Service areas are located away from patient areas and the use of separated service routes ensures that non-clinical services can be supplied to departments with minimal intrusion into the clinical spaces.

The building construction and engineering services are completed in ways that provide maximum life for the various elements while making servicing as easy as possible to minimise potential disruption to clinical services. The construction plan is developed to minimise disruption to the existing part of the site and we have planned for the earliest possible completion of the building to reduce congestion on the site. The materials used for internal and

external finishes have been carefully selected to be of the highest quality and to require minimum maintenance.

2.2.1 Site Development

2.2.1. a) Provide a site development plan.

The Site Development Plan, (all drawings are included in the Drawings Package), and shows the location of the new Diagnostic and Treatment Centre, and the site development. The plan also shows access to the existing main entry and the new emergency department, as well as ambulance access and new perimeter service road alignment.

b) Provide the following information:

i) Site context, including site development, adjacent roads and property uses (1:1000 context plan).

The Site Context Plan (Drawing #A003) shows the above-noted components.

ii) Location of all buildings including expansion provisions, roadways, pathways, fire fighting access, post-disaster provisions, green space, car parking and services elements (1:500 site plan).

The Site Development Plan (Drawing #A005) shows the above-noted components.

iii) Describe in written and plan form the site movement strategy including cars, pedestrians, deliverables, waste removal, ambulances and fire fighting access and disaster response access.

- **Main Vehicular** access is from Highway 97 is via the controlled intersection at Highway 97 and 15th Avenue. Access to Highway 97 from 21st Avenue is right-in and right-out only. Any intersection upgrading will be done by the City of Vernon and the Ministry of Highways, as described in Traffic Report prepared by Opus Hamilton, Section 4.

- **Visitors and patients arriving by car** will arrive from 31st street. The building design provides a clear entry orientation cues from 31st Street, Highway 97 and 21st street. The glazed entry corner of the new building, new canopies accenting entrance points, a generous drop off area, directional lighting and signage are some of design elements enhancing the access points and providing clear visual cues. Public access to site on southwest is clearly separated from ambulance and service site access on northeast. There are two visitor entries, along the south side of the building, clearly visible from 21st Avenue and the parking zones. Entries are accented and protected by canopy structures. The building ground level is glazed, providing transparency and the image of an accessible and friendly environment. The landscaped courtyard between the existing and new building softens the entry points to registration and emergency, and enriches the visitor experience.

- **Pedestrians** will access the site off 21st street where pedestrian arrival will predominantly be from the neighbourhood, public transit, south parking lot, vehicle patient drop off, vehicle emergency patient drop off, visitor parking and staff parking. The east access point will accommodate pedestrian arrival from the neighbourhood, public transit, east parking lot and the Polson Extended Care Facility, vehicle patient drop off, visitor parking and staff parking.

- **Parking and Drop Off** provisions include the existing south central lot, remote south lot, west lot and east lot. Modifications have been made to south central lot, providing drop off area to the entry, and to the east lot, providing expansion at the demolished Delview buildings site. Building siting is carefully located, allowing for a "buffer" zone for parking and entry points. Drop off areas are provided at two entry locations with hard and soft landscape enhancing the pedestrian experience.

- **Deliveries** will be from the existing loading area that will be utilized for the new building, thus being clearly separated from public entries to the building on the south. Service access is via new connection to the service road provided at the northeast corner of 31st Street. This will improve existing service access, by relocating it from the southwest public access point to northeast service road off 31st street.

- **Ambulance** access is provided on the north of the building and clearly separated from public entries on the south side. Ambulance access is via new connection to the relocated service road provided at the northeast corner of 31st Street **clearly separating visitor/staff from service/ambulance traffic.**.

- **Firefighting** and disaster Response points will include:
  - **The new Main Front Entry off 21st Avenue**
  - **The southwest surface parking area**

iv) Streetscape drawings demonstrating proposed massing, materials and image of the Projects, including in the context of adjoining development on the Sites.

Streetscape drawings in the Drawings Package illustrate the above items.

v) Cross-sectional diagrams showing relationship between the Project and adjacent site uses.

Cross-sectional diagrams in the Drawings Package illustrate the relationship between the new Diagnostic and Treatment Building, the Jubilee Tower, the partially-demolished Alexander Wing Building to the north and the surrounding parking areas and on-site circulation.

vi) Landscape design, including philosophy, exterior treatments, general areas, parking areas, etc. Types and maturity of plants should be identified, as should maintenance and requirements for irrigation.

General Treatment

The site context is dominated by the urban 32nd Street corridor and the greenway system running northwest to southeast along the entire length of the site. The proposed landscape development for the new building and site work responds to these dominant features.

The urban movement corridor along the West side on 32nd street will be extended into the main entrance areas along the North side of 21st Avenue. The landscape will consist of a 2 M wide pedestrian pathway shaded by large caliper deciduous trees with canopy to protect pedestrians from Vernon summer heat, to reinforce way-finding for both vehicular and pedestrian movement and to help shade the parking lots on the North side of the boulevard.

Islands around the new drop off area will be planted with groupings of deciduous to help shade the South face of the new building to reduce cooling loads and to provide comfortable waiting areas and seating close to the entrance.

The greenway is a major amenity for hospital patients, visitors and staff. It provides a respite and the opportunity to be immersed in a healing environment with passive recreation and frequent interaction with nature. Access will be improved by a direct pathway connecting the new building and the internal sidewalk system. Disturbed interface spaces are enhanced with new trees as extension of the greenway character.

Portions of the existing site that are not being changed have some mature planting will be protected during construction.

Planting

In addition to tree planting, ground level areas around the building, the entrances and the courtyards are landscaped with beds of ornamental grasses, low evergreens and colourful masses of perennials to provide interest and define outdoor amenity spaces.

The retaining wall along the East access road is treated as a "green wall" to create an attractive addition to the landscape. The wall will grow in with a mixture of climbing plants and will juxtapose a visual connection to the greenway, allowing the lush greenway planting to visually spill into the proposed hospital landscape. A trellis system with local climbing grape has been introduced for key amenity spaces to provide shelter and shade and to reflect the winery character of the Okanagan; the green wall vertical trellis system reflects the same rhythm as the ornamental architectural glass on south and east facades of the new building.

The groupings of calliper trees on the grounds intertwine through green patches and storm water capture gardens to enhance the visual connection with the greenway and encourage walking as a therapeutic activity.

Plant Species

- Trees: 40 to 60 mm Cal

- Kolreuteria paniculata (Golden Rain Tree)
- Prunus virginiana (Chokecherry, Schubert chokecherry)
- Amelanchier (Serviceberry)
- Acer ginnala (Amur maple)
- Crataegus (Hawthorn)

- Shrub: # 2 container
  - Symphoricarpos (Snowberry)
  - Rosa (Rose varieties)
  - Spiraea thunbergii (Spirea var.)
  - Rhus aromatica (Gro-Low Sumac)
  - Mahonia (Oregon grape)
  - Spirea varieties
  - Ribes (Goosebery)
  - Juniper varieties

- Ground Covers: #1 pots
  - Ornamental Grasses - variety
  - *Kinnikinnick*
  - *Gaultheria* (Salal)
  - *Hemerocalis* (Daylilies)
  - *Dictamnus*
  - *Lavendula angustifolia* (Lavender)
  - *Rudbeckia*
  - *Hosta*
  - *Pulmonaria*

- Vines:
  - *Clematis occidentalis* (Blue Western Clematis)
  - *Vitus vinifera* (grape var.)

All planting areas are to be mulched with either rock chips or composted wood fiber to retain moisture.

Furnishings

Furnishings selected are durable, require little maintenance, and are high quality with material selection appropriate to follow goals for LEED® accreditation, such as furniture manufactured by Landscape Forms. This furniture should be suitable in design that reflects the character of

the landscape and architectural aesthetics. Bicycle racks are located at key entrances for both staff and visitor uses.

Lighting

Site lighting includes the standard street and parking lot light standards, building mounted area lighting and bollard pedestrian lighting for key areas around entrances. Pedestrian pathways, amenity areas and parking will be lit with pedestrian scale fixtures for security and to provide for extended use.

Green roof levels

The three green roof levels on the proposed building range from extensive treatments to intensive with public access to reduce impervious site area, protect roof membrane, provide insulation, and improve storm water quality and flow rates. Planting for the extensive green roofs includes bands of sedums, thyme and ornamental grasses typical of the high elevations of the local surrounding mountain ranges.

The intensive green roofs include seating arrangements and planters. Views from the green roof terraces are optimized and enhanced through the seating arrangements and planting selection.

Accessible courtyard on Level 1 consists of raised planters, furnishings and level paving to allow for convenient outdoor access for patients and staff, and for aesthetic interest from interior rooms. Planting species on extensive green roof courtyards include a combination of ground level plant types as well as sedums and ornamental grasses specified for extensive green roof areas. Furnishings include moveable benches, and table and chair groupings. Low level lighting will provide visual interest at night from interior spaces.

vii) Type and profile of pavements proposed, and of curbs and gutters.

Information on profile of pavements, curbs and gutters will be to meet the requirements of the local building authority, and will be provided in future design phases.

viii) Traffic Management plan, including vehicular passenger drop-off, day parking and delivery and pedestrian access to the Facility and all emergency access.

The Vernon Jubilee Hospital provides general, acute, and long-term care, surgery, maternity, pediatrics, and continuing care services. Demands for health services have grown with the expanding population in the Okanagan region. Expansion of the Vernon Jubilee Hospital will help to meet the growing regional demands for health services.

Hospital entrance

The Vernon Jubilee Hospital is located at the northeast quadrant of the 32 Street (Highway 97) / 21 Avenue intersection. The vehicular accesses to the hospital from 21 Avenue are discussed below.

Outpatients / Visitors

The main entrance to the hospital is located on the east side of the south face of the building near parking area 'A' level-2. This entrance will primarily serve outpatients and visitors / caregivers. The drop-off loop in front of the entrance provides convenient access to the building and space for loading / unloading.

Walk-In Emergency Patients

The walk-in emergency entrance to the hospital is located on the west side of the south face of the building on level-1. Access to the walk-in emergency entrance is provided off of 21 Avenue west of 31A Street. This entrance is used for drop-off of walk-in emergency patients by friends or family and is also used by doctors / staff. A drop-off loop in front of the entrance is designed in conjunction with 4 short-term emergency parking stalls located in nearby parking area 'B'. The design allows prompt drop-off and check-in of patients while also allowing emergency short-term parking in close proximity to the entrance if required.

Ambulance and Service Vehicle Access and Circulation

The ambulance garage and loading areas are located on the north side of the hospital. The access to the ambulance garage is off of 21 Avenue using the driveway flanked by parking area 'A' and parking area 'E'. This driveway is one-way and is dedicated for emergency and service vehicles only.

In order to exit the site, emergency vehicles pass parking areas 'D' and 'I' and exit onto 21 Avenue. Service vehicles can use this same route to exit the site but can also use it as an alternate access to the loading area.

Pedestrian Circulation

A bus stop is located at 21 Avenue south of parking area 'A' level-1. The objective for safe and convenient pedestrian movement is achieved by incorporating logical connections between the parking areas / bus stops and the major entrances to the hospital.

The pedestrian circulation between the hospital and the bus stop would be possible along the sidewalk adjacent to 21 Avenue (south of parking area 'A' level-1). This sidewalk continues northwest around parking area 'A' level-1 and links to the pedestrian crossing in front of the walk-in emergency entrance.

Pedestrians can also use this sidewalk to access the hospital main entrance. The elevation difference between the walk-in emergency and main building entrances is accommodated by the staircase / ramp provided to allow universal pedestrian / wheelchair access.

Parking area 'E' is provided with two pedestrian crossings which connect to a sidewalk along the east edge of parking area 'A' level-2. A staircase / ramp would be provided to accommodate the elevation difference between parking area 'E' and the main entrance.

Parking area 'B' has a pedestrian connection to the walk-in emergency entrance at the north end adjacent to the short-term emergency parking stalls.

Pedestrians from parking area 'F' would use the pedestrian crossing at 21 Avenue, located west of 31A Street and then traverse the same route as outlined for the 21 Avenue bus stop. The pedestrian circulation to / from parking areas 'C', 'D' and 'I' will be facilitated by the existing routes to the walk-in emergency entrance.

Parking Areas

The following table provides a summary of the stalls designated for the potential users.

Table 1: Parking Stalls Summary

Parking Area	Description	Spaces
A	visitors, outpatient, 8 short-term parking stalls	
B	physician, designated staff, 4-short-term parking stalls	
C	physician and staff parking	
D	staff prepaid parking, maintenance and delivery vehicles parking	
E	patient, visitor, staff	
F	staff prepaid parking	
H	Polson residence visitor parking	
I	7-handicap parking stalls, 20 minutes loading / unloading	
Emergency Vehicles	4-stalls for outpatients, 2-stalls near ambulance garage	
Total		821 –Schedule2, 4.21

Refer to the Site Development Plan Drawing for traffic planning referred to in this section.

ix) Information required by the Regulatory Authorities having jurisdiction (with regard to zoning Bylaw requirements and/or design/control Covenant).

Development Statistics are shown on the Site Context Plan.

x) Site lighting, signage, parking control, security, electrical/communications, duct/manhole, routing/placement.

The above items are shown on the Electrical Site Plan. No parking control is shown since the Parking with be operated by Health Co.

xi) List any Output Specifications that you require to be varied and provide an explanation of the variation required. The variations list should be limited to and in the context of site development.

Summary of clarifications and assumptions

Zoning

We understand that Authority will secure any zoning variances prior to financial close and intended to commence the application process during the RFP bid stage. Infusion's design proposals include building heights which will require variance approvals. We have not been provided with a copy of the Authority's zoning variance applications and we have relied on it having been properly prepared and submitted so that there is no adverse impact on our proposals or schedule.

Infusion will be very pleased to support Authority's existing or future applications with information and documentation relating to its design and construction proposals, as required.

High Voltage Supplies

Addendum 22 issued on 11 February 2008 amended Output Specification Section H26, Division 26 – Electrical, Subsection 26 1101, Part 3, Item C.3.1.1 Page 23 to require that ProjectCo provide dual High Voltage power supplies. During the RFP response period we have contacted the representative of BC Hydro, the sole supplier of this service, to seek confirmation of the

extent of work, costs and schedule for providing the dual HV feeds to the sites. BC Hydro has been unable to confirm these details so we have based our Proposals on the assumption that BC Hydro will meet the requirements set out in our construction schedule and that the Authority will be responsible for meeting any costs for work associated with providing the HV feeds to the sites.

Utilities at Vernon Jubilee Hospital

At Vernon Jubilee Hospital, we have not allowed for upgrading the existing utility connections and high voltage switchgear for the existing buildings, just for the new VJH-DTB building as required by the output specifications.

Although we have endeavored to engage with the City of Vernon and with BC Hydro to understand their requirements, we have not been able to establish the extent of any off-site service improvements, including but not limited to, water, sanitary, gas, electrical, and traffic signalization. Consequently our proposals make no allowance for any such off-site improvements.

2.2.2 Design Proposal

INTRODUCTION

Infusion's scheme presents an approach to developing the new Vernon Jubilee Hospital Diagnostic and Treatment Centre (D&T) at Vernon Jubilee Hospital which is a state-of-the-art solution to patient-focussed care, where staff effectiveness and wellbeing are paramount.

2.2.2. a) Provide written and graphical summaries of the design to demonstrate the following features

i) How the design supports the Clinical and Non-Clinical uses of the Facility

The provision of clinical and non-clinical services is optimised by careful and effective space planning. The layout of the clinical areas is designed to ease patient and staff flows and to protect the privacy and dignity of patients undergoing treatment. Service areas are located away from patient areas and the use of separated service routes ensures that non-clinical services can be supplied to departments with minimal intrusion into the clinical spaces.

Infusion's scheme provides for a new Diagnostic and Treatment Centre and on-site parking. The existing building is renovated to provide for Ortho space in the former Ambulatory Care department on Level 1, adjacent to existing Diagnostic and Imaging and new Emergency area. The existing building entry is enhanced with the new glazed connector and canopy. New connections are provided at the Basement and at Levels 1, 2, 3, with the minimal renovation to the existing building and no patient bed loss. The Duplex building and Delview buildings are demolished to allow for new surface parking. A south portion of the Alexander Wing is demolished to provide the development zone for the DTC project.

ii) Building design concepts and elements including functional aspects (including space standards, internal circulation and way finding), environmental aspects (including healthcare campus, indoor air quality, daylight, acoustics, colour, the use of art, and sustainability), operational aspects (including infection control, ergonomics, and designing for the elderly, disabled and Bariatric)

The building design supports contemporary healthcare delivery in the following important ways:

Relocating Central Registration

Relocating Central Registration to the Level 2 Main Entry of the DTC will improve the patient arrival and orientation experience and improve overall facility operations.

Individual critical use floors

Providing individual floors for critical uses including Maternity/Paeds and ICU/CCU provides security and privacy to these functions and aligns with the future In-patient unit floorplate sizing.

Additional floors provision

Refer to Schedule 3, Volume 1, A2.F.

New Emergency Department

Providing a new Emergency Department within the new building, thus freeing up a significant area of ground floor space previously occupied by Emergency and Ambulatory Care, for other uses such as Laboratory, SPD etc. Only the Orthopaedic Department is provided in the former Ambulatory Care space.

New main entry

Creating a new main entry that will be a welcoming and lively focal point to serve the DTC, Hospital and future development on the site. Providing new central registration area at the main entry of a new building will significantly improve patient flow and relieve unnecessary circulation load between the existing and the new building. Providing a new Central Registration area at the main entry of the new building will also significantly improve patient flow and relieve unnecessary circulation load between the existing and the new building.

Traffic streams

Separating the three various arrival streams of traffic - visitors/patients, ambulances and service/parking - to separate sides of the site, clarity and wayfinding is significantly increased.

Stacking building components

Stacking the building components on equivalently-planned levels with a consistent 9m x 9m structural grid, corridor circulation, elevator and stair cores, and common building service spaces.

Floorplate orientation

Utilizing a slim racetrack floorplate oriented east-west with a central elevator core and waiting areas with views across the south of the site to provide for maximum daylighting to all areas of the building, maximum planning flexibility to all areas of the plan, and useable green roofs and patio courts to the Maternity and Paediatric departments.

D&T link to the Hospital

Connecting the D&T to the Hospital with a multi-storey link adjacent to the landscaped courtyard makes the connection between the hospital and the D&T more functional, pleasant for all users, and provides a significant visual amenity to the Hospital. At the Basement and Levels 1, 2 and 3 the connector is located proximate to the Hospital elevator core and the D&T service corridor circulation for efficiency of patient transfer between the buildings. Existing main entry on Level 1 is improved and pronounced better with the glazed connector and the canopy.

Green roofs

All visible roofs are green roofs to maximize LEED stormwater retention credits and prolong roof life. All other roofs are high-albino light-reflecting roof surfaces.

Central vertical circulation

Central vertical circulation on all levels of the D&T Building provides users with daylight, orientation and views on all levels, and access to outdoor areas at Levels 1 and 2.

Retail level

Retail at the Level 2 D&T entry deinstitutionalizes the facility and animates the entrance and the pedestrian experience.

Functional exterior design

The building façade design responds simply to the functionality of the spaces behind it without imposing any other systems or costs to create an appropriate architectural expression. The Main Entry and the Emergency entry expression are highlighted with canopies, sunscreens and colour to signal these areas.

Emergency Department

The Emergency Department is clearly seen from the site entry and parking and access are screened with landscaping from the adjacent uses.

Simple wayfinding

Simple wayfinding from each D&T level is provided by having each elevator lobby and visitor waiting area centrally located and facing staff department reception points. Wayfinding back to the circulation core and from the core to the Building entry, passenger pick-up and drop-off and the visitor parking is clear and simple. Access points and waiting areas for each level are located on the most prominent building glazed corner with direct views to the building entry, which gives visitors immediate sense of place.

Separate circulation

Discrete separate circulation for services/inpatient transfers from outpatients/visitors is provided with a back-to back core of passenger and service elevators, and also by service/inpatient transfer corridors linking the new D&T with the existing Hospital on Basement, Level 1, 2 and 3.

Airflows

Supply and exhaust airflows have been designed to control of contaminate migration via pressure relationships with air movement is from clean to less clean areas.

Air intakes

Air intakes have been located at high levels to avoid introduction of outdoor air contaminants.

Air capacity

100% outside air capacity for all air handling systems to allow for building flushing and free cooling.

iii) How the commercial/retail space is integrated into the Facility (KGH only)

While not required by the program Infusion will provide for a retail café conveniently located at the main entry of a new building for staff and visitors use, which will give vibrancy and life to the building and create inviting place where people want to be if space is available.

iv) How the proposed design integrates with the Site and takes into account the particular attributes of the Site.

Infusion's scheme places the D&T building in the defined location under the Output Specifications but with a consolidated footprint to optimize the Ground Floor and Second Floor levels. The new building is located east of the existing hospital as an "extension" of it, and provides logical future expansion options to the east parking lot. In order for the hospital to grow in the future, the site slope has to be considered. By narrowing the building floor plates to allow for maximum day light, and providing more levels we are able to well connect with the existing

departments each level, and still provide horizontal future expansion at the high site elevation to the east.

The building orientation provides terrific views to Vernon and green park area to the north, and pleasant south façade with the prominent vibrant main entry and waiting areas.

The design allows for a "buffer" zone between the buildings and access roads, which provides much needed drop off area and short term parking zone, and allows for sequential access to the building that simplifies way-finding for pedestrians and vehicles.

The internal uses of the building and public spaces are aligned with views in to the north and south to protect the privacy of the Jubilee Building inpatient areas.

Emergency visitor traffic is separated from front entry traffic with clear drop-off, waiting and pick up area, with weather protection.

Emergency ambulance traffic is located at Level 1 which works well with the sloping site topography.

Mechanical and electrical functions are slipped into the site contours at the east side adjacent to the service roadways.

v) Flexibility in design and construction to meet future expansion requirements, including ease of adding capacity in the future at minimal marginal cost and minimal disruption to the operational requirements of the Authority

The building location is guided by the given site contours, access roads, existing building location and future expansion. Continuing linear planning from the existing building and separating service circulation from the public circulation within the new building, future expansion is possible as a natural and logical continuation of the new DTC.

Refer to Schedule 3, A2.F.

vi) How the design of the building including its infrastructure addresses requirements for provision for disasters

The building is designed to post-disaster requirements for all disciplines as required by the output specifications. Following issues have been addressed:

- use of ambulatory care and other clinical space as surge capacity during major emergencies
- adequate storage of emergency supplies
- robustness and redundancy in base building systems
- the ability to isolate new development from existing to help ensure protection from highly contagious diseases

Practically, during a disaster, the design provides for VJH to improve and enhance services in the following ways:

- Perimeter parking and layby's around the site can be used for perimeter setup, emergency services, command, and supplies

- The non-emergent ambulance area, and the Level 1 courtyard are proximate to Emergency and the Hospital for casualties, and ambulance/fire/rescue drop-offs
- Ground floor functions are spacious enough to be used for overflow requirements

Graphical summaries relating to the above items are appended within the main Drawing package, Architectural.

b) List any Output Specifications that you require to be varied and provide an explanation of the variation required

With reference to our RFIs numbers 39 dated 11 December 2007 and 39R dated 21 January 2008 and various discussions at commercial/financial and design-build consultation meetings during the bid, we understand that the Authority acknowledges the existence of subjective language in the output specifications. Whilst such language is valuable for explaining the Authority's intentions and aspirations, it will need to be put in objective terms for inclusion in the Schedule 3 of the Project Agreement. We will be pleased to assist the Authority in making such changes that are necessary.

Specific clarifications and assumptions regarding the output specifications for each discipline are presented in the relevant sections of Package 2 of the RFP response.

INTRODUCTION

Infusion has considerable experience of integrating the design, construction and services in P3 projects with each other and with the hospital's clinical and non-clinical operations. This philosophy of integration has begun during the bid stage with our consultations with the Authority's procurement team and user groups, as well as internally with the regular construction, services and lifecycle integration workshops. Looking forward to the preferred proponent stage, we propose a number of enhancements to processes which, based on our experience, will provide successful outcomes for the Authority in terms of managing minor changes and accelerating project delivery.

a) Provide appropriate design documentation including:

i) Floor plans (1:100) with room numbers cross-referenced to those indicated in Sections B to F of the output Specifications Volume 3 (VJH), and to the accommodation schedule (Facility Space Requirements). Include all walls and doors, structural elements, circulation elements (e.g. stairs, elevators) and major service shafts.

Floor Plans show all noted elements (all drawings and plans are included in the Drawings Package).

ii) Building elevations and sections, and site sections, sufficient in detail to illustrate materials and major features and to confirm the building envelope strategy.

Building Elevations and Sections show all noted elements.

iii) Minimum of two 3-D renderings in colour, illustrating the overall design quality and aesthetics for the Project. One of these renderings should show the interface between the new building addition and the existing facility.

3D renderings in colour show all noted elements.

iv) A monochromatic massing model (1:200) of the Site and the Project.

A monochromatic massing model shows all noted elements.

v) Functional relationship drawings (1:100 architectural plans) indicating the location and functional relationships of all program elements, horizontal and vertical circulation, future expansion space, internal traffic flow – patient, staff, visitor, FM Services. Use colour to illustrate the program elements and to differentiate the following types of internal circulation systems: public, service, controlled access for staff and patient movement and "sterile." This needs to include the layout and general location of care-specific program elements (i.e. PARR in Surgical Services) within larger room elements. See *2.2.3.d.* for CMYK Colour System.

Functional Relationship Drawings in colour show all noted elements.

vi) Schedules of indicative finishes, fixtures, fittings and Project Co supplied equipment.

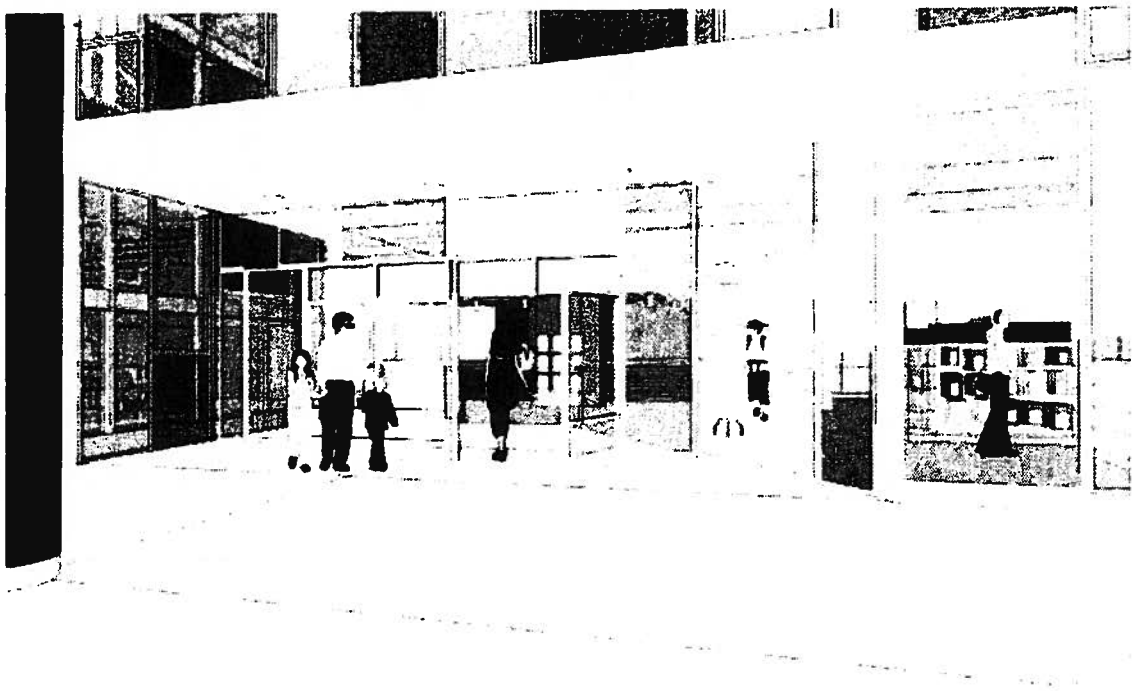
Schedules show all noted elements (see *Appendices 2.2.3. A: Vernon Finish Legend, 2.2.3. B: Vernon Finish Allocation, 2.2.3. C: Vernon Finish Schedule*).

vii) Room data sheets and drawings (1:50) in the format as shown in the sample data forms referenced in Section G of Volumes 2 and 3, and indicating the typical location of millwork, furniture, fittings, equipment, medical gases, plumbing fixtures, general power and outlets, security, communication outlet, life safety, lighting, IMIT, lighting controls, elevations and reflective ceiling plans for the following typical rooms and typical areas:

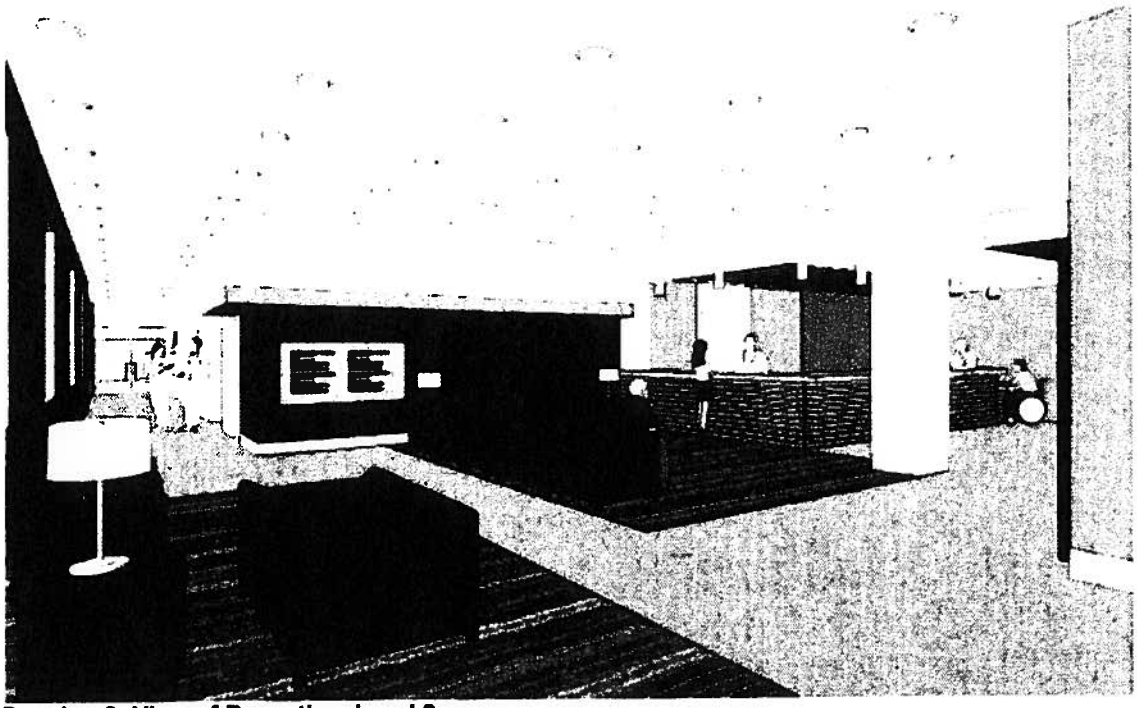
Room Data Sheets and Drawings show all noted elements for each of the following:

- Operating Room
- Procedure Room (Endo, Cysto)
- Fluoroscopy Procedure Room
- Typical Exam Room ED
- Diagnostic Imaging CT Rooms
- ED Trauma Room
- Triage Area
- Renal Dialysis Bay
- Secure Holding Room
- ED Stretcher Bay

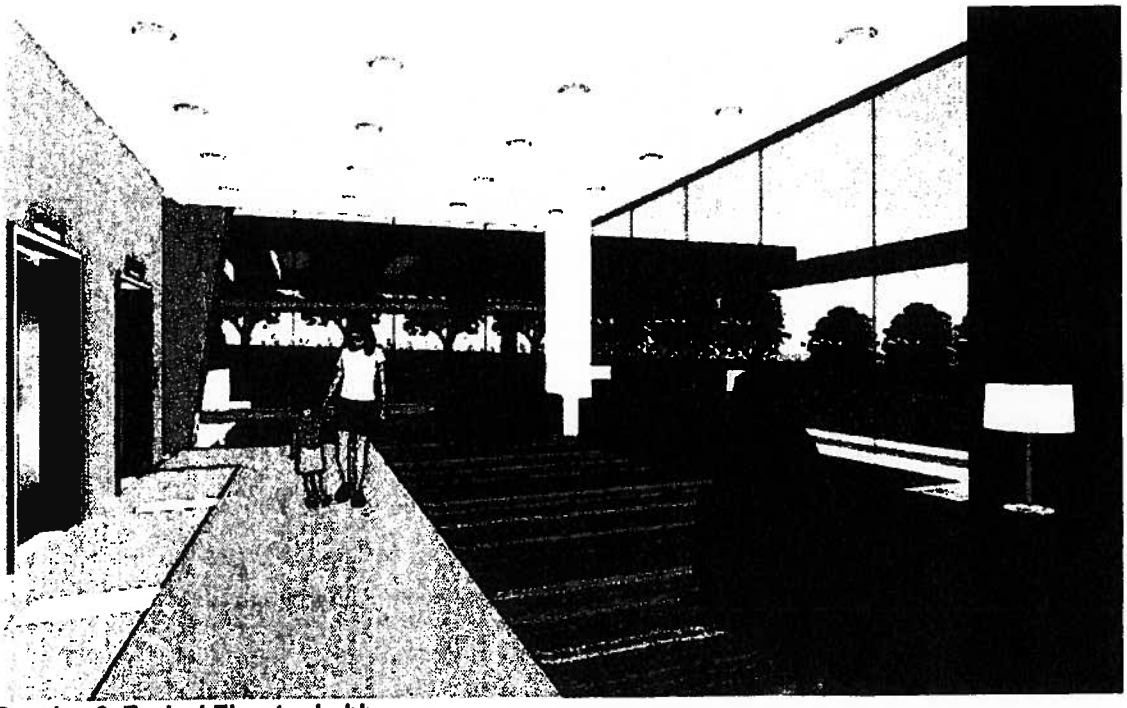
b) Describe interior design concepts and elements.



Drawing 1: View of DTC Entrance



Drawing 2: View of Reception, Level 2



Drawing 3: Typical Elevator Lobby

The interior design of the Vernon Jubilee Hospital will communicate three major ideas

We know your patients are your #1 priority

We realize that providing a non-institutional, aesthetically-soothing design will help mitigate patient anxiety, maximize comfort, and improve your ability to support patient care. Easy-to-understand way finding, ample day lighting, access to the exterior, personal control of equipment, and places of respite all contribute to a better patient experience.

Our design will help de-institutionalize the visitor's perception of healthcare environments with an ambiance that is warm, comforting, and accessible. Our design uses materials, colour and scale to convey a welcoming presence, imbuing the facility with distinctive character appropriate to function. Our design expresses VJH's identity and strengthens the connection with the community you serve.

We know that all of us have difficulty navigating around the mazes of never ending corridors with ineffective confusing signage. Our design provides a clear, identifiable layout for the public spaces of your building with elevators, reception stations, washrooms, and waiting rooms treated as a core, repeated on each floor with identifiable architectural landmarks, signage and colours.

Clinics, departments and destinations are easily identifiable by an architectural composition of signage mounted within wood panels, storefront glazing, wood veneered "eyebrows" and "front door mats" created with accent flooring.

Patients and visitors will know where they can connect with staff. The care stations are given attention with an overhead acoustic floating cloud, accent flooring, colourful walls and graphic signage.

Our design places waiting rooms, with art and with seating groupings of furniture for all sizes and ages separated from the main corridor circulation with the use of glazed storefronts, low walls and translucent partitions, allowing privacy as well as opportunities for group interaction.

The main entry lobby on Level 2 is treated as a "main boulevard"/"town centre". The waiting area has VJH's most significant art. Upgraded furniture and finishes are selected to emphasize the importance of its function.

Our design provides areas to go to while waiting for appointments, or time spent during procedures. Coffee lounges, seating alcoves in corridors, accessible exterior spaces and gardens" with meditative spaces of respite, a way to escape the harsh reality of a healthcare environment.

We know we have a population that has many physical challenges, a population that is ageing. The elderly often experience confusion, lack of confidence due to the restraints of the built environment. Our design will help enhance the experience of a broad spectrum of ages and abilities. We are providing clear signage, strategically placed, highlighted by architectural landmarks, to facilitate memory and aide in way finding. We are specifying interior materials and finishes specifically appropriate to mitigate the visual, acoustic, cognitive and physical impairments associated with both the ageing and the physically challenged.

Our design assures that every patient will have the ability to have personal control of their experience at VJH with adequate circulation space, accessible switches and blinds, furniture able to seat most physical limitations. The results are public and patient areas that are soothing, healing and reassuring in appearance and performance.

Our design for the LDRP has the focus on the mother, her family and her experience. The finishes convey an assuring, non-institutional atmosphere. We provide access to an exterior garden that will encourage the labouring women to spend some of their time outside.

Our design for the Paediatric In-Patient area addresses the concerns that young people and their families often experience fear and uncertainty in an over-institutionalized setting. Colourful finishes, playful floor patterns, and a rotating collection of art provided from within the local community of young artists will aide in providing a confident distraction. We provide access and views to the children's garden which will have water features, raised, edible, learning garden planters and playful sculpture scattered among the restful seating for patients and visitors.

We understand that your staff is your most precious asset

We appreciate that our physical surroundings and the spaces we work in can have a positive effect on our daily work experience, how we feel and how healthy we are.

Our design provides staff with efficient access to clinical tools and support for improved efficiency; it reduces travel distances by moving services closer to beds.

We know that research is showing direct links between staff performance, stress, moods and depression and the ability for staff to access daylight, exterior views and areas of respite. Our design provides lighting solutions that will help mitigate the negative effects of circadian deprivation, help concentration and help relieve stress. Where natural light is not available we are providing simulated day lighting and nature views for diurnal variation.

Our design provides lounges with views to the exterior and options for a high degree of interdisciplinary staff interaction and areas to go to relieve their stress.

We are specifying materials and finishes with healthful attributes which in turn result in an easier solution for maintenance.

We understand that a building that is good for the environment is good for our patients and our staff and our neighbours

We appreciate that the hospital environment impacts the well being of those within its walls. Our design provides an invigorated environment will affect the mood, stress level, and well being of your staff, patients, and their families.

Our design will minimize the use of resources and reduce environmental impacts while creating a healthy environment. We are specifying interior materials and finishes that are consistent with the best sustainable practices today, materials that are economically viable, readily available

and appropriate for use intensive healthcare settings – that improve the building performance and promote health and productivity.

c) Provide descriptions, including types, of the following Elevators/Vertical Transportation mechanisms, including how each meets or exceeds the requirements of the Output Specifications:

Passenger elevators are intended to serve the patients, visitors and staff but are not intended to handle any vehicular traffic other than wheelchairs. Ambulatory patients will be accommodated on the passenger elevators. Separate elevators cores are provided for passenger and service elevators.

The passenger elevators proposed for this application are larger commercial sized 4000 lb. capacity passenger elevators. These will be overhead geared traction elevators.

A separate group of service elevators will be provided for patient transfer, materials, supplies, support services, etc. Service elevators are not intended to be used for general staff & passenger movement and are located in areas and corridors designated for service uses. Service elevators will be located for convenient access to the loading facilities and to provide convenient access for patients from emergency to the Maternity, OR and ICU/CCU floors.

The service elevators proposed for the facility are 5000 lb. (1820 kg) capacity elevator with inside dimensions of 5'-8" (1725) wide by 8'-6" (2600) deep with a clear door opening of 4'-0" (1220).

Elevators dedicated to provide service between the Operating Rooms and Cleaning and Sterilization Department for both clean and soiled will be provided. These elevators will be of the twin post hydraulic type and will have a capacity of 4500 lb. with a rated speed of 100 fpm.

Design criteria have been established for the passenger elevators and an elevator quantity analysis has been performed. The criteria for the passenger elevator analysis are based on expected populations of staff, patients and visitors in the building and other assumptions.

i) Patient elevators

Ambulatory patients will be accommodated by the Passenger Elevators.

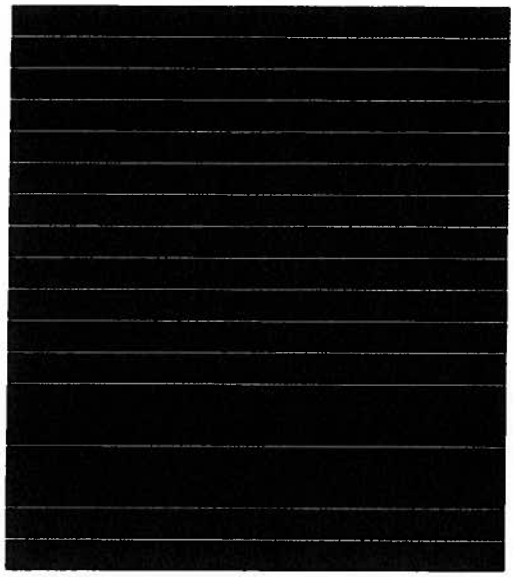
Non-ambulatory patients that need to be transported on a mobile stretcher or ambulance stretcher will be accommodated by the service elevators.

ii) Passenger elevators

Depending on the final height of the building, a central core of two (2) or three (3) passenger elevators will be provided as follows:

Table 2: Passenger Elevator Details

Passenger Elevators		
	Two (2)	Three (3)
	Overhead Geared Traction	



	4000 lb. (1816) kg	
	350 fpm (1.75 m/s)	
	Overhead, directly above the hoistway	
21950		30950
5		7
5		7
	None	
	4'-0" (1220)	
	Centre Opening	
	17'-0" (5182)	
	5'-6" (1676)	
	9'-4" (2845) x 7'-11" (2415)	
19'-0" (5790) x 7'-11" (2415)		28'-8" (8740) x 7'-11" (2415)
19'-0" (5790) x 17'-0" (5181)		28'-8" (8740) x 17'0" (5181)
	7'-8" (2340) x 5'-5" (1650)	
	9'-0" (2745)	

iii) Service elevators

The design criteria for the service elevators was not established in the RFP so the proposed system is based on general accepted principals for service elevators in hospitals.

A central core of two (2) passenger elevators will be provided as follows with potential for a third elevator:

Table 3: Service Elevator Details

Service Elevators		
	Two (2)	Three (3)
	Overhead Geared Traction	
	5000 lb (2275 kg)	
	1.75 m/s (350 fpm)	
	Overhead, directly above the hoistway	
30700		39700
7		9
6		8
1		1
	4'-0" (1220)	
	Two Speed Side Opening	
	Approximately 18'-0" (5485)	
	Approximately 6'-0" (1830)	
	8'-7" (2617) x 11'-5" (3480)	
17'-4" (5284) x 11'-5" (3480)		26'-5" (8052) x 11'-5" (3480)
17'-2" (5235) x 17'-0" (5181)		25'-11" (7900) x 17'-0" (5181)

[redacted]	5'-8" x (1725) x 8'-6" (2600) 9'-0" (2952)

In accordance with the Output Specifications, separated dedicated elevators will be provided to service the CSD Department and the OR's located one floor above. The elevators are sized to accommodate the carts that will be used. The following is a summary of the size of these dedicated service elevators:

Table 4: CSD Elevator Details

CSD Clean and Soiled Elevators	
[redacted]	One (1) Each Twin Post Hydraulic 4500 lb (1588 kg) 100 fpm (0.5 m/s) Flexible, try to limit distance from the hoistway 4250 Two (2) front only 4'-0" (1220) Two speed side opening 13'-4" (4057) 4'-0" (1219) 8'-3" (2515) x 9'-8" (2946) 8'-3" (2540) x 5'-9" (1753) 5'-8" (1727) x 7'-9" (2375) 8'-0" (2440)

iv) Fire Fighter elevator(s)

All elevators including the passenger elevators, service elevators and the dedicated CSD and OR levels will be equipped with automatic emergency recall operation as defined by the B44 Safety Code for Elevators. One (1) service elevator that serves all landing will be the designated fire fighter elevator.

All elevators will be equipped with standby power, being equipped with vital or delayed vital as appropriate.

Summary of Clarifications and Assumptions

We note that the STC ratings in the output specifications are quite stringent and considerably higher than is typically provided in hospitals in the province. We will construct internal walls according to the codes and standards stated as we understand the desire to ensure, for example, the right environment in teaching theatres and privacy for patients in consultation rooms. Our decision to construct the building frame in concrete is fundamental to our low-noise approach to the design. However, we would note that even though we will provide the appropriately rated wall construction, we can not guarantee that the whole room will meet in-situ test requirements.

Our proposals allow for millwork in accordance with the schedule in Addendum 19, however, we note that this may not entirely match up with the detailed room layouts.

All mock-up rooms will be constructed in the existing buildings, to the East of the new diagnostic and treatment building location at Vernon Jubilee Hospital, which are ultimately scheduled to be demolished.

In lieu of an external wall rain screen system, our proposals are based on using an EFIS panel system similar to that used on the existing Royal Building at Kelowna General Hospital.

INTRODUCTION

While the technology of the new Facility will be the most advanced and proven systems on the market, we understand that the primary duties of healthcare staff is to provide healthcare. Our goal is to make each technology accessible, simple and efficient to use that medical staff will rapidly adopt, understand and be able to use each communication tool available to them to assist them in their healthcare duties.

2.2.9. a) For each of the following technology and communication systems, describe the system and associated scope, and the typical devices and functions for each area to be served.

Describe any integration between each system and any others:

Technology and Communications Systems in the Vernon DTC shall be the most advanced and proven systems available for modern healthcare facilities. Each separate technology system will be designed to enable medical staff to maximize their ability to instantly communicate and access information by utilizing the latest information technology systems. The full power of advanced IT communications will be accessible throughout each facility. Within all proposed technology designs for the new facility, careful consideration will be given to providing the best infrastructure to support the most sophisticated medical operations of today, while allowing for the flexibility to adapt to the future requirements of the Authority's healthcare operations. The intent of this section is to provide an overview of the proposed technology and communications systems that will comply with the criteria as established by the Design and Construction Output Specifications for the new Facilities except where noted.

While the technology of the new Facility will be the most advanced and proven systems on the market, we understand that the primary duties of healthcare staff is to provide healthcare. Our goal is to make each technology so simple and efficient to use that medical staff will rapidly adopt, understand and be able to use each communication tool available to them to assist them in their healthcare duties.

Each individual communication system will be programmed and configured to meet the customized operational needs of nursing and medical staff. These requirements will be obtained through direct design consultations and workshop sessions with the Authority's operational directors and each unique clinical department. Decisions made by the Authority will be implemented in the most practical, simple-to-use and efficient means possible. Full technology training sessions will be provided to each user group, which will be repeated at regular intervals before and after occupancy.

The individual technology and communications system components included within this proposal include:

- active layer 2/3/4 networking switches,
- wireless local area network security switches,
- wireless access points,
- UPS backup power for critical systems (see power section 2.2.8 for more info),
- structured cabling infrastructure for wired and wireless communication ,
- Analogue clocks,
- addressable two-stage fire alarm,

- advanced nurse call systems,
- code blue, code white, public address,
- Localised intercom,
- stationary and mobile video conferencing system,
- patient entertainment and monitoring support infrastructure,
- VoIP telephone system expansion,
- central dictation support infrastructure,
- ,
- infant protection,
- OR room management,
- wired and wireless staff duress,
- Localised intrusion detection security systems,
- Localised proximity card based access control,
- advanced CCTV surveillance and recording and centralized alarm/event management software.

The key goals of all proposed technologies and communications systems are to be flexible and support the rapidly changing information technology needs of the Authority as follows:

- Each communication system has been selected to enhance the operational objectives of the Authority and its staff using the most advanced and proven technologies available within the healthcare industry.
- Communication systems will be integrated wherever practical to achieve maximum functional scalability using a common IT local area network (LAN) platform.
- All technologies and communication systems will be closely coordinated with the functional and clinical needs of each department. This also requires close coordination between Infusion's experienced healthcare systems engineers and the Authority's Information Technology department.

i) Nurse call systems and main equipment locations

Technology and Communication Systems

The new nurse call system for the DTC will be the backbone technology for instant electronic patient to nurse communications. The fundamental intent of the nurse call system is to immediately notify nursing staff when events occur that require their attention. A complete nurse call system will allow nursing and support staff to be in continuous support of multiple patient locations.

The configuration of the system will be capable of differentiating a variety of input and output events that could be used for additional operating functionality such as housekeeping. Infusion will work closely with department manager to understand and design the most effective and

simple system to effectively annunciate events so that operational responses can be provided in the shortest possible time.

Priority based ring tones and zone lights will also be available to provide visual indicators to lead staff to the call origin. The nurse call system will be implemented in a robust and sophisticated manner to meet the requirements of staff without being overly complicated to end-users. The new system will be fully capable of integration with event management software, wireless communication devices and a wide variety of medical applications to allow for application expansion as they may arise over the life of the new facility.

System and Associated Scope

Infusion will provide an advanced nurse call system in each patient care area within the DTC. The advanced nurse call system to be provided will be composed of strategically fixed nurse call stations located in patient areas independently connected to communicate with centralized nurse call system controllers. Nurse call control panels will then output event information, as programmed, to local nurse call consoles at each care stations to notify staff.

The new nurse call system will be compatible with the most current installation and functionality standards of the Authority. Although the functionality and integration capability will be the same, Infusion proposes that the nurse call product to be Rauland 4000 or later replacement model from Rauland. Infusion will meet directly with the Authority's nursing department leaders to obtain functional programming requirements for the new nurse call system. These programming requirements would involve establishing configuration and programming for:

- call assignments,
- staff communication device assignments,
- priority levels,
- day night shift scheduling,
- call annunciation locations,
- code blue response,
- alarm systems responses,
- customized call display requirements and any bulletin board programming requirements.

Infusion will support and maintain the new nurse call system under its responsibilities for operation of the Facility. It is anticipated that the nurse call system to function as a complete independent system within the new DTC facility. We will investigate the need for interfacing to the existing nurse call system in the existing building as necessary.

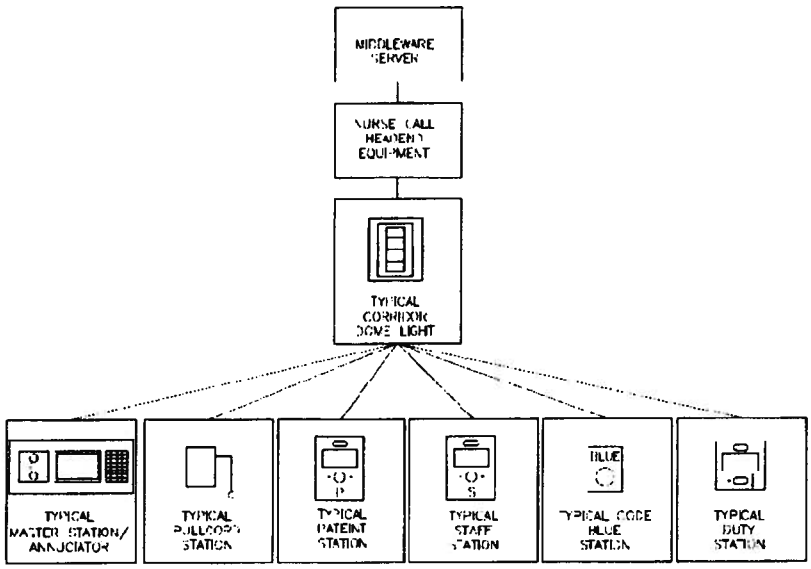


Figure 4: Nurse Call Overview Block Diagram

Typical Devices and Function

All nurse call system devices and consoles will be supplied from a single manufacturer and comply with all CSA C22.2 and CSA Z32.04 requirements.
For a typical patient room Nurse Call Stations will be provided as follows: Nurse Call, Staff Assist, Code Blue, Aux Input, 2-way Communication.

- A patient pull cord station or a patient station will be installed in all patient washrooms, treatment rooms, patient dressing cubicles, patient treatment locations, bathrooms and other areas where patients may need to call for assistance.
- A staff emergency station and code blue button will be placed in all patient care rooms, treatment rooms and other rooms where staff may need to call for assistance.
- A duty station will be installed in a utility room or other areas where staff members may be working and need notification of active calls within their area.
- The dome light will be located to provide staff the possible view on the outside of the room where nurse call stations are located and lead responder to room call light.
- The equipment will be networked together to provide a centralized code blue system.
- The staff will be fully trained to utilize the nurse call system to its full potential.
- Each nurse call station will be individually programmable to allow multiple call classification and priority levels.
- Infusion will work closely with clinical staff to fully understand the intended operation and provide call stations to best suit the clinical and operational needs of each department and will locate call in the appropriate room types
- Examples of nurse call initiated events that will be available include normal patient call, staff emergency call, code blue, bed exit, priority patient call, bathroom call, shower call,

anaesthetic call, clean room call and porter call. Each call event will require a unique input at the station.

- The nurse call system will allow for cascading of call to higher priorities if they are not answered, will have time out call cascading if the calls are not cancelled and will be able to be displayed on the nurse call master, the wireless phone, and any other type of call display.

System Integration

- The new nurse call system will use middleware software for event/alarm management and annunciation to other systems as required (i.e. Info Displays, Wireless Handsets, etc.) within each department.
- The new nurse call system for the new facility will be connected to the building management network and will be compatible for future integration to allow exchange of patient record information on select viewing devices. The Authority will need to configure firewall access to integrate nurse call to their clinical networks as required.
- The call management software will record all calls from all departments, response time and allow trending and report generation.
- The new nurse call system will be capable of integrating with an annunciator on wireless staff communication devices (PDA's or phones) for remote alarm notification.

ii) Wireless staff communications/infrastructure

Technology and Communication Systems

Infusion will provide a wireless network using Authority approved products. Wireless networking technologies are allowing traditional static hardwired IP networks to become mobile and boundless. As such, wireless communications are transforming the way healthcare applications and processes are being delivered.

As wireless technology improves and new tools for communicating emerge the wireless infrastructure within hospitals is becoming just as critical as the hardwired infrastructure. New healthcare applications will continue to move closer and closer to the point of care with goal of streamlining healthcare delivery and reducing medical errors.

System and Associated Scope

Infusion will provide a full enterprise wireless solution for full 802.11 based wireless coverage throughout the facility and the end use Vocera devices. The wireless design of the facility will be a key system within this project.

- All cabling infrastructure will meet or exceed the Authority's current performance standards and be Category 6.

- Infusion will provide a complete enterprise wireless network based on the Nortel WLAN 2300 Series solution. Specifically the enterprise class 2380 WLAN Security Switch which can support up to 120 access points will be provided.
- Nortel 2330/2330A which are dual radio 802.11a/b/g Access Points will be provided in select locations for complete coverage of patient care and public areas of each facility.
- Infusion will provide Nortel 2246 Application Gateway for OAI support into various other systems as required by the Authority.
- Nortel WLAN Management Software will be used to locate client and rogue access points throughout the facility.
- As tracking systems are fairly new to implementation to the Healthcare environments and the Authority has very few (if any) installations utilizing this type of technology. Infusion will provide several training sessions on the Asset, Staff and Patient tracking system to inform staff about how the system can be utilized as necessary.
- Within scope of current established designs, the DTC will be designed around the 802.11a/b/g standard at the time of construction,
- The use of cell based distributed processing using thin wireless access points (AP) is highly recommended for voice over wireless quality of service support; this selection is however at the discretion of the Authority.

Typical Devices and Function

- Each AP will be connected to patch panels located in the nearest LCR that will provide both data communications as well as Power-Over-Ethernet connectivity.

To make effective use of current 802.11 based wireless tracking real time location algorithms each 802.11 access point (AP) will be arranged in orthogonal grids to support Relative Signal Strength (RSS) based location software.

- Infusion will provide an extensive wireless survey to map out signal strengths throughout the entire facility.
- This survey will be conducted on a regular basis for the duration of system use as various sources of interference may arise during normal facility operations.
- Infusion will provide a software licences for Real Time Location System (RTLS) software to be used by the Authority.

System Integration

Several independent systems are expected to make usage of a common 802.11 based wireless network throughout the hospital. Seamless integration will be available to all systems via the 802.11 standard. Clinical telemetry systems are recommended to operate on frequencies outside of the unlicensed 2.4 and 5Ghz spectrums, this will need to be coordinated and confirmed through a comprehensive frequency allocation plan with the Authority's biomedical engineering department.

iii) Public address system

Technology and Communication Systems

Infusion will provide a public address system for the new facility, however this system will be restricted to use during emergency calls in the event that the primary communication systems such as wired or wireless telephone devices are not available.

System and Associated Scope

In general, the Facility's communication requirements will be met without using the public address system.

- The public address system will be for use only for emergency calls, when other communications systems have not worked, or when general announcements are needed to communicate with staff and the public.
- The output specifications require that the new public address system will operate independently but also have full integration to fire alarm paging system for additional backup paging in the event of failure, Infusion requests that the Authority consider an integrated solution as an option.

Typical Devices and Function

Infusion will provide a complete paging system with typical devices consisting of a control system software, loud speakers, microphone stations, amplifiers and dedicated wiring.

- Audible alert levels will be 10dBA above ambient with minimum of 75dBA.

System integration

Infusion will investigate the need for integration of new overhead paging systems with existing systems if required by the Authority. Currently we do not anticipate this to be needed as a telephone interface is planned to allow access remote paging functionality by means of proper access codes.

iv) Structured cabling

Technology and Communication Systems

The structured cabling system will form the backbone for the high speed digital communications highway within the new facility. Cabling will be selected to support the bandwidth requirements of the latest healthcare computing technology. Structured cabling and patching components are custom designed to allow for faster moves, adds and changes of field and head end equipment connections. The structured cabling system will support data, voice and media requirements on a common infrastructure for simple configuration and management.

System and Associated Scope

Infusion will provide structured cabling and physical wiring pathways, meet TIA and BICSI standards. The majority of communication systems field devices will be supported from designated communications rooms on each floor. A star wired backbone cabling architecture

will service each Local Communications Room (LCR) via a centralized Main Communications Room (MCR). Within the new Facilities, a single MCR along with 1 LCR stacked vertically per floor is proposed within the structured cabling design.

LCRs will be allocated in at the center of a 70m (based on output specification) radius to cover the entire facility; centrally located core locations within the building are preferred for maximum coverage efficiency. A main fibre-optic distribution patch panel is also proposed within the MCR to allow single point management for all backbone cabling links within the facility. All building management servers provided under the scope of Infusion will be installed within the MCR. It is not anticipated to have a raised floor system within the communication room.

Typical Devices and Function

The bandwidth requirements and distance limitations will ultimate determine the type and quantity of backbone cable installed within the new facility.

- With the design two (2) 24-Strand Multimode 50/125 micron Laser Optimized OM3 backbone cables will be provided to each LCR from the MCR for both bandwidth and redundancy (no single mode required).
- Each data/voice outlet to have a minimum of (2) cat6 network cables installed.
- Furthermore, all ceiling spaces will have cable system drops for wireless access points.
- Infusion does not anticipate all cabling drops to be active. Infusion does not anticipate that all ports will require POE, as there would be a significant amount of large amount of energy wasted by this requirement. Infusion believes that flexibility inherent to the communications system design will allow for the rapid addition and reduction of active ports to comfortably meet the Authority's IT networking requirements at each facility.
- The exact number of active ports required needs to be confirmed by the Authority the number of network devices included in the equipment schedule. We have included for what we feel to be a reasonable amount of active ports for a healthcare facility within our proposal.
- Category 6 cabling is highly recommended for 80-90% of all network drops at each facility. Category 6a horizontal cabling will be provided for specific high bandwidth locations as an alternate to horizontal fibre optic cabling.
- Category 6a cabling will be provided if necessary for rooms requiring video streaming applications, such as dedicated teaching/training, video conferencing rooms and PACS workstations, this cable can support 10Gbps which is directly comparable to high-end fibre optic performance.
- If a category better than category 6a is the official standard of the Authority at the time of ordering, it will be priced and presented to the Authority to determine if they want to utilize the latest standard for all locations.

System Integration

- Servers and control equipment provided by Infusion would be installed in the new MCR.

- A star wired cabling approach will be utilized to wire all outlet locations back to local communication rooms and all communication rooms back to a MCR within the facility and then outside of the facility back to the main core network rooms at each site. As the new phone systems will be VoIP we do not anticipate the need for traditional copper backbone cabling within the new buildings.
- The existing core networks in the existing buildings and off-site server farms will be used for all Authority server applications and core network functionality.
- Two independent fibre optic links will be provided to achieve WAN redundancy. Cable type would be armoured for additional protection for both fibre optic multimode and single mode links to core networks at each site. Backbone cables each new building through two separate duct bank entry points for outside plant pathway redundancy.

v) Code blue systems

Technology and Communication Systems

Infusion will implement a code blue system as a component of the overall nurse call system. The code blue system will be configured to notify the code blue team of a code blue event and response to the cardiac arrest in the most rapid manner possible. A dedicated plan for code blue response will need to be implemented in consultation with the Authority.

System and Associated Scope

Code Blue will be provided as a component of the overall nurse call system.
Existing code blue systems at each site will be expanded to the new facilities if necessary in accordance with the Authority's current code blue response plans.
Code blue elevator recall will need to be implemented.

Typical Devices and Function

Infusion shall provide Code blue stations (separate station to other nurse call stations/buttons) shall be located within all patient rooms, OR's, procedure rooms, PARR / PACU (at each bed location), emergency department (each cubicles / beds location), each exam room, each treatment room, each LDRP room to identify the exact room where the patient needs assistance via nurse call dome lights, nurse call annunciation, and wireless annunciation.

System integration

Infusion will integrate the nurse call system with other alarm systems to annunciate code blue (cardiac arrest) and at local nurse stations and switchboard.

vi) Code white system

Technology and Communication Systems

Infusion will provide a panic duress system for the hospital that will allow immediate response by the Authority's Protection Services department to violent threats that occur at the new facility.

System and Associated Scope

Fixed panic alarms will be provided at care stations and reception areas to allow alarm initiation at staffed areas.
In addition to 802.11 based access point infrastructure, Infusion will also provide a dedicated wireless code white panic alarm system to protect Staff.

- The wireless panic system will report locally at the main care station in each installed department.
- The wireless panic system will visually annunciate the room/hallway location on a graphical map when a wireless panic button is triggered by Staff.

Typical Devices and Function

The panic alarm systems monitor input events from staff triggered field devices and will annunciate the location of the alarm at the Infusion call centre and at the closest nurses' station via audible and visual alarm displays.

Fixed panic alarms will be provided at all staff care stations, reception areas and other occupied locations with direct monitored connection to remote security stations. Infusion will investigate the need for local audible siren, strobe light for additional safety and deterrence. The panic system will visually annunciate the room/hallway location on a graphical map when a wireless panic button is triggered by Staff. Alarm displays will include information on both the wireless device initiating the alarm and the room in which the alarm was initiated.

System integration

The wireless panic system will report locally at main care station in each installed department, as well as centrally at a call centre.

vii) Patient entertainment/educational television

Technology and Communication Systems

Infusion will support the cabling infrastructure requirements of the Patient Entertainment system selected by the Authority.

System and Associated Scope

The Authority will provide the patient entertainment equipment, Infusion will provide the necessary infrastructure to support.

Typical Devices and Function

The proposed patient entertainment system infrastructure will be capable of supporting in-room patient entertainment including live television, movies, internet, patient education as well as in-room telephone service in all in-patient rooms and all other patient locations where it is expected that patients will have long stays. Infusion will provide sufficient bandwidth to accommodate each location.
The areas requiring access to the patient entertainment system will include all selective bedrooms, selective lounges, lobby, multi-purpose rooms and other rooms with audio visual capacity.

The type of end-use will allow patients and staff to be able to change program channels, select closed captioning and control room lights. All cabling will be via the structured cabling system (selection of Category 6 and/or Co-axial to be determined) and local power.

System integration

Further requirements and specific locations are to be determined by the Authority.

viii) Patient monitoring

Technology and Communication Systems

Infusion will provide physical pathways and/or structured cabling to support the Patient monitoring systems as selected by the Authority.

System and Associated Scope

Infusion shall install/connect all patient monitoring systems equipment and devices and provide power, raceway, structured cabling infrastructure including as identified in the Equipment Schedule. Authority to supply equipment, devices, software and test/commission the complete system.

Typical Devices and Function

Typical patient care room will be wired to allow a patient monitoring device to be located at each patient bed headwall.

System integration

Infusion will provide a structured cabling system to allow integration over the Authority's IP network with other Authority clinical networks and servers (located outside of the new facilities). Exact patient monitoring requirements to be confirmed by the Authority during the design development stage.

ix) Intercommunication

Infusion will supply communication systems and infrastructure requirements to allow Staff to synchronize and extend their capacity to communicate effectively throughout the new facility.

Due to the extensive need for locked doors within the new facility, Infusion anticipates the need for an advanced intercom system to safely allow access to secure spaces. Infusion will provide a complete intercom solution to meet these requirements.

Technology and Communication Systems

Infusion will provide intercom systems as determined for each department within the new facility. We propose to integrate the intercom system into an overall integrated security solution and telephone system interface for additional functionality.

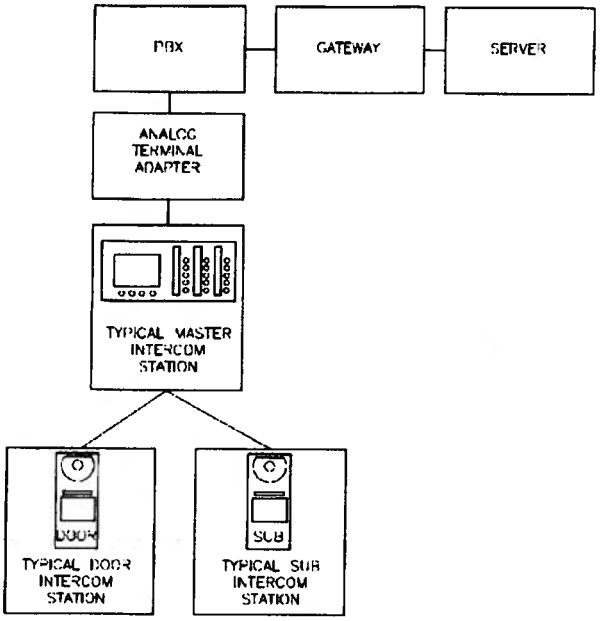


Figure 5: Intercommunication System Overview Diagram

System and Associated Scope

Intercom master stations will be provided at selected nursing stations and reception areas as required for two-way communication and remote door release. Intercom substations will be located at strategic door entrances for secure access or after-hours access to selected department. Specific departmental intercom requirements will need to be identified in user group meetings with staff.

Typical Devices and Function

Typical intercom devices will consist of sub-stations and master-stations with two way full duplex communications functionality. Select sub-stations will also have CCTV video cameras integrated to display persons who request entry to monitors tied in with master stations.

System integration

The final design of the intercom system will be based upon the user group functionalities required. From a base perspective each department will have the ability to control access independently with local intercom master stations. If functionality is required between departments then Infusion recommends a centralized intercom solution that is integrated with the access control system and telephone system to allow extended functionality. As an example requests to enter after hours could be transferred from master stations automatically in the event that a care station is not attended. Staff could receive notifications via wireless phone messages that entry is requested at a particular intercom doorway. Further discussions on integration will be necessary to determine these requirements.

x) Security systems

Infusion has dedicated design staff which are experienced with a variety of electronic security systems and devices used within healthcare environments. Infusion will work closely to determine a comprehensive security plan for the new facility based the following criteria:

- Executive direction from the Authority's Threat and Risk Assessment program

- Healthcare security best practices
- Output Specification Technology Requirements
- Liaison with licensed security consultants to analyze unique security threats to the facility (To be coordinated at the request of the Authority's security department).

The Infusion design team will work closely with the Authority's security department to establish a security design that complies with the following best practice healthcare security methodology:

- Protection of staff, patients and public against internal and external security threats by means of effective operational and technology based methods.
- Direct cooperation and coordination of threat response scenarios with the Authority's security department.
- Establishing direct and effective security communication methods for staff.
- Training and educating staff on security technologies and threat response methods.
- Installation of panic alarm systems and CCTV coverage at care stations and staff locations.
- Active and passive monitoring the perimeters of the facility by means of CCTV surveillance cameras to detect and record potential threats before they breach the perimeter of the facility.
- Securing the perimeter of the facility against external threats by means of electronic access control on outer doors as a first barrier of defence against outside intruders.
- Installing high resolution facial capture cameras at public entrances for use by law enforcement as a deterrent and evidence tool
- Securing each department for independent control of access by means of direct two-way audio intercom and camera systems.
- Programming of ID cards, location of all security devices and monitoring requirements to be identified.
- Identification of all security alarm annunciation requirements in consultation with the Authority's security department.

Technology and Communication Systems

Infusion will provide a comprehensive security system complete with CCTV, Access Control and Intrusion Detection to protect Staff, Patients and the public from internal and external threats. Overall features include:

- Cameras will be provided at all entry/exits, lobbies, elevator lobbies, corridor junctions, nurse stations and stairwells.
- Security systems will include a security desk near the main front entrance, access control at all main public entrances and restricted areas where medical equipment are stored.

- Alarm event integration between the CCTV system and access control system for alarm based recording and pre-programmed events.
- Staff duress systems are required to be hardwired in the form of panic buttons and wireless panic devices, these buttons will also be integrated into the intrusion detection system.

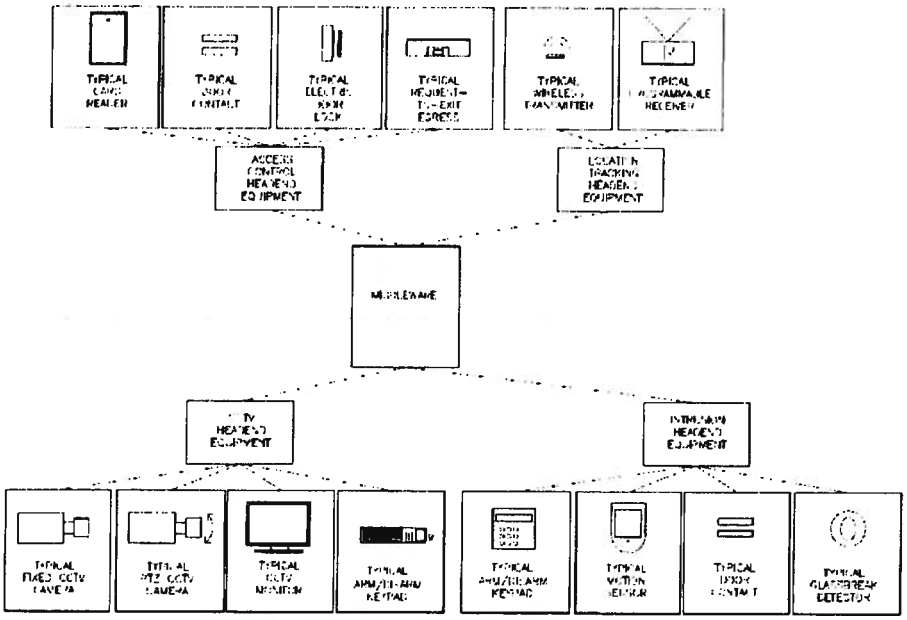


Figure 6: Integrated Security System Overview Diagram

System and Associated Scope

The new access control system for the new buildings will be standalone for the new building yet compatible with the existing access control system currently utilized in the Authority using database integration software.

Selective departments will be secured with card access for ingress and egress restrictions. Any secured room will meet provincial holding room standards and will be equipped with the following:

- Dedicated monitoring intercoms between each holding room and the local nursing station.
- Wireless Staff panic alarm devices
- Dedicated CCTV cameras
- Tamperproof devices within the room
- Institutional grade locking devices
- The new CCTV system will have network and web access for remote monitoring and will be of sufficient quality to be used as court evidence in Canada.

Typical Devices and Function

- This system will be a PC based, contains an integral photo identification card system, can lock and unlock doors via time schedule, utilizes proximity field effect technology, has sufficient capacity to handle regional employees via WAN database interconnection and provide this authentication 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.
- The system will utilize a field server and allow multiple workstations to access this file server for control and annunciation purposes.
- The system will consist of a main access control panel, door position contacts, card readers, electric door lock, request-to-exit sensor.
- The access controllers will be mounted in the communication rooms.
- All the wiring for the card readers, request-to-exit egress motion sensors, and door contacts will home run inside conduits to local control panels.

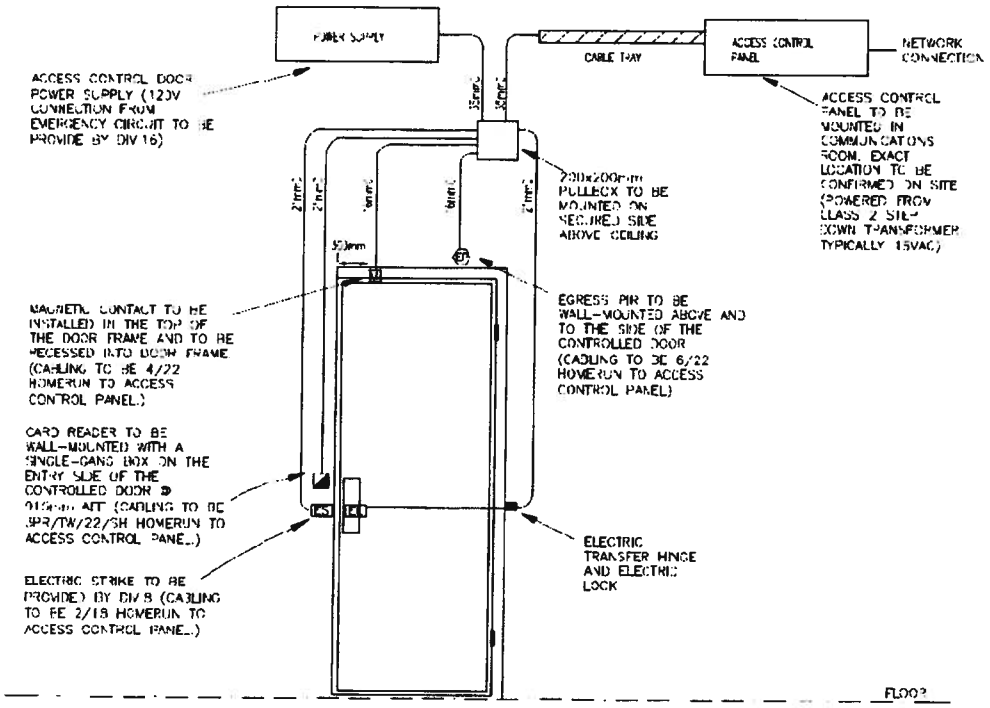


Figure 7: Typical Access Control Door Layout

Video Surveillance System

The proposed video surveillance system will be a digital CCTV system consisting of:

- Fixed interior CCTV cameras

- PTZ interior mini dome cameras.
- PTZ exterior high resolution cameras.
- Local LCD monitors located at nursing stations and central reception areas as well as centralized security monitoring station via IP connectivity.
- Digital Video Recorder (DVR) complete with software that controls all parameters of each individual camera.
- Cameras will be equipped with vari-focal, auto-iris lens to allow for scene coverage adjustment and automatic backlighting compensation for clear images in all lighting levels.
- The exact location and viewing angle will be confirmed by available light and viewing subject matter to make them to operate most effectively.
- Each new fixed camera will require Category 6 structured cabling for video signal and Power Over Ethernet.
- Each new PTZ camera will require Category 6 structured cabling for video signal and 2/18 FT4 rated for power.
- Motion detection module and alarm interface unit, interior and exterior CCTV systems are augmented with dedicated video monitors.
- The camera system will be equipped with a motion detection module (could be software based) allowing for scene selected and camera specific alarms to be initiated automatically on the basis of motion within a programmed scene.

System integration

Infusion will be responsible for sending CCTV images to the Authority via secure WAN transmissions.

xi) Central dictation system

Technology and Communication Systems

The central dictation system for each new facility shall form part of the overall centralized system of the IHA. The file server and storage server is located off site in the server farm.

System and Associated Scope

Infusion will work with Telus to ensure that telephones in the new Facility shall be programmed to access the dictation system. All telephones shall allow staff the ability to dictate onto the central IHA dictation systems.

Typical Devices and Function

No new devices are expected other than standard telephones being supplied.

System integration

The dictation system will be integrated as part of the structured cabling plant. An access code will be provided by the Authority allowing Staff to access the dictation system.

xii) Clock system

Technology and Communication Systems

System and Associated Scope

Typical Devices and Function

The new facilities will be provided with new digital face clock units for quick time identification. Single sided clocks will be provided at nursing stations, and dual sided clocks will be provided in strategic hallway locations. Clocks provided for Operating Rooms, Labour and Delivery Rooms, procedure rooms and treatment rooms will be equipped with "Count-Up/Count-Down" timers.

System integration

The proposed wireless clock system for the hospital will be integrated with any existing wireless clock system currently utilized in at the hospital sites.

xiii) Audio visual and video conferencing

Technology and Communication Systems

Infusion will provide the full Videoconferencing requirements of the new Facility. The active components for this systems and infrastructure will be provided by Project. Infusion will work with the Authority to identify infrastructure requirements in each designated videoconferencing room.

System and Associated Scope

Infusion shall provide the active components and infrastructure to support the Authority's fixed videoconferencing system requirements. Operating theatres will be equipped as digital theatres and allow audio / video streaming to video/conference rooms within the facility, lecture theatres within the facility classrooms and to other areas of the existing hospital and remotely to other IHA facilities. The location of microphones, video cameras, video monitors will also be installed at appropriate locations and angles to maximize the audio and video clarity within the room.

Typical Devices and Function

Infusion will provide fixed videoconferencing systems in conference rooms complete with monitors, cameras, microphones, televisions, digital projectors, automatic microphone controllers, amplifiers, speakers, video controllers, remote controls, codec and network connections. Room lighting controls will be interfaced to the video conference system for integrated controls. Typical Video Conferencing System support infrastructure will include: conduit, back boxes, 120V power, cable trays, pull boxes and other support structures.

- A typical video conferencing room will be designed with special lighting systems and noise attenuation characteristics to optimize the performance of the system.
- Exact requirements and specific locations are to be determined on a room by room basis.

System integration

- Infusion will be providing active components compatible with the Authority's standardized Polycom videoconferencing product line.

xiv) Code call systems

Technology and Communication Systems

Infusion shall recognize and adopt the Authority's standardized Code Call system requirements. Infusion staff shall be trained in the recognition of these unique facility wide alerts. Standardized response procedures will be implemented in consultation with the Authority's risk management department. Code calls in the facility shall comprise the following:

- Code Blue - Cardiac Arrest
- Code Red - Fire
- Code Orange - Disaster
- Code Brown - Chemical / Hazardous Spill
- Code Yellow - Missing Patient
- Code Black - Bomb Threat
- Code White - Violent Patient
- Code Pink - Cardiac Paediatric
- Code Green - Evacuation

System and Associated Scope

Infusion shall provide code blue, code white, code red annunciation at switchboard/call centre via annunciators. Infusion shall provide code blue call buttons to form part of the nurse call system, shall annunciate on the nurse call system, shall annunciate at a location designated by Authority so that they can page the clinical code blue response team, interface to the elevators to automatically home elevators to the appropriate location, automatically display on the wireless handheld devices, and instruct Authority staff to overhead page the code blue situation. Infusion will work with Telus to program the telephone system with a pre-programmed button sequence shall allow clinical staff to call the appropriate IHA staff so that they may initiate the code blue response team, in the event that the nurse call system has failed.

Typical Devices and Function

Infusion shall provide Code blue stations (separate station to other nurse call stations/buttons) and they should be located within all patient rooms, OR's, procedure rooms, PARR / PACU (at each bed location), emergency department (each cubicles / beds location), each exam room, each treatment room to identify the exact room where the patient needs assistance via nurse call dome lights, nurse call annunciation, and wireless annunciation. Infusion will provide code white (duress / panic buttons) and it will be part of the security and nurse call systems.

System integration

Infusion will investigate the need for interfacing to the existing the code blue system in existing building as necessary.

b) Provide documentation of proposed telephone and network systems showing:

The telephone system proposed will meet the established common technology platforms of the Authority. The system will be an expansion of the existing Nortel ICS 1000 systems and will be extended into the new facilities to accommodate new IP phones. Additional IP licenses for a full functioning telephone system will be provided. The proposed telephony network architecture will be an IP-based telephony environment as well as the capability to provision call centre and voice mail services. The existing facility site IP/PBX and the voicemail systems will provide all the call processing and voicemail services. Telephones will be based upon Nortel Network IP Telephones (IP Phone 2002 and IP Phone 2004). Switching equipment within the communication rooms will be based on HP Procurve 5400zl chassis switches for connectivity. Layer 2 HP Procurve network switches will be selected with Quality of Service (QoS) and Power Over Ethernet (POE) for IP phone support.

I) Origin of supply and interconnection with external services including redundant service.

Infusion will provide cabling interconnection with the existing buildings for a majority of supply and interconnection services for new systems. New dual single mode fibre optic cabling links will provide a backbone connection to the existing core network for each site. The data and telephone networks will be connected from this location using a structured cabling backbone. This backbone cabling connection will enter the new facilities through two separate underground duct banks. Infusion will provide two separate cables for pathway redundancy between the new MCR and the existing core network rooms at each site. The new facility may require an upgrade to the WAN service within the existing communication site service (this service upgrade would be provided by the Authority within the design of active component networks). The responsibility for providing additional WAN capacity would be under the scope of the Authority.
The majoring of security services will be connected via the LAN where possible and will utilize dedicated pairs of fibre backbone cabling.

ii) Proposed PABX communications system, including phone switch, handset types, backup power, voice mail system, and proposed software.

Extension of the VoIP Phone System and settings to match current site standards. All modifications to the phone system will be done in consultation with the current administrator of the VoIP PBX (Telus). Exact telephone system settings and configurations to be determined through user group consultations.

iii) Proposed PABX switch layout drawing, indicating CPUs, all equipment cards, spare ports, spare card locations and proposed software.

Extension of the VoIP Phone System and settings to match current site standards. All modifications to the phone system will be done in consultation with the current administrator of the VoIP PBX (Telus). Exact telephone system settings and configurations to be determined through user group consultations.

iv) Proposed voice mail, including quantity of mailboxes and storage time.

Extension of the VoIP Phone System and settings to match current site standards. All modifications to the phone system will be done in consultation with the current administrator of the VoIP PBX (Telus). Exact telephone system settings and configurations to be determined through user group consultations.

v) Proposed integration with wireless telephone system

Infusion will provide a wireless network including access points that will allow the wireless telephone system to operate. Wireless telephones, access points, network switches and wireless phone servers will integrate to the Nortel ICS 1000 system allow seamless access to outside lines from wireless devices. Infusion will work with Telus (Current Phone System Contractor) to establish the scope of work for each phone system integration component. Service and licensing costs incurred to integrate new functionality to the Authority's existing phone system will be passed through to the Authority via their existing service agreement with Telus.

Infusion power access points with Power Over Ethernet integrated at the switch. Infusion will select the integrated option for ease of IT management. POE ports will be allocated as required based on the requirements of field devices. Infusion will provide a UPS system within the communication rooms sized to support 20 minutes wireless network backup uptime requirements. Infusion will also provide middleware alarm management software (such as ConnexALL) which can be used as an interface to output event information to a 3rd party wireless phone sever (Vocera or equivalent). The nurse call system and intercom system will interface to the wireless telephone system allowing annunciation and two way voice communication to fixed stations via wireless phone integration.

vi) Proposed integration with other Division 27 systems

Infusion will provide a complete structured cabling system to support Division 27 devices. Infusion will provide integration between system via IP software protocols to maximize use of common cabling infrastructure. The structured cabling system will be star configured with every communications room being a main configuration location to integrate Division 27 systems using the same infrastructure. New devices can easily be added to the network as required by the Authority. Infusion will also provide a middleware software event management system to integrate alarms from a variety of Div 27 systems onto a common platform for annunciation. Once registered on the middleware software alarm events can be transmitted anywhere on the LAN for alarm management within the facility. The Authority may also consider configuring WAN equipment to allow secure access to monitor selected alarms remotely off -site.

vii) Proposed call centre systems and layouts

The proposed call centre requires very few stations and can easily be handled in a typical office via centralized call centre software. The systems will connect to the overall site VoIP phone system and utilize advanced Interactive Voice Response software to accommodate automated functionality and call routing functions.

viii) Proposed network diagram

The structured cabling system will support standard network configuration. The drawing below shows a collapsed backbone star wired arrangement.

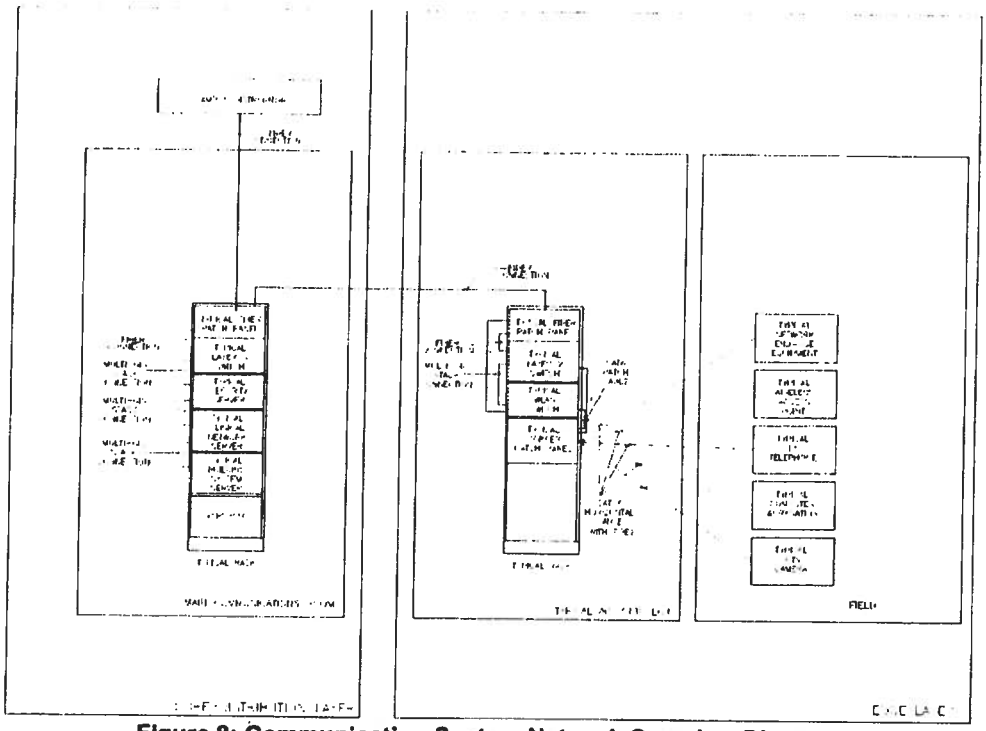


Figure 8: Communication System Network Overview Diagram

ix) Proposed communication room layouts

The proposed typical communication layout is as shown below. There is space for multiple racks. Only those racks needed will be provided at completion leaving spare space for future racks.

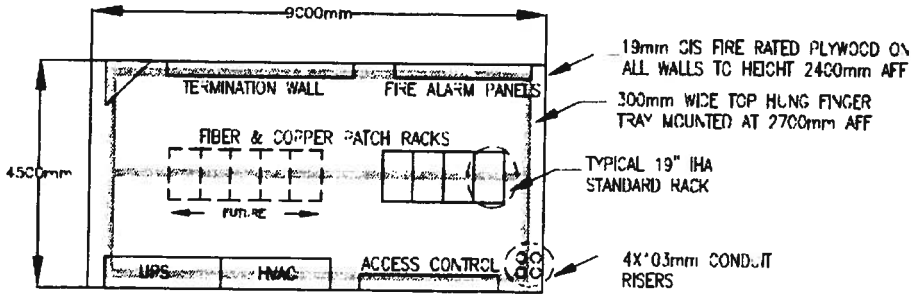


Figure 9: Main Communications Room Layout

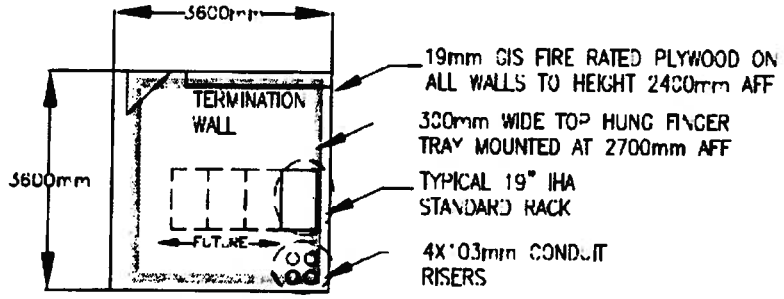


Figure 10: Local Communications Room Layout

x) Proposed network equipment layouts, detailing interconnection details

The structured cabling will allow for a star wired distributed network layout. We will work with the Authority's preferred IT vendor to coordinate their design with the structured cabling design. As the structured cabling design meets the Authority's standards, we anticipate full compatibility with the network design.

xi) Proposed network interface with other systems

All building systems that run on the network supplied by Infusion will have the ability to integrate with each other if deemed necessary through consultations with the Authority. Integration to the wireless staff communication system is anticipated as is integration of all security systems.

xii) Proposed connection to the WAN service

Infusion will connect each new facility back to the existing core network locations at each hospital site. From this location, the WAN service connection can be facilitated via router configurations to allow expanded WAN service to each new building. In the event that the Authority requires additional WAN bandwidth in excess of the 2X1 Gbps Telco link allocated for KGH and the 100 Mbps Telco link allocated for the hospital, the Authority will need to upgrade the WAN service to support additional requirements for each new building.

xiii) Proposed connections to local servers/server room

Infusion will provide structured cabling and physical wiring pathways, meet TIA and BICSI standards. The majority of communication system field devices are to be supported from designated communications rooms on each floor. A star wired backbone cabling structure would service each Local Communications Room (LCR) on each floor via the centralized Main Communications Room (MCR).
All centralized Servers provided under the scope of Infusion will be installed within the MCR. A main fibre optic distribution patch panel is also proposed for the MCR to allow single point management for all backbone cabling links within the facility.

c) For the proposed telephone and network system set out in (b) above, provide Describe the telephone and network services systems and how they will satisfy the needs of users in general. Provide specific detail for those users who have individual/group needs.

Infusion will supply infrastructure to connect these technologies through a high capacity structured cabling system. Active equipment provided by Infusion will be installed within communications rooms in the new facility. Any centralized server equipment provided by Infusion will be provided within the Main Communication Room located on the ground floor

level. Infusion is under the assumption that any clinical application servers required for operation of the new facility will be provided by the Authority in their off-site server location. Infusion has provisioned for extra rack within the Main Communication Room in the event that some Authority supplied servers must be installed there, however the mechanical systems in this room is not designed for high heat density server cooling requirements.

d) Describe in detail the communication traffic management plan for the FM Services call centre system.

Exact communication traffic management configuration will require further coordination with the building maintenance contractor.

e) Provide description of data communication systems showing:

To meet the requirement of the current and emerging healthcare technologies, the local area network (LAN) for each Facility will be designed around a hierarchical network model, which is based on a modular design to allow easy installing, scaling, and troubleshooting. The benefit of this network architecture is to provide secure access for systems and applications to network services while allowing new functionality to be added and removed from the LAN with minimal disruption to other network services.

A hierarchical network topology design is recommended for network management and scalability, high availability in the logical topology, link aggregation and load balancing. It is recommended that the LAN be designed with two levels of cabling infrastructure hierarchy: multi-gigabit patched fibre optic backbone network technology at the Core and Distribution layers and copper horizontal network technology within the Edge layer. The intent is to provide a maximum of 100Mbs for each active data port in the field; if additional bandwidth is required a copper 1000Mbs port would be used only where required.

For the bandwidth requirements of high-end video conferencing and PACS systems 10 Gbps over copper is the recommended alternative to fibre optic horizontal cabling. For select locations 10 Gbps switching ports could be added, Infusion however does not expect any edge layer applications to require more than 1 Gbps in the foreseeable future.

The proposed communication network infrastructure will provide each facility with the high availability required for healthcare applications, including voice, data and video solutions. The network design will be designed with a high level of redundancy and scalability to fulfil the medical application requirements as defined by the Interior Health Authority. Some of the network architecture characteristics will require redundancy (dual connections to layer 3 switches, spare infrastructure pathways, power supply redundancy) to support medical applications.

The core layer, which consists of multi-gigabit Layer 3 stackable switches, are proposed to perform the role of the network hub for the connection of peripheral network entities: access layer workgroup connectivity, DMZ connectivity and local server farm connectivity. Characteristics for the core switch components will include multi-gigabit backbone technology with fibre optic style uplink, logical address structure (to allow ease of management and trouble-shooting), dynamic load-sharing across the core structure where appropriate, efficient and controlled use of bandwidth, controls access layer protocols and services, and aggregated Quality of Service (QoS) and security. Infusion will route the incoming core data network backbone connection through a multi-gigbit core layer 3 switch located within the MCR.

A typical Core/Distribution Layer Network Architecture layout is shown in the figure below. The edge layer is recommended to consist of 10/100 Mbps Layer 2 stackable switches in each LCR on each floor with gigabit uplinks to the Layer 3 switches located within the MCR.

Characteristics for edge layer network switch components will include gigabit trunking/uplink technology, 10/100 connection availability, as well as support for the latest IEEE POE, VLAN, QoS standards. Application specific VLANs are recommended for local segmentation of network based on user groups with common interests and broadcast traffic isolation. The implementation of VLANs would allow for better network traffic utilization and increased security. A typical Edge Layer Network Architecture layout is shown in Figure 2 below.

i) Location of all data gathering equipment, including file servers, computers, etc.

Any centralized server equipment provided by Infusion will be provided within the Main Communication Room located on the ground floor level. Infusion is under the assumption that any clinical application servers required for operation of the new facility will be provided by the Authority in the off-site server farm. Infusion has provisioned for extra rack within the Main Communication Room in the event that some Authority supplied servers must be installed there, however the mechanical systems in this room is not designed for high heat density server cooling requirements.

ii) Data cabling system wiring standards

In terms of physical wiring pathways, a proposed design shall meet EIA/TIA standards and BICSI distribution methods. A main communication room (MCR) and typical local communication rooms (LCRs) are proposed to be built in each Facility. All systems field devices are to be supported from designated communications rooms on each floor. In addition it is proposed that a single server room be allocated for server applications and core network functionality. A star wired backbone cabling structure would service all LCRs via the centralized MCR.

A main fibre optic patch panel is also proposed for the MCR to allow single point management of all backbone cabling links. All centralized Servers provided under the scope of Infusion will be installed within the MCR.

iii) Relationship between data communications and all other items of equipment.

Structured cabling has been provided to equipment items as required in the output specification. Items such as television, desktop computers, printers, fax, scanners have data cabling for connection to the network.

iv) Interconnection and links between the facilities and existing buildings, including main single line schematic showing proposed methodology of distribution.

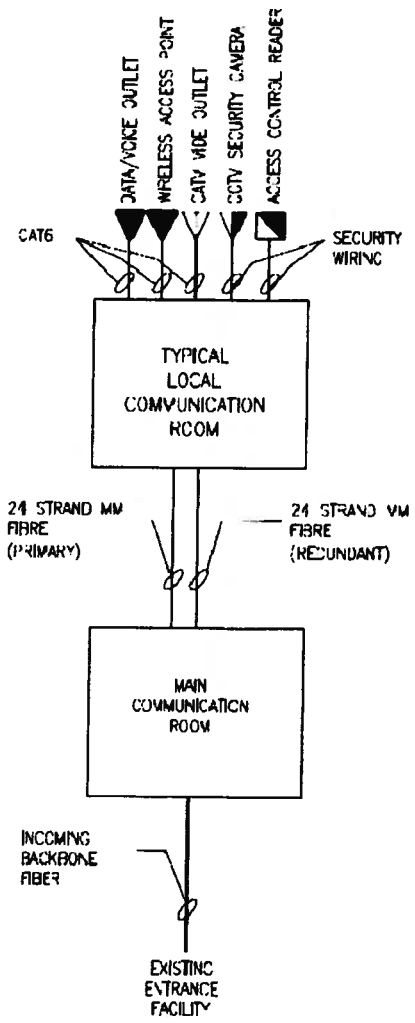


Figure 11: Main Single Line Network Architecture (Typical)

f) In addition to the above data communication system drawings, describe the data communications services and how they will satisfy the needs of related services.

Infusion will provide a complete structured cabling system to support Division 27 devices. The structured cabling system will be star configured with every communications room being a main configuration location to integrate Division 27 systems using the same infrastructure. Data communications will be interconnected via a structured patching system and active networking devices (provided by the Authority). Infusion will allow for integration between a variety of system protocols using a common cabling infrastructure platform.

g) Provide details of all standards proposed for supply, installation, testing and commissioning.

All communication systems will be tested and commissioned to the manufacturer's recommendations. Complete system demonstrations and a comprehensive commissioning

program will be developed with the Authority as indicated in the commissioning section of their document. It is the intent that the authority has a smoothest possible transition into the building.

Supply Standards

Supply components will be confirmed through a shop drawing review process. All items will be comply with the Infusion proposal unless otherwise confirmed by the Authority in writing.

Installation Standards

All local codes and regulations will be adhered to during the installation of communication and technology systems. All equipment manufacturer recommendations will be followed during the installation process. Latest telecommunication installation standards will be followed and adhered to during installation.

Testing Standards

Testing of systems will be part of the installation and commissioning process. Where required Infusion will all required test documentation for each individual system to verify correct installation.

Commissioning Standards

All communications systems will be formally commissioned with an Owner's representative present for verification. All end users will be trained in system operations and how to use each system effectively. All necessary test documentation will be provided to the Owner along with maintenance manuals prior to the commissioning process.

Summary of Clarifications and Assumptions

With reference to specifications H26 0503 C3.1.1 *Interoperation of systems* and H26 0503 C3.1.4 *Interface to existing results in testing and commissioning of entire new and existing system,* where existing systems are altered, the affected systems will be tested to ensure they still work correctly. This does not mean that every component of each system will be tested.

With reference to specifications H26 0503 C3.1.1 *Interoperation of systems* and F2 B2.1.4 *Seamless integration of systems,* we specifically clarify that the Data Network and Voice system will be expanded from the existing installation and thus fully integrated; the Code Blue / Pink system, along with the site-wide overhead paging will be integrated to a common switchboard; and the CCTV, Access Control and Code White and Security alarms will be integrated to a common security system. We believe that this meets the intent of the Output Specifications.

With reference to specifications H26 0500 A1.1 *Electrical systems shall provide redundancy* and H26 0500 C3.1.1 *Mandatory to provide redundancy,* we confirm that the system is designed to provide redundancy to ensure continuity of service in the electrical and communication systems. We are providing two primary transformers, two generators, two generator busses, multiple bus ducts in the electrical rooms, multiple panels fed from multiple sources in the operating rooms, tie-breakers between secondary main busses as shown on our drawings, redundant power supplies and redundancy in circuiting of amplifiers in the fire alarm, both an emergency voice communication system and public address system, and other redundancies where consistent with good industry practice.

H26 0500 A1.3.1 *Provide reliability for all systems.* We have allowed for meeting the intent of this requirement by utilizing proven technology and products.

Sections H27 0513 C3.2.4 *Mandatory that each component of the systems be tested, documented, and recorded in video* and H26 0500 C3.2.4 state; *"Mandatory that each component of the system be tested, documented and recorded in video."* We have interpreted this requirement to mean that all components requiring testing will be tested according to applicable standards and documented fully including representative video. We have found video recording useful in creating training videos which simplify training of constantly changing staff, and facilitate easy refresher training. These types of videos can be distributed from the central patient/staff education system and can also be useful in training patients as well as staff in the use of systems such as nurse call.

H26 0500 A3.9.2 *Provide 4 comm rooms in shelled areas or a minimum of two comm rooms per storey.* The technical requirement to ensure all outlets are within 70m of the communications room is achieved by the provision of a dedicated room as indicated on the floor plans provided, which enhances space for clinical functions. Since each communications room only serves outlets on its own floor, this avoids confusion of which communications room serves which area and minimizes the risk of unplanned interruption to service.

H27 0514 C3.1.1 *If a category better than category 6 is the latest standard at the time of ordering, it shall be priced and presented to IHA to determine if they want to utilize the latest standard at no additional cost to IHA.* The use of current proven technology is understood to be a benefit, and as new standards that are within the project budget become available they will be presented to the Authority for review. We would note that Poject Co is unable to predict future technology trends or Authority equipment procurement policies and will accept a "no-better, no-worse" situation should the Authority wish to adopt a revised standard.

We have allowed a level of spare capacity that is economically feasible at 300% in the cable trays and 200% capacity in the communications rooms.

H27 0514 C3.1.4 *Mandatory that all rooms that have data drops shall have at minimum 100% spare drops.* To provide a cost effective design, the number of spare drops at each location will be selected based on good industry practice, considering location and potential usage.

H27 0514 C3.1.19 *Mandatory that each fixed seating position in lecture theatres, etc. have data outlet and power outlet.* Since the vast majority of notebook computers have batteries and wireless internet access, data and power outlets will be provided in the room according to good industry practice and we have not allowed for a data drop at each fixed seating position.

H27 0514 C3.1.20 *Mandatory that every data/voice outlet is active.* While it would be possible to meet this criteria, given the universality of generic telecommunications outlets, we consider this a wasteful provision contravening H26 0500 A 1.4 Economical. We therefore have allowed port activation based on the number of devices listed.

F2-B2.1.2 *New fire alarm throughout KGH Site to high rise requirements.* The fire alarm in the existing building will not be replaced as this cannot accurately be estimated at this time, especially if it intended to be done to a new building specification level, and is outside the scope of a new building project. We have however determined how the intent could be met and this can be negotiated into the contract.

H26 2401 C3.1.1.3.4 *Receptacles for wireless in ceiling space of corridors.* Where systems such as wireless access points or wireless duress require powered transmitters on the ceiling, they will be powered by cabling systems concealed in the ceiling. We need to clarify the deactivation of the power to the room upon activation of a second stage alarm of the cross-zone fire detection system.

H26 2401 C3.1.1.3.51 *Mandatory that all spaces within 120/208 v distribution equipment have insulated covers over bus stabs and a complete draw-out mechanism ready for breaker installation.* Where electrical distribution is draw-out type and the anticipated breakers are known spaces will be outfitted for the anticipated breaker including draw out mechanisms.

H26 2774 A1.1.2 *Mandatory that Project Co provide all necessary connection an service to Medical Equipment.* Since Infusion cannot estimate the requirements for undefined equipment at each facility, an allowance has been made for equipment specifically outlined in the equipment list only.

H27 0513 C3.1.4 *Mandatory that redundancy shall be incorporated into systems and equipment such that the failure of a single piece of major equipment or major conductor shall not impair the operation of the facility nor the clinical or administrative activities.* The system is designed to provide redundancy to ensure continuity of service in the electrical and communication systems to an appropriate level for these types of healthcare facilities. For example, we are providing redundant power supplies and redundancy in circuiting of amplifiers in the fire alarm. We are also providing an emergency voice communication system and a public address system so that redundancy is provided.

H27 0513 C3.1.9.1 *All communication, and life safety systems shall be installed into the space to ceiling level and floor level such that the finishing of the space only requires extension of services from ceiling and/or floor to final devices and equipment.* Communication and life safety systems control and distribution nodes will be provided into the communication rooms with sensor distribution as prescribed.

H27 5123 C3.1.4 *Mandatory that phone have intercom capability and remote door release.* Telus has indicated that the phone system cannot provide this functionality.

H27 5224-Nurse Call 3.1.20 *Mandatory to include wireless nurse call devices within patient rooms to allow patient calls while not in bed.* The nurse call system specified by the Authority (Rauland 4000) does not support this wireless function. The specified systems functionality will remain as per the rest of the facility.

With respect to specifications H27 5224-Nurse Call 3.1.26 *Mandatory that wireless communications device as a panic button and* H27 5400.3 Wireless Communication Systems *Mandatory that handheld devices to be battery powered and each one to come with battery charger. Fully charged battery to last for minimum of 8 hours of talk time*, we are providing the Vocera system as specified by the Authority and it will match the rest of the hospital. We have not allowed for providing any additional Vocera Communications Badge wearable devices, batteries or chargers as it has been assumed that, as an existing Vocera user, the Authority already has a satisfactory supply. We would note that batteries for the handheld/wearable devices for the Vocera system specified by the Authority do not allow 8 hours of talk time.

H27 5320 Patient Entertainment System 3.1.3 *Mandatory that all patient rooms are standard phones.* Project Co will use VOIP phones, which will be standard for the facility.

H27 5320-Patient Staff Education System 3.1.2 *Mandatory to provide education kiosks.* This requirement was deleted in Addendum #19, however data cabling and power will be provided to appropriate locations for kiosks.

H27 5322 Videoconferencing *Mandatory that all operating theatres be equipped as digital theatre and allow...* Equipment will be provided by the Authority, infrastructure to support the equipment will be provided by Project Co.

H27 5365 Patient Monitoring/Medical Devices *Mandatory that all rooms shall be wired to allow patient monitoring device to be located in room. The patient monitoring shall be connected via structured cabling system to the network. Any specialized wiring needed...* Project Co will supply standard cabling for all patient monitoring but, as monitoring is provided by IHA, we are unaware of, and have not allowed for, any specialized wiring requirements.

H27 5365 Patient Monitoring/Medical Devices 3.1.2 *Mandatory that all patient monitoring systems shall be monitored at the nursing desk for each medical department and all alarms shall be annunciated on the wireless devices issued to the nursing staff. Should monitoring not occur at a particular nurse station then connections shall be made to patient monitoring system to permit monitoring as an alternate location...* We are not providing patient monitoring system and cannot ensure how it works. We have based our proposals on the assumption that any devices procured by the Authority will connect to the network and will be able to be displayed anywhere on the network.

H27 5365 Patient Monitoring 3.1.4 *Mandatory that the system...* We are not providing system and have assumed that the Authority will ensure it comes with all necessary components.

H27 5365 Patient Monitoring 3.1.7 *Mandatory to provide an active RFID system capable to operating over the wireless network and provided coverage throughout all the new building and all existing buildings on the site.* Project Co does not have control over the WiFi access points, or installation of RFID antennas in the existing buildings on site, and therefore cannot guarantee that the active RFID system used in the new building will work in the existing building although if WiFi based it may very well.

H27 5375 Interfacing to existing system 1.1.1 *Mandatory that all systems identified in Division 27 be interfaced to existing hospital systems...*We will interface systems that need to interface like security, the network, the telephone.

H27 5375 Interfacing to Existing System 3.1.2 *Mandatory that should interfacing not be possible...* Project Co will not replace existing hospital systems nor do we believe it is necessary to replace them for proper functioning of the new building.

H27 5375 Interfacing to Existing System 3.1.4 *Mandatory that interfacing of new equipment to existing equipment result in testing and commissioning of the entire new and existing system.* Project Co will test all components that need testing, that have been affected by any necessary interface.

H 27 5375 Interfacing to Existing Systems 3.1.5 *Interfacing includes: extension of backbone structured cabling, software/programming updates, interface hardware and software.* We are unable to quantify this as we do not know what will need interfacing.

H27 5375 Interfacing to Existing System 3.1.10 *Mandatory that project provide redundant connection paths comprised of trunk copper and fibre between existing main communication room and new building communication room for PBX, video, alarm, voice...*We will provide redundant data paths and provide appropriate connection paths to interconnect required interface.

H27 5400.2 Wireless Infrastructure 3.1.1 *Mandatory that project co provide a complete wireless network throughout the facility including parking areas...* Since the wireless infrastructure is intended to support clinical functions and staff, and no such clinical functions exist in the parkade, any coverage in the parkade will be incidental, associated with peripheral coverage from access points located in the main building.

H27 5400.2 Wireless Infrastructure 3.1.5 *Mandatory that sufficient bandwidth shall be provided for the wireless system for all current applications in the facility plus 100% additional spare capacity.* The data room does not indicate the current bandwidth of current applications. We intent to provide the access points specified in the density specified which sets the bandwidth limitations.

We have allowed for a centralized paging system rather than separate redundant systems.

We have not included for any specialized wiring in the patient rooms that might be required for the patient monitoring systems supplied by the Authority. We have not provided any component or infrastructure for the patient monitoring systems.

The existing PBX, video, alarm, voice, network, nurse call, fire alarm, paging systems do not have the capability of allowing redundant connection paths so we have not included for this.

H27 5400.5 *Authority's End Use Equipment 3.1.6, 3.1.7, 3.1.8* We are unaware of what exact equipment the authority is providing and we cannot ensure it will meet the strictest requirements identified. We are providing the brand of wireless system specified in the output spec and therefore it should be easy for the authority to buy end use devices that work well on this system.

H28 1300 Security 3.1.1 *It is the responsibility of Project Co to design, provide, and install, the security systems to meet the objectives of their security program. IHA will identify their needs as one aspect of the security system requirements. The Project Co to meet with IHA to obtain the information...* Project will provide the security system shown on the plans as identified in the threat and risk assessment (see *Appendix 2.2.9. A: Security Threat and Risk Assessment*).

H28 1300 Security 3.28.5 *Important that CCTV cameras be provided at entrance doors with door bells and intercom to the pharmacy department...*Intercom will be provided with VOIP access rather than door bells to provide maximum flexibility.

G1 *Room Data Sheets* Since the Room Data Sheets are more detailed than the output spec, where a contradiction between them existed that allowed us to reduce the equipment installed, and where not otherwise required by code, we have not provided the equipment.

In output specification H27 0513 it is noted that all IHA standards in effect at the time of installation of the communication and technology systems shall be followed and implemented. Infusion will be pleased to liaise closely with the Authority's representatives to provide appropriate systems, but it is not feasible to comply with standards that are unknown at the time of design. We are unable to predict future technology trends or Authority equipment procurement policies and require to be in a "no-better, no-worse" situation should the Authority wish to adopt revised standards.

Security Threat and Risk Assessment

Purpose

This document will serve as a security risk assessment for the Kelowna and Vernon, new ACC and Diagnostic Treatment Building respectfully. We have included recommendations that will assist in alleviating negative impact to the people, the property, and the reputation of the facility, upon completion of construction.

What is at Risk?

It is important to identify the assets we are attempting to protect or that are at risk. The categories of assets at risk include the following: Staff, Patients, Visitors, Vendors and Contractors, Facility/Buildings, Grounds/Real Estate, Equipment, Supplies, Personal Belongings, Records, Infrastructure, Continuity of Business, and Environment.

Probable Loss or Risk Events

We will need to meet with your loss prevention and existing security personnel to ascertain past patterns of security risk events occurring. The recommendations in this report are best practices used in most BC Hospitals.
Events that we will need statistics on are as follows:
(1) Staff: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Theft.
(2) Patients: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Wandering, Theft, Contamination.
(3) Visitors: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Wandering, Theft, Contamination.
(4) Vendors and Contractors: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Theft, Contamination.
(5) Facility/Buildings: Theft, Vandalism, Graffiti, Fire, Sabotage.
(6) Grounds/Real Estate: Theft, Vandalism, Graffiti, Fire, Sabotage.
(7) Equipment: Lost, Theft, Vandalism, Sabotage.
(8) Supplies: Waste.
(9) Personal Belongings: Theft.
(10) Records: Theft, Vandalism, Fire, Water Damage, Loss.
(11) Infrastructure: Vandalism, Theft.

Risk Assessment Methodology

In order to prioritize the recommendations, two factors are taken into account: 1) the potential impact if the threat was to occur and 2) the probability that the threat will occur. Once these factors are assessed, the recommendation can then be assigned a level of priority.

Priority Matrix

		Probability		
Potential Impact		Highly Probable	Moderately Probable	Not Probable
	Catastrophic	Urgent	High	Medium
	Serious	Urgent	High	Medium
	Moderate	Medium	Medium	Low
	Low	Medium	Low	Low

Potential Impact

This refers to the severity the incident would have if it were to occur. The degree of severity ranges in scale and is dependant on the criticality of the event. The potential impact of the event can be describes as:

Catastrophic
The identified threat will endanger patients, staff or visitors as well as expose the organization to considerable liability.

Serious
The identified threat would have a significant impact on patients, staff, department or organization.

Moderate
The identified threat would have a modest impact on the operation of the department.

Low
The identified threat would have negligible impact.

Probability

This refers to the estimated chance the event will occur.

Highly Probable
The identified threat will likely occur.

Moderately Probable
The identified threat is as likely to occur, as it is not to occur.

Not Probable
The identified threat is not likely to occur.

Prioritizing Recommendations

The degree of necessity that a priority be implemented is ranked as follows:

Urgent Priority
Action should be initiated immediately.
Failing to implement this commendation without delay will likely endanger life safety and/or expose the organization to significant liability.

High Priority
The recommendation should be initiated as soon as practicable.
Failing to implement this recommendation in a timely manner may result in an incident with potentially serious impacts.

Medium Priority – This recommendation should be implemented when time permits.
This recommendation will improve overall security.

Low Priority
The recommendation should be considered.
If implemented, the recommendation would provide increased security with minimal value.
Should we be successful on the project, we will obtain current information on current incidents such as aggressive behaviour, missing patients, loss, panic duress, break and entering, and vandalism.

Risk Mitigation

In order to reduce the probability of the identified risks from occurring, the following risk mitigation measures have been considered: Access Control, CCTV, Duress/Panic Devices, Intrusion Detection, Patient Wandering, Key Control, Security Policy and Procedure, Training, Lighting, and Landscaping.

The security staffing is a huge issue and currently is not in our scope to provide. We will need to work with your security staff to determine how they will patrol and respond to incidents. Based on these items, your staff will be able to prepare an operational plan for security for the facility.

Access Control

We have proposed an implementation strategy of a facility wide access control system consisting of card access on strategic doors complete with auto-locking functionality of doors identified as secure after-hours doors.
In addition to the electronic controlling of doors, their needs to be a method of monitoring strategic doors for both forced entry and door held open or door propping. This assists in eliminating misuse of strategic doors.
The complete access control system will be monitored for all alarm and supervisory conditions with appropriate policy governing response, investigation, resolution and penalty for miss-use or breach by your security personnel.

Application of Access Control in the Facility

We have used the principle of protection layers for this facility, the more layers of protection, the harder a target is to breach. We have locked the outer layer of the facility, have provided the ability to lock off the emergency department, have provided the ability to lock off the elevators, and have provided the ability to lock off each department. The layered approach makes it more difficult for someone to breach the security of the facility. In addition, there is the speed of response to the detection of each breach the thief must also contend with.
Other considerations include the fact that the emergency department, maternity, and ICU will operate 24 hours per day seven days per week with visitors arriving 24 hours per day seven days per week. These areas are public with the need to let people in after hours. So intercom systems will be needed in these departments.
We also know from experience and based upon audit reports, there are only certain areas that need to be accessed by visitors after-hours and there are only certain areas during open hours that visitors and the public should have the ability to access. We will review these areas with you if we are successful.

Recommended Access Control Program

The perimeter access doors must be electronically locked with certain dedicated doors equipped with card readers. The perimeter card reader doors would be those that are designated employee entrances or service entrances. We have designated a reasonable quantity of these doors, but will need to meet with your staff to finalize exact locations.
The next layer of access control should include all elevators, access points to wings or departments, service corridors or any separation points from public to service areas. It may be difficult to some of these corridors as a result of Code and exiting requirements.
Areas that are secured utilizing access control will limit open access to the general public, reduce the risk of theft and limit the areas to be initially searched in the event of a wandering/missing patient.
We have secured each department with an access control reader. Other doors to the department are locked with keys.

CCTV

The use of CCTV is of great benefit for garnering key visual evidence that may not necessarily be available from witnesses or access control audit reports. It is also important to note that it is difficult to actually measure any deterrent value that CCTV provides.
CCTV can be utilized in the investigation of Missing/Lost patients to confirm location or point of exit, if in fact the patient did exit the property.
Integration of the CCTV system to the Access Control system permits intelligence to be utilized to pre position dome cameras, call up fixed cameras automatically and present a view on a viewing station. The integration of the two systems permits cameras and views of live and

recorded video to be displayed simultaneously with the alarm signal. Alarm inputs include door alarms, intercoms, and duress alarms.
CCTV cameras will be of high quality suitable for working in the lighting and environment they are to be installed. Manufacturers design cameras to operate in specific lighting conditions. Secondly, one should not expect to cover vast areas with CCTV cameras unless the camera is designed to provide an overall view. Target Image sizes are classed in 4 categories:
(1) Detection
Allows for detection of any change of a defined field of view; 9% of the image
(2) Classification
Allows differentiation between types of figures such as humans and animals; Requires 17% of the captured image
(3) Assessment
Allows assessments of images including characteristics; requires 26% of the captured image.
(4) Recognition
Allows view of a human target's head including characteristics, which lead to identification. – requires 22% of the head and shoulders

Recording

A quality digital recording system will be maintained that provides for quality recording of at least 2 CIF, ideally 4 CIF with storage capacity for at least 30 days. The system should have the ability to offload incident images for evidentiary purposes using some sort of removable media such as CD-R or DVD-R.
Allowances should be made by the installation contractor to spot cameras prior to final installation to ensure the final camera location provides the best view of the required image. Exterior cameras need to be coordinated with the landscape plan to ensure that trees or shrubs do not hinder sight lines.
It is recommended that CCTV be utilized in key locations of high threat and risk for theft, vandalism, and main pedestrian entrances such that the images provide an assessment level of detail.

Duress/Panic Devices

Duress/Panic Devices are sometimes utilized in the Healthcare environment as a means to quickly summons help or initiate a security response typically as a result of aggressive behaviour or if a lone worker is threatened.
There are two types of Duress/Panic Alarms. The first and most common are hardwired or fixed panic buttons. These will be installed at strategic locations at all nursing stations.
In addition to these areas, it is recommended to install fixed buttons in the administration area, human resources area, and at strategic locations throughout pharmacy.
The second type of Duress/Panic Alarm is the wireless panic alarm, which is carried on a person. There are two types of wireless panic alarms. Those that provide location and those that provides a general alarm to a general area.
The most common Duress/Panic alarm in use is that of the general alarm as a result of its cost and area of protection being covered.
We recommend wireless duress alarms be put in emergency and maternity departments.

Intrusion Detection

Intrusion Detection Systems are utilized in areas of high risk for break enter and theft or for areas that are securing patient records. A typical intrusion detection system would consist of a control unit and keypad, motion detectors, glass break detectors, door contacts and a siren. Intrusion alarms would be monitored off-site by a third party monitoring company and will be interfaced to the main access control system if true integration and reporting exists.
For healthcare facilities, intrusion detection is not often used as areas are normally running 24 hours a day.

Patient Wandering

Patient wandering systems are utilized in areas where risk exists of Patients wandering away from the unit as a result of various conditions and various levels of risk. There are two types of wandering system configurations. Those that simply create an alarm and those that interfaces to an electronic locking device or elevator to prevent a patient from wandering.
For this project, we recommend a patient wandering system be utilized for maternity only to reduce threat of baby abductions.

Security Policy and Procedure

Security Policy and Procedure will be developed in concert with the Interior Health Authority if we are successful on the project. The existing policies will likely be extended to these facilities.

Training

Security Awareness training and instructions on the use of various security systems is of paramount importance and should not be overlooked. All too often it is assumed that staff and system users know how to operate a system. A thorough documented training manual and seminar package will be developed to assist staff with the use and accessibility of the various security programs being delivered.

Lighting

Exterior and interior lighting act as a good deterrent to crime related issues. It is proven that criminals like to work in the dark and poorly lit areas.
Exterior lighting will be provided around the perimeter of the building and in parking areas that promote good visibility at night while provided cut off for LEED purposes.

Landscaping

Landscaping will be reviewed in concert with the exterior security layout to ensure sight lines and lighting is maintained.

Detailed Assessment of the Facility

Building Exterior and Perimeter

Typically, hospitals present the most challenging environment to secure as the philosophy of an open and friendly environment for the staff, patients and visitors has been the norm. Although this philosophy has been slightly altered based on incidents within healthcare facilities in British Columbia over time, this new facility will remain relatively accessible during "normal business hours" (0600 HRS to 2000 HRS), whereas after-hours access will be limited. This presents a number of risks as it relates to unauthorized individuals accessing hospital property with the intention of causing harm in a variety of different ways, such as theft, aggressive behaviour, vandalism, etc.
The Emergency entrance provides specific risk that will be addressed within the section related specifically to that department.

<u>Risks</u>

Threat to the personal safety of patients, visitors and staff outside of the building, especially after-hours
Potential for sabotage/vandalism to the building or its components
Allowing access to the facility by unauthorized individuals

<u>Recommendations</u>

Exterior lighting will be provided on pathways, at entrances, and in the parkade. High
CCTV will capture high traffic areas for the purposes of providing deterrent and investigative information. High
All perimeter doors will be equipped with proper locking mechanisms to ensure the chance of unauthorized entry is reduced. High
Staff entrances will have access control to limit access to authorized personnel only. High

Landscaping techniques will be used to enhance the protection of the building and maximize the effectiveness of other security measures. Consideration will be given when planting trees and shrubs to minimize hiding places, dark spots that promote criminal activity. Medium
Good clear signage that provides proper way finding for patients and visitors will be in place. Ensuring entrances and traffic patterns are properly marked; this will cut down on the potential for wandering into unauthorized areas. Medium

Parking - Parkade

Parking at the ACC will be available to staff and customers alike in the form of a parkade. Parking areas present risk as it relates to vehicle theft, break-in, and vandalism. An attendant will not staff the parking area; therefore, the risk of break-in to the parking collection machine does exist. This has been a common occurrence at many Health facilities.

Risks

Threat to the personal safety of patients, visitors and staff in the parking area, especially after-hours
Potential for break-in and/or theft of vehicle or vehicle contents

Recommendations

Duress alarms will be placed within the parking area connected to the Helpdesk, therefore, in the event an alarm is generated Security would be dispatched. High
The parking collection machines should be located in visible, well-lit areas. Medium
Security patrol must be utilized within the parking areas and perimeter to deter suspicious and illegal activity. Employees, patients and visitors should be encouraged to report suspicious activity to Security immediately, through internal communication and signage. IHA may need to add more security patrols. High
The parkade will be well lit and CCTV coverage will be provided in the parkade. High

Helipad

Risks

Threat to the personal safety of staff and patients utilizing this area
Potential for loss or damage to organizational equipment or supplies
Potential for sabotage to organizational infrastructure

Recommendations

Must meet Transport Canada's mandate for Heliport Security
Access to the helipad must be restricted when not in use. High
Access to the helipad must be restricted during takeoff and landing preparations. High
Strict procedures need to be developed for preparation for landing, landing and takeoff. Due to the fact that Authority staff will be likely be required to transport patients from the pad, consultation with local Authority staff officials is required. High

Plant Services

Risks

Unauthorized access by wandering patients
Threat to personal safety of staff working alone
Potential for sabotage to equipment and/or physical plant

Recommendations

All Plant Services areas must be secure and unauthorized access must be prohibited. Consideration to be given for high traffic areas to utilize card access. High
CCTV should be utilized in the public areas outside of the Plant Services area, capturing the corridor and elevator vestibule. Medium

Meeting Areas/Videoconferencing Areas/Classrooms/Group Rooms

Risks

Theft of Audio/Visual equipment that will be stored in multiple locations
Theft of computer equipment
Threat to personal safety of staff using these resources outside of normal business hours
Theft or destruction of organizational property

Recommendations

Limit the number of access points, in which, the general public can gain entry and exit to/from this area. High
Strictly control access to any of the areas storing high value AV equipment. High
Utilize card access on key points that may require investigative information. Medium
Utilize CCTV in public areas to provide deterrent and for investigative purposes. Medium
Provide fixed duress alarm system for reception areas for immediate response. Medium
Ensure regular, random security patrol exists throughout this area on a daily basis. Will have to confirm this with IHA security. High

Gift Shop/Cashier

Risks

Theft of cash and/or valuables from the Cashier's office
Threat to personal safety of Cashier
Threat to personal safety of Foundation receptionist based on location in public or proximity to Cashier

Recommendations

Secure the Cashier office at all times and limit the number of keys for that space. High
Install an intrusion detection system within Cashier's area to alert Security after-hours in the event of unauthorized access. High
Provide fixed duress alarms in the Cashier office. High
Install CCTV in the Cashier area. High
Limit the amount of cash in the Cashier booth and do not store large quantities after-hours. Medium

Ambulatory Care/General Clinics

Risks

Loss of equipment due to high traffic area
Threat to personal safety of staff dealing with high volume of clients in public areas and treatment rooms

Recommendations

Access should be loosely controlled by ensuring patients need to present to reception during normal business hours. An ability to provide non-electronic locks on all rooms must exist and protocol in place to ensure that is done so after-hours. High
Provide duress alarm coverage in all reception areas. High
CCTV coverage to include main corridors in surrounding areas to provide a deterrent and for investigative purposes. Medium
Provision of access control on one entry door to allow after hours access limited to staff. Medium

Critical Care Unit/Intensive Care Unit

Risks

Threat to personal safety of staff by patients and visitors
Theft of organizational equipment and supplies
Theft of patient valuables
Theft of narcotics
Theft of staff belongings

Recommendations
Access should be loosely controlled by ensuring a "one way in, and one way out flow". By doing so, anyone entering the unit has a better chance of being seen by Hospital staff. High
Staff must be given some level of prevention and management of aggressive behaviour. High
Educate patients, staff and visitors on the importance of limiting valuables on their person during the time they spend at the facility. Medium
Install fixed duress alarm system for all care stations and any of treatment rooms that are deemed high-risk at the main nursing station. High
Ensure all narcotics are secured and processes are in place that meet or exceed the Controlled Drugs and Substances Act. High
Provide limited access after hours. Medium

Emergency Department
Risks
Threat to personal safety of staff by unpredictable clients
Threat to personal safety of clients by self and other clients
Loss or destruction of organizational property
Recommendations
All staff working with high-risk clients must be trained in the principles of prevention and management of aggressive behaviour. High
A sophisticated duress alarm system that allows for the use of hard-wired and wireless technology is needed. The system needs to have the ability to summons assistance locally, as well as, from on-site security. High
Access should be separated from the rest of the hospital. However, card access should be utilized to ensure hospital personnel have the ability to move freely throughout the department. High
Seclusion rooms must be designed to meet provincial standards, to ensure high-risk patients are unable to cause harm to self or others. High
CCTV should be utilized within the common areas and on the exterior of this unit. High
Ensure security staff are trained to respond immediately and appropriately in a non-threatening manner. High
Security provides a physical presence in the area. High
A lock down system is available to lock public doors if gang violence is suspected. Medium

OR/PACU/PARR
Risks
Threat to personal safety of staff by patients and visitors
Risk of wandering/missing patients within this setting
Theft of organizational equipment and supplies
Theft of patient valuables
Theft of narcotics
Theft of staff belongings
Recommendations
Access should be controlled via proper flow and access control. By doing so, anyone entering the unit needs to check in with Hospital staff. High
Staff must be given some level of prevention and management of aggressive behaviour. High
CCTV should be utilized in corridors to provide a deterrent and be used for investigative purposes. Medium
Utilize card access to control staff areas where valuables and equipment are located. High
Educate patients, staff and visitors on the importance of limiting valuables on their person during the time they spend at the facility. Medium
Install fixed duress alarm system for all care stations. This system must notify Security immediately to ensure emergency response. High

Ensure all narcotics are secured and processes are in place that meet or exceed the Controlled Drugs and Substances Act. High

FM Call Centre

Risks

Threat to personal safety of staff working in quiet area after-hours

Recommendations

Secure this area at all times, and utilize card access technology to ensure authorized employees have access. High

Ensure Call Centre staff is aware of emergency procedures. High

Staff Support

Risks

Threat to the personal safety of employees utilizing this area

Theft or damage to organizational property

Recommendations

Secure access at all times for these areas, and utilization of card access to allow staff-only access. High

Installation of fixed duress alarms within all areas to allow staff to summons for immediate assistance. High

Regular, random Security patrol of the Staff Facilities area. Medium

Utilize CCTV in surrounding corridors to provide deterrent and for investigative purposes. Medium

Sterilization/Decontamination

Risks

Threat to personal safety of staff working outside of normal business hours

Theft or damage to organizational equipment or supplies

Recommendations

Ensure this area is secure at all times. Card access should be utilized to ensure authorized staff are able to move freely. High

Utilize CCTV in the surrounding public corridors to provide a deterrent and for investigative purposes. Medium

Provide fixed panic button at reception of this area.

UBC Research Space

Risks

Threat to personal safety of staff by clients

Loss or damage to research equipment

Loss of research material

Recommendations

Limit the number of access points to this area of the facility to ensure anyone entering the area must pass by legitimate staff, such as receptionists. High

Install fixed duress alarm buttons in all high-risk areas such as reception areas. High

Utilize CCTV in the public corridors to provide a deterrent and for investigative purposes. Medium

Utilize card access at the entry of this facility to limit access to legitimate staff. High

Paediatrics

Risk

Threat to personal safety of staff by clients

Theft of organizational equipment or supplies
Aggressive parents
Recommendations
Installation of fixed duress buttons within strategic, high-risk locations i.e. treatment rooms and reception desks. High
Limit the number of access points to this area during the day, ensuring that clients present to a reception area and cannot wander throughout. Card access technology should be utilized to ensure the movement of authorized staff is not impeded. High
Utilize CCTV in surrounding areas to provide a deterrent and for investigative purposes. Medium
Train staff on dealing with aggressive people. High
Provide regular patrols of this area. Medium

Maternity
Risks
Abduction of a newborn baby
Threat to personal safety of staff from patients and visitors
Threat to personal safety of patients from other patients and visitors
Theft of staff/patient's personal belongings
Theft of organizational equipment or supplies
Theft of narcotics
Recommendations
Hospital specific newborn security, abduction and search protocols must be established and implemented. High
Orientation to be provided to healthcare staff regarding protocol around security and specifically, newborn security. High
Staff and Physicians must participate in the hospital identification system. High
Access should be limited to a single designated entry point for the general public in this area, to maximize the chance they are seen by a staff member entering and exiting the unit. High
All other exit doors leading out of this area must be equipped with a 15 second delay system that notifies staff in the area, as well as, Security after 2 seconds in the event someone tries to exit from these specific doors. High
An extensive CCTV system must be utilized to ensure all entrances and exits are covered off and can provide clear footage of all activity.
Regular, random security patrol must take place. High
Utilize card access to control entry after hours into this room. High
Educate patients, staff and visitors on the importance of limiting valuables on their person during the time they spend at the facility. Medium
Install fixed duress alarm system for all care stations. This system must notify Security immediately to ensure emergency response. High
Ensure all narcotics are secured and processes are in place that meet or exceed the Controlled Drugs and Substances Act. High
Provide infant protection system for patient tagging. Medium

Renal Services
Risks
Threat to personal safety of staff from clients
Theft of organizational equipment or supplies
Recommendations
Installation of fixed duress buttons at main nurse desk. High
Limit the number of access points to this area during the day, ensuring that clients present to a reception area and cannot wander throughout. High

Utilize CCTV in surrounding areas to provide a deterrent and for investigative purposes. Medium
Limit area after hours by securing elevators. Medium

2.2.10 Mechanical Systems

INTRODUCTION

The Following is a description of the heating and cooling energy plants, fire protection systems, air handling systems, plumbing systems and medical gas systems. Throughout the design process, Infusion has paid particular attention to maximizing system redundancies and to accommodating future expansion when designing the heating and cooling energy plants, fire projection systems, air handling systems, plumbing systems and medical gas systems. The following sections highlight the specifics features of each of these systems.

2.2.10. a) Provide brief descriptions of each of the following systems

i) Main energy sources

Infusion will provide electrically driven chillers and hybrid fluid coolers that provide cooling for the facility. The chillers operate at a COP of 5.4, which means that for every one unit of electrical energy consumed, the chillers are able to provide over five units of cooling energy.

We will provide 96% efficient gas fired condensing boilers for heating the facility. The boilers use natural gas as a primary fuel and propane gas as a backup fuel.
The following graph presents the relative consumption of electricity vs. gas

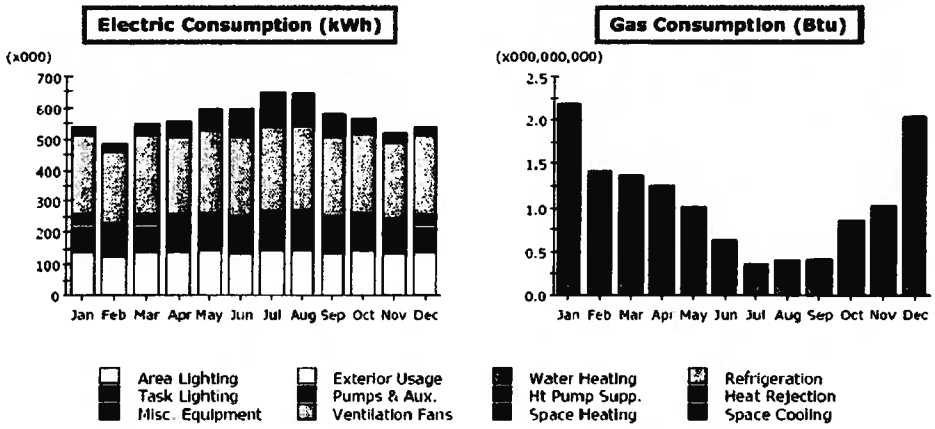


Figure 12: Relative Consumption of Electricity vs. Gas

ii) Cooling plant

Cooling will be provided via six 80 ton, variable compressor speed, magnetic (oil-free) bearing chillers and hybrid fluid coolers for a total cooling plant capacity of 480 tons (1686 kW). The chillers are centralized and all located in the level 6 mechanical room.

The use of variable speed chilled water distribution throughout the facility reduces the amount of energy consumed in pumping power. Distribution pumps are 100% lead lag for full redundancy.

Systems within the hospital requiring cooling 24 hours a day, 7 days a week have been provided with continuous cooling. Air side dehumidification has been provided via face and bypass systems installed in all air handling units.

Spring isolated circuit balancing cartridges have been provided for all cooling circuits.

iii) Heating plant

Heating is provided via five 96% efficient, fully modulating condensing hot water boilers with a total plant output capacity of 4,397kW.

All heating water system piping is interconnected to allow for redundancy provisions.

A variable speed heating water distribution pumping system has been provided for the combined primary heating, reheat and perimeter radiation system. The use of variable speed heating water distribution throughout the facility reduces the amount of energy consumed in pumping power. Distribution pumps are 100% lead lag for full redundancy.

Perimeter radiation has been provided with additional radiant ceiling heating panels in perimeter patient areas and staff clinical areas. On site 10,000gal propane storage tanks have been provided for emergency backup. The tanks are sized to allow the boiler plant to operate for 72 hours under the most extreme winter period.

Spring isolated circuit balancing cartridges have been provided for all heating circuits.

iv) Steam plant (CSR equipment)

Primary steam for humidification and sterilization has been provided from the existing steam plant in the Vernon Jubilee Hospital. Distribution pumps are 100% lead lag for full redundancy. steam boiler plant.

A new 50mm steam line will be connected to the existing steam plant in the Vernon Jubilee Hospital.

v) Wet, dry, and pre-action sprinkler systems

The building has been provided with two independent combined water connections for a redundancy in the water supply. The fire protection system has been designed in accordance with NFPA standards. The building is fully sprinklered throughout with an integral standpipe system sized to accommodate the anticipated future vertical expansion.

A fire pump system has been provided to ensure adequate water pressure is maintained at all times. Interior spaces have been provided with wet sprinklers and exterior spaces and spaces subject to freezing have been provided with dry sprinkler systems.

Data rooms and Electrical rooms have been provided with pre-action sprinkler systems and all patient care areas have been provided with flush pendent concealed fully recessed sprinkler heads for ease of cleaning and resistance to contamination build up for infection control.

vi) Heat dissipation systems, cooling towers, etc.

Hybrid fluid coolers with variable speed drive system are provided to reject the heat from the chillers. The use of closed circuit hybrid fluid coolers prevents the introduction of outdoor

pollutants and helps to protect the surrounding environment from the spread of Legionellas via the cooling tower.

A variable flow plate and frame heat recovery system has been designed to reclaim rejected heat from the cooling plant for preheating of domestic hot water. The hybrid fluid coolers have been provided with basin heaters for freeze protection in periods of non operation.

vii) Air handling systems

All total air change rates and outdoor air change rates have been provided in accordance with CSA Z317.2-01 Special Requirements for HVAC Systems in Health Care Facilities. The building air handling systems consist of 22 main supply and return air handling units (11 supply and 11 return). All air handling units have been located in the penthouse mechanical room for improved serviceability and reduce noise and vibration transmission.

Each supply air handling unit consists of outside air dampers, MERV 7 pre filters, glycol heat recovery coil, return air damper, MERV 7 electronic air filters, UV sweeping lights, heating coil, steam humidifier, cooling coil with face and bypass dampers for humidity control, variable speed supply air fan, MERV 14 final filters (MERV 15 for Class 1 suites) and discharge dampers.

Each return air handling unit consists of MERV 7 pre filters, variable speed return air fan, return air dampers, and exhaust air dampers. Glycol heat recovery has been provided between the exhaust air streams and the outdoor air intake stream. All air handling systems have been designed for 100% outside are capacity for free cooling and building flushing.

All Class 1 suites have been provided with two parallel air handling units, each running at 50% for additional redundancy provision. The class 1 spaces in this project are the maternity services, surgical suites and ICU & CCU. All isolation rooms are being completely exhausted by a separate dedicated ducting system with parallel 100% redundant exhaust fans.

All Emergency department entrances have been provided with protective air curtains to save thermal energy and provide an environmental separation to protect against potential contaminants.

viii) Domestic hot and cold water systems at various temperatures

Domestic water has been provided to the Hospital via two separate 150 mm street connections. This new water service will be interconnected to the existing Hospital water service via a 100mm isolated line connection.

A new plumbing and fire protection station will be provided in the lower level mechanical room and will contains the following equipment:

- Domestic water meter and strainer
- Dual PRV station
- Reduced pressure backflow station (domestic water)
- Fire protection station consisting of a double check valve assembly with tamper switches and wet sprinkler valve station with tamper switch.

Water pressure will be provided by triplex domestic water booster pumps to a minimum of 35 psi (24 kPa) and a maximum pressure of 70 psi (483 kPa). Four domestic hot water tanks have been provided, each with a nominal capacity of 720 gallons. Domestic hot water heating has

been provided for each tank via double wall heating water immersion heaters. The use of heating water to provide domestic water heating allows the domestic water system to share in the premium combustion efficiency of the condensing hot water boiler plant.

Domestic hot and cold water will be provided by two separate risers that loop together on each floor, thus allowing for servicing and expansion while keeping domestic water available to the floor. Water quality at each plumbing fixture shall be free of microbes to meet the Ministry of Environment guidelines for potable water. Filtration and softening to suit Vernon water supply will be provided complete with appropriately located drains and flushing valves to allow for disinfection and cleaning. Water quality for equipment requiring domestic water will suit the equipment manufacturer's recommendations. Appropriately located drains and flushing valves to allow for disinfection and cleaning.

Potable hot water used for patient areas has been dedicated for this use. Process areas have separate hot water connections from hot water mains. Mixing valves at required fixtures are the temperature sensing type with active control, and where specific equipment requirements dictate it, supply temperature within 1°F of design and supply pressure will be within 2psi (13.79 kPa) of design.

All domestic water calculations have included provisions for the 20% additional capacity as best practice to anticipate changes in technology and medical programs.

ix) Redundancy provisions

The heating plant has been designed so that with the largest boiler out the remaining boilers are capable of providing a minimum of 100% of the peak design load.

The cooling plant has been designed so that with the largest chiller or fluid cooler out the remaining units are capable of providing a minimum of 87% of the design load.

The above heating and cooling plant redundancy provisions exceed the CSA standard 317.04 heating and cooling plant redundancy requirements of 67% and 50%, respectively. The heating water distribution has been designed with a minimum of two lead/lag pumps and VSD's providing 100% redundancy in the heating water distribution pumping system.

The heating boilers have been equipped with dual natural gas / propane gas burners allowing for the instant switch over of fuel sources in the event of an emergency. The provision of dual water connection to the facility provides 100% redundancy in the event of a water main failure. Further, the interconnection of this new water service to the existing Hospital facility extends this level of redundancy to the existing buildings.

Each floor has been provided with two separate heating water, chilled water, medical gas, domestic water, and fire protection mains. If for any reason one main should be out of service, the other main is capable of providing a 100% redundant service. A 100% redundancy on the isolation room exhaust is provided via backup exhaust fans. All variable speed drives are provided with a by-pass.

x) Tempered water systems

For all areas, specifically hands free plumbing fixtures provided for infection control requirements, appropriate anti scald pressure balancing mixing valves c/w check stops shall be installed at local faucets. This will provide tempered water for all pluming fixtures requiring tempered water or hands free operation. Providing a dedicated piped tempered water system less than 60°C/140°F is not recommended in order to minimize the potential risk of legionella pneumophila within the facility.

xi) Plumbing fixtures

Plumbing fixtures are all institutional quality, white vitreous china or stainless steel.
All fixtures in patient rooms are ADA compliant. All plumbing fixtures or groups of fixtures have been designed complete with isolation valves for maintenance and future expansion.

To provide reduction in water usage, the select use of low flow fixtures has been incorporated. Clinical requirements have remained paramount and as such not all of the plumbing fixtures are low flow, such as scrub sinks. However, low flow fixtures are specified where feasible.

For a full description of plumbing fixtures, please refer to *Appendix 2.2.10. A: Plumbing Fixture Description.*

xii) Drainage systems

Sanitary drainage from the Hospital is to be drained by gravity in a 200mm line and will be connected to the city sanitary service at the south west of the hospital. The storm drainage system interconnects at the foundation level and a 250mm storm drain (66250 L approximately) will be connected to the city storm system at the northwest of the Hospital.

Decontaminated area waste is drained with a dedicated drainage system to holding tanks located outside the hospital building. This system allows for the potential testing of area waste prior to discharge into the city system.

A minimal amount of acid drainage is required. Where required acid treatment will be provided by use of point of use acid dilution in any lab areas with connections to the sanitary drainage system. Roof drains are non-flow control type in order to prevent the pooling of rainwater on the Hospital roof.

xiii) Special Drainage System and RO System as specified in the VJH program

Vernon hospital will not be provided with a Renal Dialysis department.

xiv) All major mechanical space locations

All air handling units, condensing boilers, chillers, pumps and expansion tanks are located in the level 6 mechanical room. By centralizing the location of these major pieces of mechanical equipment serviceability has been increased and noise transmission has been cumulatively addressed. Additional space in this mechanical room has been allocated to allow for expansion and the future addition of equipment.

The hybrid fluid coolers are located on the rooftop, above the chillers in the level 6 mechanical room. The level 1 mechanical room contains the water entry station, fire protection station and domestic hot water tanks.

Adjacent to the level 1 mechanical room is the level 1 medical gas room which contains the medical air compressor & desiccant dryer, utility air compressor & desiccant dryer, vacuum compressor and all of the medical gas cylinders. Locating the medical gas cylinder room on level 1 allows for the regular drop of and pick up of cylinders from a back of house, street level access, thus avoiding the interruption of clinical services.

xv) Building management system

The new building management system (BMS) will be a complete, open protocol system from one controls manufacturer and will be non-proprietary. The system will have the capability to link into an Ethernet system, will be distributed based, will have remote dial-out functionality and internet access to the system for individual user setpoints. The system will provide operator

information, alarm management, control functions, enterprise-level information, control access, information management such as monitoring, transmitting, archiving, retrieving, and reporting, diagnostic monitoring, report monitoring energy management, standard application for terminal HVAC systems and operator transaction archiving. The BMS system will have an additional 20% capacity built in for future traffic increases.

xvi) Detail provisions to accommodate future expansion

All HVAC ductwork, heating water lines, chilled water lines, medical gas piping, domestic water piping, fire protection piping and sanitary drainage systems have been designed to accommodate a 20% future expansion.

Each floor has been provided with two separate heating water, chilled water, medical gas, domestic water, and fire protection mains. The medical gas, domestic water and fire protection mains for each system are looped around each floor to allow for the easy expansion of any system at any location without effecting adjacent spaces. Mechanical rooms have been designed to allow for the addition of future equipment associated with an expansion. Modular chillers have been provided to allow for the simple connection of additional chillers for increased cooling capacity.

Cap-offs and isolation valves have been provided for easy installation of future services and maintenance. City connections have been upsized to ensure they can handle additional future load. BMS systems have been designed to allow for a 20% increase in traffic and future expansion.

Future changes to operating hours are not considered in the energy model. Future expansions on ICU/CCU level are included as ICU space and simulated as existing ICU spaces. Future expansions in all spaces are simulated as if they were currently being used. Associated assumptions include operating hours, temperature and RH setpoints, occupancy, lighting, and plug loads.

xvii) Overview of the commissioning process (systems to CSR)

Infusion believes that Commissioning of any facility must commence at the start of the build process in order for all parties to understand the performance and operational goals that must be achieved by the facility at the commencement of the facilities operational phase. Infusion will take a holistic and inclusive approach to commissioning ensuring that all stakeholders – contractors; sub-contractors; Engineers of Record; Owners; Independent Certifiers, Users and Operators, participate in the commissioning process so that it is well understood that the facility has been constructed to the required performance and is operating at that optimum level. Commissioning is not viewed as just the testing of basic elements of a system but rather is the Testing, Commissioning, Acceptance, Training and Turn over of a facility as a whole. In our view commissioning will commence at the inception of the project. Commissioning will therefore be a key topic of discussion during the design development of DTC building.

A Draft Master Commissioning Plan (see *Appendix 2.3.1. A: Commissioning Plan*) has been developed that outlines how the commissioning process will evolve, who is involved in the commissioning process and their role and how the success of commissioning will be measured. This plan includes the formation of a Commissioning Steering committee who will guide and monitor the transition from the build environment, through testing and commissioning, into the training of operations personnel and ultimately to the turn over and completion of the facility. Steering Committee will be headed by the Independent Commissioning Agent and will include representatives from all Infusion partners including the Construction Team, Design and Engineering team, Facility Maintenance partners. Other potential Committee members may from time to time include the Independent Certifier, the Authorities Representative as well as a representative from the Lender's Technical Advisor.

A key element to the success of the project is to ensure that not only do systems function independently but also in concert with each other. To that end, our basic philosophy to integrate new systems with existing systems will as follows:

- The new system will be tested in isolation to ensure its operability prior to interface.
- The existing system will be verified to be functioning within its prescribed performance parameters. This may include spot testing, review of IHA maintenance records for the system and any other IHA documentation.
- Integration will then occur and specific tests will be conducted to ensure the integration is functioning adequately.
- Finally, spot checks will be conducted on the entire integrated system to verify performance has been maintained and not compromised.

By following this philosophy, Infusion will ensure that the entire facility is functioning as required on the first day of operation and beyond.

b) Provide and address the following

i) Load calculations

Provide the U values for the building envelope including: exterior walls, glazing system, floor, roof and internal partition system.

The following table presents the building envelope U-Values used for load calculation.

Table 5: Building Envelope U-Values for Load Calculation

Assembly	Overall U value ($BTU/H{\cdot}ft^2{\cdot}^oF$)
Exterior walls (above grade)	0.047
Glazing systems	0.434
Floor (in contact with ground)	0.010
Roof	0.033
Internal partition systems - walls	0.132
Internal partition systems - ceilings	0.361
Internal partition systems - floors	0.087

ii) Air handling system

Air handling system type and function

The following is a description of each air handling system type, capacity and function. Each air handling system consists of one supply air handling unit and one return air handling unit.

Each supply air handling unit consists of outside air dampers, MERV 7 pre filters, glycol heat recovery coil, return air damper, MERV 13 electronic air filters, UV sweeping lights, heating coil, steam humidifier, cooling coil with face and bypass dampers for humidity control, variable speed supply air fan, MERV 14 final filters (MERV 15 for Class 1 suites) and discharge dampers.

Each return air handling unit consists of MERV 7 pre filters, variable speed return air fan, return air dampers, and exhaust air dampers. All air handling systems are capable of 100% outside air for free cooling.

- AHU-F2-1/2 and AHU-F2-2/2 are parallel 50% systems dedicated for serving the Class 1 Maternity Services area. The units have a combined capacity if 18,900 L/S.
- AHU-E3A-1/2 and AHU-E3A-2/2 are parallel 50% systems dedicated for serving the Class 1 Surgical Suites. The units have a combined capacity of 23,600 L/S.
- AHU-E3-B is a system dedicated to serving the Surgical Support area with a capacity of 11,800 L/S
- AHU-D1 is a system dedicated to serving the Ambulatory Care area with a capacity of 18,900 L/S.
- AHU-F1A-1/2 and AHU-F1A-2/2 are parallel 50% systems dedicated for serving the Class 1 ICU & CCU with a combined capacity of 4,700 L/S
- AHU-F1-B is a system dedicated to serving the ICU & CCU Support areas with a capacity of 14,200 L/S.
- AHU-C1 is a system dedicated to serving the Emergency Department with a capacity of 23,600 L/S
- AHU-E4-CSR is a system dedicated to serving the Central Sterile Reprocessing with a capacity of 9,400 L/S.

Cooling and heating sources

Electrically driven chillers with a COP of 5.4 and hybrid fluid coolers provide cooling for the facility.

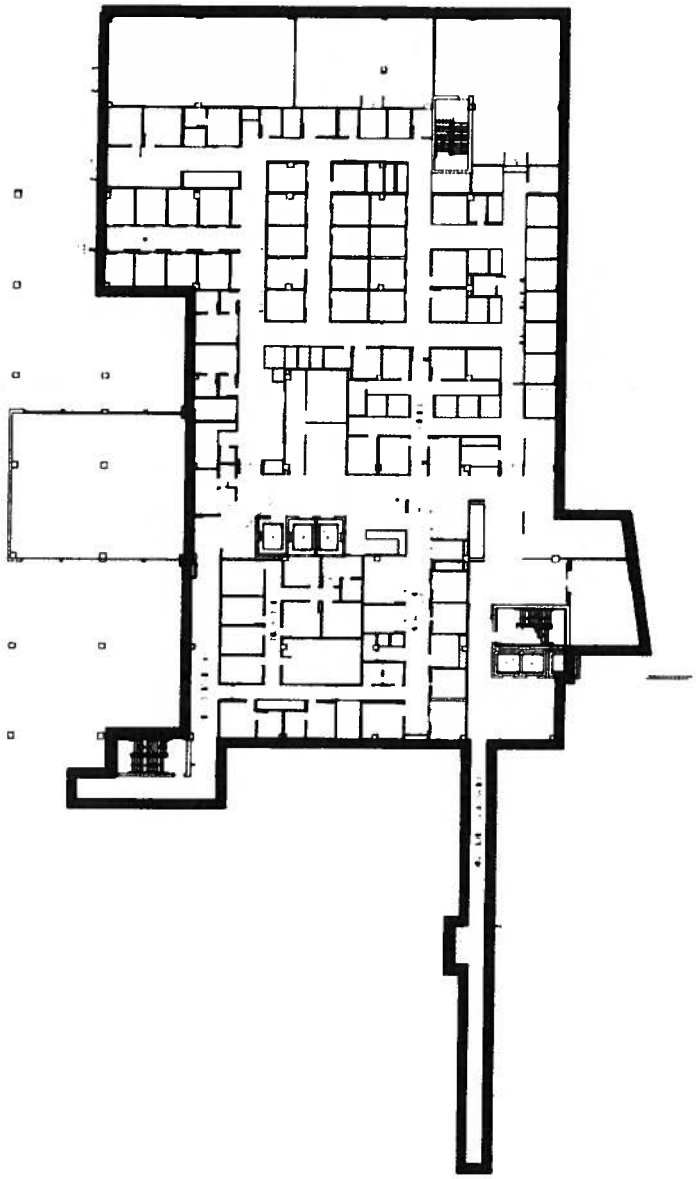
96% efficient gas fired condensing boilers provide heating for the facility. The boilers use natural gas as a primary fuel and propane gas as a backup fuel.

The boiler and chiller plants are located in the level 4 mechanical room.

Zone by zone cooling and heating loads (in w/m2). Clearly identify each zone.

- Following is an identification of each zone and a summary of the zone by zone cooling and heating loads. As discussed further in section *2.2.12 Energy Efficiency and LEED* two independent energy models of the building were developed. One model was developed using the *Trane TRACE700* design software and was used to size equipment based on estimate peak heating and cooling loads per the outdoor design temperatures. A second model was developed using the *DOE-based eQuest* software and was used to estimate actual expected building performance per the historical outdoor air temperatures for the region. The following information has been extracted from the *eQuest* model as it is expected that this model will be more representative of the actual building performance.

- Zone C1 encompasses the entire Emergency Department on Level 1. Below is an outline of this area. The average heating load for this zone is 88.7 W/m^2. The average cooling load for this zone is 78.2 W/m^2.



2.2.11 Medical Gases

INTRODUCTION

The following describes the major features of the medical gas system proposed for the DTC.

2.2.11. a) For Medical Gases

i) Provide drawings (1:200) of the medical gas services and systems.

Please refer to drawings M007 – M010 (all drawings are included in the Drawings Package).

ii) Describe the medical gas plant, size and storage, including the number and capacity of central compressors, vacuum pumps, cylinder storage, bulk storage, etc.

The medical gas plant shall be located in the mechanical room area on the main level of the hospital.

The air compressors and desiccant dryers are located in the main mechanical room. The medical gas cylinder room is located on Level 1.

The cylinder room holds the medical air reserve cylinders, the nitrogen cylinders, nitrous oxide cylinder, carbon dioxide cylinders and the vacuum pump system. The oxygen will be provided from the existing bulk oxygen system located on site. The Medical Air compressors are triplex oil-less, stack mounted package capable of 95.8scfm (2660 L/min) complete with desiccant dryers.

The Utility air compressors are duplex oil-less, stack mounted package capable of 2 x 19.8 scfm complete with desiccant dryers. The Vacuum pumps are triplex oil-less rotary lube system capable of 94.4 scfm. The new building will tie into the existing bulk oxygen storage tank. The existing bulk oxygen system was recently upgraded in 2005-2006 and future expansion was taken into consideration during that time.

iii) Describe how the medical gas services and systems will satisfy the needs of plant, equipment, staff and patient facilities.

The medical gases were sized according to the approximate number of outlets outlined in the technical specification and room data sheets. The medical gas equipment and cylinders are centrally located and the gases will be piped from the mechanical room to two mechanical shafts and rise up to the floors above. All medical gas services on each floor shall be looped to assist with maintenance and allow of easy installation of future services.

For each area requiring medical gas, there will be a centrally located medical valve box and alarm panel. Medical gas will be piped to the valve box and then distributed to the units. Isolation valves will be installed for each room and area to minimize area shut-down for maintenance and future installations.

iv) Provide details of the following:

Compliance with provincial and national standards/codes and practices

The medical gas system will comply with the following standards and codes:

- CAN/CSA Standard-Z305.1-92, Non-Flammable Medical Gas Piping Systems, and
- CAN/CSA Standard Z305.5-M86 Medical Gas Terminal Units.

Source of each gas

Medical air shall be provided from the triplex oil-less air compressor in the mechanical room. The reserve medical air cylinders will be located in the cylinder room. Oxygen will be provided from the existing bulk oxygen system and piped to the new building. The nitrogen, nitrous oxide and carbon dioxide cylinders shall be located in the cylinder room, adjacent to the main mechanical room and be complete with manifolds.

Systems proposed for gas supply and vacuum

Vacuum shall be provided by the duplex oil-less vacuum pump system located in the cylinder room.

Gas type provided

The following medical gases will be provided:

- Medical Air
- Vacuum
- Oxygen
- Nitrogen
- Nitrous Oxide
- Carbon Dioxide
- Compressed air for CSR

Location of each plant or storage facility and how they will be accessed

All medical gas equipment and cylinders shall be located on the main floor of the new DTC in the mechanical room and gas cylinder room. The existing bulk oxygen system is located north east of the existing hospital.

v) Each item of plant and the extent of each medical gas system must be detailed separately.

- Refer to section iv) above

vi) Identify Certification Company.

Medical gas testing will be by a certified testing agency to ensure gas purity and no cross-contamination. All costs associated with co-ordination and assistance during testing have been allowed for.

2.2.15 Furniture, Fittings and Equipment

2.2.15. a) Describe how Project Co will manage equipment requirements/deliveries with Authority.

With regard to KGH and VJH, describe how Project Co will interface with the Authority with regard to Design and Construction Output Specifications Sections H1 and H2 Equipment.

With regard to KGH, describe how Project Co will interface with the UBC Faculty of Medicine with regard to Design and Construction Output Specifications Section H3 Equipment.

Infusion, through its involvement with healthcare projects, believes the best way of delivering Equipment is through direct communication at the earliest possible opportunity with the User, Infusion and Infusion's Healthcare Equipment Consultant. Equipment is intrinsic to the design of the Hospital, Infusion knows that the User of the Facility needs to be comfortable to fulfil their duties yet if the Equipment, the 'tools of the trade', are anyway below expectation then the final piece of the jigsaw will not be fully delivered to the satisfaction of the User. Schedule 3, Volume 2 & 3 Sections H1.1, Equipment Procurement Strategy identifies the overriding principles and the information below

Infusion will review the requirements of the Equipment Program from Interior Health and would then welcome further dialogue with the Users to completely understand the needs and outputs necessary. Infusion understands there are constraints in the choices of equipment, be it time, quality or cost along with maintenance and Life Cycle. Infusion comes with the necessary skills to assist in this process and primarily their expert knowledge covering the procurement process

Infusion take pride in our delivery in such a key element of the building and warrant that sufficient time and energy is directed utilizing Equipment List Appendix 1 and reflect the requirements of the Output Specifications Sections H1 and H2 Listed below is our view to ensure capturing and delivering the best for Kelowna and Vernon, and have used the Output Specifications H1 and H2 as a template for our delivery.

General Approach to Equipment Planning

Infusion will provide an Equipment Planner as part of our service for delivery of equipment. The Equipment Planner's services are performed in a systematic step-by-step progression of activities. Each activity is time-sequenced to coordinate precisely with the corresponding design and construction phases over the term of the project. This process provides for the orderly development and assembly of valid information during each activity for which the succeeding activity is dependent.

As part of our analysis and equipment selection, we work closely with the architects and engineers to ensure that they have the correct specifications for any owner-supplied equipment that may impact the design of the space. All structural, mechanical and utility issues related to equipment are addressed early in the process. We have the technical expertise necessary to help identify the most current technologies, as well as specify and purchase them in a cost effective manner.

This knowledge base and early involvement for the design interface will be critical for the success at Kelowna, Vernon and Kelowna UBC. Each project presents its own unique equipment requirements yet this will be managed by Infusion's Equipment Planner through their understanding of timing and presentation of detailed information co-ordinated with not only the Output Specification H1, H2 and H3 but also the inclusion of the Output Specification as a whole.

Approach to Integration of Equipment Planning Activities with Construction and Project Completion

During construction the Equipment Planner begins Minor Equipment Specifications Development, which includes the development of minor equipment specifications with users, creation of preliminary purchasing specifications and establishing a composite room list that includes new and reused equipment.

The Equipment Planner will coordinate the delivery for all equipment purchased by owner-supplied, contractor installed equipment. The entire process will be closely monitored to ensure that the required equipment is on-site when it is needed so as to not delay occupancy.

Preparation of Requests for Proposals and Purchase of Equipment

The Construction Schedule will be monitored periodically with other members of the Project Team to begin to determine the Delivery Schedule for Category 1 equipment.

The Equipment Planner will prepare and submit to the Hospitals a recommended bid list by category commodity. The Hospitals will review, modify, and approve the suppliers' bid list.

Based on the projected delivery dates, the Equipment Planner will issue Requests for Proposals (RFPs) for the required Category 1 equipment. These RFPs will be issued in time to ensure that the Authority has sufficient time to review and approve the purchase of equipment from the successful manufacturers.

These bid packages will incorporate any special terms and conditions—including prices—by manufacturer and equipment model numbers (or alternatives), accessories, warranty information (where appropriate), maintenance contracts (as appropriate), and delivery terms for the equipment. The bid package will also include provisions guaranteeing delivery of the latest version/technology available at the time of shipment.

Once manufacturers' bids are received, all specifics – including costs, terms and conditions, options and/or recommendations, etc. – are entered, by manufacturer, into spreadsheets so that accurate comparisons can be made between the various manufacturers' offers.
Using this tool, we will consult with the Authority to analyze the specific bids. Based on long experience with the operation and function of virtually all major hospital equipment, we will advise and make recommendations as to the most cost-effective selections. Once all the equipment information is presented and analyzed, the Authority will make the final decision on each buy.

After equipment decisions have been made, the Authority may grant the Equipment Planner full authority to negotiate final terms on its behalf. When the final terms have been negotiated, the Authority will have the opportunity to review and approve those terms. The Equipment Planner then will prepare, for Authority review, all purchase order (PO) documents required by each manufacturer. After POs have been approved, the Equipment Planner—as the agent of the Authority—will issue them, and copy all appropriate and authorized parties.

The Authority would order all equipment shown as Authority supplied from the Room by Room Equipment (Equipment List Appendix 1) List. Our proposals are based on the supply and installation of equipment in accordance with the requirements in the Equipment Lists provided in the Data Room. Specifically, we note that neither parking equipment nor window washing equipment have been specified or allowed for at either the Vernon or Kelowna sites.

Installation of Category 1 Equipment

The Equipment Planner will develop the timetables for delivery and installation of all Category 1 equipment that must be installed during construction. This equipment will be delivered directly to the Project site. When required or appropriate, Infusion will coordinate the schedules of any equipment manufacturer/supplier that must be on site during the installation process.

Pre-Installation Management of Category 2 and 3 Equipment

Prior to the installation of new equipment, the Equipment Planner will meet with the Authority to determine occupancy dates for specific areas of the new building. Once dates have been confirmed, the Equipment Planner will notify the Authority of the schedule. This effort will then be coordinated with appropriate and authorized Authority resources: Bio-Med/Facilities, IT/MIS, Respiratory, Telecom, etc. Some level of pre-planning is accomplished with the placement of new vs. existing equipment (i.e. what a department requires to remain operational during the move, what medical equipment is needed for the move, and what can physically be de-installed and relocated prior to, during, and after the move).

The Equipment Planner will meet with other members of the project team and determine the best location for offloading of new equipment, specific routes within the new facility, elevator availability and elevator/floor protection requirements.

Delivery/Installation Coordination and Expediting

In conjunction with the Construction Manager, the Equipment Planner will schedule and coordinate the delivery and installation dates for all equipment and furnishings purchased by the Authority and by the Equipment Planner on behalf of the Authority. We will monitor and expedite deliveries to ensure compatibility with construction work schedules and occupancy dates, and publish periodic Purchasing Status Reports.

Storage Management (Staging)

Subsequent to the contracting for off-site storage services (if required) for applicable owner-installed equipment, the Equipment Planner will monitor such services on an ongoing basis.

Receiving Management

The Equipment Planner will provide procedural guidance and monitor receiving activities, including documentation of deliveries, for all owner-supplied equipment. We will resolve matters relating to damaged or non-conforming shipments.

Installation/Relocation Management

Subsequent to contracting for installation services for Authority equipment and furnishings (not otherwise provided by Authority personnel or equipment and furnishings suppliers), the Equipment Planner will monitor all such services, as well as coordinate supplier supervision of owner-supplied/contractor-installed items.

After installation, we will inspect the condition and operation of the equipment and coordinate any repairs, modifications, or replacements necessary to comply with purchase order terms and conditions.

The Equipment Planner will assist the Authority with the development of a plan that will provide for the timely and systemic relocation of retained items.

Equipment Training

Working in Conjunction with Authority representatives, the Equipment Planner will contact manufacturers/reps and schedule staff in-services/training on the appropriate equipment.

Resolution of Damage Claims and Invoice Discrepancies

The Equipment Planner will provide procedural guidance to the Hospitals with respect to the routing and review of equipment invoices or requests for payments. We will negotiate damage claims on behalf of the Authority and resolve, if authorized, any invoice variances to ensure compliance with purchase order terms and conditions. All such actions will be subject to the Authority's prior approval.

Follow-Through

Subject to prior approval by the Authority, and subsequent to occupancy, the Equipment Planner will take all necessary action to assist in enforcing the obligations of any supplier of equipment or furnishings including providing in-service training, spare parts lists, maintenance manuals, warranties, and service contracts.

INTRODUCTION

Infusion takes an active role in managing the design and construction phase of its projects and will be represented on site throughout as the first point of contact for the Authority. Graham Design Builders and Stantec will operate as a fully integrated design and construction team for the project execution. The schedule for design and construction of the facilities is of vital importance to the Authority and the communities it serves. We believe that by working together with a non-traditional, collaborative approach we will deliver the project on time, reliably, safely and to the satisfaction of the Authority. Our approach will allow Graham Design Builders to fast-track the design and construction interface and to reduce overall timescales. Through this integrated relationship we share openly ideas, seek improvements and evolve solutions to meet project objectives.

Our inherent local presence speaks clearly of our commitment to the community. The key members of our team have intimate knowledge of these types of projects and the needs of both the Authority and the community.

The team will:

- Respect and prioritize the hospitals' health service mission
- Maintain high levels of technical competence and professionalism
- Ensure a consistent level of performance
- Ensure compliance with all applicable standards, guidelines and regulations as well as its contractual obligations.

2.3.1. a) Describe and provide an outline management plan for the integration of the design and construction phases of the Project, showing and identifying:

Management Plan

On the selection of preferred proponent we will activate the project management plan which will give clear and concise direction on processes and procedures for project. The management plan will incorporate all necessary project controls, guidance and procedures relating to:

- Management processes
- Design processes
- Methodology and work procedures
- Schedule management
- Quality assurance
- Health and safety
- Environmental and LEED

Within the management plan there are a number of areas of particular importance to the Authority, which we make comment on below.

Design and Construction Organization

Further detail of the design build team organization is provided in section 2.3.2. of the proposal.

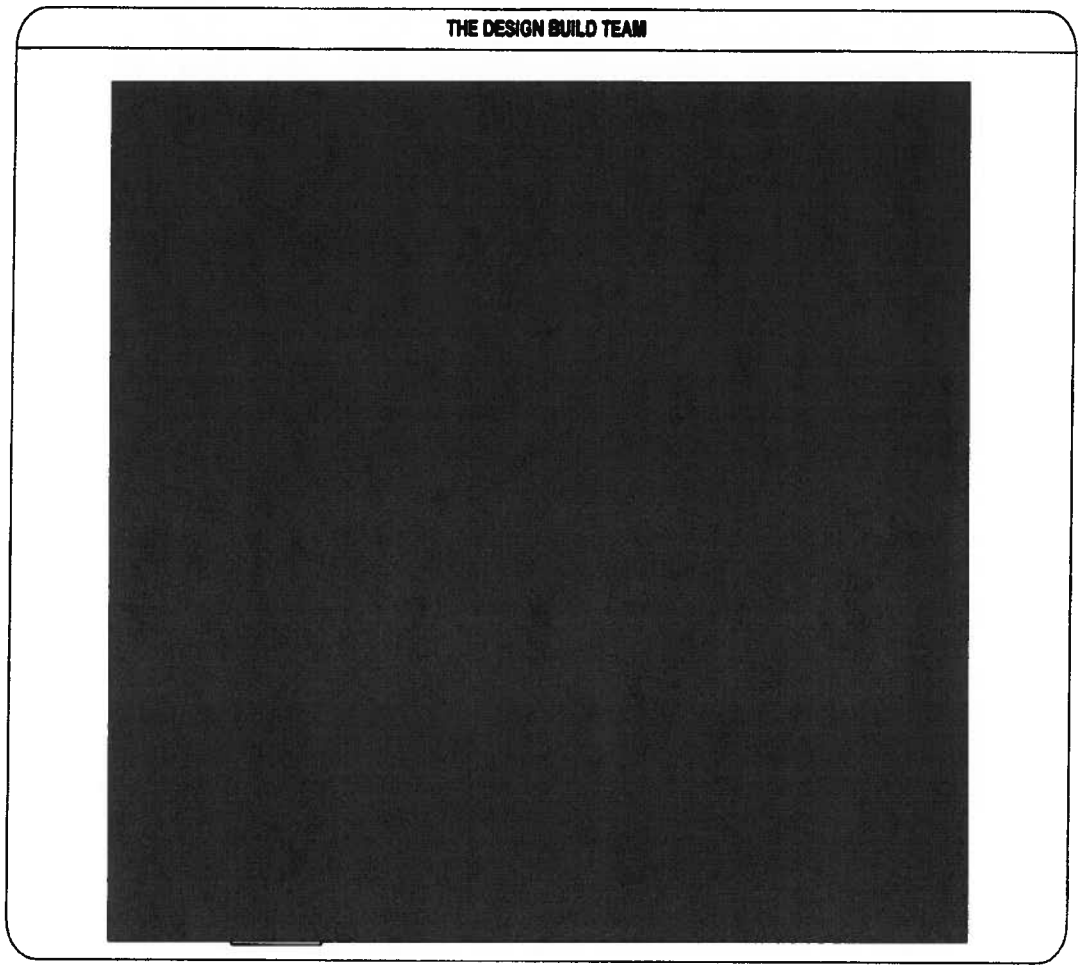


Figure 13: Design Build Organization Chart

i) Construction methodology and general approach to be adopted for the Project. Indicate the Proponent's understanding of the Project processes and roles of both the Authority and Project Co.

In determining appropriate construction methodology it is important to understand the schedule constraints as well as the design which will be constructed. Further schedule information is provided in section 2.3.3., however, the methodology descriptions below are closely linked with the approach to design and construction schedule.

Our proposals and project delivery schedule are based on agreeing the terms of an early works contract with the Authority to enable commencement of certain design and site work immediately after the announcement of the preferred proponent. The early works will include amending the preloading at the KGH-ACC site, realignment of underground sanitary, water, gas, and electrical services, commencement of design and making applications for site

development, building and demolition permits. The form and key terms of the early works contract are provided in section 4.3 of this proposal.

Our general methodology and approach to this project is too to address in three distinct phases for design and construction. The first phase, primarily design, is the preconstruction phase. During this period we intend to complete our construction documents, and commence some early work on site. The early work will consist of demolition of the existing out building and consist of building new underground services, relocating the BC Hydro power lines, and temporary parking provisions.

The next phase will be the construction phase, including preparation of the mock-up rooms within the Alexander wing of the existing facility, will commence with applications for permits from the City of Vernon, excavation for foundations and progressively constructing structural, architectural and building services works. Our full construction team will be on site during this phase.

The final phase is the post-construction phase, after which the building is substantially complete, which focuses on final commissioning and hand-over activities. At this time we expect to have a much smaller management team left on site, with the key people being our mechanical and electrical coordinators and commissioning agents.

The schedule put forward to complete this project is achievable but strives to achieve the Authority's imperative of early completion. In order to complete the design during the timelines established, communications between the design team, the builder, Infusion and the facilities manager will be clear and direct. To achieve a higher degree of synergy, the core design team will be located in a single project office, along with Infusion's project leadership and key team members from the design-build contractor and the facilities manager. The team will work from a single office location which will enable a focused, coordinated approach and will encourage strong collaboration between infrastructure providers, designers, constructors and operations specialists.

We believe that this is the best way to achieve a complete design that accounts for all of the required performance outputs. Each team member can provide challenges or input to the design process, and at the same time remain informed of progress to efficiently evolve his or her particular responsibility on the project. All of the materials will be managed and stored on a dedicated project server to enable immediate access to all information and to facilitate coordination.

Underpinning the tangible measures to ensure coordination is a philosophy common to all Infusion team members: that P3 projects demand a fully integrated team approach. Our methodology is to facilitate frequent, detailed and focused communications between team members to ensure that the design is understood and owned by the whole team.

ii) List departments that will require: phasing, alterations, and/or construction in the existing facility; Ortho clinic (VJH).

There are several departments that will be affected by phasing, alterations, and construction activities in the existing facility, however these are not extensive and take place over short time scales:

- Basement, new tie-in and corridor construction
- Level 1, connection to existing registration area
- Level 1, connection to existing imaging department
- Level 1, partial demolition of existing building

- Level 2, tie-in to existing nursing units
- Level 3, tie-in to existing nursing units
- After relocation to the new DTB building, the existing orthopaedic space may be refurbished.

Our proposals have made allowance for the handling and removal of asbestos in the existing facilities to the extent revealed in the information provided by the Authority in the Data Room. Should any other sources of asbestos, or other hazardous material, be encountered on either site besides what is described in the documents, we will liaise closely with the Authority to ensure that a safe environment for construction workers, hospital staff and patients is preserved. We have assumed that any impacts on construction schedule and costs of such an event will be dealt with using the variations and compensation event mechanisms in the Project Agreement.

iii) Interfacing to existing systems including shutdowns, modifications, replacement.

The requirements for system interface tie-ins will be refined once the full details of existing systems can be ascertained from site surveys and subsequent detailed design. In principle, we will leave existing systems fully operational and untouched until such time as the new building systems are complete and separately commissioned. Only once the new and old systems are proven to be simultaneously operational will the final connections be established. In preparation for the system shutdown a communications plan will be drafted and agreed with the hospital and communicated thoroughly to staff, patients and users in advance of the predetermined time and day of shutdown. During the shutdown period the hospital will be kept informed of progress of the interface connection work and notified immediately before system operation is restored.

The tie-ins to the existing hospital buildings will not require any shut downs of the operating units. We will construct false walls in the existing buildings prior to cutting the exterior envelope and installing the new doors. Once the new entrances and walkways are connected and complete, the false walls will be removed for access. A similar process will be followed for the partial demolition. We will need to build a temporary wall in the existing building; once the rooms have been vacated we will do the selective demolition, build the permanent wall, and remove the temporary wall.

iv) The process of design being implemented through construction.

Amongst the first processes to commence after announcement of preferred proponent will be developing the bid design in consultation and cooperation with the relevant parties. The focus will be on confirming the Authority's requirements for the design and agreeing the sign-off of functionality to the satisfaction of the Authority and the user groups. This will be done by through a series of structured design meetings with the lead representatives of Infusion, Graham and Stantec led by the Project Manager. The facility manager will also participate in these meetings to ensure the design acknowledges best practice for non-clinical functionality.

Detailed design integration requirements will then be better understood, detailed design will continue in a progressive manner, and initial site mobilization will take place. The intent of this period will be to evolve the final design, give the Authority's users the opportunity to confirm preferences, and to ensure complete documentation of the design. We fully understand that the design will be refined and construction methodology will be adapted to be flexible to the Authority's requirements. This integration of the design will be a collaborative effort in a completely open approach. We are firmly committed to teamwork and communication between all players – client, constructor, facility manager and concession manager – key partners for a successful project.

We have explained in section 2.1.1 of the proposal how we intend to approach the design development stage and the enhancements to the value optimization, design submittal and review processes, which we believe will accelerate project delivery whilst providing the Authority with flexibility as well as accurate, consistent and relevant information.

v) Traffic Management Plan during the construction work.

For the Vernon Jubilee Hospital site, the primary objective of traffic management will be to control site access, and secure the site. Construction excavation as well as deliveries will be controlled. We are intending to utilize the next furthest street south of the main entrance to segregate as much as possible the truck traffic as it relates to the emergency entrance. Access for parking will be provided on the east side and vehicle access off 21st Avenue onto the ambulance service road. We will build a temporary access road to the east side parking lot and rear of the hospital. The road will be maintained in a good travelling condition and signed appropriately.

On days where major concrete pours are scheduled, or other activities are performed with high volume construction vehicle traffic, flag staff, signage, and lane control will be provided.

vi) Methodology for managing industrial relations risk.

Graham Design Builders operates as an open shop contractor using unionized and non-unionized work forces. For work we self perform, like concrete and carpentry, we use a labour force that is signatory to a CLAC agreement. Our major mechanical and electrical subcontractors are also unionized. The majority of our local interior and exterior finishing trades are likely to be non-unionized.

We manage our industrial relations risk by using contracts that put the risk of labour disruptions on to the party controlling the labour. Our standard subcontract has clauses in it that clearly state that it is the trade contractor's responsibility to mitigate any labour disruptions, and Graham Design Builders has the right to terminate the contract should it come to that. Having said that we have not had any a labour disruptions on any of our sites in over 10 years.

vii) Dust and Noise Control Plan.

We recognize noise and dust are two potential areas of concern, particularly near an operating hospital. Graham recognizes that noise and vibration generated from construction activities in the day may disrupt procedures and treatments taking place in adjacent areas. Likewise, noise and vibration cannot be tolerated after hours because of the need for patients to sleep. Graham will review the entire design and will suggest design and constructability solutions such as structural connection details that will minimize the need for construction activities that produce noise or vibration.

Our plan to mitigate noise will include as a minimum:

- Restricting work to within hours specified by the City of Vernon (no night work).
- Avoid starting equipment and work before 7:00am
- Using low decibel mufflers on all diesel equipment
- Using electric powered equipment where ever possible, including our tower crane which is 100% electric.

Where noise or vibration can not be eliminated, Graham will implement a communication protocol where staff can signal to the construction crews directly when work needs to cease. For

example, an alert system can be installed where foremen or superintendents, upon receipt of a paged message by a designated hospital staff member, can immediately activate a series of flashing emergency lights via remote control to indicate "stop work". All workmen on site will be trained on this emergency procedure before they will be allowed to enter the site. We believe that this safety procedure will allow for an entire site shutdown in less than a minute.
Dust control procedures will be implemented immediately and will be maintained for the duration of construction.

When performing minor renovations inside the existing hospital, we will abide by the CSA code Z317.13-03, Infection Control during construction or renovation of Health Care Facilities. For Vernon we will be making tie-ins to the existing entrance .These areas are classified as medium to high risk population groups, and the construction activity will be small-scale, short duration, with minimal dust, or Type B construction activity as defined by the code.

We will also be partially demolishing the existing building to the north of the new DTB. This is classified as Group 2, medium risk population risk group, and the construction activity is Type C.

For our work we will be using Preventative Measures I -III depending on the area we are working and the type of work we are performing. Special measures include, but are not limited to:

- Notify the user group and infection control department of our plans and obtain formal sign off prior to proceeding with the work before work commences.
- Close access panels and block vents if possible
- Clean area with a HEPA filter equipped vacuum
- using drop sheets tapped and sealed to control dust
- using water misting systems if required for dust control
- sealing windows and unused doors
- placing dust mats at access points to the work site to trap dust

Silt fences will be installed on the perimeter of the construction site to prevent run off of silt to city streets, and in doing so, help keep the streets clean and reduce the dust kicked up by flow of traffic.

Wheel washes will be installed at site exits to reduce the dirt leaving site on construction vehicles, such as dump trucks during excavation, to help maintain the cleanliness on the adjacent streets.

On days where the site is dry and at risk of creating dust, sprayed water will be utilized to help keep particulates from becoming airborne.

viii) Communications Plan with Neighbourhood/community groups, Hospital Staff and Visitors.

Underpinning our whole approach to working within and on behalf of local communities is our guiding principle of 'respect for people'. Through listening and understanding the needs of the communities within which we work, we are able to respond in positive, proactive ways with solutions.

We look to engage with the community through our resident Liaison Manager, who will forge links with the Community, Hospitals, Visitors and other stakeholders ensuring that their wishes are heard and responded to.

Our Approach in Detail

The interests of our clients are paramount. We firmly believe that the success of our company depends on understanding and satisfying its clients. To our clients we must always deliver the highest level of quality and service.

Graham considers its reputation as a leading contractor to be very important. Clients, employees, consultants, subcontractors and suppliers will be treated with the highest standards of integrity and reliability.

We shall continue to deliver the Quality service in the business we know best.
Infusion will work in partnership with the Authority and each hospital, supporting their initiatives to proactively promote the Project and to ensure all stakeholders are fully informed regarding the development and any particular issues that may be of concern to them. We will take the leading role in promoting the issues surrounding the impact of demolition, construction work and operations to all stakeholders, liaising with each hospital and their communications teams on a daily basis to promote the Project.

Communication with the Community
Effective communication requires an understanding of the relevant information and channels required for each stakeholder. We therefore strive to ensure that we are in touch with stakeholders' communication needs, both in terms of the content they require and the process by which they access and deliver information. A range of communications' strategies will be used to meet the diverse communication requirements of different stakeholder groups. Additionally, Infusion will explore innovative and less conventional methods such as web sites, SMS and art competitions to augment traditional communications strategies. The range of communications tools at Infusion's disposal is shown in the chart below.

Internal communications are equally important: we will use, amongst other tools, a web based communications site based on either Infusion's or Graham's existing standards. All external communication will be handled within Infusion, in full consultation with the Authority, as a single point of public contact for the consortium members.

We will ensure that the communication to all parties is consistent and co-ordinated with each stakeholder. We will provide a 'human face' to our communication, maximising the opportunity for direct engagement with stakeholders. This will provide ongoing, personalised communication with stakeholders, which will be escalated in intensity prior to demolition activities and during the construction and operations phase.

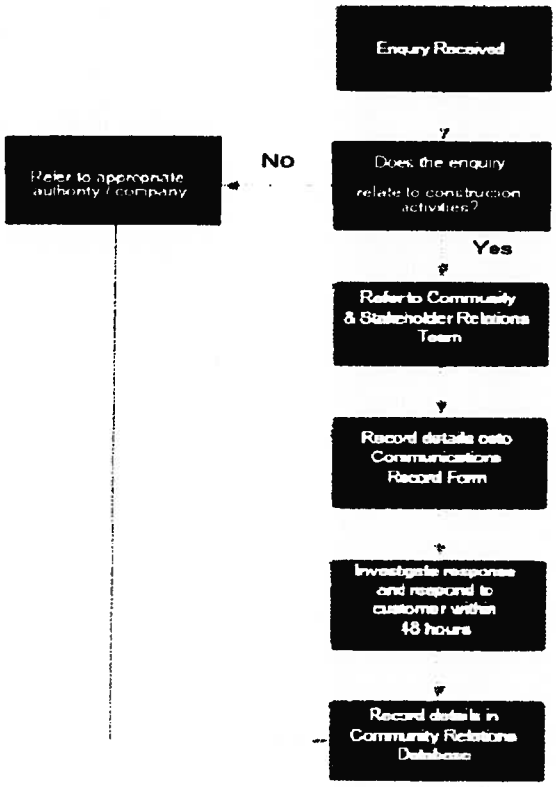
Table 6: Communications Tools

Tool	Audience	Purpose	Proposed Timeframe	Infrastructure Communications Team Role	IHA Communications Team Role
Hard Copy Materials					
Project Fact Sheets	Target audiences Broader community Key stakeholders	Provide information	Key milestone dates	Prepare and distribute with Project Manager approval	Provides info as necessary and signoff
Flyers/Notifications	Hospital users Local community Target audiences	Distribute information	Prior to work commencing (not less than 48 hours before)	Prepare draft for approval Facilitate distribution	Provides info as necessary and signoff
Construction Activity/ Project Milestone List	Target audiences Broader community Key stakeholders	Provide information	When required	Prepare and distribute at relevant meetings For use in various publications with Project Manager approval	Contribute as necessary
Website					
Website	Target audiences Broader community	Distribute information	When required	Manage and update	Contribute as necessary
Project Photography/ Webcam	Target audiences Broader community Key stakeholders	Provide historical information	Monthly	Plan, organise and facilitate	Coordinate location and subject of photography
Meetings and Briefings with Stakeholders					
Community briefings/ meetings	Target audiences Broader community	Collect and exchange information Educate	Regular basis/When required	Plan and facilitate and invite relevant project staff to attend when required	Attend meetings and participate
Elected representative briefings	Elected representatives	Collect and exchange information	When required	Provide assistance upon request	Manage all briefings
One-on-one briefings	Target audiences	Collect and exchange information Educate	When required	Facilitate and invite representatives and relevant project staff to attend when required	Plan, convene and facilitate meetings
Project Emergency Services Meeting	Emergency services	Provide information	When required	Plan, convene and facilitate inviting relevant project staff to attend when required	Plan, convene and facilitate meetings
Community presentations/Displays	Hospital users Local community Target audiences	Collect and exchange information Educate	Prior to construction commencing When required.	Plan and facilitate and invite relevant project staff to attend when required	Plan, convene and facilitate meetings
Media Promotion					
Celebratory Events	Target audiences Broader community Project Personnel	Celebrate achievements	As required	Develop, implement and manage celebration event	Advise and co-manage event
Articles and Awards	Target audiences Broader community Industry	Revise profile and promote success	At technical breakthroughs or achievements	Prepare articles Prepare award submissions.	Sign off all material
Media release Media list	Target audiences Media Broader community	Distribute information	When required	Provide suggested copy for approval No contact to be made without prior approval from Project Manager	Sign off all material
Community Information					
Community Information Line	Target audiences Broader community	Collect and exchange information	Set up before construction commences Life span of project 24/7 coverage	Develop and manage	Assist in promoting community information line
Email/SMS Alerts	Target audiences	Collect and exchange information	Set up before construction commences Life span of project	Manage and update	Assist in promoting service
Site Tours Schools program	Target audiences/Transport users/Government/Industry bodies/Local schools	Collect and exchange information Educate	When required	Plan and facilitate and invite relevant project staff to attend when required	Assist in planning and promotion of tours to relevant bodies
Community Relations Database					
Master Database	Infusion IHA Hospital	Collect and analyse information	Ongoing	Provide updated information for site-related enquiries and complaints within48 hours	Provide information to responses
Advertising					
Advertisements/Public notices	Target audiences Local community Broader community	Distribute information	Minimum of one week lead time	Prepare draft for approval Facilitate placement/booking of advertisements	Provide and approve information

We will work to identify any sensitive issues and engage with our partners in the development of communications strategies to effectively manage these issues, taking care to listen, understand and respond in a timely manner

The actual process for a question raised by the stakeholder is to allow free open access to the Liaison Manager who can be contacted by a number of methods yet ideally, where there can, there will be face to face contact, the Liaison Manager will then take full note of the question and details of the Stakeholder then process in a minimum period of 48 hours.

Figure 1 - Community Inquiry Flowchart



If at any time there is a failing in the processes then a full audit will be undertaken by the Liaison Committee. Recommendations will be advised by the Committee and processes updated.

ix) How facilities will be developed and the process by which commissioning will be undertaken.

Hospitals are recognized as some of the most sophisticated facilities delivered by the construction industry. Not only do they have numerous electrical, mechanical and communications systems, but they must also provide an attractive ambience for the staff and patients. We do not only check that a device works, or how the system is designed, we are genuinely concerned by the overall building performance as it relates to patient and staff experience.

Infusion realizes the need for all building systems to function properly and in harmony and therefore has included an initial model of the Commissioning Plan to be used on this project as *Appendix 2.3.1. A: Commissioning Plan*. The initial draft was developed in conjunction with both our Construction and Facilities Management Partners, Graham and Black and McDonald. The commissioning plan will be further evolved and mandated to include all systems, identify responsible parties, and initiate a training schedule. Time lines will be incorporated in the overall construction schedule.

We at Infusion believe that planning for the commissioning of any facility must commence from day 1. Infusion will take a holistic and inclusive approach to commissioning ensuring that all stakeholders – contractors; subcontractors; Engineers of Record; the hospitals; Independent Certifiers, users and operators – participate in the commissioning process so that it is well understood that the facility has been constructed to the required performance and is operating at that optimum level. Commissioning is not viewed as just the testing of basic elements of a system but rather incorporates the Testing, Commissioning, Acceptance, Training and Turnover of a facility as a whole.

At least four months prior to the commencement of any commissioning exercises, the Commissioning Steering Committee, made up of all project stakeholders, will meet and begin to track the construction in order to ensure the commissioning schedule, previously developed, is met. During the commissioning process, the steering committee will meet on a regular basis to ensure commissioning is being completed in a timely manner and to address any issues during the process. The Committee will ensure proper progress by review of the schedule as well as monitoring of key metrics for each system being commissioned. These performance metrics will be established during the further development of the Master Commissioning Plan as well as the Detailed Commissioning Plans.

Another key element of the Commissioning process is training. The Commissioning Agent in conjunction with the Engineer of Record, the various construction trades, and the Facilities Maintainer will develop training plans for each system being procured. The training plan will include a training agenda, any relevant information of the system, as well as a training script for the Trainer. Interior Health representatives will be encouraged to participate in the training process and all training will be video recorded for training of future staff.

x) Approach to constructing and managing required mock-up rooms. Mock-up rooms will be the following: (OR (65sm); Trauma room; Renal Dialysis Bay; ICU room; Paediatric Inpatient room including isolation ante room) and LDRP.

Rooms will be mocked up during the design development phase of the project. We will be developing these in the Alexander wing of the Vernon building (which is ultimately scheduled to

be demolished by the end of the project). The intent of these is to fine tune the design and material selections, ensure the operators accept and influence the design, and to trouble shoot any workmanship issues.

These rooms will be:

- OR
- Trauma
- Renal Dialysis
- ICU
- Paediatrics
- Inpatient Room
- Isolation and Ante Room
- LDRP

We feel that constructing the mock-up rooms in one of the existing buildings scheduled for demolition is the best, and least expensive overall option for the Authority. This will eliminate having to rent or build new space for the mock-ups. Also the existing buildings are operational with heat and power with ample space to house the mock ups. One other particular advantage of the proposed location is by using the existing buildings, the mock-ups are very close to the user groups which makes it very convenient for the review process. This requirement is important and imperative at the initial phase of design development. Once the mock-ups are reviewed, the areas including building will be demolished to allow for the Vernon project development.

It is also understood that not all elements will be available at the time of mock-up, so in order to achieve full understanding of relationships, we will be producing full scale representations of items not available at the time.

2.4.1 Construction Drawings:

Vernon Room Area Schedule
A019 VJH Level 1 Plan
A020 VJH Level 1 Plan
Vernon Level 2 A-120
Vernon Level 2 A-121
Vernon Level 2 A-122
Level 0 A-100
Level 0 A-101
Level 3 A-130
Level 3 A-131
Level 3 A-132
Level 4 A-140
Level 4 A-141
Level 5 A-150
Level 5 A-151
Level 6 A-160
Level 6 A-161
Vernon Landscape Plan L001

DRAFT

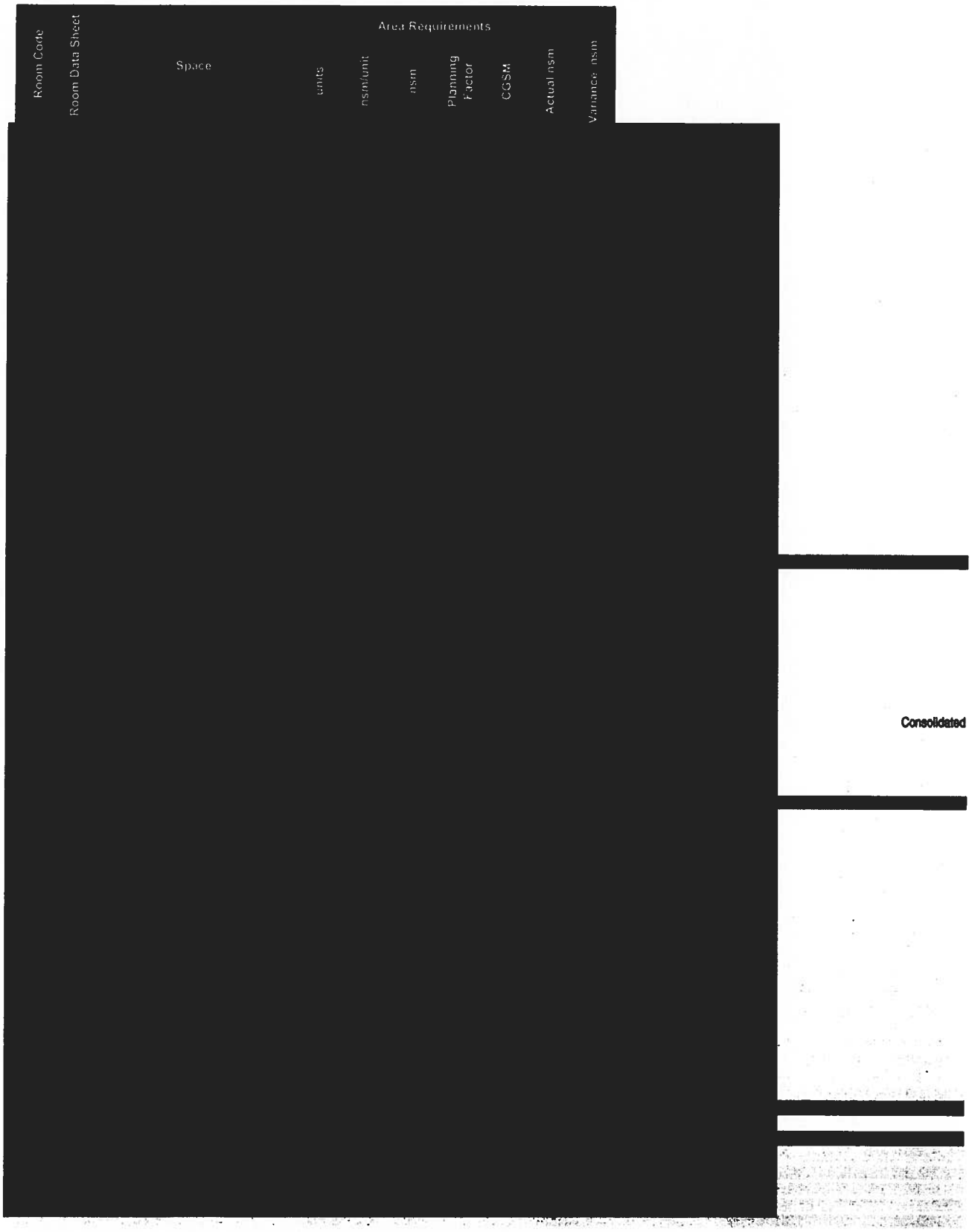
Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	GGSM	Actual nsm	Variance nsm

DRAFT

DRAFT


Area Requirements
Room Code
Room Data Sheet
Space
units
nsm/unit
nsm
Planning Factor
CGSM
Actual nsm
Variance nsm
Consolidated

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements: units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm	
		Section Total			**260.0**		**273.0**	**258.0**	**-2.0**	**260.0**

[redacted]

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm
[redacted]									

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	GGSM	Actual nsm	Variance nsm

[redacted]

DRAFT

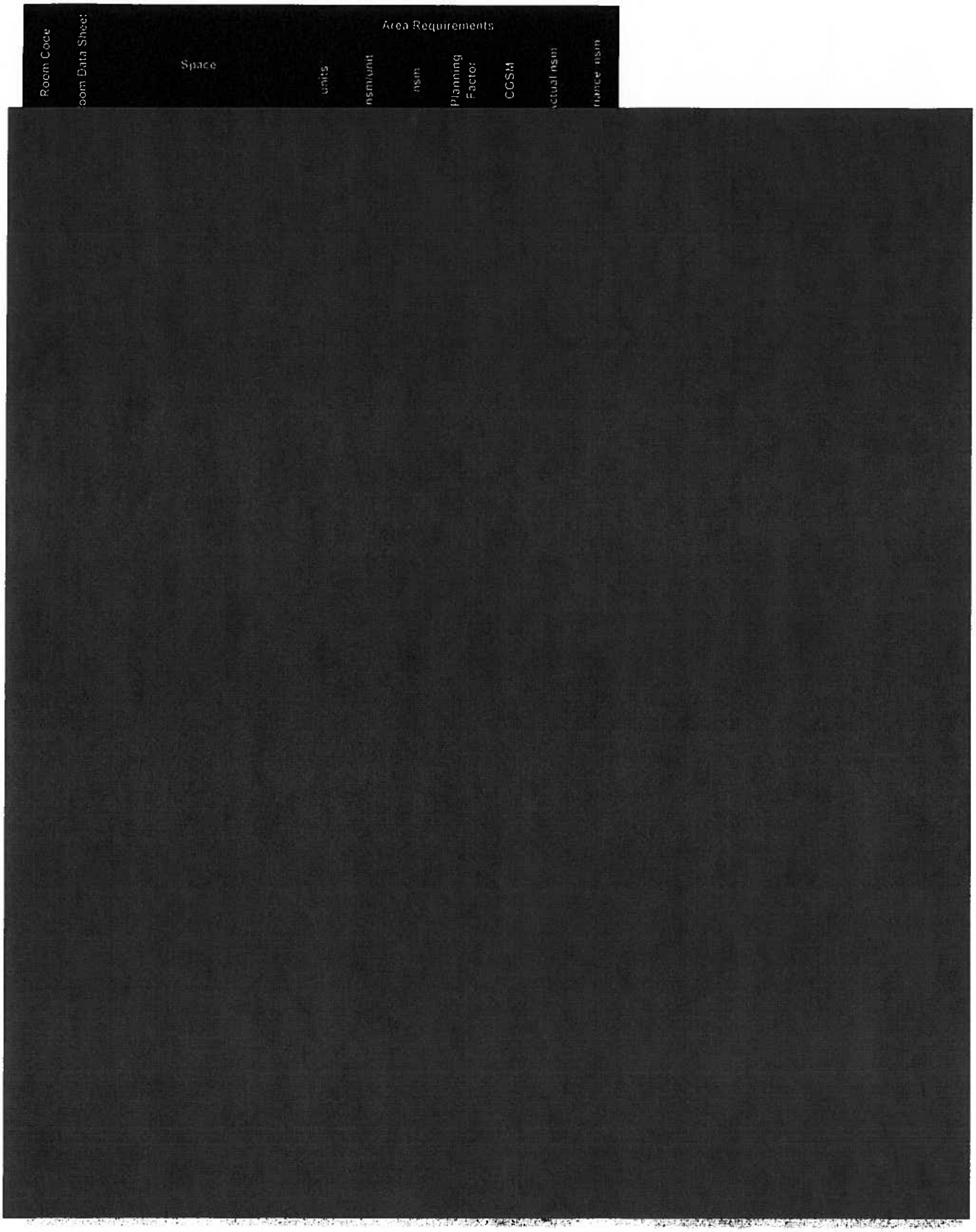
DRAFT

Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm

[redacted]

DRAFT

DRAFT


Room Code
oom Data Sheet
Space
Area Requirements
units
nsm/unit
nsm
Planning Factor
CGSM
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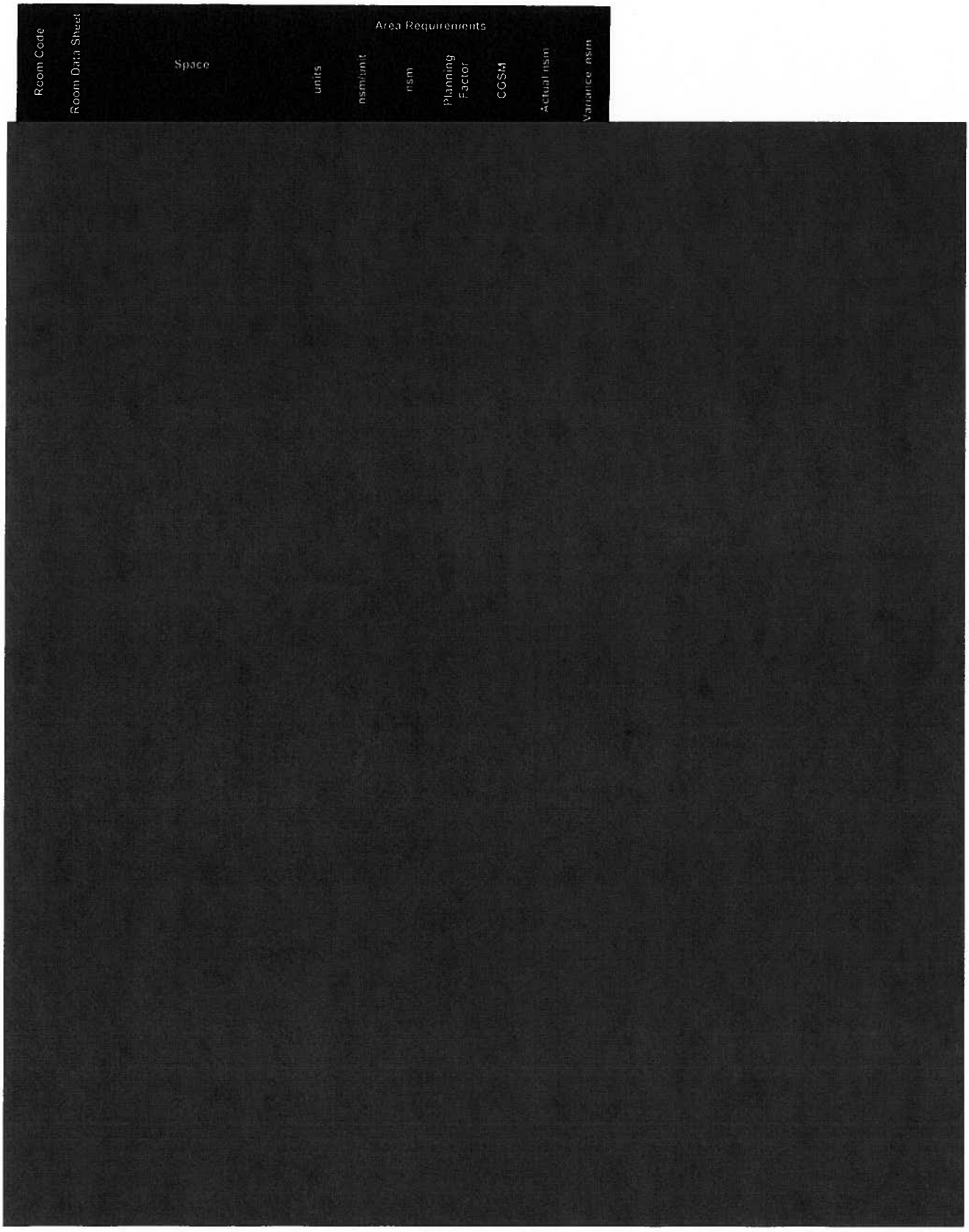
DRAFT

DRAFT


Room Code
Room Data Sheet
Space
Area Requirements
units
nsm/unit
nsm
Planning Factor
CGSM
Actual nsm
Variance nsm

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm

[redacted]

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements							
			units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm

[redacted]

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements							
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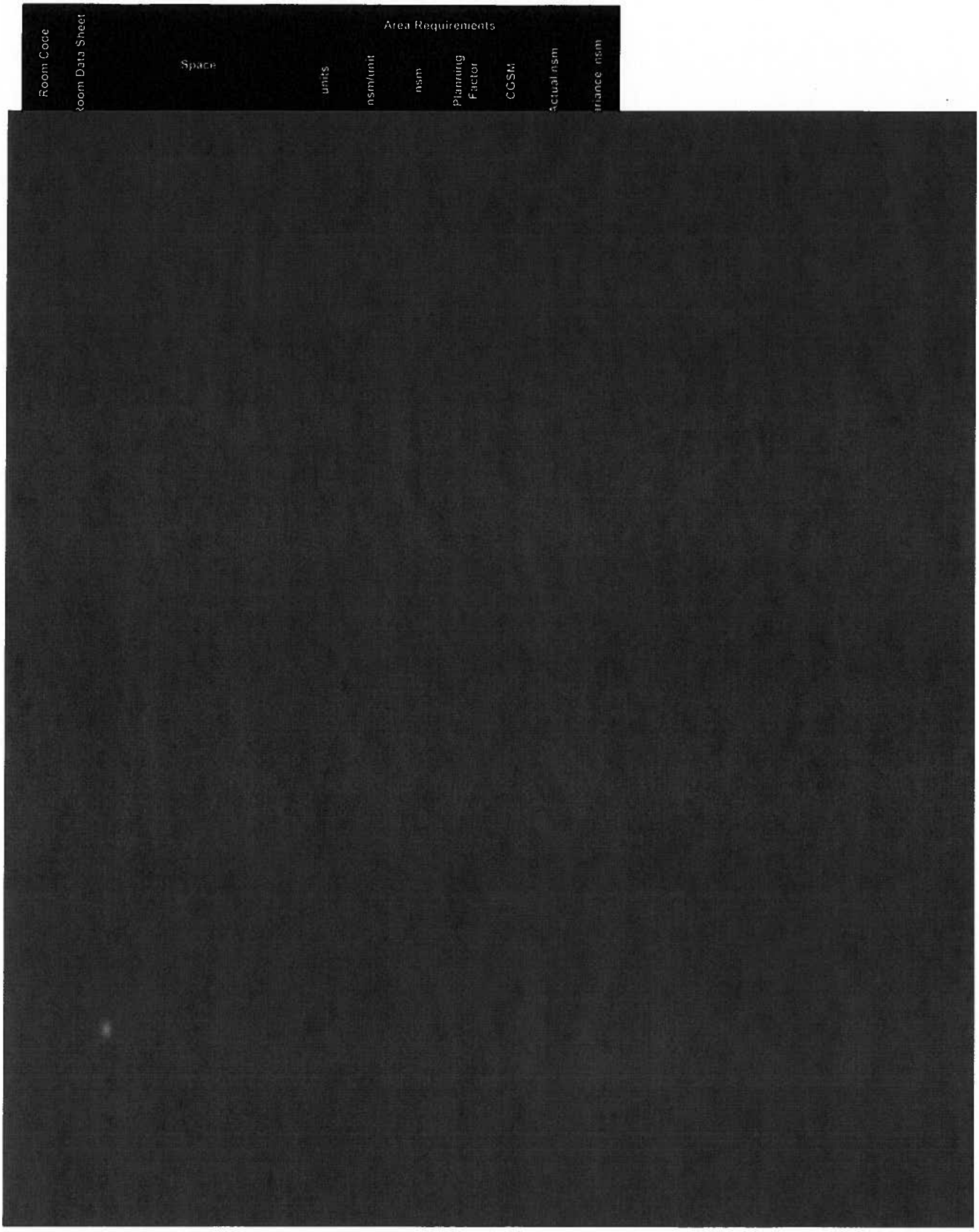
[redacted]

DRAFT

DRAFT


Room Code
Room Data Sheet
Space
Area Requirements
units
nsm/unit
nsm
Planning Factor
CGSM
Actual nsm
riance nsm

DRAFT

DRAFT

Room Code	Room Data Sheet	Space	Area Requirements						
			units	nsm/unit	nsm	Planning Factor	CGSM	Actual nsm	Variance nsm

DRAFT

Infusion

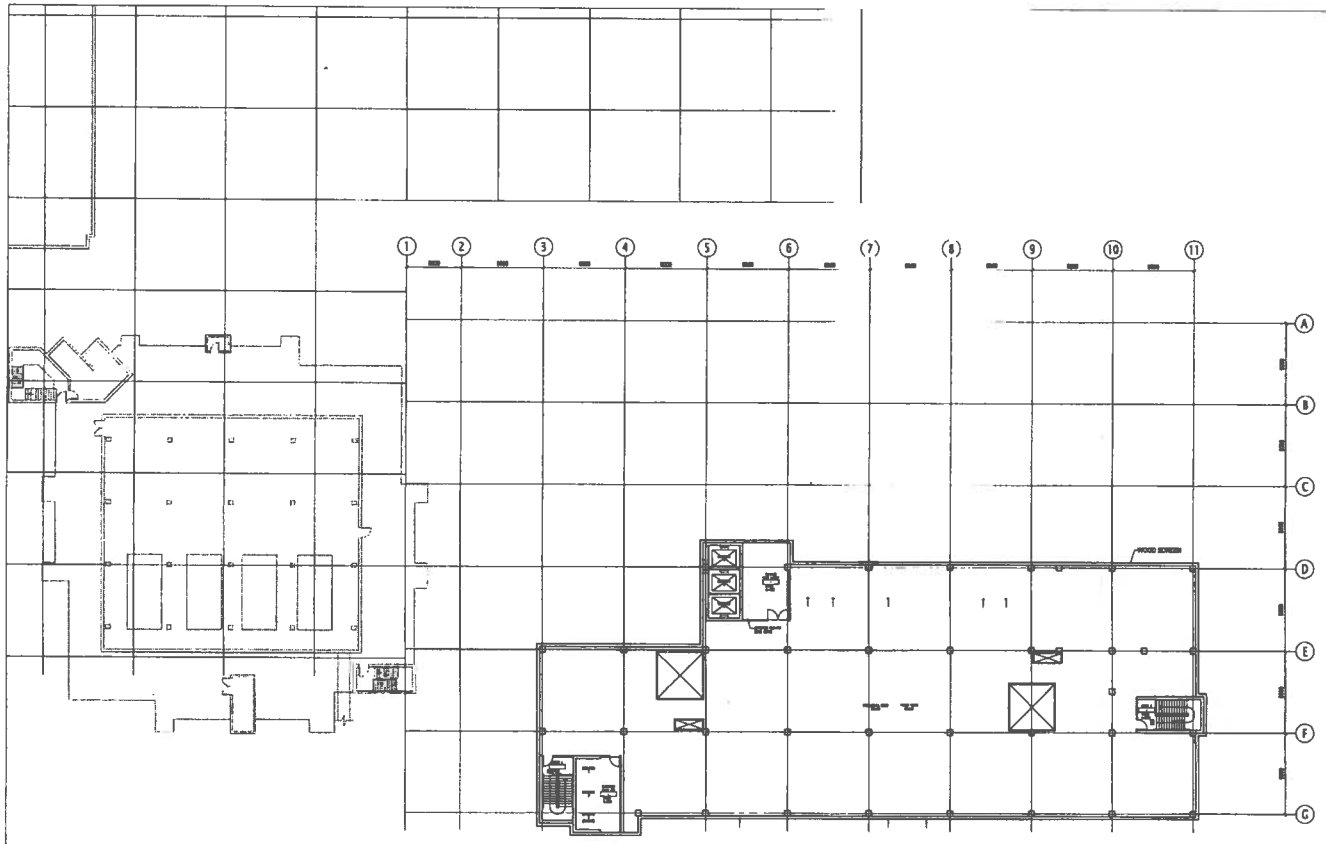
DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

SCALE 1:600

L001

LANDSCAPE PLAN



Infusion

DIAGNOSTIC & TREATMENT BUILDING

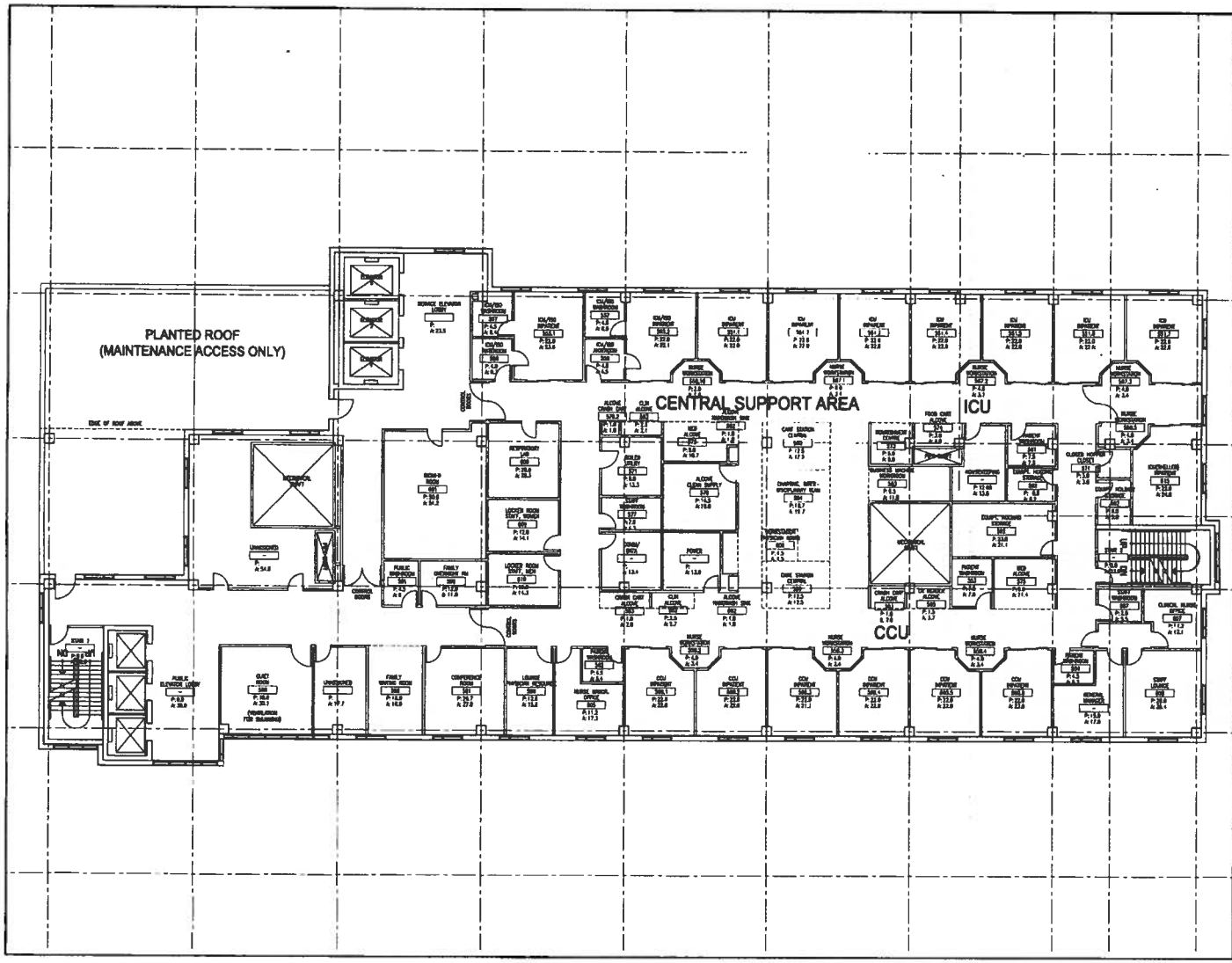
VERNON JUBILEE HOSPITAL

SCALE 1:200

A-180

5 JUNE 2008 - 90% SD REVIEW

LEVEL 6 - ROOF



Infusion

DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

SCALE 1:100

A-161

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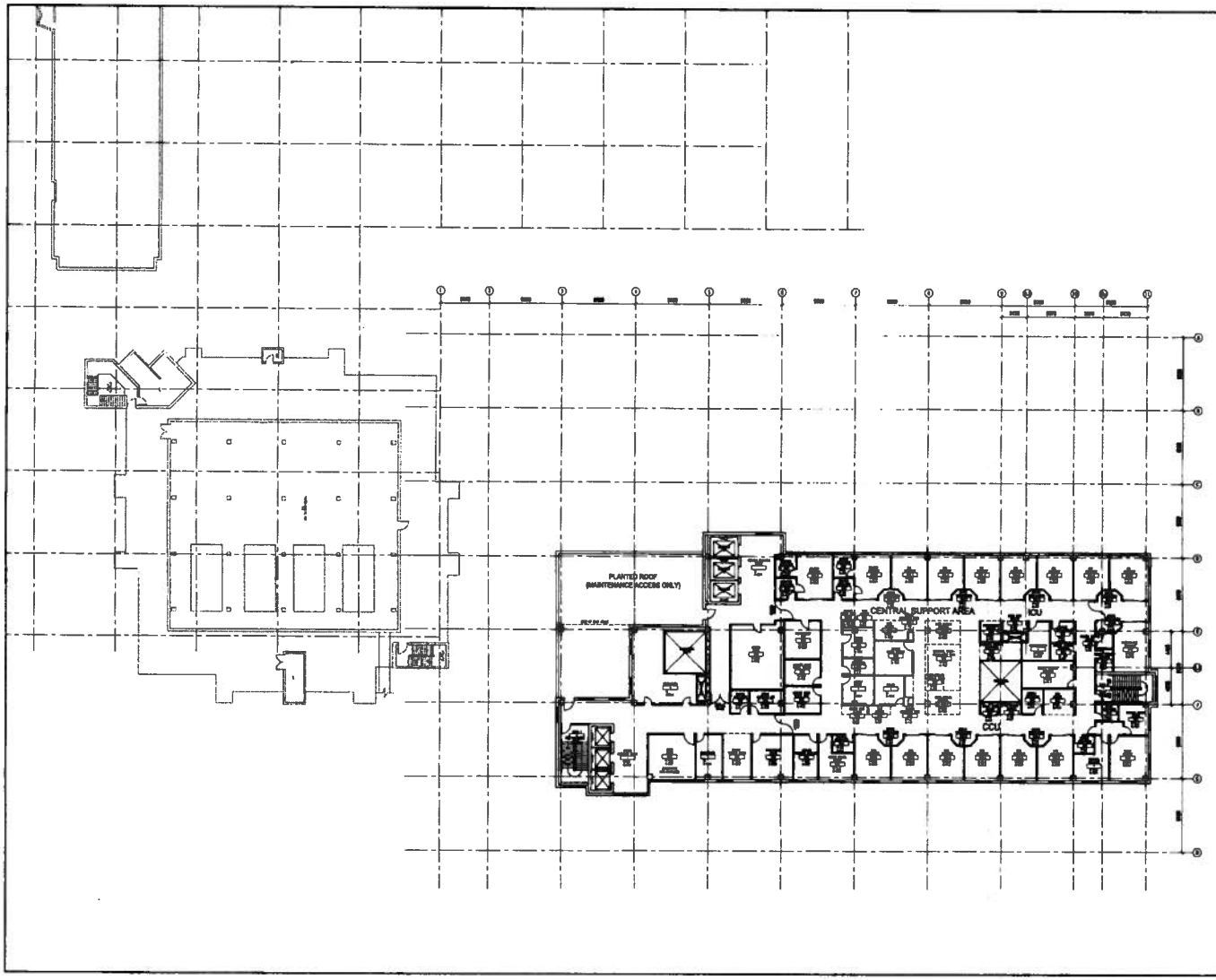
LEVEL 5



Infusion

DIAGNOSTIC & TREATMENT BUILDING

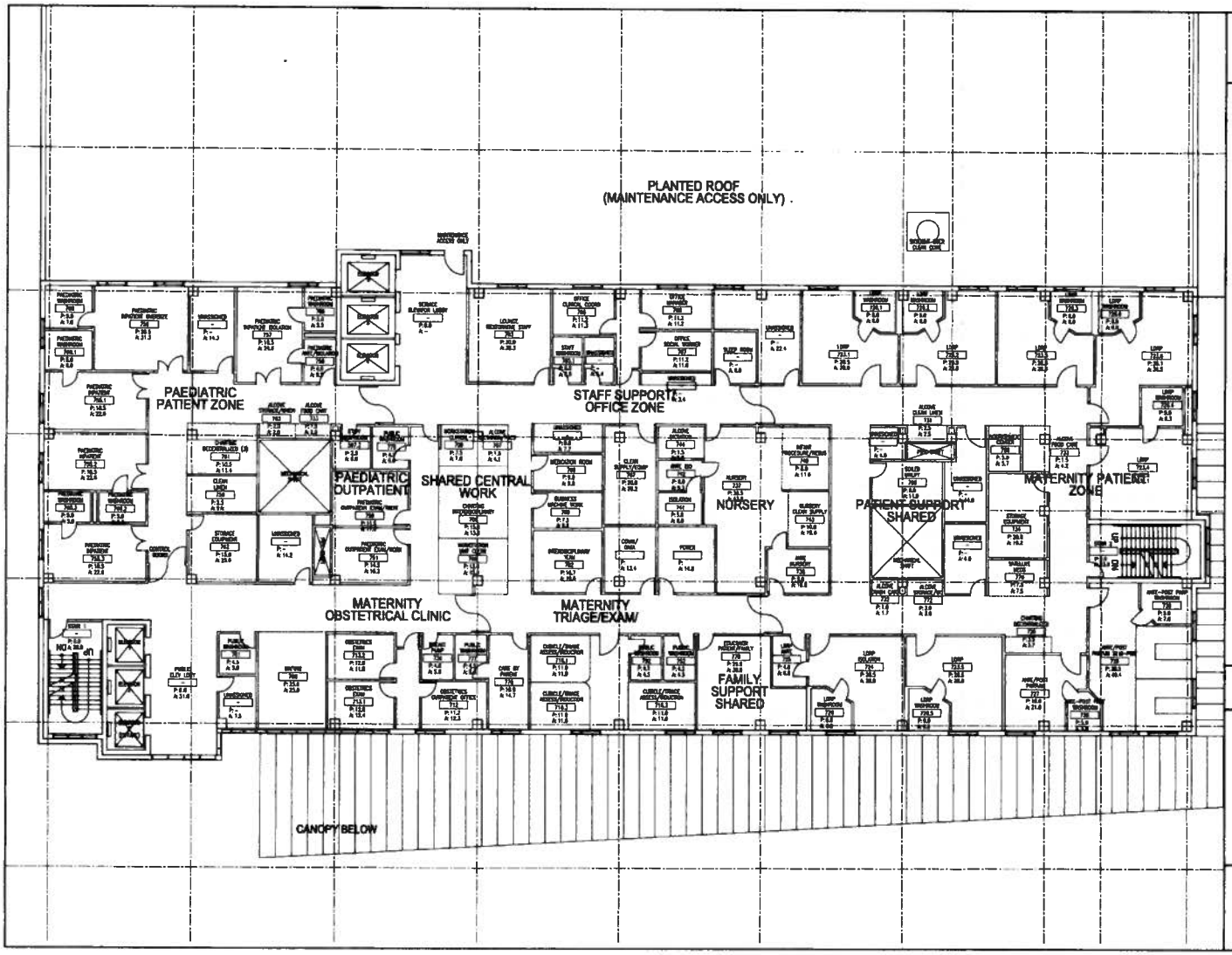
VERNON JUBILEE HOSPITAL

SCALE 1:200

A-150

5 JUNE 2006 - 90% DD REVIEW

LEVEL 5



Infusion

DIAGNOSTIC & TREATMENT BUILDING

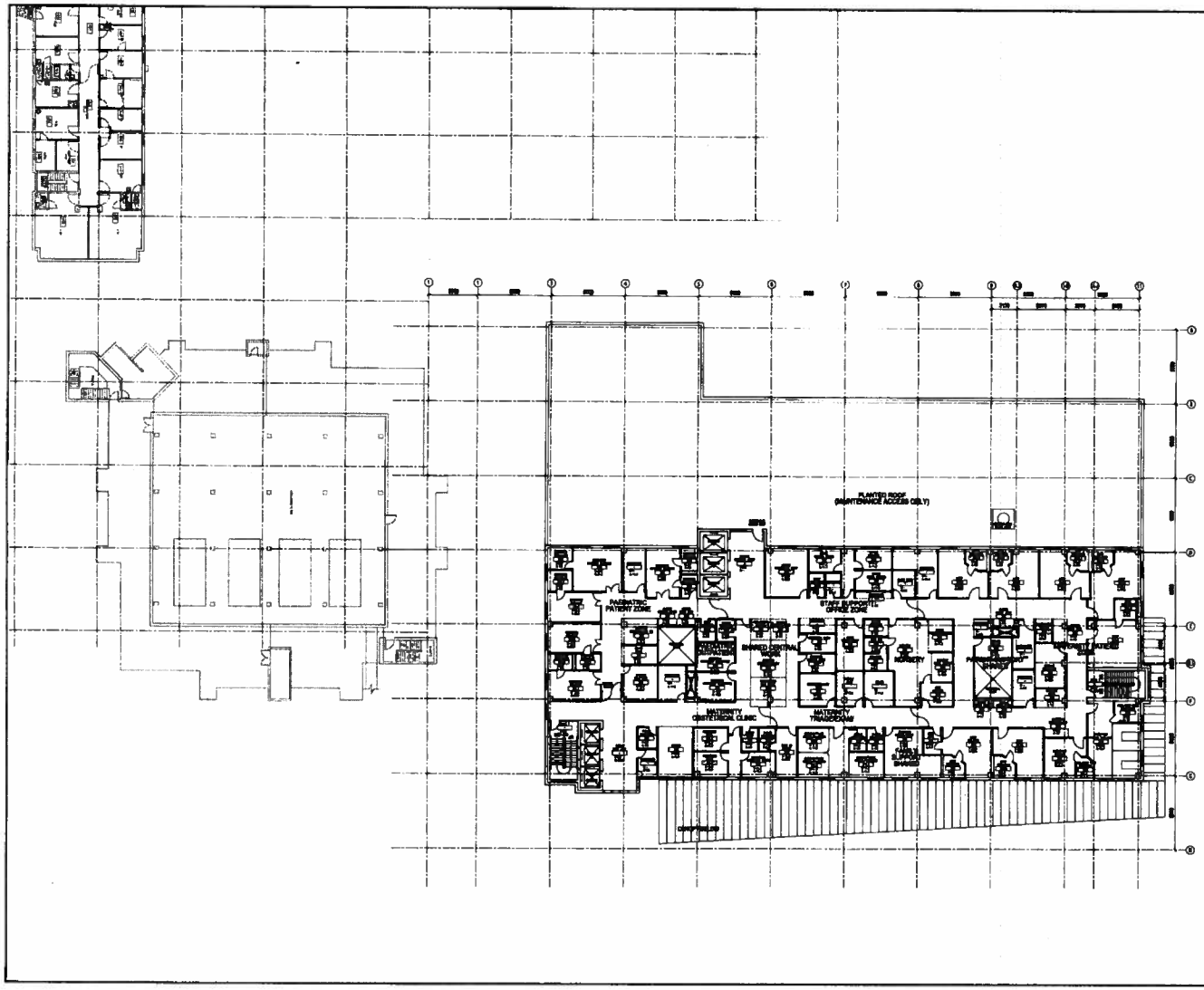
VERNON JUBILEE HOSPITAL

SCALE 1:100

A-141

5 JUNE 2008 - 60% SD REVIEW

LEVEL 4



Infusion

DIAGNOSTIC & TREATMENT BUILDING

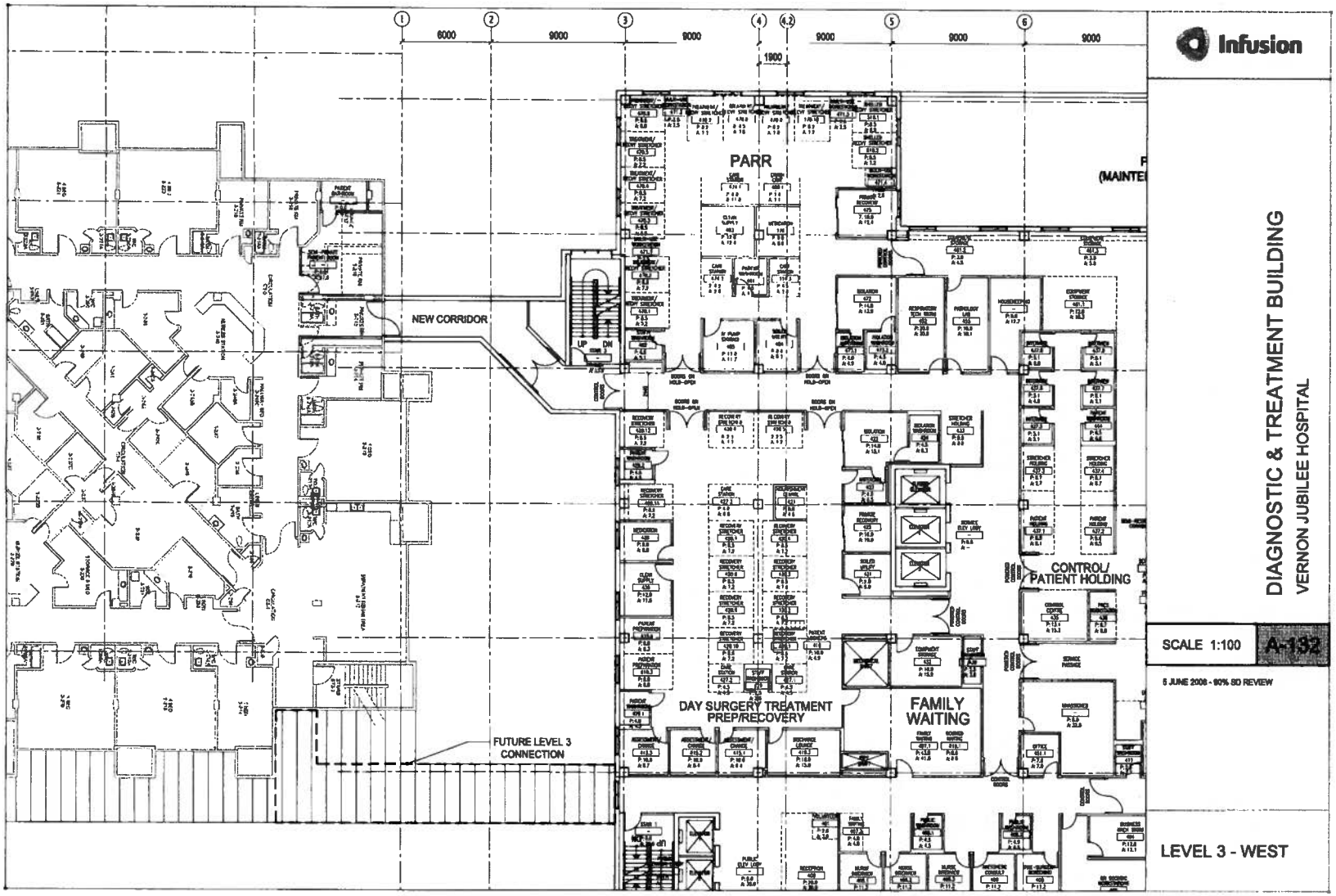
VERNON JUBILEE HOSPITAL

SCALE 1:200

A-140

5 JUNE 2008 - 90% SD REVIEW

LEVEL 4



Infusion

DIAGNOSTIC & TREATMENT BUILDING

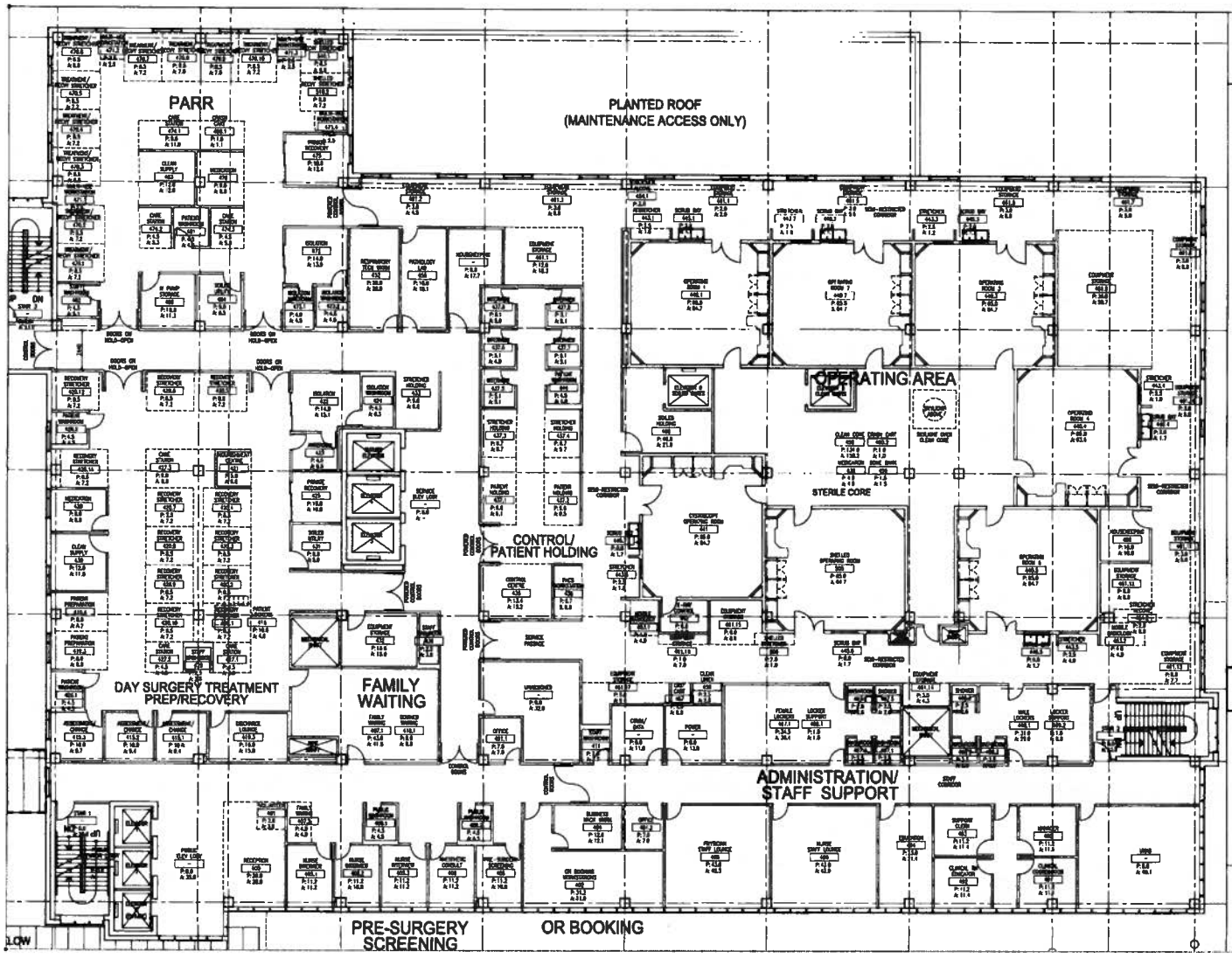
VERNON JUBILEE HOSPITAL

SCALE 1:100

A-132

6 JUNE 2008 - 90% SD REVIEW

LEVEL 3 - WEST



Infusion

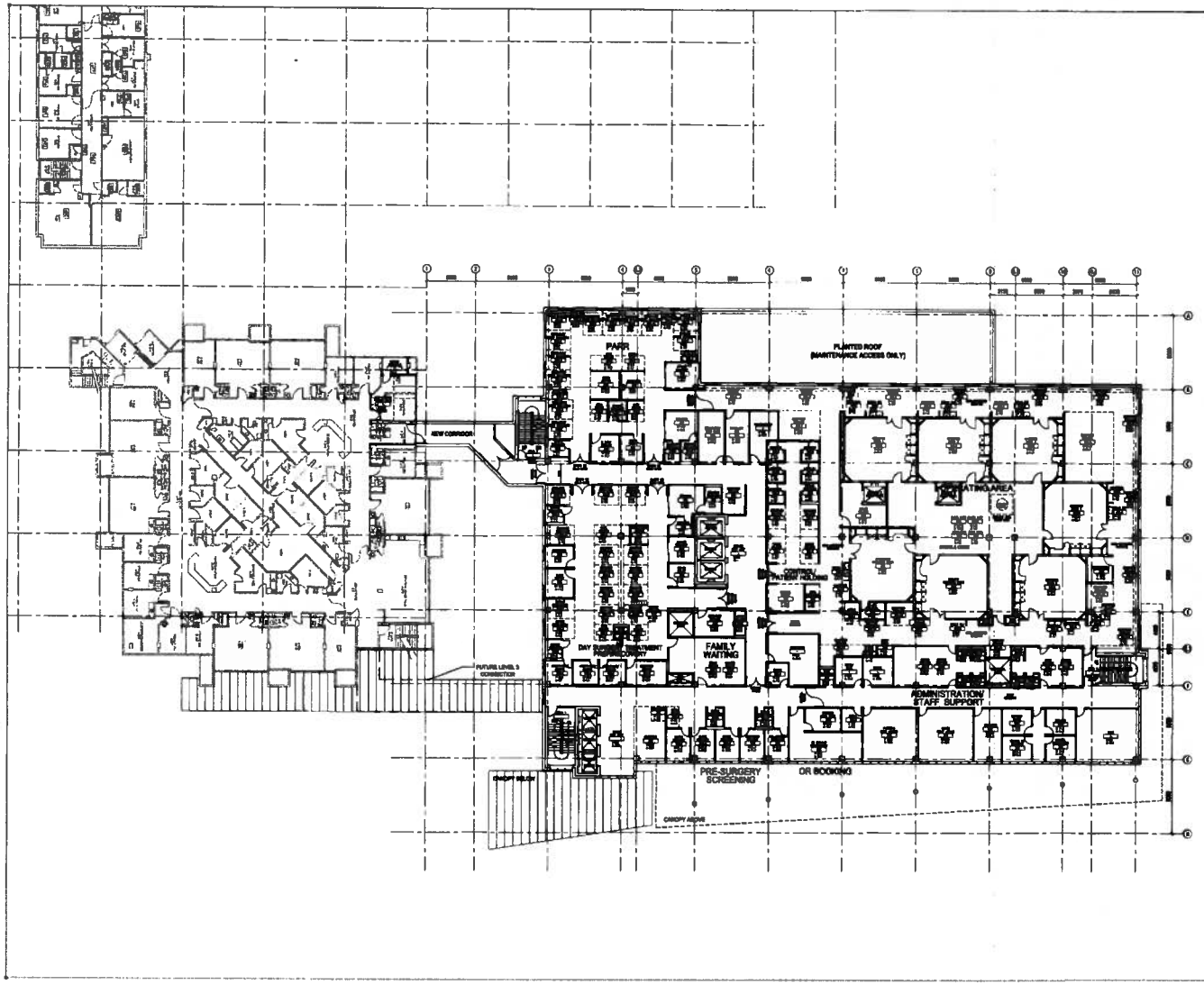
DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

SCALE 1:100

5 JUNE 2008 - 90% SD REVIEW

LEVEL 3



Infusion

DIAGNOSTIC & TREATMENT BUILDING

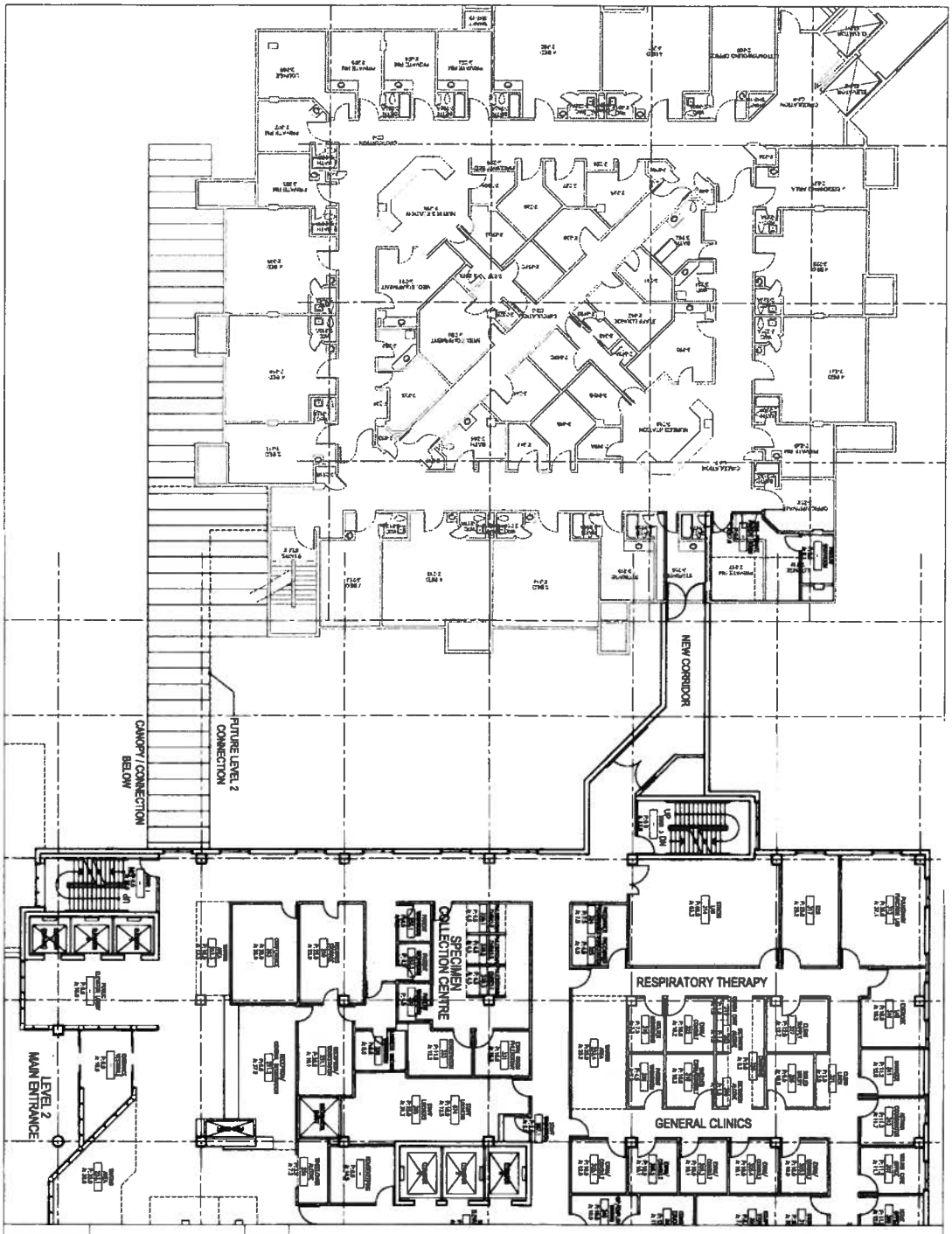
VERNON JUBILEE HOSPITAL

SCALE 1:200

A-130

5 JUNE 2008 - 90% SD REVIEW

LEVEL 3



LEVEL 2 - WEST

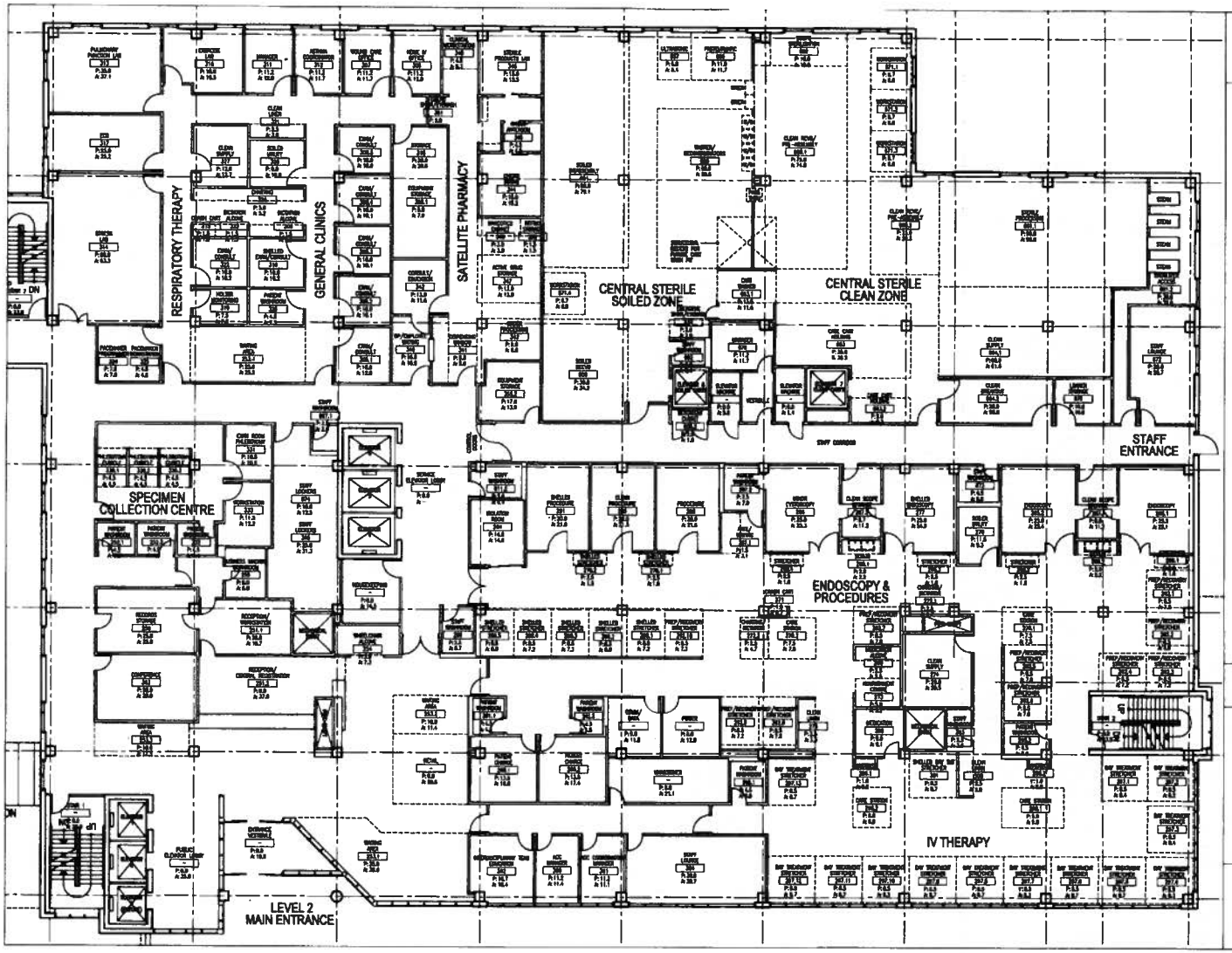
SCALE 1:100

A-1122

09.15 SCHEMATIC DESIGN 08.09.09
30 REVIEW 08.05.11

DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL



Infusion

DIAGNOSTIC & TREATMENT BUILDING

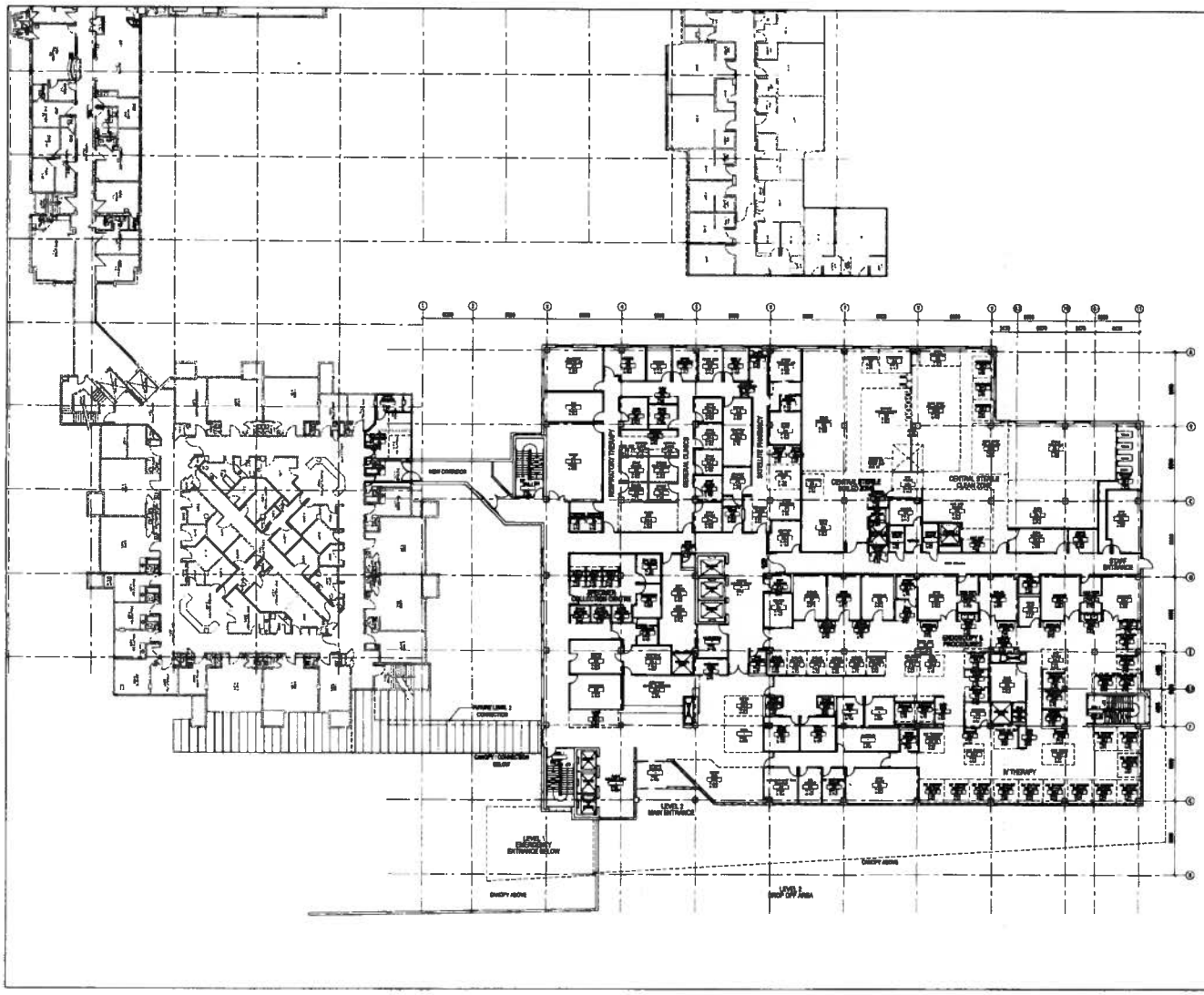
VERNON JUBILEE HOSPITAL

SCALE 1:100

A-121

90 % SCHEMATIC DESIGN	09.09.09
SD REVIEW	09.09.11

LEVEL 2



Infusion

DIAGNOSTIC & TREATMENT BUILDING

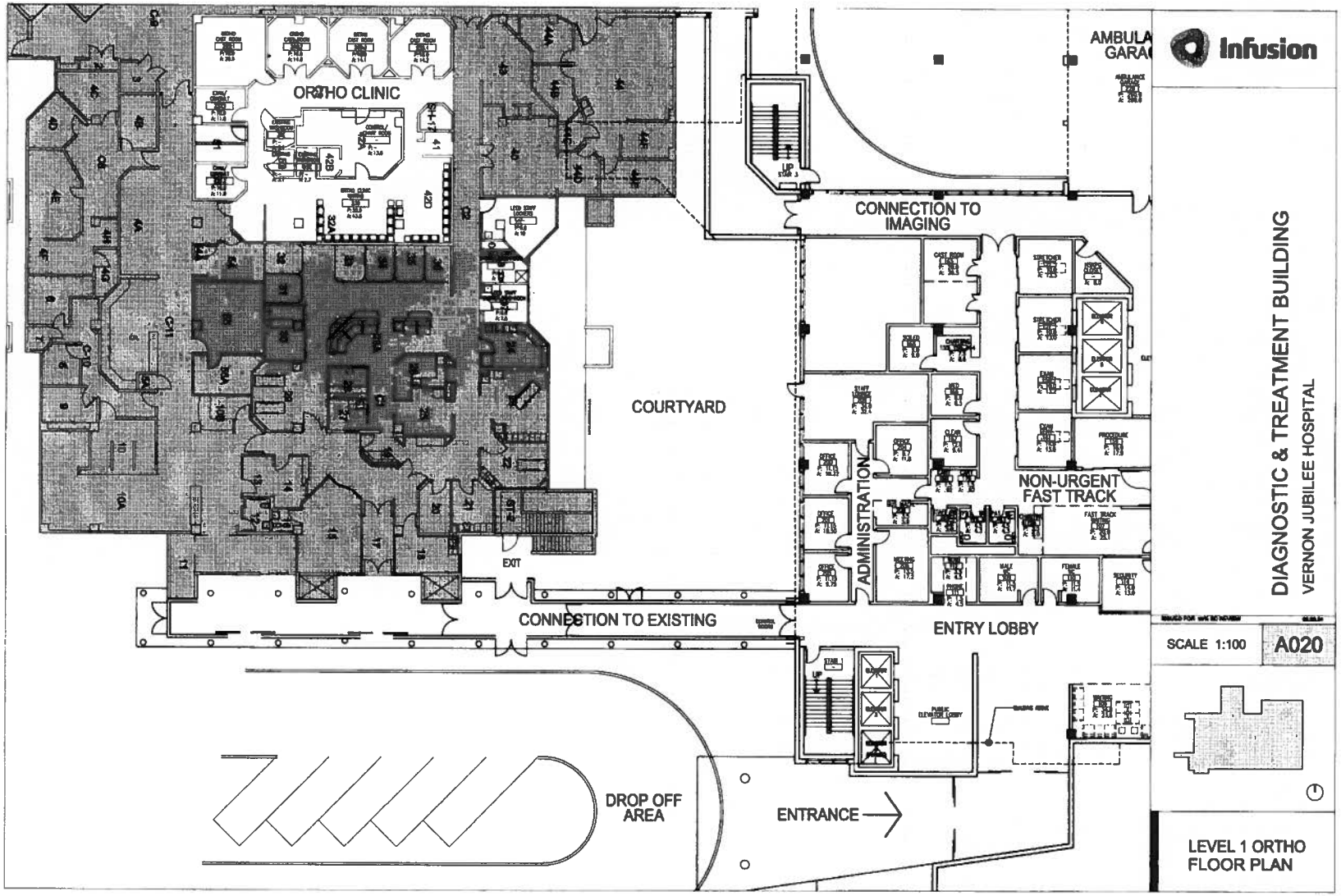
VERNON JUBILEE HOSPITAL

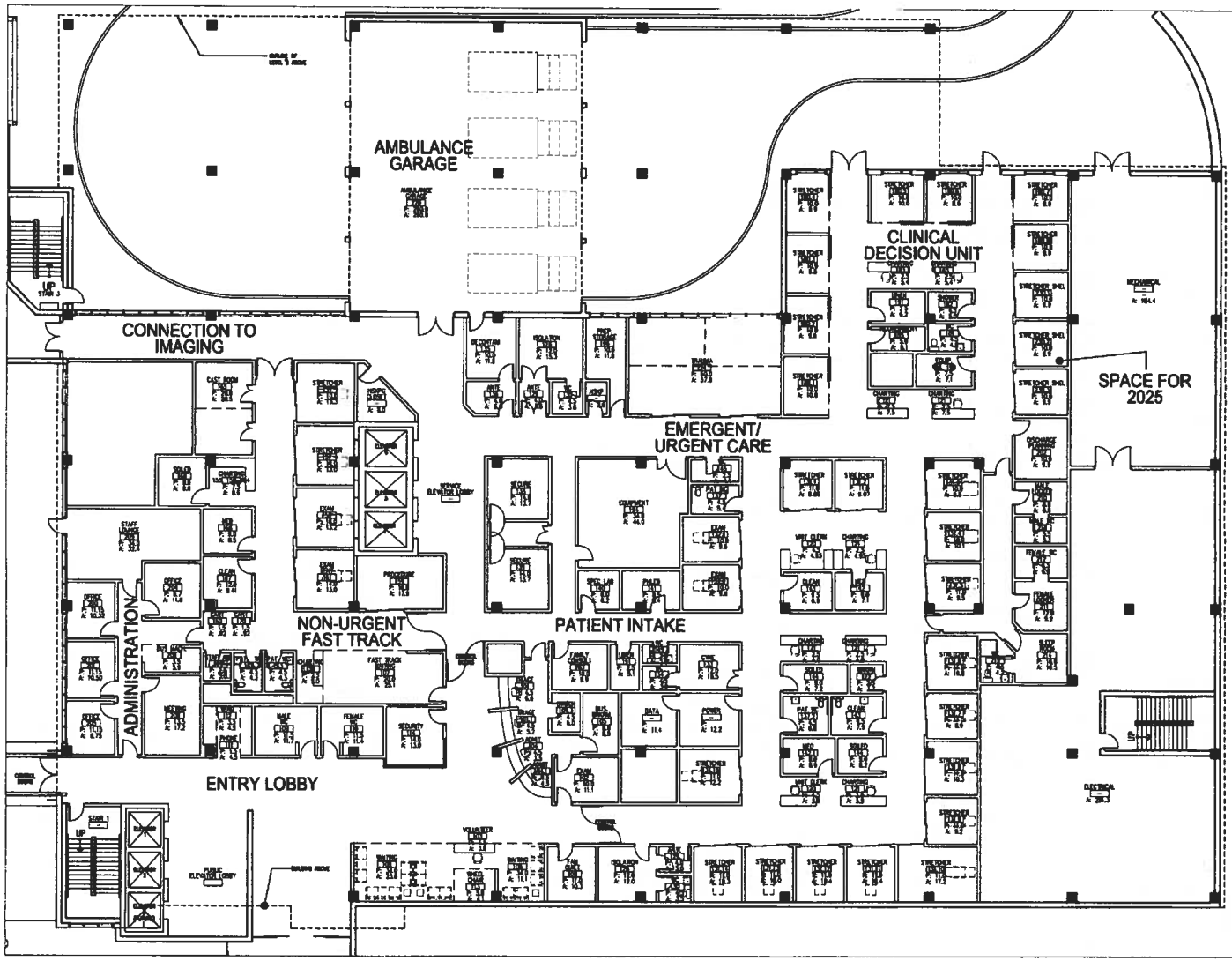
SCALE 1:200

A-120

90 % SCHEMATIC DESIGN	08.05.09
SD REVIEW	08.06.11

LEVEL 2


ORTHO CLINIC
COURTYARD
CONNECTION TO IMAGING
AMBULA
GARA
ADMINISTRATION
NON-URGENT
FAST TRACK
EXIT
CONNECTION TO EXISTING
ENTRY LOBBY
DROP OFF
AREA
ENTRANCE
Infusion
DIAGNOSTIC & TREATMENT BUILDING
VERNON JUBILEE HOSPITAL
SCALE 1:100
A020
LEVEL 1 ORTHO
FLOOR PLAN



Infusion

DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

SCALE 1:100

A019

LEVEL 1
FLOOR PLAN

Infusion

DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

A101

SCALE 1:100

5 JUNE 2009 - 90% SD REVIEW

LEVEL 0 - WEST

OUTLINE OF LEVEL 1 ABOVE

MECH RM MEZZANINE

LADDER DN

CONNECTION TO EXISTING BUILDING

SHAFT

MAINTENANCE RM

MAINTENANCE RM STAIRS

CIRCULATION

COLD PREP

REGIONAL FOOD PRO

FOOD SERVING

TRAY LINE

Infusion

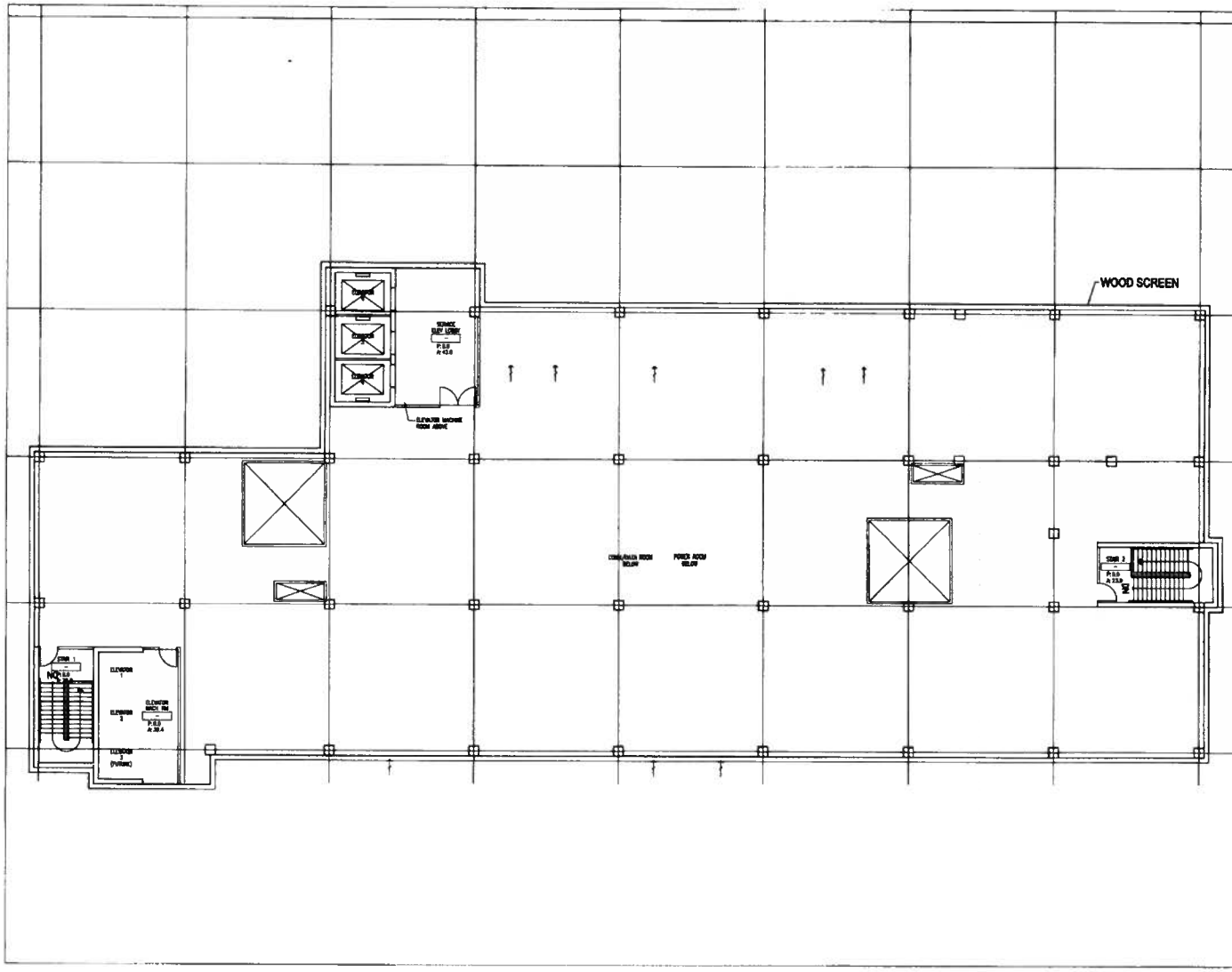
DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

SCALE 1:200

5 JUNE 2008 - 60% SD REVIEW

LEVEL 0



Infusion

DIAGNOSTIC & TREATMENT BUILDING

VERNON JUBILEE HOSPITAL

SCALE 1:100

A-161

5 JUNE 2008 - 90% SD REVIEW

LEVEL 6 - ROOF

Kelowna General Hospital

Proposal Extracts 6th / 13th March 2008

2.1.4 Design Principles
2.2.1 Site Development
2.2.2 Design Proposal
2.2.3 Architecture
2.2.9 Technology and Communication Systems
2.2.9A Security Threat and Risk Assessment
2.2.10 Mechanical Systems
2.2.11 Medical Gases
2.2.15 Furniture, Fittings and Equipment
2.3.1 Construction
2.4.1 Construction Drawings

2.1.4 Design Principles

INTRODUCTION

Infusion is pleased to acknowledge, and fully supports, the Authority's project vision. In this section we summarize our response to that vision and our adherence to the guiding principles for the project. We also briefly describe the characteristics of our design which enhance and support the core public service the Authority is tasked with delivering.

2.1.4. a) Describe how the design principles in the proposal will meet the project vision and guiding principles in Section A2.1 of Volume 2 (KGH).

Infusion's proposed Ambulatory Care Centre at Kelowna General Hospital meets and exceeds the Authority's objectives for delivering excellence in health care services to the residents of Kelowna and the catchment area by responding in the following ways to each of the Authority's stated Project Vision and Guiding Principles.

Project Vision – To set new standards of excellence in the delivery of healthcare services, to serve the needs of Kelowna and the catchment area, and to have the capacity to meet future needs. The plan will identify and develop synergies between programs and services and will describe a place where people want to be and a place where people choose to work.

Infusion's proposal provides the following distinct value-for money features:

New Standards of Excellence

- Spacious, high-specification accommodation for all programs
- A brand new Emergency Department, with provisions for future horizontal expansion as the community develops, improves service and means that the ED does not have to endure a complex and costly multi-phase renovation

Capacity to Meet Future Needs

- The potential for one additional floor of outright vertical expansion to the ACC building allowing for up to 4300 m^2 of additional future program area (plus the possibility to add a further additional floor of equal size on top of that with minor structural upgrading of the proposal). This means that a range of uses such as the proposed Cardiac Revascularization Project, additional inpatient bed space, or other functions could be considered on future upper floors that would be fully serviceable by the ACC building's main entry, elevators, helipad and connections to dedicated inpatient transfer corridors back to main Hospital
-

- A central and welcoming front entry is provided not only to the ACC, but also serves the rest of the Hospital, and will link easily for future expansion of the hospital on to the site of the Pandosy Building
- All programs on all floors include provision for future expansion area

Synergies Between Programs and Services

- Former Emergency and Ambulatory Care space in the existing Royal building is left empty for future internal redevelopment of areas such as SPD, Laboratory and other components in need of a new home
- Early delivery of UBC Medical Space on the construction schedule enhances the Authority's ability deliver on provincial medical teaching initiatives and support UBC medical students learning at the KGH site and treating patients there as well alongside KGH staff
- Early delivery of the new Visitor Parkade relieves parking congestion on the KGH site
- Improved separation of access points for visitors, patients, ambulances and loading traffic reduces sense of crowding on the site

A Place Where People Want to Be and Choose to Work

- Large and lively common areas, green roofs, patios and daylight and views from all areas of the building provide a place where staff will want to work, and a place where visitors want to be because it no longer feels like a "hospital"
- A renewed, efficient Main Entry and connection between this building and the existing Hospital, provides areas of orientation, gardens, respite, or child-care activity, artwork and donor recognition that did not exist before
- UBC's new Lecture Theatre is located adjacent to the new Visitor Parkade for ease of use by the public after hours
- Street-front retail opportunities along Pandosy Street deinstitutionalizes the project
- A garden courtyard on the busy Ambulatory Services Level 2 as a respite and refreshing amenity for outpatients and visitors
- Window views and daylight to all major treatment areas and Surgical Department provide respite and a sense of freshness when visiting the ACC
- All visible roofs are planted "green roofs"
- The lowest number of building storeys to accommodate the program means minimum impact on the surrounding community and lower risk of public resistance to the project

- A managed construction plan that will be ease the impacts of construction for hospital staff during the construction period and maintain services to the fullest degree

Guiding Principle 1 – The new Building will have standardized rooms wherever practical

Standardized room types are provided not only for all departments at the Kelowna ACC, but are also standardized with the Vernon Diagnostic & Treatment Centre site as well. This will translate into:

- Improved internal operational flexibility
- Improved future flexibility to convert rooms from one use to another
- Similarity of rooms types for easier facility management
- Greater staff familiarity of room types and improved operations both at this site, and between these to sites
- Equivalent "handedness" of rooms is also proposed wherever possible to standardize medical examination and help reduce medical error
- Use of typical room types that have been fully designed and reviewed with the users
- Consideration also for future needs as a result of changing medical delivery systems
- Ability to place the room type into the modular spatial organization
- Standardized equipment and furnishings allows interchanging of resources
- Greater staff familiarity of room types and improved operations both at this site, and between sites

Guiding Principle 2 – Adopt a modular rather than customized design approach to organizing clinical practices to maximize the long-term flexibility of interior space

The simple, regularly-shaped floor plates are organized by centralising building services and vertical circulation and then surrounding those fixed vertical elements with compact departments and simple, rectangular rooms.

Corridor and major circulation routes are generally laid one above the other on all floors, along the lines of "racetrack" layouts oriented around major exterior courtyards on all floors.

Shelled spaces in departments are generally located where they can serve as storage and other uses on an interim basis until they are outfitted.

Overall, the building is planned on 9 x 9 m structural grid with a central services and vertical circulation core – with regular shaped floor plates, departments and rooms. All are organized based on a simple stacking of central core services and vertical circulation.

Main circulation and organization fit into this modular concept allowing simple and cohesive movement through the facility. Alignment of the grid acknowledges the link to the existing site and hospital.

Regular-shaped floor plates and rooms allow for future enlargements or internal adjustments.

Alignment and placement horizontally and vertically of department and room spaces within this modular organization acknowledges the possibility of change in the delivery of health care between departments and rooms.

Inpatient units are located above the mechanical floor to allow efficient stacking of similar department and room modules. This allows more flexibility in layout as floor penetrations will not impact healthcare delivery on the floors below the Mechanical floor at Level 4.

Consideration for similar spaces can be applied in areas where overlap of space uses would be beneficial – for example, same-sizing of day-surgery treatment bays.

Shelled and soft spaces are planned to accommodate change as well, and provide useful space even in their interim state.

Modular design provides a framework for applying 'best practice' room types already used and tested.

Guiding Principle 3 – Provide flexible space that can accommodate future changes to service delivery, technology, and equipment

Generally, all departments are planned on a treatment zone with dispersed staff care centres encircling a core of staff and support services. This type of layout works well for the provision of most hospital services, from Renal to IV Therapy. Each of these areas is flexibly planned with wall area, alcoves and infrastructure that can allow for changes in technology and equipment. Our intention is that not every space is filled, to allow for this internal flexibility.

Flexible space design principles include:

- Large, regular-shaped floor plates with minimal interruption
- Simple organization of space including main circulation, department locations /planning and room placement
- Co-location of similar services and planning of departments to allow opportunity to integrate service delivery
- Soft and shell space located to allow anticipated future changes in the delivery of health services (especially in DI, ED and surgery)
- Design of mechanical and electrical zonal distribution systems to allow for simple extensions to possible areas of change
- Location of mechanical floor between clinic and inpatient areas allows utilities and technical services to reach other areas of the building with less interruption
- IPU above the mechanical floor allows for flexibility in planning and systems for these floors

- Planning of departments to be adaptable to other staffing models. Allow for supervision of other care areas, sub stations, co-location of staff and use of communication systems to maximize options

Guiding Principle 4 – Focus the program on acute, interventional and clinic activities that cannot be otherwise accommodated in the community

The Authority's facility program meets this objective by concentrating the provision of acute, interventional and clinic activities in the ACC. The layout of this project provides for discrete separation of hospital and service traffic to the ACC, enabling increased acute use of ACC facilities. Infusion's design supports this guiding principle by locating the UBC teaching and learning facilities into a separate building, allowing both medical and academic facilities to preserve their distinct character and focus, while remaining closely adjacent.

Guiding principle 5 – Elder friendly design

Elder-friendly design principles that are used in the facility design include:

- Grade-level entry and vehicle turnabout/lay-by off Pandosy Street
- Single covered main entry to all ACC and Hospital and functions
- Highly-visible elevator core at the ground floor
- Pharmacy, and food service areas located close to the Main Entry
- Orienting lobby at all ACC floors with views to courtyards and the Main Entry help people know where they are in the building
- Visible waiting areas and department signage from all elevator lobbies
- Department locations grouped as per the Functional Program to reduce unnecessary travel through the facility for multi-department visits
- Visual cues of colour along with signage and ceiling features assist patients to find department waiting areas and entries
- Acoustical ceilings and wall panelling in waiting and common areas to reduce noise
- Conveniently-located WC's
- Building form reflects main and emergency entry locations for ease of entry finding
- Convenient and generous drop off areas at all entries
- Sun and rain shelter provided at both main entries
- Clear canopy sheltered exterior and day-lit interior paths to the old main entry lobby and remainder of hospital
- Registration and testing functions immediately off the lobby, as are public washrooms and cafeteria
- Skylight path from main entry direct to passenger elevators

- Upper level elevator lobbies have exterior views over the entrance for orientation
- Central location of passenger elevators minimizes travel distances to care areas
- Departments are located based on related patient service need: walk in service on Main Level; booked appointments on Levels 2; Outpatient Clinics on Level 3; Surgery and In-patient units on Levels 5 and 6.
- Level 2 Outpatient Clinic floor has fully accessible outdoor garden directly off the elevator lobby and waiting areas
- Reception and waiting areas open directly to the elevator lobby zone
- simple departmental circulation minimizes way finding confusion and travel distances
- Thorough separation of back of house from front of house activities
- Points of destination, landmarks, activities and exterior views used for orientation
- Ambulatory care centre ties into the overall campus circulation

Guiding principle 6 – Electronic medical recordkeeping

The Authority is responsible for defining its electronic recordkeeping program and for procuring appropriate systems to support clinical and administrative needs. Electronic medical record-keeping will be fully supported in the ergonomics of staff centres and care stations. To the extent that they are programmed in this project IT/IS systems will be provided to support this guiding principle.

Guiding principle 7 - Identify the features that will make KGH a unique and attractive environment for patients, clients, staff and that will project an image of quality to the community

The patient and staff environment has been central to Infusion's approach to the design of the facilities. We recognize the endemic issue of staff retention and recruitment facing the entire public healthcare system and realize that an attractive physical environment and responsive support services are fundamental means of appealing to hospital users of all types.

From the healthy and de-institutionalized surroundings to the numerous respite areas, ample daylighting and state-of-the-art clinical facilities, our design does much to encourage healthcare professionals to pursue their careers with Interior Health. For patients, the ease of access and way finding, gardens and quality finishes will be reassuring even to users unfamiliar or nervous with a hospital environment.

We also understand the importance to the long-term future of healthcare in the Interior of a buoyant program delivered by the UBC medical faculty. In separate, purpose-built facilities on the Kelowna General Hospital site staff can teach and students can learn in an optimal environment – distinct and scholarly, yet still part of the vital healthcare campus.

The following features will project an image of quality to the community:

- Quality materials and simple detailing

- Accessible landscape courts and "green" roof gardens
- Ample space at the Main Entry for all functions
- Improved separation of access points for visitors and patient, ambulances and loading traffic
- Community-based art and sculpture program
- Pedestrian-friendly site and entry lighting

Infusion is committed to participating fully in the life of the communities in which it works. We have a long-term place in our communities as an employer and supporter of public services.

We would anticipate that our community initiatives may include supporting local artists and commissioning community artwork for display. We have contacted the Kelowna Public Arts Committee and discussed establishing a display area where local artists, with the Committee's support, can exhibit their works, while discreetly promoting their work by identifying their contact details. We have also contacted the Hospital Foundation to discuss whether they own works of art which they would like to exhibit in designated areas of the new facilities.

b) Identify and describe those features of the design and construction of the facilities that enhance the Authority's provision of the Clinical Services and Non-Clinical Services, especially those which may increase the efficiency and effectiveness while reducing the cost of the provision of those services or which may otherwise provide downstream benefits to the Authority in their day-to-day activities.

The provision of clinical and non-clinical services is optimised by careful and effective space planning. The plan optimises room relationships and ensures that clinical and non-clinical services can be provided in the most cost-efficient way.

The layout of the clinical areas is designed to ease patient and staff flows and to protect the privacy and dignity of patients undergoing treatment. Service areas are located away from patient areas and the use of separated service routes ensures that non-clinical services can be supplied to departments with minimal intrusion into the clinical spaces.

The building construction and engineering services are completed in ways that provide maximum life for the various elements while making servicing as easy as possible to minimise potential disruption to clinical services. The construction plan is developed to minimise disruption to the existing part of each site and we have planned for the earliest possible completion of the various buildings to reduce congestion on the sites. The provision of the plant services area between the occupied spaces and the shell spaces is a key example of the minimisation of disruption in use. There is the opportunity to make the necessary connections to the shell spaces without any significant disruption to clinical areas. The materials used for internal and external finishes have been carefully selected to be of the highest quality and to require minimum maintenance.

The provision of a separate building for the academic facility also enhance the opportunities for use outside of standard opening hours and will also reduce disturbance to clinical areas when the departments are in use.

We also recognise that it is essential that patients and visitors are able to find their way around the facility with ease and the arrival pathways are designed to be welcoming and easy to navigate. Easily identified entrances separate patients and visitors, hospital staff, and emergency services to simplify way-finding. A reception area on every floor also helps guide people to where they need to go.

Non-clinical services are provided by separate distribution routes, which are not readily accessible to patients and visitors. This minimises risks arising from the mixing of service and public traffic and also enables effective separation of distribution and disposal activities.

We have also taken care to design-in spaces that enhance the experience of staff, providing restful areas for staff to take meal breaks and also used elements such as green roofs to provide a less stark environment for the working day.

2.2.1 Site Development

2.2.1. a) Provide a site development plan.

The Site Development Plan, , and shows the location of the new ACC Building, the UBC Medical Studies Building and the Visitor Parkade. The plan also shows the new main entry and short-term parking, as well as ambulance and emergency short-term visitor parking off Royal Avenue.

b) Provide the following information:

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iii) Describe in written and plan form the site movement strategy including cars, pedestrians, deliverables, waste removal, ambulances and fire fighting access and disaster response access.

- Main vehicular access to the site is provided at the new "front door" which is located as the new ACC front access off Pandosy Street. A generous lay-by/drop-off is provided as well as short-term parking. Drivers who have dropped someone off at the main entry can then proceed south from the entry to the new Visitor Parkade.

- Visitors and patients arriving by car can either park at short-term street parking off Pandosy Street, or enter the site at the Rose Avenue service entry road to access the Visitor Parkade. This is the same roadway which takes visitors to Rehab as well as staff and physicians to the Staff Parkade and surface parking to the west of the new Visitor Parkade, and also serves as the access to Main Loading and Materiel Management areas.

- Pedestrians can access the site via city sidewalks along Royal Avenue and Pandosy Street, and the sidewalk network also runs directly along the new Hospital entry.

- Deliveries and waste removal will continue to be made to the Main Loading Bay with the exception of lab couriers to the ACC which may park along Pandosy Street.

- Ambulances will access the site off and on to Royal Avenue to an enclosed Ambulance Bay. During construction an interim Emergency Ambulance Bay will be provided off Royal Avenue to the north end of the central N/S corridor as shown on the Site Plan.

- Non-emergency ambulance transfers will arrive at the north entry where the interim Emergency Department entry will be located during the construction period.

- Firefighting and disaster response points will include:
  - The new Main Front Entry off Pandosy Street
  - The Royal Avenue surface parking area
  - The surface area between the new Visitor Parkade and the existing Staff Parkade

v) Cross-sectional diagrams showing relationship between the Project and adjacent site uses.

Cross-sectional diagrams illustrate the relationship between the Pandosy Street, the ACC building and the Royal Building; and the relationship between Royal Avenue, the ACC Building and the Strathcona Building. Cross sections of the UBC Medical Education Building and the Visitor Parkade, and their relationship to Pandosy Street and the adjacent residential area are also included.

vi) Landscape design, including philosophy, exterior treatments, general areas, parking areas, etc. Types and maturity of plants should be identified, as should maintenance and requirements for irrigation.

Ground Level Treatment: Pandosy Street and Royal Avenue Frontages

The design philosophy highlights the natural history and ecological character of the Okanagan and reflects the colourful patterns of agriculture that dominate the landscape. Paving patterns and textures are the central feature of the landscape design allowing for open pedestrian movement. The dominant paving is cast-in-place concrete with saw-cut joints influenced by building features and grid lines. Decorative paving consists of smooth, barrier free surfaces. Interest is created by the free-flow bands of contrasting paving as metaphor for the pattern of interior lakes. These bands are mixed with contrasting colour using materials such as local slate quarry stone.

Planting and Natural Features

The planting is an overlay of cut-outs representing the dry-land ecosystem of the interior and other rectilinear openings with regular rows of ornamental trees representing orchards and vineyards. The islands created by the parking and drop-off lay-bys are landscaped with rows of caliper size trees and an understorey of ground covers in bands to carry through the theme of the lake-valley pattern. Larger areas of planting include large local rock placements oriented to match pavement bands and to reflect the geological context of the mountains. Planting is designed to articulate the importance of the main entrance and assist in way-finding.

All planting will be irrigated with a fully automatic underground system fed by harvested rainwater. Planting layouts and species selection are designed for low maintenance after one or two seasons of establishment.

Furnishings

Furnishings must be durable and low maintenance and are therefore high quality with appropriate material selection for LEED® accreditation, such as outdoor furniture manufactured by Landscape Forms. Bicycle racks for 20 to 30 bikes and seating groups with trash receptacles are provided for the public precinct.

Lighting

Site lighting includes standard street lighting, building mounted area lighting and bollard type pedestrian lighting for the drop off circle. Low-level high-efficiency lighting in courtyard planting areas will up-light trees to provide adequate illumination and security.

South Courtyard and West Courtyards

The landscape themes are continued in the two main ground level courtyards. The entrance to the courtyard from Pandosy Street is narrowed down with planting on both sides to provide partial visual privacy from public areas creating a tranquil outdoor space suitable for staff, patient and visitor use. Furnishings consist of benches and table and chair groupings Planting areas are flush with paving and occasional rock outcrops overlap planting and pavement. Regular rows of deciduous trees provide additional sun shading in summer and allow daylighting of interior spaces during winter.

Planting Species Selection

Planting species vary for different sun and shade exposures. Most of the ground level plantings will be in shade for at least part of each day. Plantings have been selected for drought resistance thereby reducing irrigation requirements.

Species typical of the region include:

- Trees: 40 to 60 mm Cal
  - *Amelanchier* (Serviceberry)
  - *Acer ginnala* (Amur maple)
  - *Crataegus* (Hawthorn)

- Shrub: # 2 containers
  - *Symphoricarpos* (Snowberry)
  - *Rosa* (Rose varieties)
  - *Mahonia* (Oregon grape)
  - *Spirea* varieties
  - *Ribes* (Goosebery)
  - *Juniper* varieties

- Ground Covers: #1 pots
  - Ornamental Grasses - variety

- *Kinnikinnick*
- *Gaultheria*
- *Hemerocalis* (Daylilies)
- *Lavendula angustifolia* (Lavender)
- *Rudbeckia*
- *Hosta*
- *Pulmonaria*
- *Euphorbia*

All planting areas are to be mulched with either rock chips or composted wood fibre to retain moisture.

Green Roofs

Extensive green roofs cover the visible roof levels of the ACC building and UBC building to reduce impervious site area, protect roof membrane, provide insulation, and improve storm water quality and flow rates. Rainwater will be collected and stored for irrigation re-use. A cistern sized for approximately 200 cubic meters will harvest most of the irrigation water requirements. Planting for the extensive green roofs includes bands of sedums, thyme and ornamental grasses reflect the ground level themes.

Two accessible courtyards on Level 2 are designed for intensive green roof treatments. This landscape consists of raised planters, furnishings and level paving to allow for convenient outdoor access for patients and staff, and for aesthetic interest from interior rooms. Planting species on extensive green roof courtyards include a combination of ground level plant types as well as sedums and ornamental grasses specified for extensive green roof areas. Furnishings include moveable benches, and table and chair groupings. Low level lighting will provide visual interest at night from interior spaces.

vii) Type and profile of pavements proposed, and of curbs and gutters.

Information on profile of pavements, curbs and gutters will be to meet the requirements of the local building authority, and will be provided in future design phases.

viii) Traffic management plan, including vehicular passenger drop-off, day parking and delivery and pedestrian access to the Facility and all emergency access.

The Kelowna General Hospital is undergoing significant expansion. Located along Royal Avenue and Pandosy Street, the proposed ACC expansion will displace an existing 260 stall at-grade parking lot used primarily by visitors (200 stalls), medical staff (50 stalls), and 4 stalls for the ambulance garage / entrance. To replace the displaced parking, a parkade is proposed for the southwest quadrant of the Rose Avenue – Pandosy Street intersection. The 320 stall parkade provides parking stalls to replace the 260 stall visitor lot and existing at-grade staff parking at the proposed parkade location. Overall, no net change in parking supply is proposed.

The majority of the traffic and on-site circulation will be concentrated along the main entrance of the hospital off Pandosy Street, and the access to the parkade off Rose Avenue.

In addition to the revisions to parking, changes to on-site circulation and drop-off accesses are proposed. The following will discuss the relevant changes.

Main Entrance – Outpatients and Visitors

The main entrance to the Hospital is located on the east side of the building. Vehicle access is provided from Pandosy Street by a one-way loop with loading / unloading areas directly adjacent to the main entrance for convenient patient drop-offs.

Along the west side of Pandosy Street, between Royal Avenue and the one-way drop-off loop, are approximately twelve short-term angle parking stalls that are proposed for patient drop-offs, courier deliveries, and other short-term purposes. These parking stalls are accessed from Pandosy Street just south of Royal Avenue and connect to the one-way main entrance loop.

The main entrance loop also connects to a one-way drive aisle that would allow travel between the main entrance and Rose Avenue, including the proposed parkade. Additional drop-off and service vehicle parking is proposed along the west side of this drive aisle (approximately four stalls). By providing this facility, people using the main entrance drop-off loop would not have to use Pandosy Street to access the parkade, but would rather use the on-site roadway.

Walk-in Emergency Patients

Walk-in emergency patients will be dropped off along a one-way drive aisle located at the northeast corner of the hospital with vehicle access from Royal Avenue. Twelve parallel parking drop-off stalls will be provided, six along Royal Avenue and six on-site.

Ambulance Entrance

The ambulance entrance is also provided from Royal Avenue, west of the walk-in emergency entrance. The ambulance entrance provides direct access to the ambulance garage and will only be used by emergency vehicles. Space is provided in the drive aisle and access area for two additional waiting ambulances.

Material Loading/Unloading Area

A small loading dock is located west of the ambulance entrance along Royal Avenue. The vehicle access for hospital deliveries is also used to serve one small short-term parking lot for use by people dropping off patients at the walk-in emergency entrance prior to moving their vehicles to the parkade, and one twenty stall lot for medical staff. The design of the parking lots allows delivery vehicles to pull into the medical staff parking lot entrance before reversing into the loading area.

Pedestrian Access & Circulation

Pedestrian access and on-site circulation will utilize the public sidewalk network to link the hospital with the surrounding neighbourhoods. Appropriate pedestrian crossings across Royal Avenue, Pandosy Street, and Rose Avenue will be retained. The public sidewalks are located

along the periphery of the site – east / west along the north side of the building, north / south along the east side of the building. Separate on-site pedestrian circulation routes will provide connections from the public network to the hospital entrances and connections to/from the parking areas.

The on-site pedestrian network provides pedestrian facilities (sidewalks, curb ramps, and appropriate crossings) along the west side of the main entrance drop-off and short-term parking loops, to and from the parkade, and along the north side of the building for the walk-in emergency entrance.

Parking Location & Supply

The primary proposed parking supply for the Kelowna General Hospital is located in the proposed 320 stall parkade located at the southwest of the Rose Avenue – Pandosy Street intersection. The access to the parkade is from Rose Avenue. Due to the Parkade's proposed location, the majority of the vehicular traffic will be concentrated along the arterial street (Pandosy Street).

In addition to this longer term parking, short-term parking stalls are located along the east side of the hospital, and the south side of the Pandosy building with vehicle access from Pandosy Street. As stated previously, there are approximately twelve stalls north of the main entrance and four stalls south of the main entrance.

One additional eight stall short-term parking lot is located on the north side of the hospital to serve individuals dropping off patients at the walk-in emergency entrance. In addition, a twenty stall parking lot for staff is located to the west of the short-term lot off Royal Avenue. These two lots share an access with the loading/unloading area.

x) Site lighting, signage, parking control, security, electrical/communications, duct/manhole, routing/placement.

No parking control is shown as the Parkade will be operated by the Authority.

xi) List any Output Specifications that you require to be varied and provide an explanation of the variation required. The variations list should be limited to and in the context of site development.

Summary of clarifications and assumptions

Zoning

We understand that Authority will secure any zoning variances prior to financial close and intended to commence the application process during the RFP bid stage. Infusion's design proposals include building heights which will require variance approvals. We have not been provided with a copy of the Authority's zoning variance applications and we have relied on it

having been properly prepared and submitted so that there is no adverse impact on our proposals or schedule.

We have also relied upon the Authority obtaining the consent of the City of Kelowna to the existence of the rooftop helipad within the current zoning or, if necessary, securing any re-zoning or variances required.

Infusion will be very pleased to support Authority's existing or future applications with information and documentation relating to its design and construction proposals, as required.

Preloading at Kelowna General Hospital

Parking and Pandosy Street / Royal Avenue Junction

Although we have endeavoured to engage with the City of Kelowna during the bid stage, the City has not confirmed its requirements for the reconfiguration of the junction of Pandosy Street and Royal Avenue. The traffic and parking report made available by the Authority dated 24 January 2008 was not sufficiently detailed to enable either Infusion or the City of Kelowna to determine an appropriate design of the junction of Pandosy Street and Royal Avenue. Accordingly we have based our proposals on the assumption that no reconfiguration of the junction will be required by the City.

For the same reason, we have been unable to obtain any feedback from the City of Kelowna to confirm the sufficiency of our design of the new parkade. Our proposals are based on the number of parking stalls being satisfactory to the City.

High Voltage Supplies

Addendum 22 issued on 11 February 2008 amended Output Specification Section H26, Division 26 – Electrical, Subsection 26 1101, Part 3, Item C.3.1.1 Page 23 to require that ProjectCo provide dual High Voltage power supplies. During the RFP response period we have contacted the representative of Fortis BC, the sole supplier of this service, to seek confirmation of the extent of work, costs and schedule for providing the dual HV feeds to the sites. Fortis BC has been unable to confirm these details so we have based our Proposals on the assumption that Fortis BC will meet the requirements set out in our construction schedule and that the Authority will be responsible for meeting any costs for work associated with providing the HV feeds to the sites.

INTRODUCTION

Infusion's scheme presents an approach to developing the new Kelowna General Hospital Ambulatory Care Centre which is a state-of-the-art solution to patient-focussed care, where staff effectiveness and wellbeing are paramount.

2.2.2. a) Provide written and graphical summaries of the design to demonstrate the following features:

i) How the design supports the Clinical and Non-Clinical uses of the Facility.

Infusion's scheme provides for a new Ambulatory Care Centre including new Emergency Department and a new UBC Medical Education Building attached to a new Visitor's Parkade. The existing building is renovated only to provide for On-Call Accommodation and Loading Facilities.

Clinical uses are concentrated in the new ACC building, including future expansion space for clinical uses within each department as identified by the Facility Program. We have focused on achieving the most functionally efficient adjacencies possible, based on the Authority's requirements revealed in the specifications and bid stage consultation meetings. The objective of clinical efficiency was the major driver for the large footprint, lower-rise layout of the ACC building with a central core. We found that this provides the means of achieving optimal adjacencies between and within the specified programs. The design reduces the need for staff and patients to move vertically between departments, whilst the central core provides shortest horizontal travel distances at each level using separate circulation corridors for front and back of house functions.

Future clinical and non-clinical use of the facility has also been important in developing our design. In addition to the two generously sized shelled in-patient floors at the top of the ACC building there is also potential for further upward expansion contiguous with the in-patient floors. By locating UBC in a separate building on site, future expansion areas within the ACC may be provided and fully realised without displacing UBC at a later date.

Non-Clinical Uses are provided in both the ACC and the UBC Medical Building. The ACC houses administration and support space, classroom and conference facilities on the Main Floor Level 1. All other floors are devoted to clinical functions. Within the UBC Medical Education Building, the Lecture Theatre provides for students, staff and also for after-hours community use, with parking directly adjacent. The UBC Medical Library and other areas of the building are also accessible to staff and students.

ii) Building design concepts and elements including functional aspects (including space standards, internal circulation and way finding), environmental aspects (including healthcare campus, indoor air quality, daylight, acoustics, colour, the use of art, and sustainability), operational aspects (including infection control, ergonomics, and designing for the elderly, disabled and Bariatric).

The building design supports contemporary healthcare delivery in the following important ways:

Overall building height

Providing the lowest possible overall building height (6 storeys) consolidates the program, minimizes the effect on adjacent residents, fits best with the massing of adjacent structures and advances the project schedule with minimal height variance requirement for the zoning. The scheme also leaves substantial available height for future additional floors.

Additional floors

UBC Building additional floors

Floorplate Layout

Providing the largest possible ACC building floorplate on the two most critical floors – Levels 1 and 2 – immediately adjacent to the Hospital to provide for intensity of use and efficient interconnection.

New Emergency Department

Providing for a brand new Emergency Department within the new building, thus freeing up a significant area of ground floor space previously occupied by Emergency and Ambulatory Care, for other uses such as Laboratory, SPD etc. Only the Loading Bay is provided in the former Ambulatory Care space.

New Main Entry

Creating a new main entry that will be a welcoming and lively focal point to serve the ACC, the existing hospital and potential future development of the site.

UBC and the Visitor Parkade

Locating UBC and the Visitor Parkade on the south of the site rather than embedding them in the ACC building - This separate UBC and Visitor Parkade Building will also be delivered sooner than the ACC Building to assist Authority in meeting its commitment to UBC Medical School and to reduce parking congestion at the earliest possible date. This approach is also better for the adjacent residents off Royal Avenue because it helps keep additional traffic off side streets.

Traffic streams

Separating the three various arrival streams of traffic - visitors/patients, ambulances and service/parking - to separate sides of the site significantly increases clarity and wayfinding.

Stacking building components

Stacking the building components on equivalently-planned levels with a consistent 9m x 9m structural grid, corridor circulation, elevator and stair cores, and common building service spaces.

H-shaped plan

Utilizing an H-shaped plan oriented north/south with a central elevator core to provide for maximum daylighting to all areas of the building, maximum flexibility to all areas of the plan and useable green roofs and patio courts at the Level 2 Ambulatory Care Centre.

ACC link to the Hospital

Connecting the ACC to the Hospital with a 2-storey link adjacent to the landscaped courtyard makes the connection between the hospital and the ACC more functional, pleasant for all users, and provides a significant visual amenity to the Hospital. At Level 2, the connector is located proximate to the Hospital elevator core and corridor circulation (while leaving the maximum opportunity for the future Cardiac Revascularization Centre if located on the Royal Building, to interconnect at this point)

Green roofs

All visible roofs are green roofs to maximize LEED stormwater retention credits and prolong roof life. All other roofs are high-albedo light-reflecting roof surfaces.

Central vertical circulation

Central vertical circulation on all levels of the ACC provides users with daylight, orientation and views on all levels, and access to outdoor areas at Level 2

Functional exterior design

The building façade design responds simply to the functionality of the spaces behind it without imposing any other systems or costs to create an appropriate architectural expression. The Main Entry and the Emergency Entry/Royal Avenue expressions are highlighted with canopies, sunscreens and colour to signal these areas.

Emergency Department

The Emergency Department is clearly seen from the Pandosy/Royal corner and parking and access are screened with landscaping from the adjacent residential use.

Simple wayfinding

Simple wayfinding from each ACC level is provided by having each lobby centrally located between the two wings of the H-shaped building. Turn to the left as a visitor and you are at the entry and waiting to one department, turn to the right and you are at the entry to another. Wayfinding back to the circulation core, and from the core to the Building entry, passenger pick-up and drop-off and the Visitor Parkade is clear and simple.

Separate circulation

Discrete, separate circulation for services/inpatient transfers from outpatients/visitors is provided with a back-to back core of passenger and service elevators, and also by service/inpatient transfer corridors linking the new ACC with the existing Hospital and the Ground floor and Second Floor.

Airflows

Supply and exhaust airflows have been designed to control contaminate migration via pressure relationships with air movement from clean to less clean areas.

Air intakes

Air intakes have been located at high levels to avoid introduction of outdoor air contaminants.

Air capacity

100% outside air capacity for all air handling systems allows for building flushing and free cooling.

iv) How the proposed design integrates with the Site and takes into account the particular attributes of the Site.

Infusion's scheme places parking where parking currently exists off Rose Avenue.

The ACC is located in the defined location under the Output Specifications but with an enlarged footprint to optimize the Ground Floor and Second Floor levels, without affecting Authority's preloading program.

The internal uses of the building and public spaces are aligned with views in the north/south access to protect the privacy of the Royal Building inpatient areas.

Emergency traffic is diverted from the two main Hospital entry intersections to Royal Avenue, so that these interim arrivals can be more effectively managed without affecting the high-use main entry areas and access to parking.

v) Flexibility in design and construction to meet future expansion requirements, including ease of adding capacity in the future at minimal marginal cost and minimal disruption to the operational requirements of the Authority.

The ACC is designed to take one outright floor of future vertical expansion, and a second future additional floor is possible with some increases to structural elements.

Additional expansion areas for the ACC include the service court between Emergency and the Royal Building which can be serviced from the ACC. This expansion would be a one-storey structure and would not require preloading. The existing Emergency/Ambulatory Care area on Level 1 of the Hospital is also available for future expansion.

When the Pandosy Building is demolished, future construction in this area can connect directly to the new Main Entry and look into the courtyard adjacent to the link between the ACC and the existing Hospital.

The UBC Building is also capable of one additional floor of vertical expansion.

vi) How the design of the building including its infrastructure addresses requirements for provision for disasters.

The building is designed to post-disaster requirements for all disciplines as required by the output specifications.

Practically, during a disaster, the design provides for KGH to improve and enhance services:

- Perimeter parking and lay-by's off Pandosy and Royal Avenue can be used for perimeter setup, emergency services, command, and supplies
- The loading bay, non-emergent ambulance area, and service court are proximate to Emergency and the Hospital for casualties, and ambulance/fire/rescue drop-offs
- Ground floor functions are spacious enough to be used for overflow requirements
- The conference and meeting room facilities (with adjacent food service) as well as the UBC Lecture Theatre can serve as command centres, back-up and sub-emergency Ops Centres

Graphical summaries relating to the above items are appended within the main Drawing package, Architectural.

b) List any Output Specifications that you require to be varied and provide an explanation of the variation required.

With reference to our RFIs numbers 39 dated 11 December 2007 and 39R dated 21 January 2008 and various discussions at commercial/financial and design-build consultation meetings during the bid, we understand that the Authority acknowledges the existence of subjective language in the output specifications. Whilst such language is valuable for explaining the Authority's intentions and aspirations, it will need to be put in objective terms for inclusion in the Schedule 3 of the Project Agreement. We will be pleased to assist the Authority in making such changes that are necessary.

Specific clarifications and assumptions regarding the output specifications for each discipline are presented in the relevant sections of Package 2 of the RFP response.

2.2.3 Architecture

INTRODUCTION

Infusion has considerable experience of integrating the design, construction and services in P3 projects with each other and with the hospital's clinical and non-clinical operations. This philosophy of integration has begun during the bid stage with our consultations with the Authority's procurement team and user groups, as well as internally with the regular construction, services and lifecycle integration workshops. Looking forward to the preferred proponent stage, we propose a number of enhancements to processes which, based on our experience, will provide successful outcomes for the Authority in terms of managing minor changes and accelerating project delivery.

a) Provide appropriate design documentation including:

i) Floor plans (1:100) with room numbers cross-referenced to those indicated in Sections B to F of the output Specifications Volume 2 (KGH), and to the accommodation schedule (Facility Space Requirements). Include all walls and doors, structural elements, circulation elements (e.g. stairs, elevators) and major service shafts.

Floor Plans show all noted elements (all drawings and plans are included in the Drawings Package).

ii) Building elevations and sections, and site sections, sufficient in detail to illustrate materials and major features and to confirm the building envelope strategy.

Building Elevations and Sections show all noted elements.

iii) Minimum of two 3-D renderings in colour, illustrating the overall design quality and aesthetics for the Project. One of these renderings should show the interface between the new building addition and the existing facility.

3D renderings in colour show all noted elements.

iv) A monochromatic massing model (1:200) of the Site and the Project.

A monochromatic massing model shows all noted elements.

v) Functional relationship drawings (1:100 architectural plans) indicating the location and functional relationships of all program elements, horizontal and vertical circulation, future expansion space, internal traffic flow – patient, staff, visitor, FM Services. Use colour to illustrate the program elements and to differentiate the following types of internal circulation systems: public, service, controlled access for staff and patient movement and "sterile." This needs to include the layout and general location of care-specific program elements (i.e. PARR in Surgical Services) within larger room elements. See *2.2.3.d.* for CMYK Colour System.

Functional Relationship Drawings in colour show all noted elements.

vi) Schedules of indicative finishes, fixtures, fittings and Project Co supplied equipment.

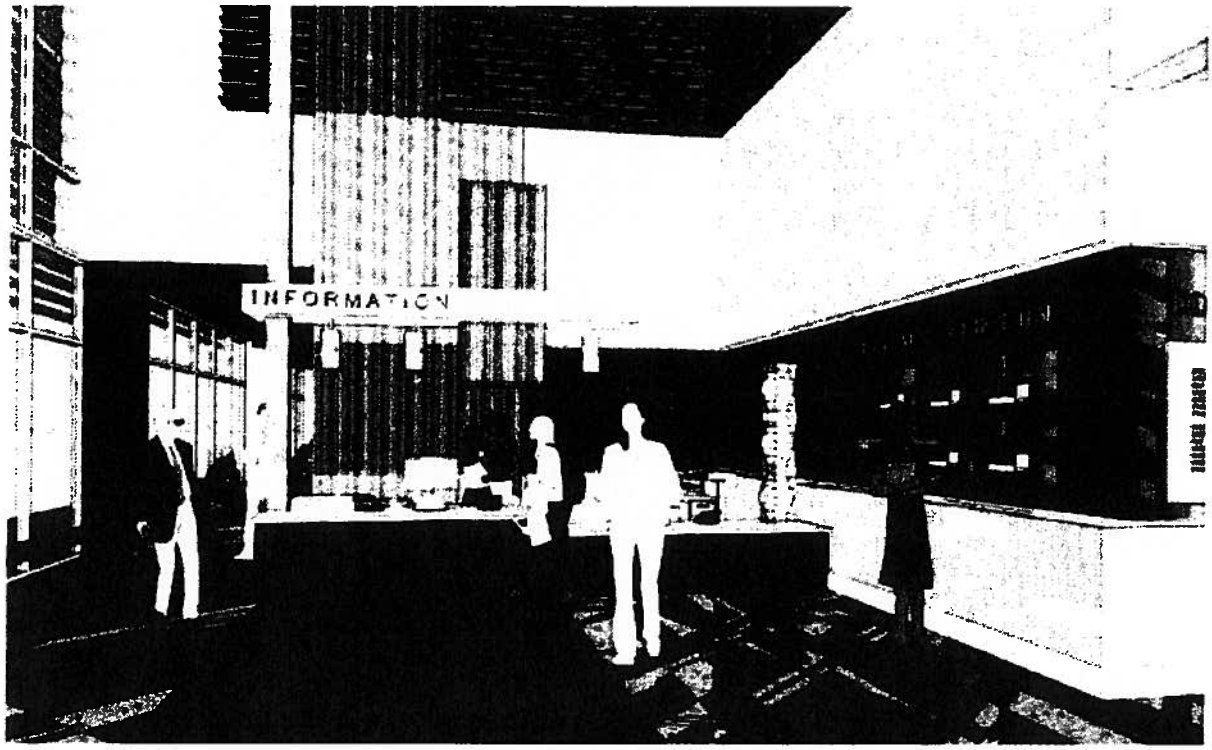
Schedules show all noted elements (see *Appendices 2.2.3. A: Kelowna Finish Schedules, 2.2.3. B: Kelowna Finish Allocation, 2.2.3. C: Kelowna Finish Schedule*).

vii) Room data sheets and drawings (1:50) in the format as shown in the sample data forms referenced in Section G of Volumes 2 and 3, and indicating the typical location of millwork, furniture, fittings, equipment, medical gases, plumbing fixtures, general power and outlets, security, communication outlet, life safety, lighting, IMIT, lighting controls, elevations and reflective ceiling plans for the following typical rooms and typical areas:

Room Data Sheets and Drawings show all noted elements for each of the following:

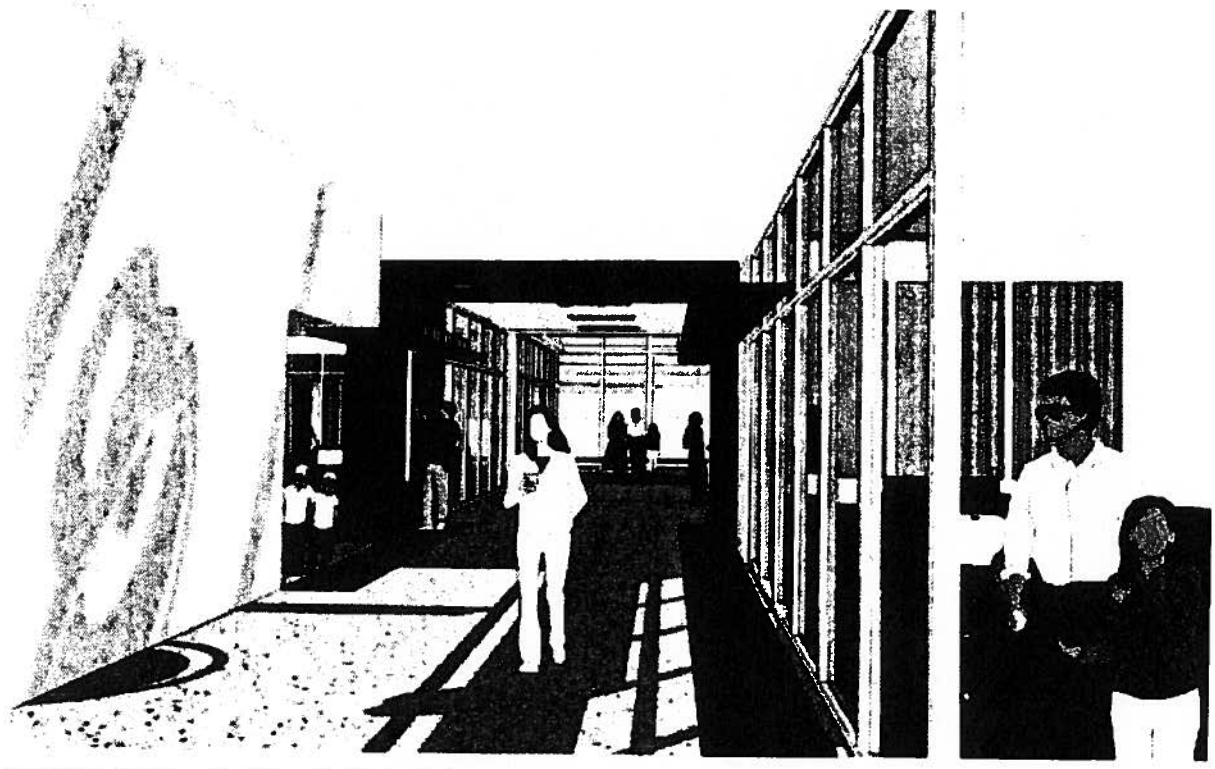
- Operating Room
- Procedure Room (Endo, Cysto)
- Fluoroscopy Procedure Room
- Typical Exam Room ED
- Diagnostic Imaging CT Rooms
- ED Trauma Room
- Triage Area
- Renal Dialysis Bay
- Secure Holding Room
- ED Stretcher Bay

b) Describe interior design concepts and elements.



Drawing 1: Main Entry, Hospital Level 1

Drawing 2: View to Elevator from Main Lobby



Drawing 3: Hospital View to Main Entry

Drawing 4: Elevator Lobby, Level 2

The interior design of the Kelowna General Hospital will communicate three major ideas

The patient experience is your #1 priority

Providing a non-institutional, aesthetically-soothing design can help mitigate patient anxiety, maximize comfort for patients, visitors and staff, and improve the Authority's ability to support patient care. Easy-to-understand way finding, ample day lighting, access to the exterior, personal control of equipment, and places of respite all contribute to a better patient experience.

Infusion's design will help de-institutionalize the visitor's perception of healthcare environments with an ambiance that is warm, comforting, and accessible. Our design uses materials, colour and scale to convey a welcoming presence, imbuing the facility with distinctive character appropriate to function. Our design expresses and enhances KGH's identity and strengthens the connection with the community you serve.

The elderly, along with most people, have difficulty navigating around the mazes of never ending corridors with ineffective confusing signage. The design provides a clear, identifiable layout for the public spaces of your building with elevators, reception stations, washrooms, and waiting rooms treated as a core, repeated on each floor with identifiable architectural landmarks, signage and colours.

Clinics, departments and destinations are easily identifiable by an architectural composition of signage mounted within wood panels, storefront glazing, wood veneered "eyebrows" and "front door mats" created with accent flooring.

Patients and visitors will identify where they can connect with staff. The care stations are given attention with an overhead acoustic "floating cloud", accent flooring, colourful walls and graphic signage.

The design places waiting rooms, with art and with seating groupings of furniture for all sizes and ages separated from the main corridor circulation with the use of glazed storefronts, low walls and translucent partitions, allowing privacy as well as opportunities for group interaction.

The main entry lobby on Level 1 is treated as a "main boulevard"/"town centre". The waiting area has KGH's most significant art. Upgraded furniture and finishes are selected to emphasize the importance of its function.

Our design provides areas to go to while waiting for appointments, or time spent during procedures. Coffee lounges, seating alcoves in corridors, accessible exterior spaces and "gardens" with meditative spaces of respite, a way to escape the harsh reality of a healthcare environment.

You serve a population that has many physical challenges, a population that is ageing. The elderly often experience confusion, lack of confidence due to the restraints of the built environment. Our design will help enhance the experience of a broad spectrum of ages and abilities. The design provides clear signage, strategically placed, highlighted by architectural landmarks, to facilitate memory and aide in way finding. Interior materials and finishes specifically appropriate to mitigate the visual, acoustic, cognitive and physical impairments associated with both the ageing and the physically challenged are specified throughout.

Infusion's design assures that every patient will have the ability to have personal control of their experience at KGH with adequate circulation space, accessible switches and blinds, furniture able to seat most physical limitations. The results are public and patient areas that are soothing, healing and reassuring in appearance and performance.

Your staff is your most precious asset

Our physical surroundings and the spaces we work in can have a positive effect on our daily work experience, how we feel and how healthy we are.

Infusion's design provides staff with efficient access to clinical tools and support for improved efficiency and reduces travel distances by moving services closer to beds and treatment areas

Evidence-based research shows direct links between staff performance, stress, moods and depression and the ability for staff to access daylight, exterior views and areas of respite. Infusion's design provides lighting solutions that will help mitigate the negative effects of circadian deprivation, help concentration and help relieve stress. Where natural light is not available we are providing simulated day lighting and nature views for diurnal variation.

The design provides staff lounges with views to the exterior and options for a high degree of interdisciplinary staff interaction and areas to go to relieve their stress.

Materials and finishes with healthful attributes which in turn result in an easier solution for maintenance are specified throughout.

A building that is good for the environment is good for your patients, your staff and your neighbours

The hospital environment impacts the well being of those within its walls. The design provides an invigorated environment will affect the mood, stress level, and well being of your staff, patients, and their families. The design also minimises the use of resources and reduce environmental impacts while creating a healthy environment.

The design specifies interior materials and finishes that are consistent with the best sustainable practices today, materials that are economically viable, readily available and appropriate for use intensive healthcare settings – that improve the building performance and promote health and productivity.

c) Provide descriptions, including types, of the following Elevators/Vertical Transportation mechanisms, including how each meets or exceeds the requirements of the Output Specifications:

Ambulatory Care Centre

Separate elevators cores are provided for passenger and service elevators. Passenger elevators are intended to serve the patients, visitors and staff but are not intended to handle any vehicular traffic other than wheelchairs. Ambulatory patients will be accommodated on the passenger elevators.

The passenger elevators proposed for this application are larger commercial sized 4000 lb. capacity passenger elevators. These will be overhead geared or gearless traction passenger elevators.

A separate group of service elevators will be provided for patient transfer, materials, supplies, support services, etc. Service elevators are not intended to be used for general staff and passenger movement and are located in areas and corridors designated for service uses.

The service elevators proposed for the facility are standard sized patient transfer / hospital service elevators with 5000 lb. capacity rating and cab inside dimensions of 1725 wide by 2600 deep with a clear door opening of 1220. Based on a typical standard hospital bed dimension of 1080 w x 2360 d this standard sized elevator should suffice provided larger beds such as bariatric beds are not required to be moved in the elevators. If oversized beds or other large objects must be moved then oversized, more expensive, custom sized service elevators may be required.

The surgical processing department and the operating rooms are located adjacent to one another and there is no need for a dedicated vertical link between the OR's and other locations and hence no dedicated elevator service is provided for these functions.

Design criteria have been established for the passenger and service elevators and an elevatoring analysis has been performed. Criteria for the elevator analysis is based on generally accepted elevator performance expectations for a health care facility and expected populations of staff, patients and visitors in the building and other assumptions.

Separate UBC / Parkade Building

Elevators for the separate parkade and UBC building will be standard passenger elevators and they will not be equipped with the same special features provided for the ACC building elevators.

A group of two (2) efficient traction elevators will be provided to serve the parking floors and the UBC areas.

i) Patient elevators

Ambulatory Care Centre

Ambulatory patients will be accommodated on the Passenger Elevators.

Non-ambulatory patients that need to be transported on a mobile stretcher, ambulance stretcher or typical hospital bed can be accommodated on the service elevators.

Separate UBC / Visitor Parkade Building

Patients are not expected in the UBC area. Patients using the parkade can be transported vertically using the common passenger elevators.

ii) Passenger elevators

Ambulatory Care Centre

A centralized group of four (4) passenger elevators will be provided for the full building fit out. The hoistway, machine room and pits will be constructed for all four (4) elevators initially, however, only three (3) elevators would be installed in the initial phase of the construction. The 4th elevator could be added at a future time when the shelled expansion space is developed. All elevators will serve all floors (except mechanical and rooftop levels). The initial three (3) elevators proposed are expected to provide adequate handling capacity to vertically transport

patients, visitors and staff within the established operating criteria based on the estimated demand and assumptions stated in the elevatoring analysis. Likewise the future four (4) car group is also expected to provide appropriate elevator service meeting the criteria established for the elevators.

Passenger elevators of the efficient traction type are proposed. Elevator control and hoisting equipment will be located in an overhead machine room located on the roof of the building.

The proposed size and speed of the elevators have been recommended based on the criteria used for the elevator analysis.

The elevators are proposed as 4000 lb. capacity passenger elevators with efficient centre opening 1220mm (4'-0") wide doors for efficient transfer of persons and optimum performance.

Two (2) car operating panels will be provided on either side of the door opening where centre opening doors are used for efficient passenger movement and access. Hall lantern signal fixtures are proposed at each floor level to provide advanced warning of elevator arrival and direction of travel also to improve passenger transfer and overall efficiency.

Elevators will be equipped with features suitable for interfacing with a wandering patient detection system. The elevators will be removed from service and further operation would be prevented upon receiving a signal fro the wandering patient detection system.

Elevators will be provided with suitable interface provisions to allow for the installation and connection of a restricted access card reader security system in each elevator for floor selective security restrictions. Provision of the security system would be by trades other than the elevator contractor.

Firefighters Emergency Operation phase 1 and 2 and emergency power operation will be provided for the elevators whether required by the minimum building code requirements or not to enhance the fire and life safety features of the elevators.

The features provided will be appropriate to meet and/or exceed the minimum requirements of the RFP.

Table 1: Passenger Elevators – ACC

Passenger Elevators - ACC				
	Type	Capacity	Speed	Clear Cab Inside Dimensions
	Overhead Traction	1820 kg (4000 lb.)	1.78 m/s	2335 w x 1650 d

Separate UBC / Visitor Parkade Building

Passenger Elevators for the separate parkade and UBC building will be standard passenger size elevators but will be larger than required by the minimum building code requirements to better accommodate persons in wheelchairs or with other mobility aids.

Table 2: Passenger Elevators – UBC and Visitor Parkade

Passenger Elevators – UBC and Visitor Parkade				
	Type	Capacity	Speed	Clear Cab Inside Dimensions
[redacted]	Traction	1590 kg (3500 lb.)	1.0 m/s	2030 w x 1650 d

Passenger Elevator Finishes

Passenger elevator finishes will consist of elevator manufacturers standard finishes including raised plastic laminate wall panels, stainless steel cab front, header and car door panels and a tubular stainless steel handrail. Lighting will be efficient fluorescent lighting above a suspended ceiling with translucent diffuser panels.

Elevator cab flooring will be provided by other trades.

Landing door panels and entrance frames will be stainless steel finish at all landings.

iii) Service elevators

Ambulatory Care Centre

A group of three (3) service elevators will be provided for the full building fit out. The hoistway, machine room and pits will be constructed for all three (3) elevators initially, however, only two (2) elevators would be installed in the initial phase of the construction. The 3rd elevator could be added at a future time when the shelled expansion space is developed. All elevators will serve all floors (including mechanical and rooftop helipad levels). The initial two (2) elevators proposed are expected to provide adequate handling capacity to vertically transport non-ambulatory patients, and other vehicular traffic such as supply carts, food, linen, waste and other materials movements. Likewise the future three (3) car group is also expected to provide appropriate elevator service to meet the anticipated needs for the fully built out facility.

Standard patient transfer / hospital type, service elevators of the efficient traction type are proposed. Elevator control and hoisting equipment will be located in an overhead machine room accessed from the roof of the building.

Service elevators will be located for convenient access to the loading area, laundry, waste facilities and stores to provide an efficient link for the vertical movement of supplies, linens, waste, equipment, carts, etc. when required.

The proposed size and speed of the elevators have been selected to provide appropriate service for the full building fit out. The elevators proposed are standard 5000 lb. capacity patient transfer, hospital / service type elevators with two speed side opening doors for accommodating larger items, carts, stretchers, etc.

Hall lantern signal fixtures are proposed at each floor level to provide advanced warning of elevator arrival and direction of travel to improve transfer and overall efficiency. A load weighing

system is proposed to measure the load in the elevator and to automatically bypass demand in certain circumstances when the load system indicates the elevator is full or heavily loaded to improve waiting times by eliminating unnecessary stops.

Elevators will be equipped with features suitable for interfacing with a wandering patient detection system. The elevators will be removed from service and further operation would be prevented upon receiving a signal fro the wandering patient detection system.

Elevators will be provided with suitable interface provisions to allow for the installation and connection of a restricted access card reader security system in each elevator for floor selective security restrictions. Provision of the security system would be by trades other than the elevator contractor.

Special priority service type operation will be provided to call an elevator for patient transfer and allow this to occur discretely with patient privacy and dignity in mind. Once the prioritized dedicated service is complete the elevator will revert back to normal "public" operation.

Service elevators will be equipped with appropriate Hospital Service functions to allow an elevator to be called to a selected landing on an expedited basis for response to medical emergencies. This operation can be initiated by keyed switches located at each landing as well as remotely through the nurse call system. Signals from the nurse call system would need to be provided to the elevator control system by trades other than the elevator contractor.

Firefighter's Emergency Operation phase 1 and 2 and emergency power operation will be provided for the elevators whether required by the minimum building code requirements or not to enhance the fire and life safety features of the elevators.

The features provided will be appropriate to meet and/or exceed the minimum requirements of the RFP.

Table 3: Service Elevators – ACC

Service Elevators - ACC				
	Type	Capacity	Speed	Clear Cab Inside Dimensions
	Overhead Traction	2270 kg (5000 lb.)	1.78 m/s	1725 w x 2600 d

UBC / Visitor Parkade Building

Service elevators will not be provided in the separate parkade and UBC building. The passenger elevators will be large commercial sized passenger elevators that can be used for moving materials, furniture, etc. when necessary.

Service Elevator Finishes

Service elevator finishes will consist of elevator manufacturers standard finishes including stainless steel cab wall panels, stainless steel cab front, header and car door panels. Handrails will be flat bar stainless steel handrails and the base of the cabs will be protected with a flat bar

stainless steel bumper rail. Lighting will be efficient fluorescent lighting above a suspended ceiling with translucent diffuser panels.

Elevator cab flooring will be provided by other trades.

Landing door panels and entrance frames will be stainless steel finish at all landings.

iv) Firefighter elevator(s)

Ambulatory Care Centre

All elevators in the ACC building will be equipped with Firefighters Emergency Operation (FEO) as defined by the B44 Safety Code for Elevators. This would include Phase I automatic and manual emergency recall operation and Phase II In-Car Emergency Operation.

A minimum of One (1) elevator will be designated for use by Firefighters as defined by the BC Building Code and will meet the additional requirements of the building code to satisfy this designation. The designated elevator will be selected by the Architect and/or Code Consultant with the input of the building authority having jurisdiction if necessary.

All elevators will be equipped with standby, emergency power from the vital or delayed vital power distribution systems as appropriate.

UBC / Visitor Parkade Building

This separate building will not likely be categorized as a high building by the building code and therefore it will not be required to provide enhanced fire and life safety features for the elevators.

The elevators will voluntarily be provided with firefighters emergency operation (FEO) as defined by the B44 Elevator Safety Code. None of the elevators will be designated for use by Firefighters as defined by the Building Code. Emergency power will not be provided for the elevators in the separate parkade and UBC building.

Summary of Clarifications and Assumptions

We note that the STC ratings in the output specifications are quite stringent and considerably higher than is typically provided in hospitals in the province. We will construct internal walls according to the codes and standards stated as we understand the desire to ensure, for example, the right environment in teaching theatres and privacy for patients in consultation rooms. Our decision to construct the building frame in concrete is fundamental to our low-noise approach to the design. However, we would note that even though we will provide the appropriately rated wall construction, we can not guarantee that the whole room will meet in-situ test requirements.

Our proposals allow for millwork in accordance with the schedule in Addendum 19, however, we note that this may not entirely match up with the detailed room layouts.

All mock-up rooms will be constructed in the existing buildings, to the East of the new diagnostic and treatment building location at Vernon Jubilee Hospital, which are ultimately scheduled to be demolished.

In lieu of an external wall rain screen system, our proposals are based on using an EFIS panel system similar to that used on the existing Royal Building at Kelowna General Hospital.

INTRODUCTION

While the technology of the new ACC will be the most advanced and proven systems on the market, we understand that the primary duties of healthcare staff is to provide healthcare. Our goal is to make each technology available, simple and efficient to use that medical staff will rapidly adopt, understand and be able to use each communication tool available to them to assist them in their healthcare duties.

2.2.9. a) For each of the following technology and communication systems, describe the system and associated scope, and the typical devices and functions for each area to be served.

Describe any integration between each system and any others:

Technology and Communications Systems at the new Facility shall be the most advanced and proven systems available for modern healthcare facilities. Each separate technology system will be designed to enable medical staff to maximize their ability to instantly communicate and access information by utilizing the latest information technology systems. The full power of advanced IT communications will be accessible throughout the facility. Within all proposed technology designs for the new facility, careful consideration will be given to providing the best infrastructure to support the most sophisticated medical operations of today, while allowing for the flexibility to adapt to the future requirements of the Authority's healthcare operations. The intent of this section is to provide an overview of the proposed technology and communications systems that will comply with the criteria as established by the Design and Construction Output Specifications for the new ACC Facilities.

While the technology of the new ACC will be the most advanced and proven systems on the market, we understand that the primary duties of healthcare staff is to provide healthcare. Our goal is to make each technology so simple and efficient to use that medical staff will rapidly adopt, understand and be able to use each communication tool available to them to assist them in their healthcare duties.

Each individual communication system will be programmed and configured to meet or exceed the customized operational needs of nursing and medical staff. These requirements will be obtained through direct design consultations and workshop sessions with the Authority's operational directors and each unique clinical department. Decisions made by the Authority will be implemented in the most practical, simple-to-use and efficient means possible. Full technology training sessions will be provided to each user group, which will be repeated at regular intervals to the satisfaction of the Authority.

The individual technology and communications system components included within this proposal include:

- active layer 2/3/4 networking switches,
- wireless local area network security switches,
- wireless access points,
- UPS backup power for critical systems (see power section 2.2.8 for more info),

- structured cabling infrastructure for wired and wireless communication ,
- Analogue clocks,
- addressable two-stage fire alarm,
- advanced nurse call systems,
- code blue, code white, public address,
- intercom addressable through PA system,
- stationary and mobile video conferencing system,
- patient entertainment and monitoring support infrastructure,
- VoIP telephone system expansion,
- central dictation support infrastructure,
- ,
- infant protection,
- OR room management,
- wired and wireless staff duress,
- localised intrusion detection security systems,
- localised proximity card based access control,
- advanced CCTV surveillance and recording and centralized alarm/event management software.

The key goals of all proposed technologies and communications systems are to be flexible and support the rapidly changing information technology needs of the Authority as follows:

- Each communication system has been selected to enhance the operational objectives of the Authority and its staff using the most advanced, proven and flexible technologies available within the healthcare industry.
- Communication systems will be integrated wherever practical to achieve maximum functional scalability using a common IT local area network (LAN) platform.
- All technologies and communication systems will be closely coordinated with the functional and clinical needs of each department. This also requires close coordination between the Infusion's experienced healthcare systems engineers and the Authority's Information Technology department.

i) Nurse call systems and main equipment locations

Technology and Communication Systems

The new nurse call system for the ACC will be the backbone technology for instant electronic patient to nurse communications. The fundamental intent of the nurse call system is to immediately notify nursing staff when events occur that require their attention. A complete nurse call system will allow nursing and support staff to be in continuous support of multiple patient locations.

The configuration of the system will be capable of differentiating a variety of input and output events that could be used for additional operating functionality such as housekeeping. Infusion will work closely with department manager to understand and design the most effective and simple system to effectively annunciate events so that operational responses can be provided in the shortest possible time.

Priority based ring tones and zone lights will also be available to provide visual indicators to lead staff to the call origin. The nurse call system will be implemented in a robust and sophisticated manner to meet the requirements of staff without being overly complicated to end-users. The new system will be fully capable of integration with event management software, wireless communication devices and a wide variety of medical applications to allow for application expansion as they may arise over the life of the new facility.

System and Associated Scope

Infusion will provide an advanced nurse call system in each patient care area within the ACC. The advanced nurse call system to be provided will be composed of strategically fixed nurse call stations located in patient areas independently connected to communicate with centralized nurse call system controllers. Nurse call control panels will then output event information, as programmed, to local nurse call consoles at each care stations to notify staff.

The new nurse call system will be compatible with the most current installation and functionality standards of the Authority. Although the functionality and integration capability will be the same, Infusion proposes that the nurse call product to be Rauland 4000 or later replacement model from Rauland. Infusion will meet directly with the Authority's nursing department leaders to obtain functional programming requirements for the new nurse call system. These programming requirements would involve establishing configuration and programming for:

- call assignments,
- staff communication device assignments,
- priority levels,
- day night shift scheduling,
- call annunciation locations,
- code blue response,
- alarm systems responses,
- customized call display requirements and any bulletin board programming requirements.

Infusion will support and maintain the new nurse call system under its responsibilities for operation of the Facility. It is anticipated that the nurse call system to function as a complete independent system within the new facility. We will investigate the need for interfacing to the existing nurse call system in existing building as necessary.

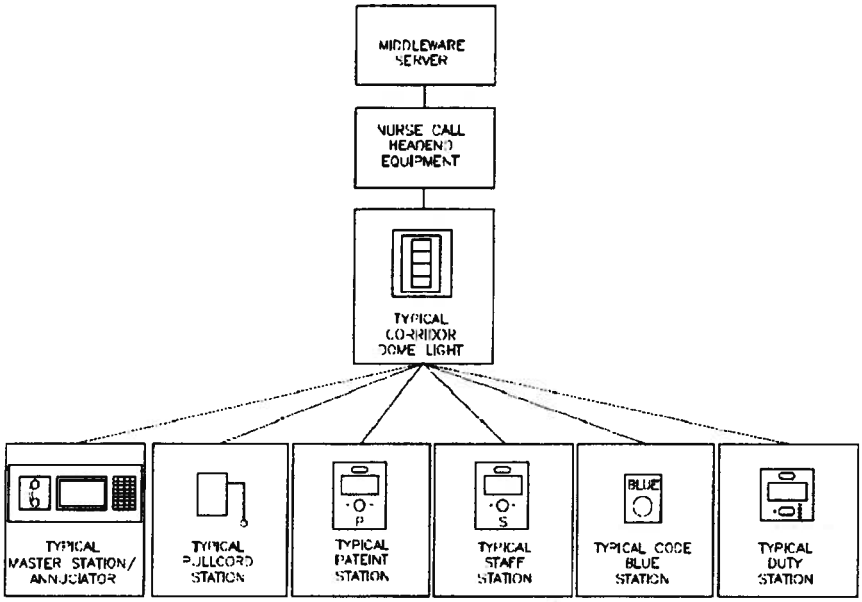


Figure 5: Nurse Call Overview Block Diagram

Typical Devices and Function

All nurse call system devices and consoles will be supplied from a single manufacturer and comply with all CSA C22.2 and CSA Z32.04 requirements.
For a typical patient room Nurse Call Stations will be provided as follows: Nurse Call, Staff Assist, Code Blue, Aux Input, 2-way Communication.

- A patient pull cord station or a patient station will be installed in all patient washrooms, treatment rooms, patient dressing cubicles, patient treatment locations, bathrooms and other areas where patients may need to call for assistance.
- A staff emergency station and code blue button will be placed in all patient care rooms, treatment rooms and other rooms where staff may need to call for assistance.
- A duty station will be installed in a utility room or other areas where staff members may be working and need notification of active calls within their area.
- The dome light will be located to provide staff the possible view on the outside of the room where nurse call stations are located and lead responder to room call light.
- The equipment will be networked together to provide a centralized code blue system.
- The staff will be fully trained to utilize the nurse call system to its full potential.
- Each nurse call station will be individually programmable to allow multiple call classification and priority levels.

- Infusion will work closely with clinical staff to fully understand the intended operation and provide call stations to best suit the clinical and operational needs of each department and will locate call in the appropriate room types
- Examples of nurse call initiated events that will be available include normal patient call, staff emergency call, code blue, bed exit, priority patient call, bathroom call, shower call, anaesthetic call, clean room call and porter call. Each call event will require a unique input at the station.
- The nurse call system will allow for cascading of call to higher priorities if they are not answered, will have time out call cascading if the calls are not cancelled and will be able to be displayed on the nurse call master, the wireless phone, and any other type of call display.

System integration

- The new nurse call system will use middleware software for event/alarm management and annunciation to other systems as required (i.e. Info Displays, Wireless Handsets, etc.) within each department.
- The new nurse call system for the new facility will be connected to the building management network and will be compatible for future integration to allow exchange of patient record information on select viewing devices. The Authority will need to configure firewall access to integrate nurse call to their clinical networks as required.
- The call management software will record all calls from all departments, response time and allow trending and report generation.
- The new nurse call system will be capable of integrating with an annunciator on wireless staff communication devices (PDA's or phones) for remote alarm notification.

ii) Wireless staff communications/infrastructure

Technology and Communication Systems

Infusion will provide a complete wireless network using Authority approved products. Wireless networking technologies are allowing traditional static hardwired IP networks to become mobile and boundless. As such, wireless communications are transforming the way healthcare applications and processes are being delivered.

As wireless technology improves and new tools for communicating emerge the wireless infrastructure within hospitals is becoming just as critical as the hardwired infrastructure. New healthcare applications will continue to move closer and closer to the point of care with goal of streamlining healthcare delivery and reducing medical errors.

System and Associated Scope

Infusion will provide a full enterprise wireless solution for full 802.11 based wireless coverage throughout the facility and the end use Vocera devices. The wireless design of the facility will be a key system within this project.

- All cabling infrastructure will meet or exceed the Authority's current performance standards and be Category 6.
- Infusion will provide a complete enterprise wireless network based on the Nortel WLAN 2300 Series solution. Specifically the enterprise class 2380 WLAN Security Switch which can support up to 120 access points will be provided.
- Nortel 2330/2330A which are dual radio 802.11a/b/g Access Points will be provided in select locations for complete coverage of patient care and public areas of each facility.
- Infusion will provide Nortel 2246 Application Gateway for OAI support into various other systems as required by the Authority.
- Nortel WLAN Management Software will be used to locate client and rogue access points throughout the facility.
- As tracking systems are a fairly new to implementation to the Healthcare environments and the Authority has very few (if any) installations utilizing this type of technology. Infusion will provide several training sessions on the Asset, Staff and Patient tracking system to inform staff about how the system can be utilized as necessary.
- Within scope of current established designs, the health Facility will be designed around the 802.11a/b/g standard at the time of construction,
- The use of cell based distributed processing using thin wireless access points (AP) is highly recommended for voice over wireless quality of service support; this selection is however at the discretion of the Authority.

Typical Devices and Function

- Each AP will be connected to patch panels located in the nearest LCR that will provide both data communications as well as Power-Over-Ethernet connectivity.

To make effective use of current 802.11 based wireless tracking real time location algorithms each 802.11 access point (AP) will be arranged in orthogonal grids to support Relative Signal Strength (RSS) based location software.

- Infusion will provide an extensive wireless survey to map out signal strengths throughout the entire facility.
- This survey will be conducted on a regular basis for the duration of system use as various sources of interference may arise during normal facility operations.

- Infusion will provide a software licences for Real Time Location System (RTLS) software to be used by the Authority.

System Integration

Several independent systems are expected to make usage of a common 802.11 based wireless network throughout the hospital. Seamless integration will be available to all systems via the 802.11 standard. Clinical telemetry systems are recommended to operate on frequencies outside of the unlicensed 2.4 and 5Ghz spectrums, this will need to be coordinated and confirmed through a comprehensive frequency allocation plan with the Authority's biomedical engineering department.

iii) Public address system

Technology and Communication Systems

Infusion will provide a public address system for the new facility, however this system will be restricted to use during emergency calls in the event that primary communication systems such as wired or wireless telephone devices are not available.

System and Associated Scope

In general, the Facility's communication requirements will be met without using the public address system.

- The public address system will be for use only for emergency calls, when other communications systems have not worked, or when general announcements are needed to communicate with staff and the public.
- The output specifications require that the new public address system will operate independently but also have full integration to fire alarm paging system for additional backup paging in the event of failure, Infusion requests that the Authority consider an integrated solution an option.

Typical Devices and Function

Infusion will provide a complete paging system with typical devices consisting of a control system software, loud speakers, microphone stations, amplifiers and dedicated wiring.

- Audible alert levels will be 10dBA above ambient with minimum of 75dBA.

System integration

Infusion will investigate the need for integration of new overhead paging systems with existing systems if required by the Authority. Currently we do not anticipate this to be needed as a telephone interface is planned to allow access remote paging functionality by means of proper access codes.

iv) Structured cabling

Technology and Communication Systems

The structured cabling system will form the backbone for the high speed digital communications highway within the new facility. Cabling will be selected to support the bandwidth requirements of the latest healthcare computing technology. Structured cabling and patching components are custom designed to allow for faster moves, adds and changes of field and head end equipment connections. The structured cabling system will support all data, voice and media requirements on a common infrastructure for simple configuration and management.

System and Associated Scope

Infusion will provide structured cabling and physical wiring pathways, meet TIA and BICSI standards. The majority of communication systems field devices will be supported from designated communications rooms on each floor. A star wired backbone cabling architecture will service each Local Communications Room (LCR) via a centralized Main Communications Room (MCR). Within the new Facilities, a single MCR along with 1 LCR stacked vertically per floor is proposed within the structured cabling design.

LCRs will be allocated in at the center of a 70m (based on output specification) radius to cover the entire facility; centrally located core locations within the building are preferred for maximum coverage efficiency. A main fibre optic distribution patch panel is also proposed within the MCR to allow single point management for all backbone cabling links within the facility. All building management servers provided under the scope of Infusion will be installed within the MCR. It is not anticipated to have a raised floor system within the communication room.

Typical Devices and Function

The bandwidth requirements and distance limitations will ultimate determine the type and quantity of backbone cable installed within the new facility.

- With the design two (2) 24-Strand Multimode 50/125 micron Laser Optimized OM3 backbone cables will be provided to each LCR from the MCR for both bandwidth and redundancy (no single mode required).
- Each data/voice outlet to have a minimum of (2) cat6 network cables installed.
- Furthermore, all ceiling spaces will have cable system drops for wireless access points.
- Infusion does not anticipate all cabling drops to be active. Infusion does not anticipate that all ports will require POE, as there would be a significant amount of large amount of energy wasted by this requirement. Infusion believes that flexibility inherent to the communications system design will allow for the rapid addition and reduction of active ports to comfortably meet the Authority's IT networking requirements at each facility.
- The exact number of active ports required needs to be confirmed by the healthcare Authority in writing based on the number of network devices included in the equipment schedule.

- Category 6 cabling is highly recommended for 80-90% of all network drops at each facility. Category 6a horizontal cabling will be provided for specific high bandwidth locations as an alternate to horizontal fibre optic cabling.
- Category 6a cabling will be provided if necessary for rooms requiring video streaming applications, such as dedicated teaching/training, video conferencing rooms and PACS workstations, this cable can support 10Gbps which is directly comparable to high-end fibre optic performance.
- If a category better than category 6a is the official standard of the Authority at the time of ordering, it will be priced and presented to the Authority to determine if they want to utilize the latest standard for all locations.

System integration

- Servers and control equipment provided by Infusion would be installed in the new MCR.
- A star wired cabling approach will be utilized to wire all outlet locations back to local communication rooms and all communication rooms back to a MCR within the facility and then outside of the facility back to the main core network rooms at each site. As the new phone systems will be VoIP we do not anticipate the need for traditional copper backbone cabling within the new buildings.
- The existing core networks in the existing buildings and off-site server farms will be used for all Authority server applications and core network functionality.
- Two independent fibre optic links will be provided to achieve WAN redundancy. Cable type would be armoured for additional protection for both fibre optic multimode and single mode links to core networks at each site. Backbone cables each new building through two separate duct bank entry points for outside plant pathway redundancy.

v) Code blue systems

Technology and Communication Systems

Infusion will implement a code blue system as a component of the overall nurse call system. The code blue system will be configured to notify the code blue team of a code blue event and response to the cardiac arrest in the most rapid manner possible. A dedicated plan for code blue response will need to be implemented in consultation with the Authority.

System and Associated Scope

Code Blue will be provided as a component of the overall nurse call system.
Existing code blue systems at each site will be expanded to the new facilities if necessary in accordance with the Authority's current code blue response plans.

Code blue elevator recall will need to be implemented.

Typical Devices and Function

Infusion shall provide Code blue stations (separate station to other nurse call stations/buttons) shall be located within all patient rooms, OR's, procedure rooms, PARR / PACU (at each bed location), emergency department (each cubicles / beds location), each exam room, each treatment room, each LDRP room to identify the exact room where the patient needs assistance via nurse call dome lights, nurse call annunciation, and wireless annunciation.

System integration

Infusion will integrate the nurse call system with other alarm systems to annunciate code blue (cardiac arrest) and at local nurse stations and switchboard.

vi) Code white system

Technology and Communication Systems

Infusion will provide a panic duress system for the hospital that will allow immediate response by the Authority's Protection Services department to violent threats that occur at the new facility.

System and Associated Scope

Fixed panic alarms will be provided at care stations and reception areas to allow alarm initiation at staffed areas.
In addition to 802.11 based access point infrastructure, Infusion will also provide a dedicated wireless code white panic alarm system to protect Staff.

- The wireless panic system will report locally at the main care station in each installed department.
- The wireless panic system will visually annunciate the room/hallway location on a graphical map when a wireless panic button is triggered by Staff.

Typical Devices and Function

The panic alarm systems monitor input events from Staff triggered field devices and will annunciate the location of the alarm at the Infusion call centre and at the closest nurses station via audible and visual alarm displays.

Fixed panic alarms will be provided at all staff care stations, reception areas and other occupied locations with direct monitored connection to remote security stations. Infusion will investigate the need for local audible siren, strobe light for additional safety and deterrence. The panic system will visually annunciate the room/hallway location on a graphical map when a wireless panic button is triggered by Staff. Alarm displays will include information on both the wireless device initiating the alarm and the room in which the alarm was initiated.

System integration

The wireless panic system will report locally at main care station in each installed department, as well as centrally at a call centre.

vii) Patient entertainment/educational television

Technology and Communication Systems

Infusion will support the cabling infrastructure requirements of the Patient Entertainment system selected by the Authority.

System and Associated Scope

The Authority will provide the patient entertainment equipment, Infusion will provide the necessary infrastructure to support.

Typical Devices and Function

The proposed patient entertainment system infrastructure will be capable of supporting in-room patient entertainment including live television, movies, internet, patient education as well as in-room telephone service in all in-patient rooms and all other patient locations where it is expected that patients will have long stays. Infusion will provide sufficient bandwidth to accommodate each location.

The areas requiring access to the patient entertainment system will include all selective bedrooms, selective lounges, lobby, multi-purpose rooms and other rooms with audio visual capacity.

The type of end-use will allow patients and staff to be able to change program channels, select closed captioning and control room lights. All cabling will be via the structured cabling system (selection of Category 6 and/or Co-axial to be determined) and local power.

System integration

Further requirements and specific locations are to be determined by the Authority.

viii) Patient monitoring

Technology and Communication Systems

Infusion will provide physical pathways and/or structured cabling to support the Patient monitoring systems as selected by the Authority.

System and Associated Scope

Infusion shall install/connect all patient monitoring systems equipment and devices and provide power, raceway, structured cabling infrastructure including as identified in the Equipment Schedule. Authority to supply equipment, devices, software and test/commission the complete system.

Typical Devices and Function

Typical patient care room will be wired to allow a patient monitoring device to be located at each patient bed headwall.

System integration

Infusion will provide a structured cabling system to allow integration over the Authority's IP network with other Authority clinical networks and servers (located outside of the new facilities). Exact patient monitoring requirements to be confirmed by the Authority during the design development stage.

ix) Intercommunication

Infusion will supply communication systems and infrastructure requirements to allow Staff to synchronize and extend their capacity to communicate effectively throughout the new facility.

Due to the extensive need for locked doors within the new facility, Infusion anticipates the need for an advanced intercom system to safely allow access to secure spaces. Infusion will provide a complete intercom solution to meet these requirements.

Technology and Communication Systems

Infusion will provide intercom systems as determined for each department within the new facility. We propose to integrate the intercom system into an overall integrated security solution and telephone system interface for additional functionality.

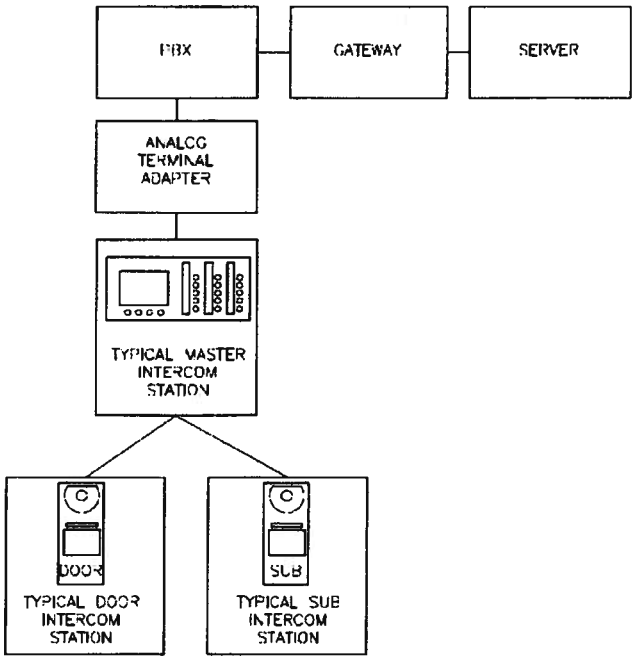


Figure 6: Intercommunication System Overview Diagram

System and Associated Scope

Intercom master stations will be provided at selected nursing stations and reception areas as required for two-way communication and remote door release. Intercom substations will be located at strategic door entrances for secure access or after-hours access to selected department. Specific departmental intercom requirements will need to be identified in user group meetings with staff.

Typical Devices and Function

Typical intercom devices will consist of sub-stations and master-stations with two way full duplex communications functionality. Select sub-stations will also have CCTV video cameras integrated to display persons who request entry to monitors tied in with master stations.

System integration

The final design of the intercom system will be based upon the user group functionalities required. From a base perspective each department will have the ability to control access independently with local intercom master stations. If functionality is required between departments then Infusion recommends a centralized intercom solution that is integrated with the access control system and telephone system to allow extended functionality.

As an example requests to enter after hours could be transferred from master stations automatically in the event that a care station is not attended. Staff could receive notifications via wireless phone messages that entry is requested at a particular intercom doorway. Further discussions on integration will be necessary to determine these requirements.

x) Security systems

Infusion has dedicated design staff which are experienced with a variety of electronic security systems and devices used within healthcare environments. Infusion will work closely to determine a comprehensive security plan for the new facility based the following criteria:

- Executive direction from the Authority's Threat and Risk Assessment program
- Healthcare security best practices
- Output Specification Technology Requirements
- Liaison with licensed security consultants to analyze unique security threats to the facility (To be coordinated at the request of the Authority's security department).

Infusion design team will work closely with the Authority's security department to establish a security design that complies with the following best practice healthcare security methodology:

- Protection of staff, patients and public against internal and external security threats by means of effective operational and technology based methods.
- Direct cooperation and coordination of threat response scenarios with the Authority's security department.

- Establishing direct and effective security communication methods for staff.
- Training and educating staff on security technologies and threat response methods.
- Installation of panic alarm systems and CCTV coverage at care stations and staff locations.
- Active and passive monitoring the perimeters of the facility by means of CCTV surveillance cameras to detect and record potential threats before they breach the perimeter of the facility.
- Securing the perimeter of the facility against external threats by means of electronic access control on outer doors as a first barrier of defence against outside intruders.
- Installing high resolution facial capture cameras at public entrances for use by law enforcement as a deterrent and evidence tool
- Securing each department for independent control of access by means of direct two-way audio intercom and camera systems.
- Programming of ID cards, location of all security devices and monitoring requirements to be identified.
- Identification of all security alarm annunciation requirements in consultation with the Authority's security department.

Technology and Communication Systems

Infusion will provide a comprehensive security system complete with CCTV, Access Control and Intrusion Detection to protect Staff, Patients and the public from internal and external threats. Overall features include:

- Cameras will be provided at all entry/exits, lobbies, elevator lobbies, corridor junctions, nurse stations and stairwells.
- Security systems will include a security desk near the main front entrance, access control at all main public entrances and restricted areas where medical equipment are stored.
- Alarm event integration between the CCTV system and access control system for alarm based recording and pre-programmed events.
- Staff duress systems are required to be hardwired in the form of panic buttons and wireless panic devices, these buttons will also be integrated into the intrusion detection system.

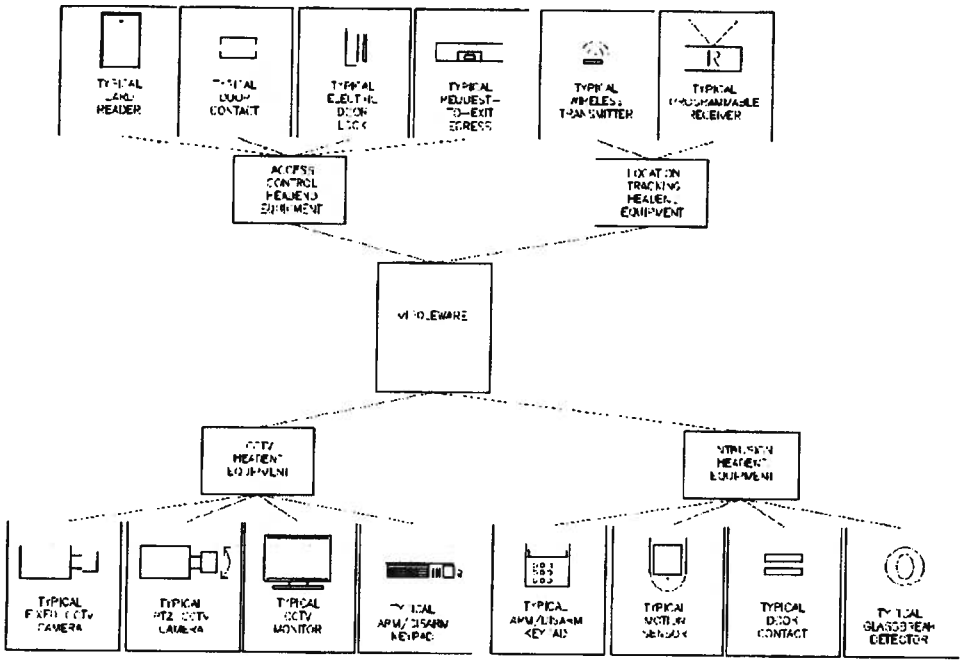


Figure 7: Integrated Security System Overview Diagram

System and Associated Scope

The new access control system for the new buildings will be standalone for the new building yet compatible with the existing access control system currently utilized in the Authority using database integration software.

Selective departments will be secured with card access for ingress and egress restrictions. Any secured room will meet provincial holding room standards and will be equipped with the following:

- Dedicated monitoring intercoms between each holding room and the local nursing station.
- Wireless Staff panic alarm devices
- Dedicated CCTV cameras
- Tamperproof devices within the room
- Institutional grade locking devices
- The new CCTV system will have network and web access for remote monitoring and will be of sufficient quality to be used as court evidence in Canada.

Typical Devices and Function

- This system will be a PC based, contains an integral photo identification card system, can lock and unlock doors via time schedule, utilizes proximity field effect technology, has sufficient capacity to handle regional employees via WAN database interconnection and provide this authentication 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.
- The system will utilize a field server and allow multiple workstations to access this file server for control and annunciation purposes.
- The system will consist of a main access control panel, door position contacts, card readers, electric door lock, request-to-exit sensor.
- The access controllers will be mounted in the communication rooms.
- All the wiring for the card readers, request-to-exit egress motion sensors, and door contacts will home run inside conduits to local control panels.

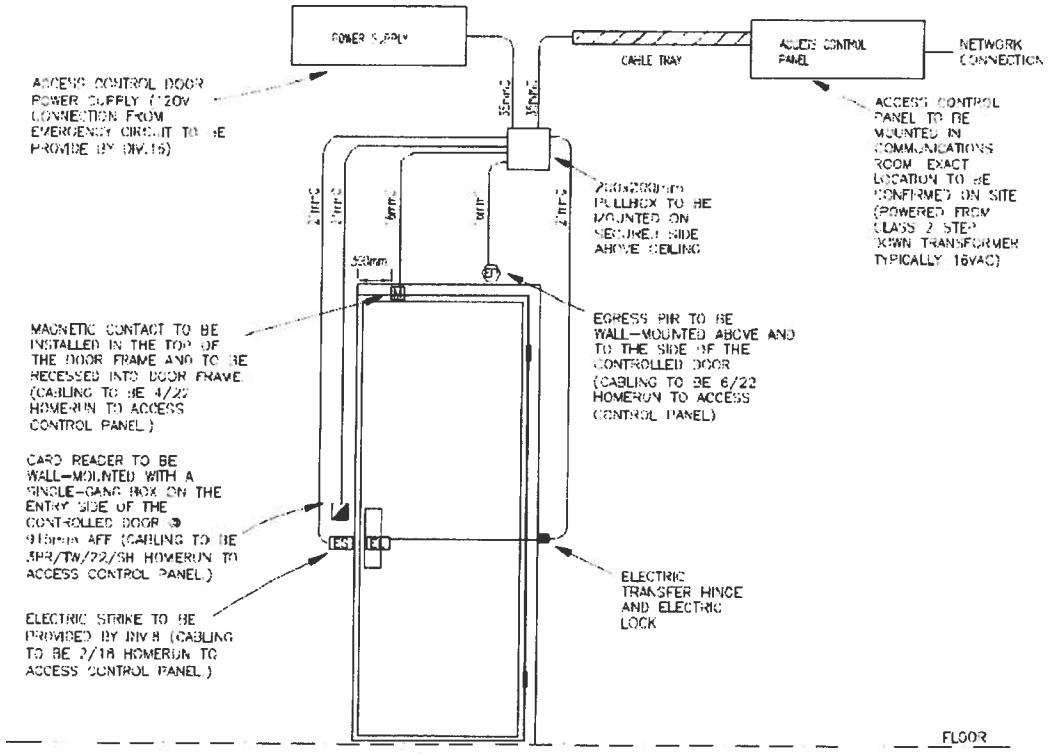


Figure 8: Typical Access Control Door Layout

Video Surveillance System

The proposed video surveillance system will be a digital CCTV system consisting of:

- Fixed interior CCTV cameras
- PTZ interior mini dome cameras.
- PTZ exterior high resolution cameras.
- Local LCD monitors located at nursing stations and central reception areas as well as centralized security monitoring station via IP connectivity.
- Digital Video Recorder (DVR) complete with software that controls all parameters of each individual camera.
- Cameras will be equipped with vari-focal, auto-iris lens to allow for scene coverage adjustment and automatic backlighting compensation for clear images in all lighting levels.
- The exact location and viewing angle will be confirmed by available light and viewing subject matter to make them to operate most effectively.
- Each new fixed camera will require Category 6 structured cabling for video signal and Power Over Ethernet.
- Each new PTZ camera will require Category 6 structured cabling for video signal and 2/18 FT4 rated for power.
- Motion detection module and alarm interface unit, interior and exterior CCTV systems are augmented with dedicated video monitors.
- The camera system will be equipped with a motion detection module (could be software based) allowing for scene selected and camera specific alarms to be initiated automatically on the basis of motion within a programmed scene.

System integration

Infusion will be responsible for sending CCTV images to the Authority via secure WAN transmissions.

xi) Central dictation system

Technology and Communication Systems

The central dictation system for each new facility shall form part of the overall centralized system of the IHA. The file server and storage server is located off site in the server farm.

System and Associated Scope

Infusion will work with Telus to ensure that telephones in the new Facility shall be programmed to access the dictation system. All telephones shall allow staff the ability to dictate onto the central IHA dictation systems.

Typical Devices and Function

No new devices are expected other than standard telephones being supplied.

System integration

The dictation system will be integrated as part of the structured cabling plant. An access code will be provided by the Authority allowing Staff to access the dictation system.

xii) Clock system

Technology and Communication Systems

System and Associated Scope

Typical Devices and Function

The new facilities will be provided with new digital face clock units for quick time identification. Single sided clocks will be provided at nursing stations, and dual sided clocks will be provided in strategic hallway locations. Clocks provided for Operating Rooms, Labour and Delivery Rooms, procedure rooms and treatment rooms will be equipped with "Count-Up/Count-Down" timers.

System integration

The proposed wireless clock system for the hospital will be integrated with any existing wireless clock system currently utilized in at the hospital sites.

xiii) Audio visual and video conferencing

Technology and Communication Systems

Infusion will provide the full Videoconferencing requirements of the new Facility. The active components for this systems and infrastructure will be provided by Project. Infusion will work with the Authority to identify infrastructure requirements in each designated videoconferencing room.

System and Associated Scope

Infusion shall provide the active components and infrastructure to support the Authority's fixed videoconferencing system requirements. The location of microphones, video cameras, video

monitors will also be installed at appropriate locations and angles to maximize the audio and video clarity within the room.

Typical Devices and Function

Infusion will provide fixed videoconferencing systems in conference rooms complete with monitors, cameras, microphones, televisions, digital projectors, automatic microphone controllers, amplifiers, speakers, video controllers, remote controls, codec and network connections.. Typical Video Conferencing System support infrastructure will include: conduit, back boxes, 120V power, cable trays, pull boxes and other support structures.

- A typical video conferencing room will be designed with special lighting systems and noise attenuation characteristics to optimize the performance of the system.
- Exact requirements and specific locations are to be determined on a room by room basis.

System integration

- Infusion will be providing active components compatible with the Authority's standardized Polycom videoconferencing product line.

xiv) Code call systems

Technology and Communication Systems

Infusion shall recognize and adopt the Authority's standardized Code Call system requirements. Infusion staff shall be trained in the recognition of these unique facility wide alerts. Standardized response procedures will be implemented in consultation with the Authority's risk management department. Code calls in the facility shall comprise the following:

- Code Blue - Cardiac Arrest
- Code Red - Fire
- Code Orange - Disaster
- Code Brown - Chemical / Hazardous Spill
- Code Yellow - Missing Patient
- Code Black - Bomb Threat
- Code White - Violent Patient
- Code Pink - Cardiac Paediatric
- Code Green - Evacuation

System and Associated Scope

Infusion shall provide code blue, code white, code red annunciation at switchboard/call centre via annunciators. Infusion shall provide code blue call buttons to form part of the nurse call system, shall annunciate on the nurse call system, shall annunciate at a location designated by Authority so that they can page the clinical code blue response team, interface to the elevators

to automatically home elevators to the appropriate location, automatically display on the wireless handheld devices, and instruct Authority staff to overhead page the code blue situation.

Infusion will work with Telus to program the telephone system with a pre-programmed button sequence shall allow clinical staff to call the appropriate IHA staff so that they may initiate the code blue response team, in the event that the nurse call system has failed.

Typical Devices and Function

Infusion shall provide Code blue stations (separate station to other nurse call stations/buttons) and they should be located within all patient rooms, OR's, procedure rooms, PARR / PACU (at each bed location), emergency department (each cubicles / beds location), each exam room, each treatment room to identify the exact room where the patient needs assistance via nurse call dome lights, nurse call annunciation, and wireless annunciation. Infusion will provide code white (duress / panic buttons) and it will be part of the security and nurse call systems.

System integration

Infusion will investigate the need for interfacing to the existing the code blue system in existing building as necessary.

b) Provide documentation of proposed telephone and network systems showing:

The telephone system proposed will meet the established common technology platforms of the Authority. The system will be an expansion of the existing Nortel ICS 1000 systems and will be extended into the new facilities to accommodate new IP phones. Additional IP licenses for a full functioning telephone system will be provided. The proposed telephony network architecture will be an IP-based telephony environment as well as the capability to provision call centre and voice mail services. The existing facility site IP/PBX and the voicemail systems will provide all the call processing and voicemail services.

Telephones will be based upon Nortel Network IP Telephones (IP Phone 2002 and IP Phone 2004). Switching equipment within the communication rooms will be based on HP Procurve 5400zl chassis switches for connectivity. Layer 2 HP Procurve network switches will be selected with Quality of Service (QoS) and Power Over Ethernet (POE) for IP phone support.

i) Origin of supply and interconnection with external services including redundant service.

Infusion will provide cabling interconnection with the existing buildings for a majority of supply and interconnection services for new systems. New dual single mode fibre optic cabling links will provide a backbone connection to the existing core network for each site. The data and telephone networks will be connected from this location using a structured cabling backbone.

This backbone cabling connection will enter the new facilities through two separate underground duct banks. Infusion will provide two separate cables for pathway redundancy between the new MCR and the existing core network rooms at each site. The new facility may require an upgrade to the WAN service within the existing communication site service (this service upgrade would be provided by the Authority within the design of active component networks). The responsibility for providing additional WAN capacity would be under the scope of the Authority.
The majoring of security services will be connected via the LAN where possible and will utilize dedicated pairs of fibre backbone cabling.

ii) Proposed PABX communications system, including phone switch, handset types, backup power, voice mail system, and proposed software.

Extension of the VoIP Phone System and settings to match current site standards. All modifications to the phone system will be done in consultation with the current administrator of the VoIP PBX (Telus). Exact telephone system settings and configurations to be determined through user group consultations.

iii) Proposed PABX switch layout drawing, indicating CPUs, all equipment cards, spare ports, spare card locations and proposed software.

Extension of the VoIP Phone System and settings to match current site standards. All modifications to the phone system will be done in consultation with the current administrator of the VoIP PBX (Telus). Exact telephone system settings and configurations to be determined through user group consultations.

iv) Proposed voice mail, including quantity of mailboxes and storage time.

Extension of the VoIP Phone System and settings to match current site standards. All modifications to the phone system will be done in consultation with the current administrator of the VoIP PBX (Telus). Exact telephone system settings and configurations to be determined through user group consultations.

v) Proposed integration with wireless telephone system.

Infusion will provide a wireless network including access points that will allow the wireless telephone system to operate. Wireless telephones, access points, network switches and wireless phone servers will integrate to the Nortel ICS 1000 system allow seamless access to outside lines from wireless devices. Infusion will work with Telus (Current Phone System Contractor) to establish the scope of work for each phone system integration component. Service and licensing costs incurred to integrate new functionality to the Authority's existing phone system will be passed through to the Authority via their existing service agreement with Telus.

Infusion power access points with Power Over Ethernet integrated at the switch. Infusion will select the integrated option for ease of IT management. POE ports will be allocated as required based on the requirements of field devices. Infusion will provide a UPS system within the communication rooms sized to support 20 minutes wireless network backup uptime requirements. Infusion will also provide middleware alarm management software (such as ConnexALL) which can be used as an interface to output event information to a 3rd party wireless phone sever (Vocera or equivalent). The nurse call system and intercom system will interface to the wireless telephone system allowing annunciation and two way voice communication to fixed stations via wireless phone integration.

vi) Proposed integration with other Division 27 systems

Infusion will provide a complete structured cabling system to support Division 27 devices. Infusion will provide integration between system via IP software protocols to maximize use of common cabling infrastructure. The structured cabling system will be star configured with every communications room being a main configuration location to integrate Division 27 systems using the same infrastructure.

New devices can easily be added to the network as required by the Authority. Infusion will also provide a middleware software event management system to integrate alarms from a variety of Div 27 systems onto a common platform for annunciation. Once registered on the middleware software alarm events can be transmitted anywhere on the LAN for alarm management within the facility. The Authority may also consider configuring WAN equipment to allow secure access to monitor selected alarms remotely off -site.

vii) Proposed call centre systems and layouts

The proposed call centre requires very few stations and can easily be handled in a typical office via centralized call centre software. The systems will connect to the overall site VoIP phone system and utilize advanced Interactive Voice Response software to accommodate automated functionality and call routing functions.

viii) Proposed network diagram

The structured cabling system will support standard network configuration. The drawing below shows a collapsed backbone star wired arrangement.

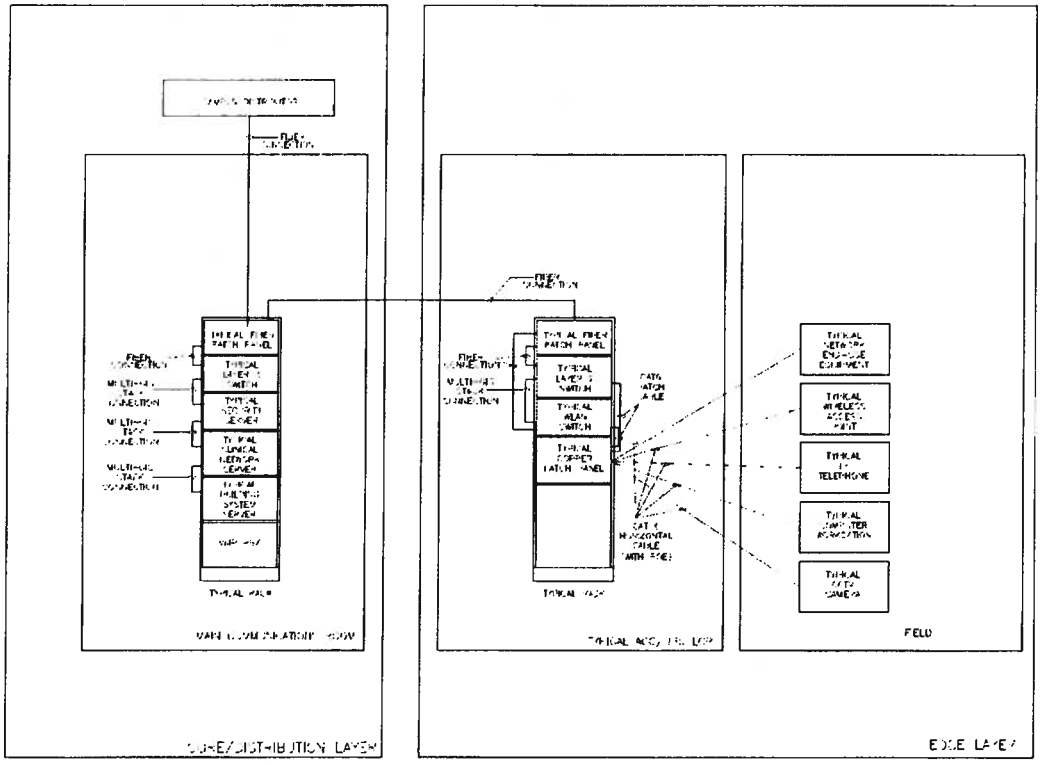


Figure 9: Communication System Network Overview Diagram

ix) Proposed communication room layouts.

The proposed typical communication layout is as shown below. There is space for multiple racks. Only those racks needed will be provided at completion leaving spare space for future racks.

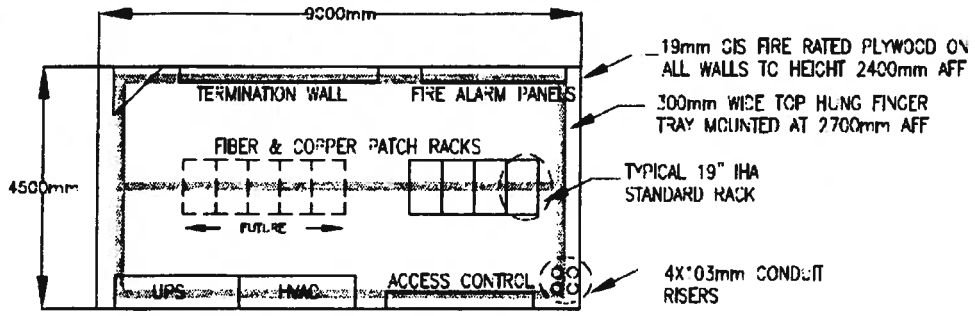


Figure 10: Main Communications Room Layout

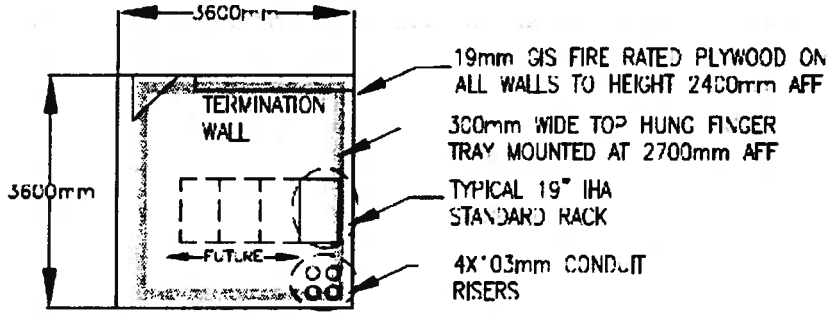


Figure 11: Local Communications Room Layout

x) Proposed network equipment layouts, detailing interconnection details.

The structured cabling will allow for a star wired distributed network layout. We will work with the Authority's preferred IT vendor to coordinate their design with the structured cabling design. As the structured cabling design meets the Authority's standards, we anticipate full compatibility with the network design.

xi) Proposed network interface with other systems.

All building systems that run on the network supplied by Infusion will have the ability to integrate with each other if deemed necessary through consultations with the Authority. Integration to the wireless staff communication system is anticipated as is integration of all security systems.

xii) Proposed connection to the WAN service.

Infusion will connect each new facility back to the existing core network locations at each hospital site. From this location, the WAN service connection can be facilitated via router configurations to allow expanded WAN service to each new building. In the event that the Authority requires additional WAN bandwidth in excess of the 2X1 Gbps Telco link allocated for KGH and the 100 Mbps Telco link allocated for the hospital, the Authority will need to upgrade the WAN service to support additional requirements for each new building.

xiii) Proposed connections to local servers/server room.

Infusion will provide structured cabling and physical wiring pathways, meet TIA and BICSI standards. The majority of communication system field devices are to be supported from designated communications rooms on each floor. A star wired backbone cabling structure would service each Local Communications Room (LCR) on each floor via the centralized Main Communications Room (MCR).
All centralized Servers provided under the scope of Infusion will be installed within the MCR. A main fibre optic distribution patch panel is also proposed for the MCR to allow single point management for all backbone cabling links within the facility.

c) For the proposed telephone and network system set out in (b) above describe the telephone and network services systems and how they will satisfy the needs of users in general. Provide specific detail for those users who have individual/group needs.

Infusion will supply infrastructure to connect these technologies through a high capacity structured cabling system. Active equipment provided by Infusion will be installed within communications rooms in the new facility. Any centralized server equipment provided by Infusion will be provided within the Main Communication Room located on the ground floor level. Infusion is under the assumption that any clinical application servers required for operation of the new facility will be provided by the Authority in their off-site server location. Infusion has provisioned for extra rack within the Main Communication Room in the event that some Authority supplied servers must be installed there, however the mechanical systems in this room is not designed for high heat density server cooling requirements.

d) Describe in detail the communication traffic management plan for the FM Services call centre system.

Exact communication traffic management configuration will require further coordination with the building maintenance contractor.

e) Provide description of data communication systems showing:

To meet the requirement of the current and emerging healthcare technologies, the local area network (LAN) for each Facility will be designed around a hierarchical network model, which is based on a modular design to allow easy installing, scaling, and troubleshooting. The benefit of this network architecture is to provide secure access for systems and applications to network services while allowing new functionality to be added and removed from the LAN with minimal disruption to other network services. A hierarchical network topology design is recommended for network management and scalability, high availability in the logical topology, link aggregation and load balancing.

It is recommended that the LAN be designed with two levels of cabling infrastructure hierarchy: multi-gigabit patched fibre optic backbone network technology at the Core and Distribution layers and copper horizontal network technology within the Edge layer. The intent is to provide a maximum of 100Mbs for each active data port in the field; if additional bandwidth is required a copper 1000Mbs port would be used only where required. For the bandwidth requirements of high-end video conferencing and PACS systems 10 Gbps over copper is the recommended alternative to fibre optic horizontal cabling. For select locations 10 Gbps switching ports could be added, Infusion however does not expect any edge layer applications to require more than 1 Gbps in the foreseeable future.

The proposed communication network infrastructure will provide each facility with the high availability required for healthcare applications, including voice, data and video solutions. The network design will be designed with a high level of redundancy and scalability to fulfil the medical application requirements as defined by the Interior Health Authority. Some of the network architecture characteristics will require redundancy (dual connections to layer 3 switches, spare infrastructure pathways, power supply redundancy) to support medical applications. The core layer, which consists of multi-gigabit Layer 3 stackable switches, are proposed to perform the role of the network hub for the connection of peripheral network entities: access layer workgroup connectivity, DMZ connectivity and local server farm connectivity. Characteristics for the core switch components will include multi-gigabit backbone technology with fibre optic style uplink, logical address structure (to allow ease of management and trouble-shooting), dynamic load-sharing across the core structure where appropriate, efficient and controlled use of bandwidth, controls access layer protocols and services, and aggregated Quality of Service (QoS) and security. Infusion will route the incoming core data network backbone connection through a multi-gigbit core layer 3 switch located within the MCR.

A typical Core/Distribution Layer Network Architecture layout is shown in the figure below. The edge layer is recommended to consist of 10/100 Mbps Layer 2 stackable switches in each LCR on each floor with gigabit uplinks to the Layer 3 switches located within the MCR. Characteristics for edge layer network switch components will include gigabit trunking/uplink technology, 10/100 connection availability, as well as support for the latest IEEE POE, VLAN, QoS standards. Application specific VLANs are recommended for local segmentation of network based on user groups with common interests and broadcast traffic isolation. The implementation of VLANs would allow for better network traffic utilization and increased security. A typical Edge Layer Network Architecture layout is shown in Figure 2 below.

i) Location of all data gathering equipment, including file servers, computers, etc.

Any centralized server equipment provided by Infusion will be provided within the Main Communication Room located on the ground floor level. Infusion is under the assumption that any clinical application servers required for operation of the new facility will be provided by the Authority in the off-site server farm. Infusion has provisioned for extra rack within the Main Communication Room in the event that some Authority supplied servers must be installed there, however the mechanical systems in this room is not designed for high heat density server cooling requirements.

ii) Data cabling system wiring standards.

In terms of physical wiring pathways, a proposed design shall meet EIA/TIA standards and BICSI distribution methods. A main communication room (MCR) and typical local communication rooms (LCRs) are proposed to be built in each Facility.

All systems field devices are to be supported from designated communications rooms on each floor. In addition it is proposed that a single server room be allocated for server applications and core network functionality. A star wired backbone cabling structure would service all LCRs via the centralized MCR.
A main fibre optic patch panel is also proposed for the MCR to allow single point management of all backbone cabling links. All centralized Servers provided under the scope of Infusion will be installed within the MCR.

iii) Relationship between data communications and all other items of equipment.

Structured cabling has been provided to equipment items as required in the output specification. Items such as television, desktop computers, printers, fax, scanners have data cabling for connection to the network.

iv) Interconnection and links between the facilities and existing buildings, including main single line schematic showing proposed methodology of distribution.

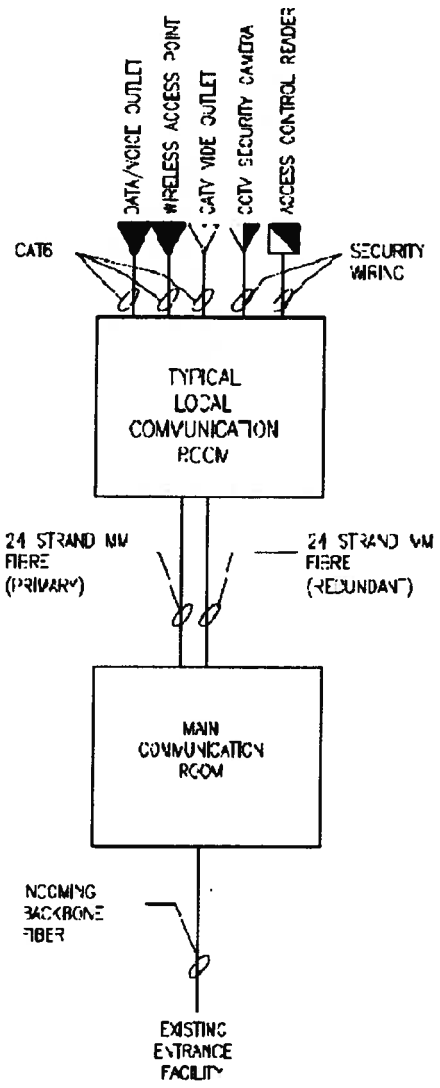


Figure 12: Main Single Line Network Architecture (Typical)

f) In addition to the above data communication system drawings, describe the data communications services and how they will satisfy the needs of related services.

Infusion will provide a complete structured cabling system to support Division 27 devices. The structured cabling system will be star configured with every communications room being a main configuration location to integrate Division 27 systems using the same infrastructure. Data communications will be interconnected via a structured patching system and active networking devices (provided by the Authority). Infusion will allow for integration between a variety of system protocols using a common cabling infrastructure platform.

g) Provide details of all standards proposed for supply, installation, testing and commissioning.

All communication systems will be tested and commissioned to the manufacturer's recommendations. Complete system demonstrations and a comprehensive commissioning program will be developed with the Authority as indicated in the commissioning section of their document. It is the intent that the authority has a smoothest possible transition into the building.

Supply Standards

Supply components will be confirmed through a shop drawing review process. All items will be comply with the Infusion proposal unless otherwise confirmed by the Authority in writing.

Installation Standards

All local codes and regulations will be adhered to during the installation of communication and technology systems. All equipment manufacturer recommendations will be followed during the installation process. Latest telecommunication installation standards will be followed and adhered to during installation.

Testing Standards

Testing of systems will be part of the installation and commissioning process. Where required Infusion will all required test documentation for each individual system to verify correct installation.

Commissioning Standards

All communications systems will be formally commissioned with an Owner's representative present for verification. All end users will be trained in system operations and how to use each system effectively. All necessary test documentation will be provided to the Owner along with maintenance manuals prior to the commissioning process.

Summary of Clarifications and Assumptions

With reference to specifications H26 0503 C3.1.1 *Interoperation of systems* and H26 0503 C3.1.4 *Interface to existing results in testing and commissioning of entire new and existing system,* where existing systems are altered, the affected systems will be tested to ensure they still work correctly. Every component of each system will not be tested.

With reference to specifications H26 0503 C3.1.1 *Interoperation of systems* and F2 B2.1.4 *Seamless integration of systems,* we specifically clarify that the Data Network and Voice system will be expanded from the existing installation and thus fully integrated; the Code Blue / Pink system, along with the site-wide overhead paging will be integrated to a common switchboard; and the CCTV, Access Control and Code White and Security alarms will be integrated to a common security system. We believe that this meets the intent of the Output Specifications.

With reference to specifications H26 0500 A1.1 *Electrical systems shall provide redundancy* and H26 0500 C3.1.1 *Mandatory to provide redundancy,* we confirm that the system is designed to provide redundancy to ensure continuity of service in the electrical and communication systems. We are providing two primary transformers, two generators, two generator busses, multiple bus ducts in the electrical rooms, multiple panels fed from multiple sources in the operating rooms, tie-breakers between secondary main busses as shown on our drawings, redundant power supplies and redundancy in circuiting of amplifiers in the fire alarm, both an emergency voice communication system and public address system, and other redundancies where consistent with good industry practice.

H26 0500 A1.3.1 *Provide reliability for all systems.* We have allowed for meeting the intent of this requirement by utilizing proven technology and products.

Sections H27 0513 C3.2.4 *Mandatory that each component of the systems be tested, documented, and recorded in video* and H26 0500 C3.2.4 state; *"Mandatory that each component of the system be tested, documented and recorded in video."* We have interpreted this requirement to mean that all components requiring testing will be tested according to applicable standards and documented fully including representative video. We have found video recording useful in creating training videos which simplify training of constantly changing staff, and facilitate easy refresher training. These types of videos can be distributed from the central patient/staff education system and can also be useful in training patients as well as staff in the use of systems such as nurse call.

H26 0500 A3.9.2 *Provide 4 comm rooms in shelled areas or a minimum of two comm rooms per storey.* The technical requirement to ensure all outlets are within 70m of the communications room is achieved by the provision of a dedicated room as indicated on the floor plans provided, which enhances space for clinical functions. Since each communications room only serves outlets on its own floor, this avoids confusion of which communications room serves which area and minimizes the risk of unplanned interruption to service.

H27 0514 C3.1.1 *If a category better than category 6 is the latest standard at the time of ordering, it shall be priced and presented to IHA to determine if they want to utilize the latest standard at no additional cost to IHA.* The use of current proven technology is understood to be a benefit, and as new standards that are within the project budget become available they will be presented to the Authority for review. We would note that Poject Co is unable to predict future

technology trends or Authority equipment procurement policies and will accept a "no-better, no-worse" situation should the Authority wish to adopt a revised standard.

We have allowed a level of spare capacity that is economically feasible at 300% in the cable trays and 200% capacity in the communications rooms.

H27 0514 C3.1.4 *Mandatory that all rooms that have data drops shall have at minimum 100% spare drops.* To provide a cost effective design, the number of spare drops at each location will be selected based on good industry practice, considering location and potential usage.

H27 0514 C3.1.19 *Mandatory that each fixed seating position in lecture theatres, etc. have data outlet and power outlet.* Since the vast majority of notebook computers have batteries and wireless internet access, data and power outlets will be provided in the room according to good industry practice and we have not allowed for a data drop at each fixed seating position.

H27 0514 C3.1.20 *Mandatory that every data/voice outlet is active.* While it would be possible to meet this criteria, given the universality of generic telecommunications outlets, we consider this a wasteful provision contravening H26 0500 A 1.4 Economical. We therefore have allowed port activation based on the number of devices listed.

F2-B2.1.2 *New fire alarm throughout KGH Site to high rise requirements.* The fire alarm in the existing building will not be replaced as this cannot accurately be estimated at this time, especially if it intended to be done to a new building specification level, and is outside the scope of a new building project. We have however determined how the intent could be met and this can be negotiated into the contract.

H26 2401 C3.1.1.3.4 *Receptacles for wireless in ceiling space of corridors.* Where systems such as wireless access points or wireless duress require powered transmitters on the ceiling, they will be powered by cabling systems concealed in the ceiling. We need to clarify the deactivation of the power to the room upon activation of a second stage alarm of the cross-zone fire detection system.

H26 2401 C3.1.1.3.51 *Mandatory that all spaces within 120/208 v distribution equipment have insulated covers over bus stabs and a complete draw-out mechanism ready for breaker installation.* Where electrical distribution is draw-out type and the anticipated breakers are known spaces will be outfitted for the anticipated breaker including draw out mechanisms.

H26 2774 A1.1.2 *Mandatory that Project Co provide all necessary connection a service to Medical Equipment.* Since Infusion cannot estimate the requirements for undefined equipment at each facility, an allowance has been made for equipment specifically outlined in the equipment list only.

H27 0513 C3.1.4 *Mandatory that redundancy shall be incorporated into systems and equipment such that the failure of a single piece of major equipment or major conductor shall not impair the operation of the facility nor the clinical or administrative activities.* The system is designed to provide redundancy to ensure continuity of service in the electrical and communication systems to an appropriate level for these types of healthcare facilities. For example, we are providing redundant power supplies and redundancy in circuiting of amplifiers in the fire alarm. We are also providing an emergency voice communication system and a public address system so that redundancy is provided.

H27 0513 C3.1.9.1 *All communication, and life safety systems shall be installed into the space to ceiling level and floor level such that the finishing of the space only requires extension of services from ceiling and/or floor to final devices and equipment.* Communication and life safety systems control and distribution nodes will be provided into the communication rooms with sensor distribution as prescribed.

H27 5123 C3.1.4 *Mandatory that phone have intercom capability and remote door release.* Telus has indicated that the phone system cannot provide this functionality.

H27 5224-Nurse Call 3.1.20 *Mandatory to include wireless nurse call devices within patient rooms to allow patient calls while not in bed.* The nurse call system specified by the Authority (Rauland 4000) does not support this wireless function. The specified systems functionality will remain as per the rest of the facility.

With respect to specifications H27 5224-Nurse Call 3.1.26 *Mandatory that wireless communications device as a panic button and* H27 5400.3 Wireless Communication Systems *Mandatory that handheld devices to be battery powered and each one to come with battery charger. Fully charged battery to last for minimum of 8 hours of talk time,* we are providing the Vocera system as specified by the Authority and it will match the rest of the hospital. We have not allowed for providing any additional Vocera Communications Badge wearable devices, batteries or chargers as it has been assumed that, as an existing Vocera user, the Authority already has a satisfactory supply. We would note that batteries for the handheld/wearable devices for the Vocera system specified by the Authority do not allow 8 hours of talk time.

H27 5320 Patient Entertainment System 3.1.3 *Mandatory that all patient rooms are standard phones.* Project Co will use VOIP phones, which will be standard for the facility.

H27 5320-Patient Staff Education System 3.1.2 *Mandatory to provide education kiosks.* This requirement was deleted in Addendum #19, however data cabling and power will be provided to appropriate locations for kiosks.

H27 5322 Videoconferencing *Mandatory that all operating theatres be equipped as digital theatre and allow...* Equipment will be provided by the Authority, infrastructure to support the equipment will be provided by Project Co.

H27 5365 Patient Monitoring/Medical Devices *Mandatory that all rooms shall be wired to allow patient monitoring device to be located in room. The patient monitoring shall be connected via structured cabling system to the network. Any specialized wiring needed...* Project Co will supply standard cabling for all patient monitoring but, as monitoring is provided by IHA, we are unaware of, and have not allowed for, any specialized wiring requirements.

H27 5365 Patient Monitoring/Medical Devices 3.1.2 *Mandatory that all patient monitoring systems shall be monitored at the nursing desk for each medical department and all alarms shall be annunciated on the wireless devices issued to the nursing staff. Should monitoring not occur at a particular nurse station then connections shall be made to patient monitoring system to permit monitoring as an alternate location...* We are not providing patient monitoring system and cannot ensure how it works. We have based our proposals on the assumption that any devices procured by the Authority will connect to the network and will be able to be displayed anywhere on the network.

H27 5365 Patient Monitoring 3.1.4 *Mandatory that the system...* We are not providing system and have assumed that the Authority will ensure it comes with all necessary components.

H27 5365 Patient Monitoring 3.1.7 *Mandatory to provide an active RFID system capable to operating over the wireless network and provided coverage throughout all the new building and all existing buildings on the site.* Project Co does not have control over the WiFi access points, or installation of RFID antennas in the existing buildings on site, and therefore cannot guarantee that the active RFID system used in the new building will work in the existing building although if WiFi based it may very well.

H27 5375 Interfacing to existing system 1.1.1 *Mandatory that all systems identified in Division 27 be interfaced to existing hospital systems...*We will interface systems that need to interface like security, the network, the telephone.

H27 5375 Interfacing to Existing System 3.1.2 *Mandatory that should interfacing not be possible...* Project Co will not replace existing hospital systems nor do we believe it is necessary to replace them for proper functioning of the new building.

H27 5375 Interfacing to Existing System 3.1.4 *Mandatory that interfacing of new equipment to existing equipment result in testing and commissioning of the entire new and existing system.* Project Co will test all components that need testing, that have been affected by any necessary interface.

H 27 5375 Interfacing to Existing Systems 3.1.5 *Interfacing includes: extension of backbone structured cabling, software/programming updates, interface hardware and software.* We are unable to quantify this as we do not know what will need interfacing.

H27 5375 Interfacing to Existing System 3.1.10 *Mandatory that project provide redundant connection paths comprised of trunk copper and fibre between existing main communication room and new building communication room for PBX, video, alarm, voice...*We will provide redundant data paths and provide appropriate connection paths to interconnect required interface.

H27 5400.2 Wireless Infrastructure 3.1.1 *Mandatory that project co provide a complete wireless network throughout the facility including parking areas...* Since the wireless infrastructure is intended to support clinical functions and staff, and no such clinical functions exist in the parkade, any coverage in the parkade will be incidental, associated with peripheral coverage from access points located in the main building.

H27 5400.2 Wireless Infrastructure 3.1.5 *Mandatory that sufficient bandwidth shall be provided for the wireless system for all current applications in the facility plus 100% additional spare capacity.* The data room does not indicate the current bandwidth of current applications. We intent to provide the access points specified in the density specified which sets the bandwidth limitations.

We have allowed for a centralized paging system rather than separate redundant systems.

We have not included for any specialized wiring in the patient rooms that might be required for the patient monitoring systems supplied by the Authority. We have not provided any component or infrastructure for the patient monitoring systems.

The existing PBX, video, alarm, voice, network, nurse call, fire alarm, paging systems do not have the capability of allowing redundant connection paths so we have not included for this.

H27 5400.5 *Authority's End Use Equipment 3.1.6, 3.1.7, 3.1.8* We are unaware of what exact equipment the authority is providing and we cannot ensure it will meet the strictest requirements identified. We are providing the brand of wireless system specified in the output spec and therefore it should be easy for the authority to buy end use devices that work well on this system.

H28 1300 Security 3.1.1 *It is the responsibility of Project Co to design, provide, and install, the security systems to meet the objectives of their security program. IHA will identify their needs as one aspect of the security system requirements. The Project Co to meet with IHA to obtain the information*... Project will provide the security system shown on the plans as identified in the threat and risk assessment (see *Appendix 2.2.9. A: Security Threat and Risk Assessment*).

H28 1300 Security 3.28.5 *Important that CCTV cameras be provided at entrance doors with door bells and intercom to the pharmacy department*...Intercom will be provided with VOIP access rather than door bells to provide maximum flexibility.

G1 *Room Data Sheets* Since the Room Data Sheets are more detailed than the output spec, where a contradiction between them existed that allowed us to reduce the equipment installed, and where not otherwise required by code, we have not provided the equipment.

In output specification H27 0513 it is noted that all IHA standards in effect at the time of installation of the communication and technology systems shall be followed and implemented. Infusion will be pleased to liaise closely with the Authority's representatives to provide appropriate systems, but it is not feasible to comply with standards that are unknown at the time of design. We are unable to predict future technology trends or Authority equipment procurement policies and require to be in a "no-better, no-worse" situation should the Authority wish to adopt revised standards.

Security Threat and Risk Assessment

Purpose

This document will serve as a security risk assessment for the Kelowna and Vernon, new ACC and Diagnostic Treatment Building respectfully. We have included recommendations that will assist in alleviating negative impact to the people, the property, and the reputation of the facility, upon completion of construction.

What is at Risk?

It is important to identify the assets we are attempting to protect or that are at risk. The categories of assets at risk include the following: Staff, Patients, Visitors, Vendors and Contractors, Facility/Buildings, Grounds/Real Estate, Equipment, Supplies, Personal Belongings, Records, Infrastructure, Continuity of Business, and Environment.

Probable Loss or Risk Events

We will need to meet with your loss prevention and existing security personnel to ascertain past patterns of security risk events occurring. The recommendations in this report are best practices used in most BC Hospitals.
Events that we will need statistics on are as follows:
(1) Staff: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Theft.
(2) Patients: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Wandering, Theft, Contamination.
(3) Visitors: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Wandering, Theft, Contamination.
(4) Vendors and Contractors: Verbal Threats/Abuse, Aggressive Behaviour, Violence, Accident/Injury, Theft, Contamination.
(5) Facility/Buildings: Theft, Vandalism, Graffiti, Fire, Sabotage.
(6) Grounds/Real Estate: Theft, Vandalism, Graffiti, Fire, Sabotage.
(7) Equipment: Lost, Theft, Vandalism, Sabotage.
(8) Supplies: Waste.
(9) Personal Belongings: Theft.
(10) Records: Theft, Vandalism, Fire, Water Damage, Loss.
(11) Infrastructure: Vandalism, Theft.

Risk Assessment Methodology

In order to prioritize the recommendations, two factors are taken into account: 1) the potential impact if the threat was to occur and 2) the probability that the threat will occur. Once these factors are assessed, the recommendation can then be assigned a level of priority.

Priority Matrix

	Probability

Potential Impact		Highly Probable	Moderately Probable	Not Probable
	Catastrophic	Urgent	High	Medium
	Serious	Urgent	High	Medium
	Moderate	Medium	Medium	Low
	Low	Medium	Low	Low

Potential Impact

This refers to the severity the incident would have if it were to occur. The degree of severity ranges in scale and is dependant on the criticality of the event. The potential impact of the event can be describes as:

Catastrophic

The identified threat will endanger patients, staff or visitors as well as expose the organization to considerable liability.

Serious

The identified threat would have a significant impact on patients, staff, department or organization.

Moderate

The identified threat would have a modest impact on the operation of the department.

Low

The identified threat would have negligible impact.

Probability

This refers to the estimated chance the event will occur.

Highly Probable

The identified threat will likely occur.

Moderately Probable

The identified threat is as likely to occur, as it is not to occur.

Not Probable

The identified threat is not likely to occur.

Prioritizing Recommendations

The degree of necessity that a priority be implemented is ranked as follows:

Urgent Priority

Action should be initiated immediately.

Failing to implement this commendation without delay will likely endanger life safety and/or expose the organization to significant liability.

High Priority

The recommendation should be initiated as soon as practicable.

Failing to implement this recommendation in a timely manner may result in an incident with potentially serious impacts.

Medium Priority – This recommendation should be implemented when time permits.

This recommendation will improve overall security.

Low Priority

The recommendation should be considered.

If implemented, the recommendation would provide increased security with minimal value.

Should we be successful on the project, we will obtain current information on current incidents such as aggressive behaviour, missing patients, loss, panic duress, break and entering, and vandalism.

Risk Mitigation

In order to reduce the probability of the identified risks from occurring, the following risk mitigation measures have been considered: Access Control, CCTV, Duress/Panic Devices, Intrusion Detection, Patient Wandering, Key Control, Security Policy and Procedure, Training, Lighting, and Landscaping.

The security staffing is a huge issue and currently is not in our scope to provide. We will need to work with your security staff to determine how they will patrol and respond to incidents. Based on these items, your staff will be able to prepare an operational plan for security for the facility.

Access Control

We have proposed an implementation strategy of a facility wide access control system consisting of card access on strategic doors complete with auto-locking functionality of doors identified as secure after-hours doors.

In addition to the electronic controlling of doors, their needs to be a method of monitoring strategic doors for both forced entry and door held open or door propping. This assists in eliminating misuse of strategic doors.

The complete access control system will be monitored for all alarm and supervisory conditions with appropriate policy governing response, investigation, resolution and penalty for miss-use or breach by your security personnel.

Application of Access Control in the Facility

We have used the principle of protection layers for this facility, the more layers of protection, the harder a target is to breach. We have locked the outer layer of the facility, have provided the ability to lock off the emergency department, have provided the ability to lock off the elevators, and have provided the ability to lock off each department. The layered approach makes it more difficult for someone to breach the security of the facility. In addition, there is the speed of response to the detection of each breach the thief must also contend with.

Other considerations include the fact that the emergency department, maternity, and ICU will operate 24 hours per day seven days per week with visitors arriving 24 hours per day seven days per week. These areas are public with the need to let people in after hours. So intercom systems will be needed in these departments.

We also know from experience and based upon audit reports, there are only certain areas that need to be accessed by visitors after-hours and there are only certain areas during open hours that visitors and the public should have the ability to access. We will review these areas with you if we are successful.

Recommended Access Control Program

The perimeter access doors must be electronically locked with certain dedicated doors equipped with card readers. The perimeter card reader doors would be those that are designated employee entrances or service entrances. We have designated a reasonable quantity of these doors, but will need to meet with your staff to finalize exact locations.

The next layer of access control should include all elevators, access points to wings or departments, service corridors or any separation points from public to service areas. It may be difficult to some of these corridors as a result of Code and exiting requirements.

Areas that are secured utilizing access control will limit open access to the general public, reduce the risk of theft and limit the areas to be initially searched in the event of a wandering/missing patient.

We have secured each department with an access control reader. Other doors to the department are locked with keys.

CCTV

The use of CCTV is of great benefit for garnering key visual evidence that may not necessarily be available from witnesses or access control audit reports. It is also important to note that it is difficult to actually measure any deterrent value that CCTV provides.

CCTV can be utilized in the investigation of Missing/Lost patients to confirm location or point of exit, if in fact the patient did exit the property.

Integration of the CCTV system to the Access Control system permits intelligence to be utilized to pre position dome cameras, call up fixed cameras automatically and present a view on a viewing station. The integration of the two systems permits cameras and views of live and recorded video to be displayed simultaneously with the alarm signal. Alarm inputs include door alarms, intercoms, and duress alarms.

CCTV cameras will be of high quality suitable for working in the lighting and environment they are to be installed. Manufacturers design cameras to operate in specific lighting conditions. Secondly, one should not expect to cover vast areas with CCTV cameras unless the camera is designed to provide an overall view. Target Image sizes are classed in 4 categories:

(1) Detection

Allows for detection of any change of a defined field of view; 9% of the image

(2) Classification

Allows differentiation between types of figures such as humans and animals; Requires 17% of the captured image

(3) Assessment

Allows assessments of images including characteristics; requires 26% of the captured image.

(4) Recognition

Allows view of a human target's head including characteristics, which lead to identification. – requires 22% of the head and shoulders

Recording

A quality digital recording system will be maintained that provides for quality recording of at least 2 CIF, ideally 4 CIF with storage capacity for at least 30 days. The system should have the ability to offload incident images for evidentiary purposes using some sort of removable media such as CD-R or DVD-R.

Allowances should be made by the installation contractor to spot cameras prior to final installation to ensure the final camera location provides the best view of the required image. Exterior cameras need to be coordinated with the landscape plan to ensure that trees or shrubs do not hinder sight lines.

It is recommended that CCTV be utilized in key locations of high threat and risk for theft, vandalism, and main pedestrian entrances such that the images provide an assessment level of detail.

Duress/Panic Devices

Duress/Panic Devices are sometimes utilized in the Healthcare environment as a means to quickly summons help or initiate a security response typically as a result of aggressive behaviour or if a lone worker is threatened.

There are two types of Duress/Panic Alarms. The first and most common are hardwired or fixed panic buttons. These will be installed at strategic locations at all nursing stations.

In addition to these areas, it is recommended to install fixed buttons in the administration area, human resources area, and at strategic locations throughout pharmacy.

The second type of Duress/Panic Alarm is the wireless panic alarm, which is carried on a person. There are two types of wireless panic alarms. Those that provide location and those that provides a general alarm to a general area.

The most common Duress/Panic alarm in use is that of the general alarm as a result of its cost and area of protection being covered.
We recommend wireless duress alarms be put in emergency and maternity departments.

Intrusion Detection

Intrusion Detection Systems are utilized in areas of high risk for break enter and theft or for areas that are securing patient records. A typical intrusion detection system would consist of a control unit and keypad, motion detectors, glass break detectors, door contacts and a siren. Intrusion alarms would be monitored off-site by a third party monitoring company and will be interfaced to the main access control system if true integration and reporting exists.
For healthcare facilities, intrusion detection is not often used as areas are normally running 24 hours a day.

Patient Wandering

Patient wandering systems are utilized in areas where risk exists of Patients wandering away from the unit as a result of various conditions and various levels of risk. There are two types of wandering system configurations. Those that simply create an alarm and those that interfaces to an electronic locking device or elevator to prevent a patient from wandering.
For this project, we recommend a patient wandering system be utilized for maternity only to reduce threat of baby abductions.

Security Policy and Procedure

Security Policy and Procedure will be developed in concert with the Interior Health Authority if we are successful on the project. The existing policies will likely be extended to these facilities.

Training

Security Awareness training and instructions on the use of various security systems is of paramount importance and should not be overlooked. All too often it is assumed that staff and system users know how to operate a system. A thorough documented training manual and seminar package will be developed to assist staff with the use and accessibility of the various security programs being delivered.

Lighting

Exterior and interior lighting act as a good deterrent to crime related issues. It is proven that criminals like to work in the dark and poorly lit areas.
Exterior lighting will be provided around the perimeter of the building and in parking areas that promote good visibility at night while provided cut off for LEED purposes.

Landscaping

Landscaping will be reviewed in concert with the exterior security layout to ensure sight lines and lighting is maintained.

Detailed Assessment of the Facility

Building Exterior and Perimeter

Typically, hospitals present the most challenging environment to secure as the philosophy of an open and friendly environment for the staff, patients and visitors has been the norm. Although this philosophy has been slightly altered based on incidents within healthcare facilities in British Columbia over time, this new facility will remain relatively accessible during "normal business hours" (0600 HRS to 2000 HRS), whereas after-hours access will be limited. This presents a number of risks as it relates to unauthorized individuals accessing hospital property with the

intention of causing harm in a variety of different ways, such as theft, aggressive behaviour, vandalism, etc.
The Emergency entrance provides specific risk that will be addressed within the section related specifically to that department.

Risks

Threat to the personal safety of patients, visitors and staff outside of the building, especially after-hours
Potential for sabotage/vandalism to the building or its components
Allowing access to the facility by unauthorized individuals

Recommendations

Exterior lighting will be provided on pathways, at entrances, and in the parkade. High
CCTV will capture high traffic areas for the purposes of providing deterrent and investigative information. High
All perimeter doors will be equipped with proper locking mechanisms to ensure the chance of unauthorized entry is reduced. High
Staff entrances will have access control to limit access to authorized personnel only. High
Landscaping techniques will be used to enhance the protection of the building and maximize the effectiveness of other security measures. Consideration will be given when planting trees and shrubs to minimize hiding places, dark spots that promote criminal activity. Medium
Good clear signage that provides proper way finding for patients and visitors will be in place. Ensuring entrances and traffic patterns are properly marked; this will cut down on the potential for wandering into unauthorized areas. Medium

Parking - Parkade

Parking at the ACC will be available to staff and customers alike in the form of a parkade. Parking areas present risk as it relates to vehicle theft, break-in, and vandalism. An attendant will not staff the parking area; therefore, the risk of break-in to the parking collection machine does exist. This has been a common occurrence at many Health facilities.

Risks

Threat to the personal safety of patients, visitors and staff in the parking area, especially after-hours
Potential for break-in and/or theft of vehicle or vehicle contents

Recommendations

Duress alarms will be placed within the parking area connected to the Helpdesk, therefore, in the event an alarm is generated Security would be dispatched. High
The parking collection machines should be located in visible, well-lit areas. Medium
Security patrol must be utilized within the parking areas and perimeter to deter suspicious and illegal activity. Employees, patients and visitors should be encouraged to report suspicious activity to Security immediately, through internal communication and signage. IHA may need to add more security patrols. High
The parkade will be well lit and CCTV coverage will be provided in the parkade. High

Helipad

Risks

Threat to the personal safety of staff and patients utilizing this area
Potential for loss or damage to organizational equipment or supplies
Potential for sabotage to organizational infrastructure

Recommendations

Must meet Transport Canada's mandate for Heliport Security
Access to the helipad must be restricted when not in use. High
Access to the helipad must be restricted during takeoff and landing preparations. High

Strict procedures need to be developed for preparation for landing, landing and takeoff. Due to the fact that Authority staff will be likely be required to transport patients from the pad, consultation with local Authority staff officials is required. High

Plant Services

Risks

Unauthorized access by wandering patients
Threat to personal safety of staff working alone
Potential for sabotage to equipment and/or physical plant

Recommendations

All Plant Services areas must be secure and unauthorized access must be prohibited.
Consideration to be given for high traffic areas to utilize card access. High
CCTV should be utilized in the public areas outside of the Plant Services area, capturing the corridor and elevator vestibule. Medium

Meeting Areas/Videoconferencing Areas/Classrooms/Group Rooms

Risks

Theft of Audio/Visual equipment that will be stored in multiple locations
Theft of computer equipment
Threat to personal safety of staff using these resources outside of normal business hours
Theft or destruction of organizational property

Recommendations

Limit the number of access points, in which, the general public can gain entry and exit to/from this area. High
Strictly control access to any of the areas storing high value AV equipment. High
Utilize card access on key points that may require investigative information. Medium
Utilize CCTV in public areas to provide deterrent and for investigative purposes. Medium
Provide fixed duress alarm system for reception areas for immediate response. Medium
Ensure regular, random security patrol exists throughout this area on a daily basis. Will have to confirm this with IHA security. High

Gift Shop/Cashier

Risks

Theft of cash and/or valuables from the Cashier's office
Threat to personal safety of Cashier
Threat to personal safety of Foundation receptionist based on location in public or proximity to Cashier

Recommendations

Secure the Cashier office at all times and limit the number of keys for that space. High
Install an intrusion detection system within Cashier's area to alert Security after-hours in the event of unauthorized access. High
Provide fixed duress alarms in the Cashier office. High
Install CCTV in the Cashier area. High
Limit the amount of cash in the Cashier booth and do not store large quantities after-hours. Medium

Ambulatory Care/General Clinics

Risks

Loss of equipment due to high traffic area
Threat to personal safety of staff dealing with high volume of clients in public areas and treatment rooms

Recommendations
Access should be loosely controlled by ensuring patients need to present to reception during normal business hours. An ability to provide non-electronic locks on all rooms must exist and protocol in place to ensure that is done so after-hours. High
Provide duress alarm coverage in all reception areas. High
CCTV coverage to include main corridors in surrounding areas to provide a deterrent and for investigative purposes. Medium
Provision of access control on one entry door to allow after hours access limited to staff. Medium

Critical Care Unit/Intensive Care Unit

Risks
Threat to personal safety of staff by patients and visitors
Theft of organizational equipment and supplies
Theft of patient valuables
Theft of narcotics
Theft of staff belongings
Recommendations
Access should be loosely controlled by ensuring a "one way in, and one way out flow". By doing so, anyone entering the unit has a better chance of being seen by Hospital staff. High
Staff must be given some level of prevention and management of aggressive behaviour. High
Educate patients, staff and visitors on the importance of limiting valuables on their person during the time they spend at the facility. Medium
Install fixed duress alarm system for all care stations and any of treatment rooms that are deemed high-risk at the main nursing station. High
Ensure all narcotics are secured and processes are in place that meet or exceed the Controlled Drugs and Substances Act. High
Provide limited access after hours. Medium

Emergency Department

Risks
Threat to personal safety of staff by unpredictable clients
Threat to personal safety of clients by self and other clients
Loss or destruction of organizational property
Recommendations
All staff working with high-risk clients must be trained in the principles of prevention and management of aggressive behaviour. High
A sophisticated duress alarm system that allows for the use of hard-wired and wireless technology is needed. The system needs to have the ability to summons assistance locally, as well as, from on-site security. High
Access should be separated from the rest of the hospital. However, card access should be utilized to ensure hospital personnel have the ability to move freely throughout the department. High
Seclusion rooms must be designed to meet provincial standards, to ensure high-risk patients are unable to cause harm to self or others. High
CCTV should be utilized within the common areas and on the exterior of this unit. High
Ensure security staff are trained to respond immediately and appropriately in a non-threatening manner. High
Security provides a physical presence in the area. High
A lock down system is available to lock public doors if gang violence is suspected. Medium

OR/PACU/PARR

Risks

Threat to personal safety of staff by patients and visitors
Risk of wandering/missing patients within this setting
Theft of organizational equipment and supplies
Theft of patient valuables
Theft of narcotics
Theft of staff belongings

Recommendations

Access should be controlled via proper flow and access control. By doing so, anyone entering the unit needs to check in with Hospital staff. High
Staff must be given some level of prevention and management of aggressive behaviour. High
CCTV should be utilized in corridors to provide a deterrent and be used for investigative purposes. Medium
Utilize card access to control staff areas where valuables and equipment are located. High
Educate patients, staff and visitors on the importance of limiting valuables on their person during the time they spend at the facility. Medium
Install fixed duress alarm system for all care stations. This system must notify Security immediately to ensure emergency response. High
Ensure all narcotics are secured and processes are in place that meet or exceed the Controlled Drugs and Substances Act. High

FM Call Centre

Risks

Threat to personal safety of staff working in quiet area after-hours

Recommendations

Secure this area at all times, and utilize card access technology to ensure authorized employees have access. High
Ensure Call Centre staff is aware of emergency procedures. High

Staff Support

Risks

Threat to the personal safety of employees utilizing this area
Theft or damage to organizational property

Recommendations

Secure access at all times for these areas, and utilization of card access to allow staff-only access. High
Installation of fixed duress alarms within all areas to allow staff to summons for immediate assistance. High
Regular, random Security patrol of the Staff Facilities area. Medium
Utilize CCTV in surrounding corridors to provide deterrent and for investigative purposes. Medium

Sterilization/Decontamination

Risks

Threat to personal safety of staff working outside of normal business hours
Theft or damage to organizational equipment or supplies

Recommendations

Ensure this area is secure at all times. Card access should be utilized to ensure authorized staff are able to move freely. High
Utilize CCTV in the surrounding public corridors to provide a deterrent and for investigative purposes. Medium

Provide fixed panic button at reception of this area.

UBC Research Space

Risks

Threat to personal safety of staff by clients
Loss or damage to research equipment
Loss of research material

Recommendations

Limit the number of access points to this area of the facility to ensure anyone entering the area must pass by legitimate staff, such as receptionists. High
Install fixed duress alarm buttons in all high-risk areas such as reception areas. High
Utilize CCTV in the public corridors to provide a deterrent and for investigative purposes. Medium
Utilize card access at the entry of this facility to limit access to legitimate staff. High

Paediatrics

Risk

Threat to personal safety of staff by clients
Theft of organizational equipment or supplies
Aggressive parents

Recommendations

Installation of fixed duress buttons within strategic, high-risk locations i.e. treatment rooms and reception desks. High
Limit the number of access points to this area during the day, ensuring that clients present to a reception area and cannot wander throughout. Card access technology should be utilized to ensure the movement of authorized staff is not impeded. High
Utilize CCTV in surrounding areas to provide a deterrent and for investigative purposes. Medium
Train staff on dealing with aggressive people. High
Provide regular patrols of this area. Medium

Maternity

Risks

Abduction of a newborn baby
Threat to personal safety of staff from patients and visitors
Threat to personal safety of patients from other patients and visitors
Theft of staff/patient's personal belongings
Theft of organizational equipment or supplies
Theft of narcotics

Recommendations

Hospital specific newborn security, abduction and search protocols must be established and implemented. High
Orientation to be provided to healthcare staff regarding protocol around security and specifically, newborn security. High
Staff and Physicians must participate in the hospital identification system. High
Access should be limited to a single designated entry point for the general public in this area, to maximize the chance they are seen by a staff member entering and exiting the unit. High
All other exit doors leading out of this area must be equipped with a 15 second delay system that notifies staff in the area, as well as, Security after 2 seconds in the event someone tries to exit from these specific doors. High

An extensive CCTV system must be utilized to ensure all entrances and exits are covered off and can provide clear footage of all activity.
Regular, random security patrol must take place. High
Utilize card access to control entry after hours into this room. High
Educate patients, staff and visitors on the importance of limiting valuables on their person during the time they spend at the facility. Medium
Install fixed duress alarm system for all care stations. This system must notify Security immediately to ensure emergency response. High
Ensure all narcotics are secured and processes are in place that meet or exceed the Controlled Drugs and Substances Act. High
Provide infant protection system for patient tagging. Medium

Renal Services

Risks

Threat to personal safety of staff from clients
Theft of organizational equipment or supplies

Recommendations

Installation of fixed duress buttons at main nurse desk. High
Limit the number of access points to this area during the day, ensuring that clients present to a reception area and cannot wander throughout. High
Utilize CCTV in surrounding areas to provide a deterrent and for investigative purposes. Medium
Limit area after hours by securing elevators. Medium

2.2.10 Mechanical Systems

INTRODUCTION

The Following is a description of the heating and cooling energy plants, fire protection systems, air handling systems, plumbing systems and medical gas systems. Throughout the design process, Infusion has paid particular attention to maximizing system redundancies and to accommodating future expansion when designing the heating and cooling energy plants, fire projection systems, air handling systems, plumbing systems and medical gas systems. The following sections highlight the specifics features of each of these systems.

2.2.10. a) Provide brief descriptions of each of the following systems

i) Main energy sources

- Electrically driven chillers and hybrid fluid coolers provide cooling for the facility. The chillers operate at a COP of 5.4, which means that for every one unit of electrical energy consumed, the chillers are able to provide over five units of cooling energy.
- 96% efficient gas fired condensing boilers provide heating for the facility. The boilers use natural gas as a primary fuel and propane gas as a backup fuel.
- The following graph presents the relative consumption of electricity vs. gas.

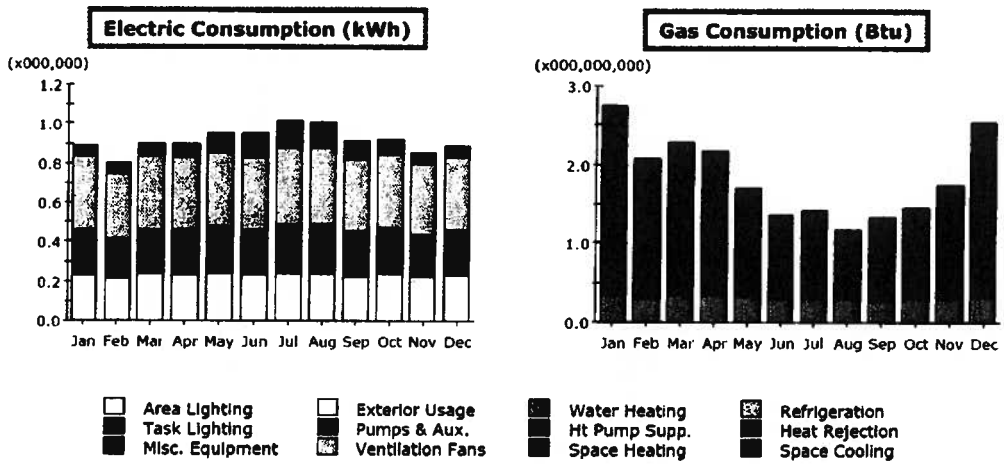


Figure 1: Relative Consumption of Electricity vs. Gas

ii) Cooling plant

- Cooling for the new Ambulatory Care Centre (A.C.C.) is provided via two banks modular chillers, each bank consisting of five 80 ton, variable compressor speed, magnetic (oil-

free) bearing chillers and hybrid fluid coolers for a chiller cooling capacity of 800 tons (2810 kW).

- An additional 200 tons (702 kW) of lake water cooling is provided to the A.C.C by tying into the existing lake water cooling system with a new plate and frame exchanger and utilizing the excess capacity of the existing system.
- The chillers and heat exchanger are centralized and all located in the level 4 mechanical room. The hybrid fluid coolers are located on the roof above level 6.
- The use of variable speed chilled water distribution throughout the facility reduces the amount of energy consumed in pumping power. Distribution pumps are 100% lead lag for full redundancy.
- Systems within the hospital requiring cooling 24 hours a day, 7 days a week have been provided with continuous cooling.
- Air side dehumidification has been provided via face and bypass systems installed in all air handling units.
- Spring isolated circuit balancing cartridges have been provided for all cooling circuits.
- Cooling has been provided to the UBC/Visitor Parkade via a 90 ton (316kW) ground source heat pump system.

iii) Heating plant

- Heating for the A.C.C. is provided via eight 96% efficient, fully modulating condensing hot water boilers with a total plant output capacity of 6,900kW.
- All heating water system piping is interconnected to allow for redundancy provisions.
- A variable speed heating water distribution pumping system has been provided for the combined primary heating, reheat and perimeter radiation system. The use of variable speed heating water distribution throughout the facility reduces the amount of energy consumed in pumping power. Distribution pumps are 100% lead lag for full redundancy.
- Perimeter radiation has been provided with additional radiant ceiling heating panels in perimeter patient areas and staff clinical areas.
- On site 18,000gal propane storage tanks have been provided for emergency backup. The tanks are sized to allow the boiler plant to operate for 72 hours under the most extreme winter period
- Spring isolated circuit balancing cartridges have been provided for all heating circuits.
- Heating has been provided to the UBC/Visitor Parkade via a 316kW ground source heat pump system and a 180kW gas fired condensing hot water boiler.

iv) Steam plant (CSR equipment)

- Primary steam for humidification and sterilization has been provided from the existing steam boiler plant.
- A new 50mm steam line will be connected to the existing steam main in the Strathacona building of the Kelowna Hospital.

v) Wet, dry, and pre-action sprinkler systems

- Both the A.C.C. and the UBC/ Visitor Parking buildings have been provided with two independent combined water connections for a redundancy in the water supply.
- The fire protection system has been designed in accordance with NFPA standards.
- The A.C.C. building is fully sprinklered throughout with an integral standpipe system.
- The UBC / Visitor Parking building is also fully sprinklered throughout.
- A fire pump system has been provided to ensure adequate water pressure is maintained at all times.
- Interior spaces have been provided with wet sprinklers.
- Exterior spaces and spaces subject to freezing have been provided with dry sprinkler systems.
- Data rooms and Electrical rooms have been provided with pre-action sprinkler systems.
- All patient care areas have been provided with flush pendent concealed fully recessed sprinkler heads for ease of cleaning and resistance to contamination build up.
- The Helipad has been provided with an H-2 category foam fire suppression system to meet the requirements of NFPA 418.

vi) Heat dissipation systems, cooling towers, etc.

- Hybrid fluid coolers with variable speed drive system are provided to reject the heat from the chillers.
- The use of closed circuit hybrid fluid coolers prevents the introduction of outdoor pollutants and helps to protect the surrounding environment from the spread of Legionellas via the cooling towers.
- A variable flow plate and frame heat recovery system has been designed to reclaim rejected heat from the cooling plant for preheating of domestic hot water.

- The hybrid fluid coolers have been provided with basin heaters for freeze protection in periods of non operation.

vii) Air handling systems

- All total air change rates and outdoor air change rates have been provided in accordance with CSA Z317.2-01 Special Requirements for HVAC Systems in Health Care Facilities.
- The Hospital air handling systems consist of 9 main supply and return air handling units (9 supply and 9 return). All air handling units have been located in the Level 4 mechanical room for improved serviceability and reduce noise and vibration transmission.
- The UBC building air handling system consists of one combined supply and return unit, located in the UBC building mechanical room.
- Each supply air handling unit consists of outside air dampers, MERV 7 pre filters, glycol heat recovery coil, return air damper, electronic air filters, UV sweeping lights, heating coil, steam humidifier, cooling coil with face and bypass dampers for humidity control, variable speed supply air fan, MERV 14 final filters (MERV 15 for Class 1 suites) and discharge dampers.
- Each return air handling unit consists of MERV 7 pre filters, variable speed return air fan, return air dampers and exhaust air dampers.
- Glycol heat recovery has been provided between the exhaust air streams and the outdoor air intake stream.
- All air handling systems have been designed for 100% outside air capacity for free cooling.
- All Class 1 suites have been provided with two parallel air handling units, each running at 50% for additional redundancy provision. The class 1 spaces in this project are the Emergency rooms and the Surgical suites.
- All isolation rooms are being completely exhausted by a separate dedicated ducting system with parallel 100% redundant exhaust fans.

viii) Domestic hot and cold water systems at various temperatures

- Domestic water has been provided to the A.C.C. via two separate 150 mm street connections. This new water service will be interconnected to the existing Hospital water service.

- Water pressure in the A.C.C. will be provided by triplex domestic water booster pumps to a minimum of 35 psi (24 kPa) and a maximum pressure of 70 psi (483 kPa).
- Four domestic hot water tanks have been provided for the A.C.C., each with a nominal capacity of 1500 gallons. Domestic hot water heating has been provided for each tank via double wall heating water immersion heaters. The use of heating water to provide domestic water heating allows the domestic water system to share in the premium combustion efficiency of the condensing hot water boiler plant.
- Domestic hot and cold water will be provided by two separate risers that loop together on each floor, thus allowing for servicing and expansion while keeping domestic water available to the floor.
- Water quality at each plumbing fixture and equipment requiring domestic water is purified to be free of microbes to meet the Ministry of Environment guidelines for potable water and are provided with appropriately located drains and flushing valves to allow for disinfection and cleaning.
- Potable hot water used for patient areas has been dedicated for this use. Process areas have separate hot water connections from hot water mains.
- Mixing valves at required fixtures are the temperature sensing type with active control, and where specific equipment requirements dictate it, supply temperature within 1°F of design and supply pressure will be within 2psi (13.79 kPa) of design.
- All domestic water calculations to incorporate 20% additional capacity as best practice to anticipate changes in technology and medical programs.
- Domestic water has been provided to the UBC building via two separate 150 mm street connections.

ix) Redundancy provisions

- The heating plant has been designed so that with the largest boiler out the remaining boilers are capable of providing a minimum of 100% of the peak design load.
- The cooling plant has been designed so that with the largest unit out (lake water cooling) the remaining units are capable of providing a minimum of 90% of the peak design load.
- The above heating and cooling plant redundancy provisions exceed the CSA standard 317.04 heating and cooling plant redundancy requirements of 67% and 50%, respectively.

- The heating water distribution has been designed with a minimum of two lead/lag pumps and VSD's providing 100% redundancy in the heating water distribution pumping system.
- The heating boilers have been equipped with dual natural gas / propane gas burners allowing for the instant switch over of fuel sources in the event of an emergency.
- The provision of dual water connection to the facility provides 100% redundancy in the event of a water main failure. Further, the interconnection of this new water service to the existing Hospital facility extends this level of redundancy to the existing buildings.
- Each floor has been provided with two separate heating water, chilled water, medical gas, domestic water, and fire protection mains. If for any reason one main should be out of service, the other main is capable of providing a 100% redundant service.
- A 100% redundancy on the isolation room exhaust is provided via backup exhaust fans.
- All variable speed drives are provided with a by-pass.
- The new cooling system has been designed and interconnected to the existing lake water cooling system such should the lake water cooling system go down for any reason the new building now has the capability of back feeding the existing hospital with chilled water from the chillers.

x) Tempered water systems

- For all areas, specifically hands free plumbing fixtures provided for infection control requirements, appropriate anti scald pressure balancing mixing valves c/w check stops shall be installed at local faucets. This will provide tempered water for all pluming fixtures requiring tempered water or hands free operation.
- Providing a dedicated piped tempered water system less than 60°C/140°F is not recommended in order to minimize the potential risk of legionella pneumophila within the facility.

xi) Plumbing fixtures

- Plumbing fixtures are all institutional quality, white vitreous china or stainless steel.
- All fixtures in patient rooms are ADA compliant.
- All plumbing fixtures or groups of fixtures have been designed complete with isolation valves for maintenance and future expansion.
- To provide reduction in water usage, the select use of low flow fixtures has been incorporated. Clinical requirements have remained paramount and as such not all of the

plumbing fixtures are low flow, such as scrub sinks. However, low flow fixtures are specified where feasible and according to the user's approval.

- For a full description of plumbing fixtures, please refer to *Appendix 2.2.10. A: Plumbing Fixture Description.*

xii) Drainage systems

- Sanitary drainage from the A.C.C. is be drained by gravity in a 250mm line and will be connected to the existing city sanitary service.
- The storm drainage system from the A.C.C. interconnects at the foundation level and a 250mm storm drain (43000 L approximately) will be connected to the existing city storm system.
- Decontaminated area waste is drained with a dedicated drainage system to holding tanks located outside the hospital building. This system allows for the potential testing of area waste prior to discharge into the city system.
- Acid drainage is provided by point of use acid dilution in lab areas and then connected to the sanitary drainage system.
- Roof drains are non-flow control type in order to prevent the pooling of rainwater on the Hospital roof.

xiii) Special Drainage System and RO System in Renal Dialysis Suite (KGH)

- Acid resistant piping will be required in the haemodialysis are on the 5th floor from the dialysis headwall boxes.
- The drainage will be collect into centrally located, fully enclosed stainless steel floor sinks complete with nozzle sprayer before tying into the building sanitary system to allow for proper dilution.

xiv) All major mechanical space locations

- All air handling units, condensing boilers, chillers, pumps and expansion tanks are located in the level 4 mechanical room. By centralizing the location of these major pieces of mechanical equipment serviceability has been increased and noise transmission has been cumulatively addressed. Additional space in this mechanical room has been allocated to allow for expansion and the future addition of equipment.
- The hybrid fluid coolers are located on the rooftop above level 6. The location of the fluid coolers has been selected with consideration to the location of the helipad.

- The level 1 mechanical room contains the water entry station, fire protection station and domestic hot water tanks. Locating the water entry and fire protection stations on the ground floor helps to reduce response times in the event of an emergency.
- Adjacent to the level 1 mechanical room is the level 1 medical gas room which contains the medical air compressor & desiccant dryer, utility air compressor & desiccant dryer, vacuum compressor and all of the medical gas cylinders. Locating the medical gas cylinder room on level 1 allows for the regular drop of and pick up of cylinders from a back of house, street level access, thus avoiding the interruption of clinical services.

xv) Building management system

The new building management system (BMS) will be a complete, open protocol system from one controls manufacturer and will be non-proprietary. The system will have the capability to link into an Ethernet system, will be distributed based, will have remote dial-out functionality and internet access to the system for individual user setpoints. The system will provide operator information, alarm management, control functions, enterprise-level information, control access, information management such as monitoring, transmitting, archiving, retrieving, and reporting, diagnostic monitoring, report monitoring energy management, standard application for terminal HVAC systems and operator transaction archiving. The BMS system will have an additional 20% capacity built in for future traffic increases.

xvi) Detail provisions to accommodate future expansion

- All HVAC ductwork, heating water lines, chilled water lines, medical gas piping, domestic water piping, fire protection piping and sanitary drainage systems have been designed to accommodate a 20% future expansion.
- Each floor has been provided with two heating water, chilled water, medical gas, domestic water, and fire protection mains.
- The medical gas, domestic water and fire protection mains for each system are looped around each floor to allow for the easy expansion of any system at any location without effecting adjacent spaces.
- Mechanical rooms have been designed to allow for the addition of future equipment associated with an expansion.
- Modular chillers have been provided to allow for the simple connection of additional chillers for increased cooling capacity
- Cap-offs and isolation valves have been provided for easy installation of future services and maintenance.
- City connections have been upsized to ensure they can handle additional future load.

- BMS systems have been designed to allow for a 20% increase in traffic and future expansion.

xvii) Overview of the commissioning process (systems to CSR)

Infusion believes that Commissioning of any facility must commence at the start of the build process in order for all parties to understand the performance and operational goals that must be achieved by the facility at the commencement of the facilities operational phase. Infusion will take a holistic and inclusive approach to commissioning ensuring that all stakeholders – contractors; sub-contractors; Engineers of Record; Owners; Independent Certifiers, Users and Operators, participate in the commissioning process so that it is well understood that the facility has been constructed to the required performance and is operating at that optimum level. Commissioning is not viewed as just the testing of basic elements of a system but rather is the Testing, Commissioning, Acceptance, Training and Turn over of a facility as a whole. In our view commissioning will commence at the inception of the project. Commissioning will therefore be a key topic of discussion during the design development of the ACC, Parkade and UBC buildings.

A Draft Master Commissioning Plan (see *Appendix 2.3.1. A: Commissioning Plan*) has been developed that outlines how the commissioning process will evolve, who is involved in the commissioning process and their role and how the success of commissioning will be measured. This plan includes the formation of a Commissioning Steering committee who will guide and monitor the transition from the build environment, through testing and commissioning, into the training of operations personnel and ultimately to the turn over and completion of the facility. Steering Committee will be headed by the Independent Commissioning Agent and will include representatives from all Infusion partners including the Construction Team, Design and Engineering team, Facility Maintenance partners. Other potential Committee members may from time to time include the Independent Certifier, the Authorities Representative as well as a representative from the Lender's Technical Advisor.

A key element to the success of the project is to ensure that not only do systems function independently but also in concert with each other. To that end, our basic philosophy to integrate new systems with existing systems will as follows:

- The new system will be tested in isolation to ensure its operability prior to interface.
- The existing system will be verified to be functioning within its prescribed performance parameters. This may include spot testing, review of IHA maintenance records for the system and any other IHA documentation.
- Integration will then occur and specific tests will be conducted to ensure the integration is functioning adequately.
- Finally, spot checks will be conducted on the entire integrated system to verify performance has been maintained and not compromised.

By following this philosophy, Infusion will ensure that the entire facility is functioning as required on the first day of operation and beyond.

b) Provide and address the following

i) Load calculations

Provide the U Values for the building envelope including exterior walls, glazing system, floor, roof and internal partition system.

The following table presents the building envelope U-Values used for load calculation.

Table 4: Building envelope U-values used for load calculation

Assembly	Overall U value ($BTU/H{\cdot}ft^2{\cdot}^\circ F$)
Exterior walls (above grade)	0.047
Glazing systems	0.434
Floor (in contact with ground)	0.010
Roof	0.033
Internal partition systems - walls	0.132
Internal partition systems - ceilings	0.361
Internal partition systems - floors	0.087

ii) Air handling system

Air handling system type and function

- Following is a description of each air handling system type, capacity and function. Unless otherwise noted, each air handling system consists of one supply air handling unit and one return air handling unit.
- Each supply air handling unit consists of outside air dampers, MERV 7 pre filters, glycol heat recovery coil, return air damper, electronic air filters, UV sweeping lights, heating coil, steam humidifier, cooling coil with face and bypass dampers for humidity control, variable speed supply air fan, MERV 14 final filters (MERV 15 for Class 1 suites) and discharge dampers.
- Each return air handling unit consists of MERV 7 pre filters, variable speed return air fan, return air dampers and exhaust air dampers.
- All air handling systems are capable of 100% outside air for free cooling and building flushing.
- AHU-D6-1 is a system dedicated to serving the renal area with a capacity of 14,150 L/S.
- AHU-D2 is a system dedicated to serving the Intervention/short stay area with a capacity of 14,150 L/S.

- AHU-D3 is a system dedicated to serving the specialty clinics with a capacity of 14,150 L/S.
- AHU-E1-1/2 and AHU-E1-2/2 are parallel 50% systems dedicated to serving the Class 1 surgical services area. The units have a combined capacity of 56,600 L/S.
- AHU-D5 is a system dedicated to serving the AC express testing area with a capacity of 23,600 L/S.
- AHU-C1-A-1/2 and AHU-C1-A-2/2 are parallel 50% systems dedicated to serving the Class 1 ER Urgent trauma area. The units have a combined capacity of 14,150 L/S.
- AHU-C1-B is a system dedicated to serving the emergency department with a capacity of 14,150 L/S.
- AHU-F1 is a system dedicated to serving the UBC academic campus with a capacity of 18,877 L/S.

Cooling and heating sources

- Electrically driven chillers and hybrid fluid coolers provide cooling for the facility. The chillers operate at a COP of 5.4, which means that for every one unit of electrical energy consumed, the chillers are able to provide over five units of cooling energy.
- 96% efficient gas fired condensing boilers provide heating for the facility. The boilers use natural gas as a primary fuel and propane gas as a backup fuel.
- The boiler and chiller plants are located in the level 4 mechanical room.

Zone by zone cooling and heating loads (in w/m2). Clearly identify each zone.

Following is an identification of each zone and a summary of the zone by zone cooling and heating loads. As discussed further in section *2.2.12 Energy Efficiency and LEED* two independent energy models of the building were developed. One model was developed using the *Trane TRACE700* design software and was used to size equipment based on estimate peak heating and cooling loads per the outdoor design temperatures. A second model was developed using the *DOE eQuest* software and was used to estimate actual expected building performance per the historical outdoor air temperatures for the region. The following information has been extracted from the *eQuest* model as it is expected that this model will be more representative of the actual building performance.

- Zone C1A encompasses the Class 1 Emergency Department on Level 1. Below is an outline of this area. The average heating load for this zone is 133.3 W/m^2. The average cooling load for this zone is 137.2 W/m^2.

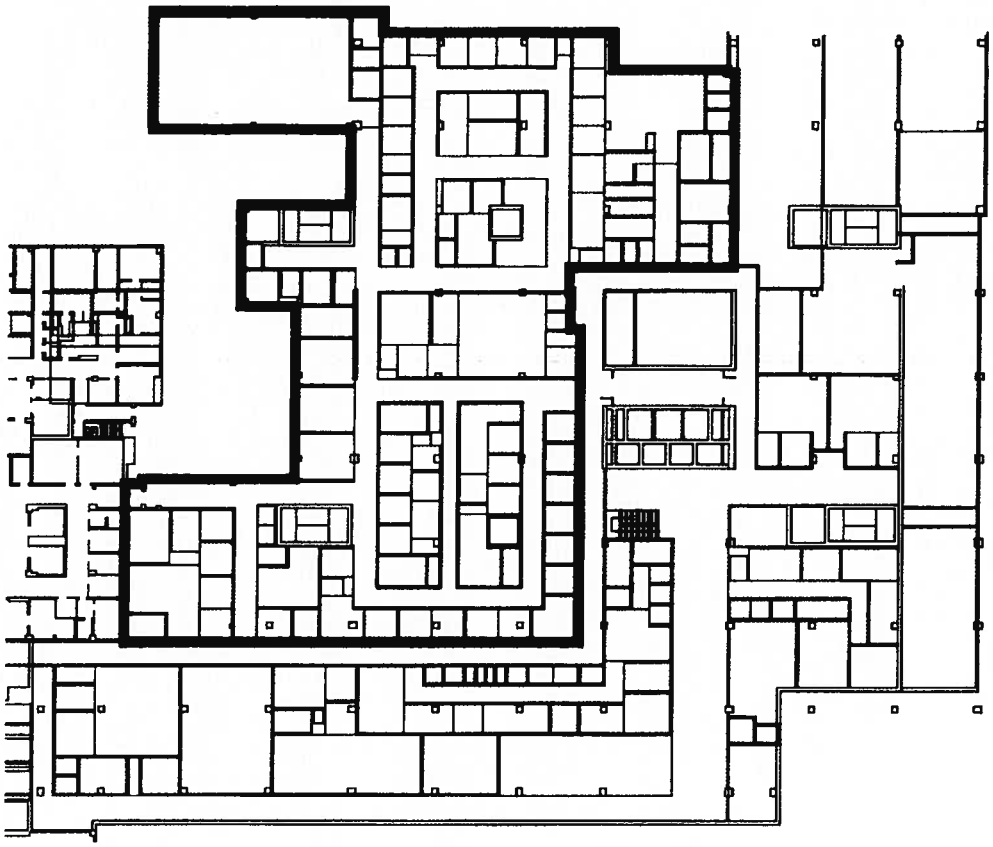


Figure 13: Outline of Zone C1A on Level 1

- Zone C1B encompasses the Emergency Department Support Space on Level 1. Below is an outline of this area. The average heating load for this zone is 81.0 W/m^2. The average cooling load for this zone is 100.7 W/m^2.

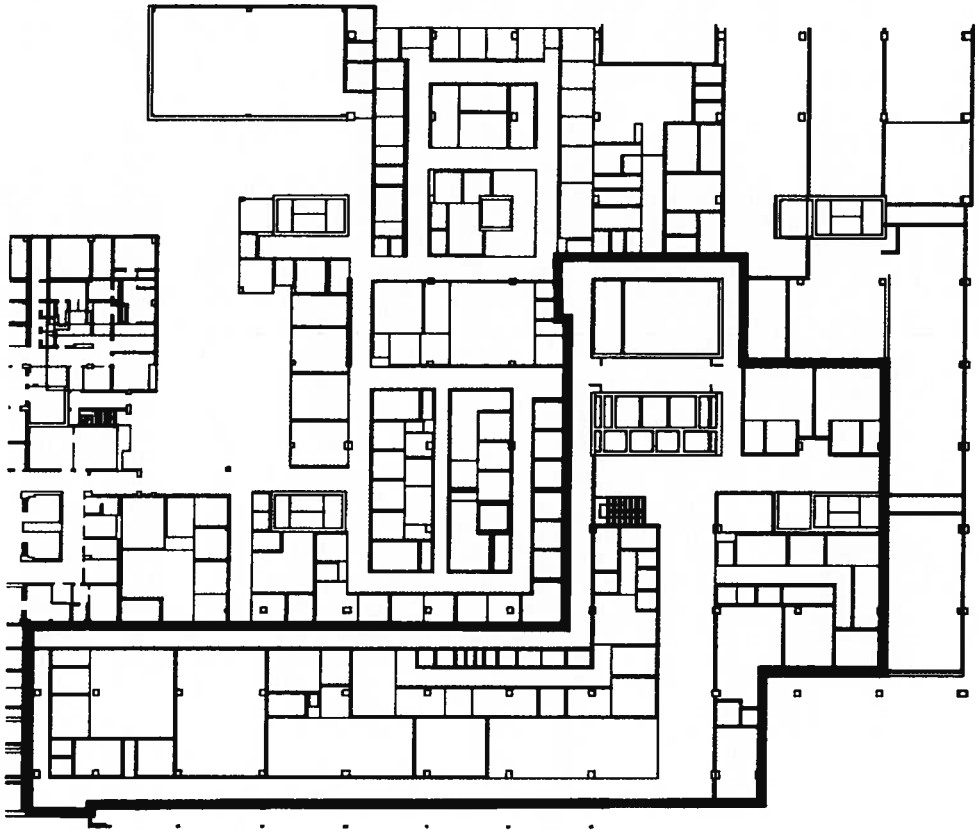


Figure 14: Outline of Zone C1B on Level 1

- Zone D2 encompasses the Ambulatory Care Short Stay on Level 2. Below is an outline of this area. The average heating load for this zone is 88.9 W/m^2. The average cooling load for this zone is 86.5 W/m^2.

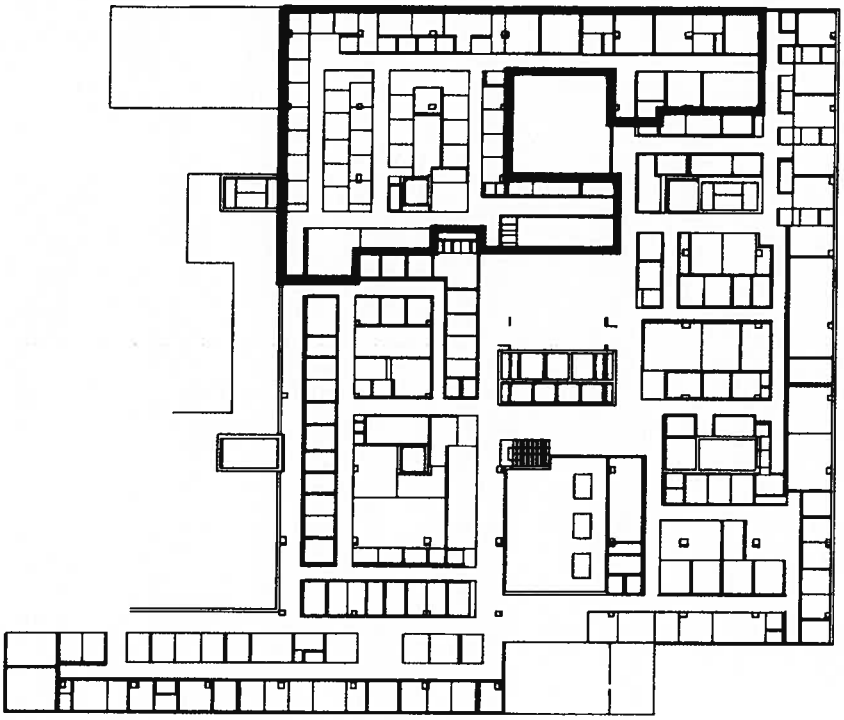


Figure 15: Outline of Zone D2 on Level 2

- Zone D3 encompasses the Specialty Clinics on Level 2. Below is an outline of this area. The average heating load for this zone is 90.1 W/m^2. The average cooling load for this zone is 95.6 W/m^2.

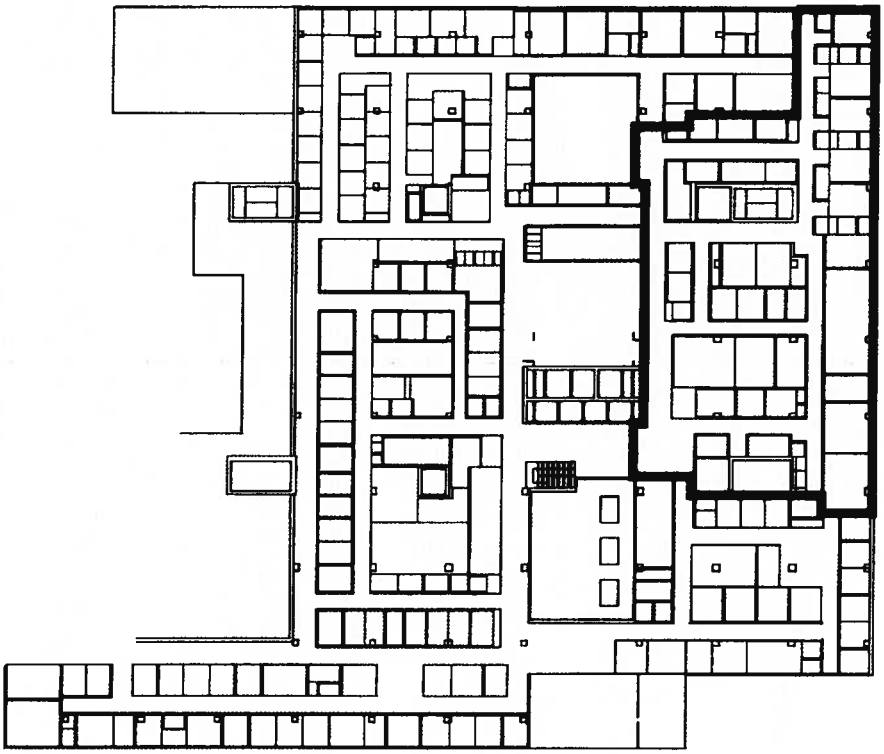


Figure 16: Outline of Zone D3 on Level 2

- Zone D5 encompasses the Ambulatory Care Diagnostics department on Level 2. Below is an outline of this area. The average heating load for this zone is 85.7 W/m^2. The average cooling load for this zone is 89.4 W/m^2.

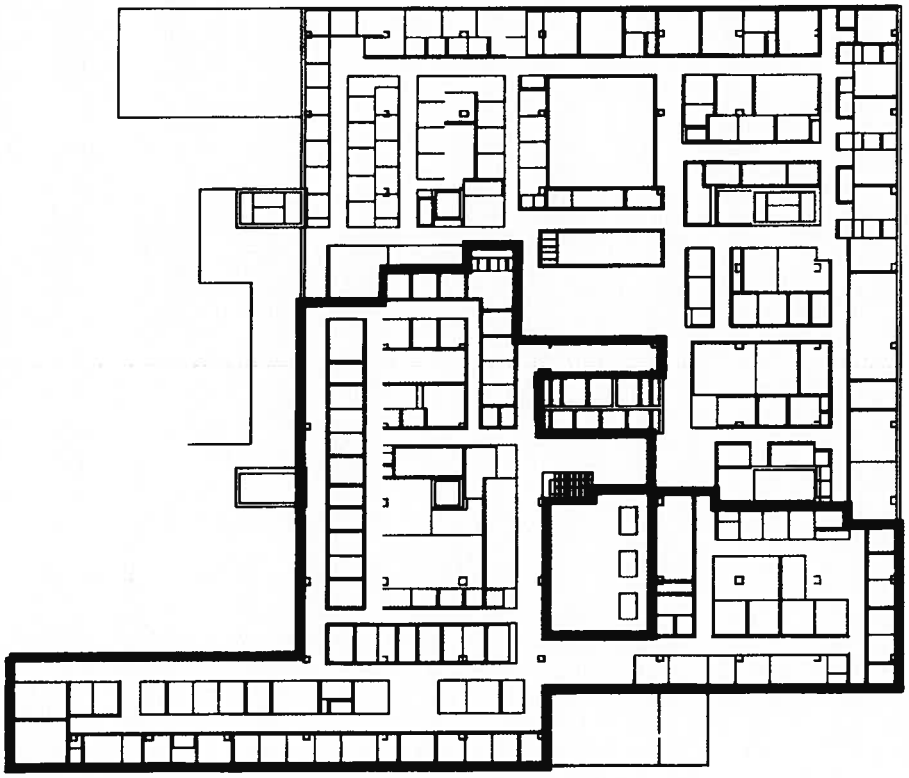


Figure 17: Outline of Zone D5 on Level 2

- Zone D6 encompasses the Renal Services department on Level 3. Below is an outline of this area. The average heating load for this zone is 71.1 W/m^2. The average cooling load for this zone is 91.0 W/m^2.

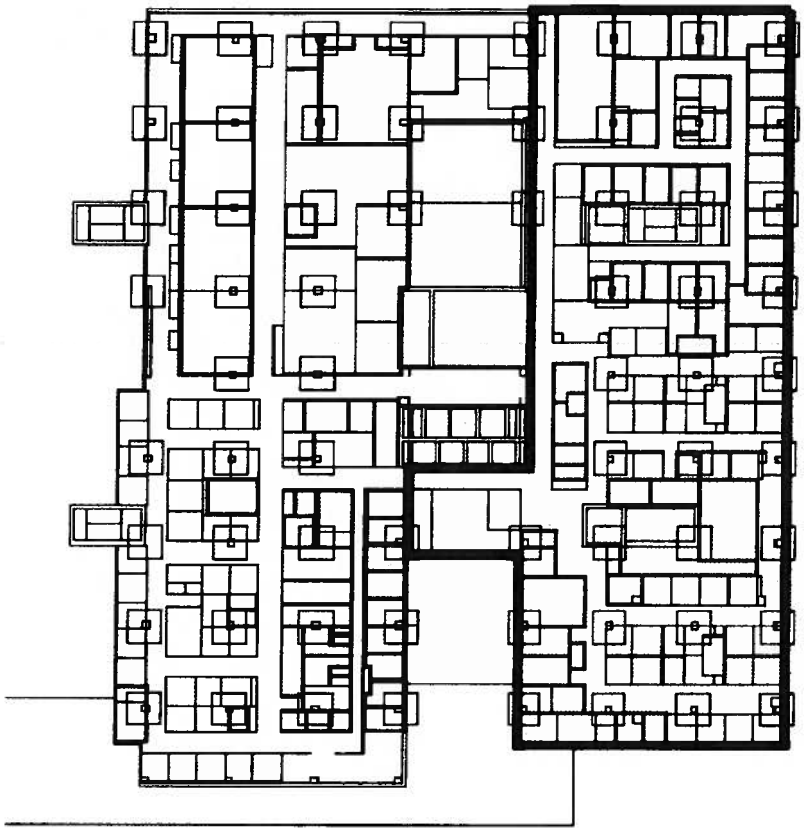


Figure 18: Outline of Zone D6 on Level 3

- Zone E1 encompasses the Class 1 Surgical Services department on Level 3. Below is an outline of this area. The average heating load for this zone is 225.6 W/m^2. The average cooling load for this zone is 215.4 W/m^2.

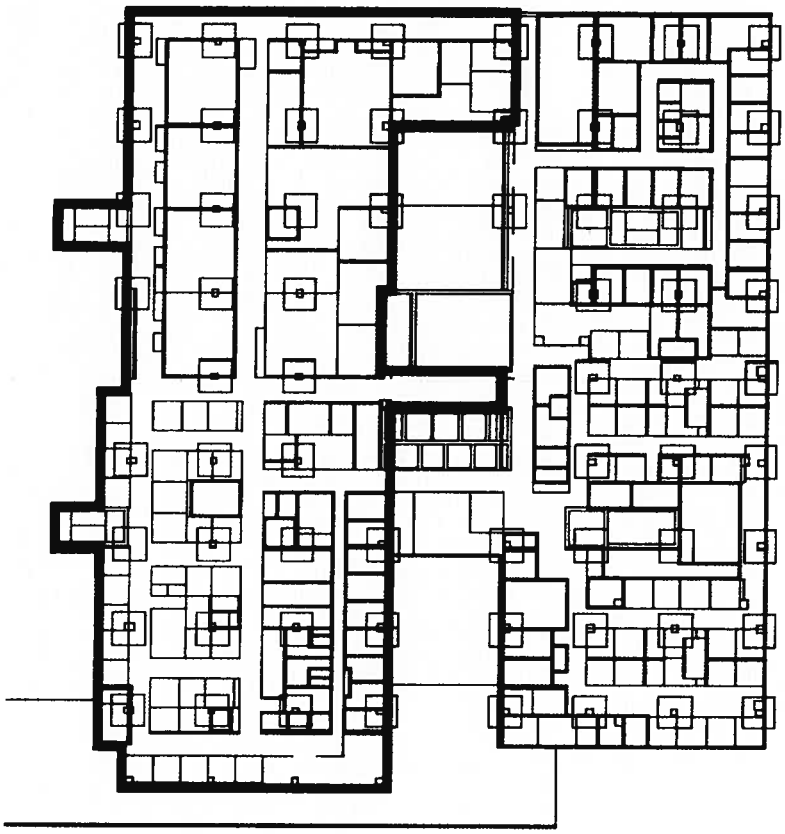


Figure 19: Outline of Zone E1 on Level 3

- Zone F1 encompasses the UBC Academic building. Below are outlines of this area. The average heating load for this zone is 149.2 W/m^2. The average cooling load for this zone is 59.0 W/m^2.

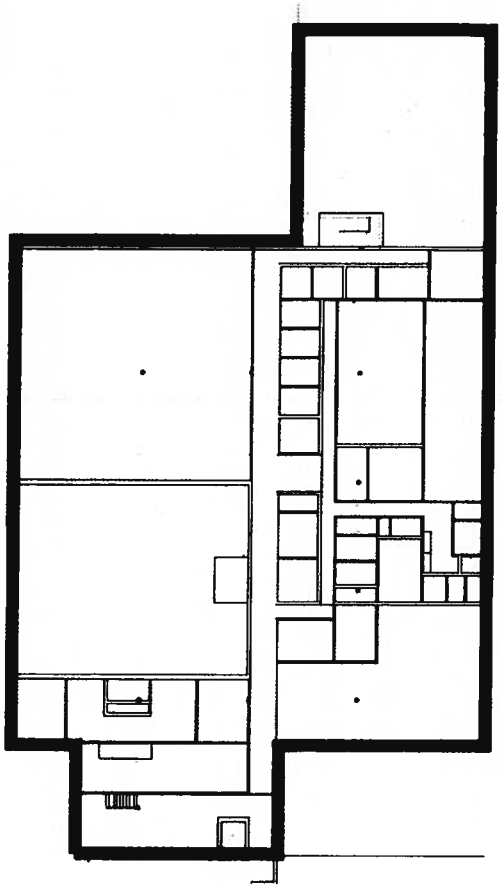


Figure 20: Outline of Zone F1 on Level 1

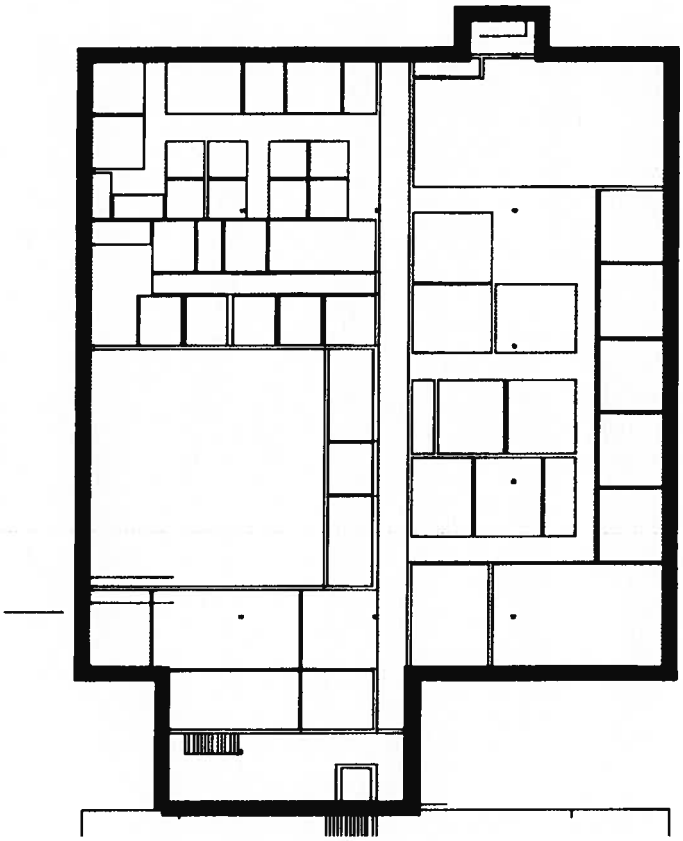


Figure 10: Outline of Zone F1 on Level 2

Floor area served by each unit (in m2)

- AHU-C1-A-1 & 2: 3111 m²
- AHU-C1-B: 2865 m²
- AHU-D2: 1315 m²
- AHU-D3: 1345 m²
- AHU-D5: 2815 m²
- AHU-D6: 2300 m²
- AHU-E1-1 & 2: 2726 m²
- AHU-F1: 2119 m²

Smoke control and operation under fire service requirements

- The new building has been divided into smoke compartments to the requirements of NFPA Standard 92A.
- Areas of refuge have been designed into the building to prevent smoke from spreading to adjacent compartments.
- Smoke dampers are located between smoke management zones to prevent circulation of smoke within the building.
- Smoke management systems are coordinated with the fire alarm and sprinkler zones.
- Smoke management systems are interfaced with the fire alarm systems.

iii) Cooling and heating plants

Description of plants, including type and configuration

- The cooling and heating plants have been designed to meet or exceed the Hospital thermal demands based on the following peak outdoor design conditions:

  Summer: 33C DB / 20C WB
  Winter: -23C
- Chilled water for cooling for the A.C.C. is generated via two banks modular chillers, each bank consisting of five 80 ton, variable compressor speed, magnetic bearing chillers and ten parallel 80 ton hybrid fluid coolers.
- Chilled water for cooling the UBC Building is generated via one bank of three ground source heat pumps, and a ground source field, for a total cooling capacity of 90 tons (316 kW).
- All chilled water systems are designed to operate on a 7C chilled water supply temperature and a 16C chilled water return. The use of a 7C chilled water supply temperature allows for flexibility in future additions or renovations.
- The fluid coolers are designed to operate on a 32C condenser water supply temperature and a 21C condenser water return. The use of 32C condenser water supply temperature allows for the 'free' pre-heating of domestic hot water.
- Variable speed chilled water distribution pumps provide cooling water to zone re-cool coils throughout the facility. The use of distributed re-cool coils eliminates the need for cooling and re-heating of supply air and results in reduced energy consumption.
- Dedicated evaporator and condenser pumps ensure that flow requirements through the chillers are continually satisfied
- Heating water for space and domestic water heating is provided to the A.C.C. via five 96% efficient, fully modulating condensing hot water boilers.

- Heating for the UBC Academic building is provided by a ground source heat pump system that provides 316kW of heating and a single 180kW condensing hot water boiler, for a total heating capacity of 496kW
- The space heating water system is designed to operate on a 60C heating water supply temperature and a 38C heating water return water temperature.
- The domestic hot water heating system is designed to operate on 82C heating water supply temperature and a 38C heating water return water temperature.
- Each boiler has been provided with a dedicated boiler feed pump to ensure flow requirements through the boilers are continually satisfied.
- Variable speed space heating water distribution pumps provided heating water to zone re-heat coils, radiant ceiling panels and perimeter radiation units.

Plant locations

Both the cooling and heating plants for the A.C.C. are in the level 4 mechanical room with the hybrid fluid coolers located above the chillers on the roof of level 6.

The cooling and heating plants for the UBC building are located in the level 1 mechanical room of the UBC building.

Average loads, in w/m2, based on total heated/conditioned area

Following is a summary of the average total cooling and heating loads in W/m^2 based on total heated/conditioned areas. As discussed further in section *2.2.12 Energy Efficiency and LEED*, two independent energy models of the building were developed. One model was developed to size equipment based on estimate peak heating and cooling loads per the outdoor design temperatures and the other model was developed to estimate actual expected building performance per the historical outdoor air temperatures for the region. The following information has been extracted from the estimated actual expected building performance model.

- The total average heating load for the Hospital and UBC buildings is 74 W/m^2.
- The total average cooling load for the Hospital and UBC buildings is 77 W/m^2.

Total loads in KW and total installed capacities

- The peak total space heating load for the Hospital is 4729kW.
- The peak total domestic hot water heating load for the Hospital is 1251 kW.
- The peak total building heating load for the Hospital is 5980 kW.
- Building heating for the Hospital is provided by six 947 kW and two 609 kW condensing water heating boilers for a total installed heating capacity of 6900 kW.
- The peak total building cooling load for the Hospital is 876 tons (3078 kW).

- Cooling for the Hospital is provided by ten 80 ton (281kW) chillers and hybrid fluid coolers and 200 tons (702 kW) of lake water cooling for a total cooling capacity of 1000tons (3513kW).
- The peak total building heating load is for the UBC Academic building is 427kW.
- Building heating for the UBC Academic building is provided by a ground source heat pump system that provide 316kW of heating and a 180kW condensing hot water boiler, for a total installed heating capacity of 496kW.
- The peak total cooling load for the UBC Academic building is 79 tons (277 kW).
- Cooling for the UBC Academic building is provided by a ground source heat pump system that provides 90 tons (316 kW) of cooling.

Energy recovery measures

- The air handling units are equipped with glycol loop heat recovery systems to transfer energy between general exhaust air and intake air.
- The use of glycol loop heat recovery ensures there is no cross contamination between the exhaust air stream and the supply air stream.
- Energy from equipment and space cooling is recovered from the condenser water and is used for preheating of domestic hot water, in effect reducing the domestic hot water heating demand and simultaneously reducing the fluid cooler energy requirements.
- Condensing boilers recover sensible and latent energy in the boiler flue gasses and transfer that energy into building heating water.

Standby plant or duplication provisions

- The heating water and chilled water distribution systems have been designed with a minimum of two lead/lag pumps and VSD's, each providing 100% redundancy in the heating water and chilled water distribution pumping systems.
- The heating boilers have been equipped with dual natural gas / propane gas burners allowing for the instant switch over of fuel sources in the event of an emergency.
- The Hospital heating plant has been designed such that with that with the largest unit out the plant is capable of still providing 100% capacity.
- The Hospital chilled water plant has been designed such that with that with the largest unit out (lake water cooling) the plant is capable of still providing 90% capacity

- One of the greatest benefits of tying the new hospital into the existing lake water cooling system is that the new building now has the capability of back feeding the existing hospital with chilled water from the chillers, should the lake water cooling system go down for any reason.
- All variable speed drives are provided with a by-pass.

iv) Typical mechanical design for specialty systems

Emergency – Trauma Rooms

HVAC

- ER waiting rooms have been designed with a minimum outdoor air of 4 air changes per hour with a total of 12 air changes per hour. Negative pressure area - directed airflow of relatively high volumes and low sidewall exhaust directly to outdoors.
- Trauma rooms designed with a minimum outdoor air of 4 air changes per hour with a total of 12 air changes per hour. Positive pressure area – overhead air supply directly above patient bed with return grilles located at the perimeter.

Medical Gases

- The emergency / trauma room is to be equipped with medical air, vacuum and oxygen.
- The medical gas outlets to be mounted on the overhead service arm shall be:
  - 3x Vacuum;
  - 2 x Medical air; and
  - 2 x Oxygen.

Secure Rooms in ER

- Designed with a minimum outdoor air of 4 air changes per hour with a total of 12 air changes per hour. Positive pressure area – inward direction air flow and totally exhausted.

Sterile Core in Surgical Suite

- Designed with a minimum outdoor air of 6 air changes per hour with a total of 20 air changes per hour. Negative pressure area – exhaust grille directly above the sterilizer door to capture fugitive steam.

ED Family/Quiet Room (smudging capabilities)

- Designed with a minimum outdoor air of 2 air changes per hour with a total of 6 air changes per hour. Negative pressure area – exhaust air directly to outdoors.

Operating Rooms

HVAC

- Designed with a minimum outdoor air of 6 air changes per hour with a total of 20 air changes per hour. Positive pressure area – ceiling diffusers of low-velocity and high volume output. Air handling unit has two stages of filtration: MERV 7 then MERV 15.

Medical Gases

- The operating room shall be equipped with medical air, vacuum, oxygen, nitrogen, nitrous oxide and carbon dioxide.
- Each OR is to have a medical valve box and alarm panel located outside in the corridor.
- Each OR also shall be equipped with a nitrogen control panel and gas scavenging system.
- Additional CO2 gas piping rough in has been provided from the operating rooms to the adjacent cooridor for future use. Zone valve boxes and alarm panels have been designed to allow for this future modification.
- The medical gas outlets to be mounted on equipment boom shall be:
  - 3 x vacuum
  - 1 x Medial Air
  - 1 x Oxygen
  - 1 x Nitrogen
  - 1 x Nitrous Oxide
  - 1 x Carbon Dioxide
- The medical gas outlets to be mounted on the anaesthetist equipment boom shall be:
  - 3 x Vacuum
  - 2 x Medial Air
  - 2 x Oxygen
  - 1 x Nitrous Oxide

Isolation Rooms/Ante Rooms

HVAC

- Designed with a minimum outdoor air of 3 air changes per hour with a total of 12 air changes per hour. Negative pressure area – both supply and exhaust air volumes controlled by a pressure sensor located within the wall of the patient room exit. All air exhausted to outdoors. An alarm mechanism located at the nurses station to signal loss of negative pressure.
- Dual 100% exhaust fans have been provided for all isolation rooms to provide full redundancy.
- HEPA filtration of exhaust air has been provided for all isolation rooms to protect the surrounding environment.

Medical Gases

- Isolation/ante rooms shall be equipped with medical air, vacuum and oxygen.
- The number of medical gas outlet required in an isolation/ante room shall depend on the area of the hospital that the room is located and shall conform to the requirements set out in the technical specification for isolation/ante rooms.

Decontamination Rooms

HVAC

Designed with a minimum outdoor air of 2 air changes per hour with a total of 6 air changes per hour. Negative pressure area – independent, filtered ventilation and exhaust system.

Medical Gases

- The decontamination room shall be equipped with medical air, vacuum and oxygen.
- The medical gas outlets to be mounted on equipment boom shall be:
- 2 x Vacuum
- 1 x Medial Air
- 1 x Oxygen

v) Domestic hot water systems

Description of system and primary fuel

- Domestic hot water will be supplied to the A.C.C. by four domestic water tanks and to the UBC building by one tank. All tanks will be complete with double wall immersion

heaters. The immersion heater supply water will be supplied by a dedicated natural gas fired condensing boiler system.

Storage (in litres per bed and for total storage)

- Total storage of domestic hot water will be 3180 gal (12050 L).

Recovery rate, in litres per hour, for 55°C/100°F temperature rise

- Recovery rate will be 10796 L/hr at a 55°C/100°F temperature rise.

Number and size of storage vessels, construction and material and location of plant

- There will be 4 x 720 gal (2700 L) storage tanks and 1 x 330 gal (1250 L) storage tank. These tanks will comply to all ASME requirements and be of stainless steel construction.
- Immersion heaters will be double wall u-tube type to allow for efficient heating and recovery time for the hot water system.
- Domestic hot water plants will be located on the ground floor mechanical room while the boiler systems supplying the hot water will be located within the penthouse mechanical room.

Define number of pressure zones and how function of domestic re-circulating system is accomplished

- Domestic hot water recirculation (DHWR) will be routed on each floor and connected to the domestic hot water at the furthest point from the domestic hot water recirculation riser. A DHWR pump will pump the recirculation water back to the domestic hot water plant and be interconnected to the DCW to preheat the water entering the storage tanks.

vi) Tempered water systems

Description of systems

- A 60°C/140°F domestic hot water piping system with be provided and installed throughout the facility. Refer to domestic hot water systems description.

Areas requiring warm water system and number of outlets

- For all areas that require specific hands free plumbing fixtures for infection control requirements to patients. Scrub sinks, patient exam sinks etc will be provided with appropriate pressure balancing mixing valves c/w check stops. This will provide point of

use tempered water for all pluming fixtures requiring tempered water or hands free operation.

Anti scald safety measures

- Hands free plumbing fixtures within patient areas and specific washrooms will be provided with appropriate pressure balancing mixing valves c/w check stops.
- Patient showers and bathing facilities will be provided with appropriate anti scald pressure balancing mixing valves c/w check stops.

Legionella prevention requirements, disinfection systems, etc.

- Providing a dedicated piped tempered water system less than 60c is not recommended in order to minimize the potential risk of legionella pneumophila within the facility.
- Providing appropriate pressure balancing mixing valves c/w check stops for all plumbing fixtures requiring tempered water or hands free operation.
- Insure that that the facility maintenance program includes for domestic hot water equipment maintenance which involves monitoring water temperature and quality with routine sampling and reduction of scale and biofilm formation.
- Provide periodic high temperature maintenance of all associated hot water generation equipment and piping.
- Insure that there are no dead legs or sections of domestic hot water supply and recirc piping which have no flow.
- Maximize the installation of copper piping. Copper is the best material for resisting legionella colonization and resist scale and biofilm formation.
- Each domestic hot water tank will be supplied with inter-tank circulation pumps to maintain a maximum domestic hot water temperature within each tank.
- The entire new domestic water piping installed shall be thoroughly disinfected as per AWWA requirements and flushed prior to supplying domestic water. This includes domestic cold water, domestic hot water and domestic hot water recirculation systems.

c) Describe the proposed Fire Protection system and how it will integrate with the fire detection systems incorporated within the electrical, hydraulic and/or mechanical installations, including indicative features such as:

Underground distribution network (if applicable)

Not applicable

Tanks, if any, provided for fire protection

Not applicable

Pumps, if any

A fire pumps system will be provided to ensure fire protection pressure requirements are met during all operation conditions.

Summary of Clarifications and Assumptions

F5.1A1.3.1.1 *All major systems and items of the mechanical plant and equipment have a useful life expectancy of 25 to 30 years.* Some mechanical equipment, such as pumps and fans, are expected to have useful equipment life of less then 25 years. The cost of this equipment refresh has been included in the life cycle costing analysis.

F5.1A1.5.1.5 *The strategies implemented include environmentally friendly approaches to minimize the impact on the global environment. Emissions will be reduced and environmentally friendly refrigerants utilized to reduce the global warming and ozone depletion potential. Minimum requirements shall meet the Kyoto Protocol.* In absence of the defined requirements of the Kyoto Protocol, the refrigerants have been selected with environmental considerations and best engineering practice in mind. All refrigerants shall be free of harmful CFC's.

F5.1E5.1.1.5 *Radiant ceiling panels be utilized for all clinical spaces, patient areas and staff clinical areas.* Radiant ceiling heating panels have been provided for all perimeter patient and staff area. In interior spaces where there are no envelope heat losses an auxiliary heating system is not needed. Heating in these interior spaces will be provided by an airside system with re-heat coils for zone temperature control.

F5.1E5.1.1.19 *A dedicated pumping system be provided for the following: Primary Heating, Reheat, Perimeter Radiation, Glycol Heating.* A single dedicated pumping system with 100% redundant leed/lag pumps has been provided for the facility heating systems. The use of larger, fully redundant pumps increases the overall plant efficiency, reduces maintenance costs and increases reliability of the heating water supply.

F5.1G7.1.1.19 *Separate patient care area air handling systems from support space systems.* In some instances the ratio of patient care area to support space area (i.e. exam rooms to nurse stations) is such that the spaces should be served from the same air handling system. In all cases best engineering practice and all code requirements have been maintained to ensure the protection of indoor air quality.

H21 303 B2.2.2 *Main Fire Pump Controller. The minimum withstand rating of the controller shall be not less than 100,000 amps RMS Symmetrical at 200-600v, or any higher fault current as shown on the plans.* It is difficult to confirm what the minimum withstand rating of the controller shall be at this stage of the design. The final controller selection will be in accordance with established design standards and applicable regulations and may not be exactly as specified above.

H23 131 B2.5.1 2.5.1 *Boiler Feed Pumps . Pump casing and flanges suitable for maximum working pressure of 4000kPa (580 psig).* The boiler feed pump system is anticipated to operate at a nominal pressure below 200kPa (30psi). As such 4000kPa capacity pumps are beyond the requirements of this system. All pump casings and flanges will be specified in accordance with established design standards and applicable regulations.

H23 830 B2.28.1 *High Efficiency Aluminum Core Heat Recovery (Reversing Flow Style with 2 Position Damper).1 This heat recovery system shall be the basis of design and shall be utilized for the base price.* An aluminum core heat recovery system would be susceptible to cross contamination between exhaust and supply air streams. If this type of system were to be specified it would only be usable in the rare times when the volume of outdoor air intake is greater then the volume of 'dirty' general exhaust and the system was not in a free cooling mode. Alternatively our design has utilized a glycol run around loop heat recovery system which isolates the exhaust and supply air streams, ensuring zero cross contamination while ensuring heat recovery is available under all operating conditions.

H23 863 A1.2 *Hybrid fluid cooler. Furnish and install an induced-draft, crossflow-type, factory assembled, galvanized steel, closed circuit fluid cooler. Unit shall consist of cell. The limiting overall dimensions of the fluid cooler shall be 8.4167 ft wide, 9.0625 ft long, and 16.99 ft high to the top of the fan guard. Total operating power of all fans shall not exceed 15 Hp. Combined capacity of all motors per cell shall not exceed Hp.* 15Hp fluid coolers are below the manufacturer's recommendations for fluid cooler cell size on our project. In order to improve the operating efficiency and to reduce the number of fluid coolers required, our design will utilize 30Hp fluid coolers, in accordance with the manufacturer's recommendations. We have designed our system according to the required codes but not to satisfy the Kyoto Protocol requirements which are unknown at this time.

2.2.11 Medical Gases

INTRODUCTION

The following describes the medical gas system proposed for the ACC and compliments the design information contained within the drawings provided in the Drawings Package.

2.2.11. a) For Medical Gases

- The medical gas plant will be located in the mechanical room area on the main level of the ACC.
- The air compressors, desiccant dryers and the vacuum pump system are located in the main mechanical room.
- The medical gas cylinder room is located southwest of the mechanical room and is approximately 106.6m². The cylinder room holds the medical air reserve cylinders, the nitrogen cylinders, nitrous oxide cylinder and carbon dioxide cylinders. The oxygen will be provided from the existing bulk oxygen system located on site.
- Medical Gas equipment capacity and type:
  - Medical Air compressors shall be quad oil-less, base mounted package capable of 144 scfm (4075 L/min) complete with desiccant dryers
  - Utility air compressor shall be duplex oil-less, stack mounted package capable of 2 x 19.8 scfm complete with desiccant dryers.
  - Vacuum pumps shall be triplex oil-less rotary lobe system capable of 118 scfm.
  - The existing bulk oxygen system will need to be evaluated as to whether it has enough capacity to provide for additional demand from the ACC. The existing system may need to be upgraded for the site. Since we are not able to confirm if this system will require upgrade, we have assumed that it will not at this time. We will confirm if a capacity issue exists within the first three months of design and notify the Authority if further measures are required.

i) Provide drawings (1:200) of the medical gas services and systems.

Please refer to drawings M08 to M014.

ii) Describe the medical gas plant, size and storage, including the number and capacity of central compressors, vacuum pumps, cylinder storage, bulk storage, etc.

- The medical gases were sized according to the approximate number of outlets outlined for the ACC building in the technical specification and room data sheets.

- The medical gas equipment and cylinders are located on the main floor of the hospital. The gases will be piped from the mechanical room to four mechanical shafts (two per tower) and rise up to the floors above. All medical gas services on each floor shall be looped to assist with maintenance and allow of easy installation of future services.
- For each area requiring medical gas, there will be a centrally located medical valve box and alarm panel. Medical gas will be piped to the valve box and then distributed to the units. Isolation valves will be installed for each room and area to minimize area shut-down for maintenance and future installations.

iii) Describe how the medical gas services and systems will satisfy the needs of plant, equipment, staff and patient facilities.

The medical gas system being provided will comply with the intent of the output specifications and will be compatible with the system currently used on site. Piping distributions will include a suitable number of isolation valves and zones which will be strategically located to limit the effect on adjacent areas during maintenance shutdowns so that the impact on staff and patients can be minimized.

The outlets will be of a similar type to the ones used within the facility so that existing equipment can be used interchangeably and staff can be confident in their use.

iv) Provide details of the following:

Compliance with provincial and national standards/codes and practices

The design will comply with the following:

- CAN/CSA Standard-Z305.1-92, Non-Flammable Medical Gas Piping Systems, and
- CAN/CSA Standard Z305.5-M86 Medical Gas Terminal Units.

Source of each gas

- Medical air shall be provided from the triplex oil-less air compressor in the mechanical room. The reserve medical air cylinders will be located in the cylinder room.
- Oxygen will be provided from the existing bulk oxygen system and piped to the new ACC building.
- The nitrogen, nitrous oxide and carbon dioxide cylinders shall be located in the cylinder room, north of the main mechanical room and will be complete with manifolds.

Systems proposed for gas supply and vacuum

- Vacuum shall be provided by the duplex oil-less vacuum pump system located in the mechanical room.

Gas type provided

The following gases have been provided for:

- Medical Air
- Vacuum
- Oxygen
- Nitrogen
- Nitrous Oxide
- Carbon Dioxide
- Compressed air for CSR

Location of each plant or storage facility and how they will be accessed

- All medical gas equipment and cylinders shall be located on the main floor of the ACC building in the mechanical room and gas cylinder room. There will be external access provided near the ambulance garage and alternate access from the interior of the building.
- The existing bulk oxygen system is located west of the existing parkade and new UBC building.

v) Each item of plant and the extent of each medical gas system must be detailed separately

- Refer to section iv) above.

vi) Identify Certification Company

- Medical gas testing will be by a certified testing agency to ensure gas purity and no cross-contamination. All costs associated with the co-ordination and assistance during testing have been allowed for.

2.2.15 Furniture, Fittings and Equipment

2.2.15. a) Describe how Project Co will manage equipment requirements/deliveries with Authority.

With regard to KGH and VJH, describe how Project Co will interface with the Authority with regard to Design and Construction Output Specifications Sections H1 and H2 Equipment.

With regard to KGH, describe how Project Co will interface with the UBC Faculty of Medicine with regard to Design and Construction Output Specifications Section H3 Equipment.

Infusion, through its involvement with healthcare projects, believes the best way of delivering Equipment is through direct communication at the earliest possible opportunity with the User, Infusion and Infusion's Healthcare Equipment Consultant. Equipment is intrinsic to the design of the Hospital, Infusion knows that the User of the Facility needs to be comfortable to fulfil their duties yet if the Equipment, the 'tools of the trade', are anyway below expectation then the final piece of the jigsaw will not be fully delivered to the satisfaction of the User. Schedule 3, Volume 2 & 3 Sections H1.1, Equipment Procurement Strategy identifies the overriding principles and the information below

Infusion will review the requirements of the Equipment Program from Interior Health and would then welcome further dialogue with the Users to completely understand the needs and outputs necessary. Infusion understands there are constraints in the choices of equipment, be it time, quality or cost along with maintenance and Life Cycle. Infusion comes with the necessary skills to assist in this process and primarily their expert knowledge covering the procurement process

Infusion take pride in our delivery in such a key element of the building and warrant that sufficient time and energy is directed utilizing Equipment List Appendix 1 and reflect the requirements of the Output Specifications Sections H1 and H2 Listed below is our view to ensure capturing and delivering the best for Kelowna and Vernon, and have used the Output Specifications H1 and H2 as a template for our delivery.

General Approach to Equipment Planning

Infusion will provide an Equipment Planner as part of our service for delivery of equipment. The Equipment Planner's services are performed in a systematic step-by-step progression of activities. Each activity is time-sequenced to coordinate precisely with the corresponding design and construction phases over the term of the project. This process provides for the orderly development and assembly of valid information during each activity for which the succeeding activity is dependent.

As part of our analysis and equipment selection, we work closely with the architects and engineers to ensure that they have the correct specifications for any owner-supplied equipment that may impact the design of the space. All structural, mechanical and utility issues related to equipment are addressed early in the process. We have the technical expertise necessary to

help identify the most current technologies, as well as specify and purchase them in a cost effective manner.

This knowledge base and early involvement for the design interface will be critical for the success at Kelowna, Vernon and Kelowna UBC. Each project presents its own unique equipment requirements yet this will be managed by Infusion's Equipment Planner through their understanding of timing and presentation of detailed information co-ordinated with not only the Output Specification H1, H2 and H3 but also the inclusion of the Output Specification as a whole.

Approach to Integration of Equipment Planning Activities with Construction and Project Completion

During construction the Equipment Planner begins Minor Equipment Specifications Development, which includes the development of minor equipment specifications with users, creation of preliminary purchasing specifications and establishing a composite room list that includes new and reused equipment.

The Equipment Planner will coordinate the delivery for all equipment purchased by owner-supplied, contractor installed equipment. The entire process will be closely monitored to ensure that the required equipment is on-site when it is needed so as to not delay occupancy.

Preparation of Requests for Proposals and Purchase of Equipment

The Construction Schedule will be monitored periodically with other members of the Project Team to begin to determine the Delivery Schedule for Category 1 equipment.

The Equipment Planner will prepare and submit to the Hospitals a recommended bid list by category commodity. The Hospitals will review, modify, and approve the suppliers' bid list.

Based on the projected delivery dates, the Equipment Planner will issue Requests for Proposals (RFPs) for the required Category 1 equipment. These RFPs will be issued in time to ensure that the Authority has sufficient time to review and approve the purchase of equipment from the successful manufacturers.

These bid packages will incorporate any special terms and conditions—including prices—by manufacturer and equipment model numbers (or alternatives), accessories, warranty information (where appropriate), maintenance contracts (as appropriate), and delivery terms for the equipment. The bid package will also include provisions guaranteeing delivery of the latest version/technology available at the time of shipment.

Once manufacturers' bids are received, all specifics – including costs, terms and conditions, options and/or recommendations, etc. – are entered, by manufacturer, into spreadsheets so that accurate comparisons can be made between the various manufacturers' offers.
Using this tool, we will consult with the Authority to analyze the specific bids. Based on long experience with the operation and function of virtually all major hospital equipment, we will advise and make recommendations as to the most cost-effective selections. Once all the equipment information is presented and analyzed, the Authority will make the final decision on each buy.

After equipment decisions have been made, the Authority may grant the Equipment Planner full authority to negotiate final terms on its behalf. When the final terms have been negotiated, the Authority will have the opportunity to review and approve those terms. The Equipment Planner then will prepare, for Authority review, all purchase order (PO) documents required by each manufacturer. After POs have been approved, the Equipment Planner—as the agent of the Authority—will issue them, and copy all appropriate and authorized parties.

The Authority would order all equipment shown as Authority supplied from the Room by Room Equipment (Equipment List Appendix 1) List. Our proposals are based on the supply and installation of equipment in accordance with the requirements in the Equipment Lists provided in the Data Room. Specifically, we note that neither parking equipment nor window washing equipment have been specified or allowed for at either the Vernon or Kelowna sites.

Installation of Category 1 Equipment

The Equipment Planner will develop the timetables for delivery and installation of all Category 1 equipment that must be installed during construction. This equipment will be delivered directly to the Project site. When required or appropriate, Infusion will coordinate the schedules of any equipment manufacturer/supplier that must be on site during the installation process.

Pre-Installation Management of Category 2 and 3 Equipment

Prior to the installation of new equipment, the Equipment Planner will meet with the Authority to determine occupancy dates for specific areas of the new building. Once dates have been confirmed, the Equipment Planner will notify the Authority of the schedule. This effort will then be coordinated with appropriate and authorized Authority resources: Bio-Med/Facilities, IT/MIS, Respiratory, Telecom, etc. Some level of pre-planning is accomplished with the placement of new vs. existing equipment (i.e. what a department requires to remain operational during the move, what medical equipment is needed for the move, and what can physically be de-installed and relocated prior to, during, and after the move).

The Equipment Planner will meet with other members of the project team and determine the best location for offloading of new equipment, specific routes within the new facility, elevator availability and elevator/floor protection requirements.

Delivery/Installation Coordination and Expediting

In conjunction with the Construction Manager, the Equipment Planner will schedule and coordinate the delivery and installation dates for all equipment and furnishings purchased by the Authority and by the Equipment Planner on behalf of the Authority. We will monitor and expedite deliveries to ensure compatibility with construction work schedules and occupancy dates, and publish periodic Purchasing Status Reports.

Storage Management (Staging)

Subsequent to the contracting for off-site storage services (if required) for applicable owner-installed equipment, the Equipment Planner will monitor such services on an ongoing basis.

Receiving Management

The Equipment Planner will provide procedural guidance and monitor receiving activities, including documentation of deliveries, for all owner-supplied equipment. We will resolve matters relating to damaged or non-conforming shipments.

Installation/Relocation Management

Subsequent to contracting for installation services for Authority equipment and furnishings (not otherwise provided by Authority personnel or equipment and furnishings suppliers), the Equipment Planner will monitor all such services, as well as coordinate supplier supervision of owner-supplied/contractor-installed items.

After installation, we will inspect the condition and operation of the equipment and coordinate any repairs, modifications, or replacements necessary to comply with purchase order terms and conditions.

The Equipment Planner will assist the Authority with the development of a plan that will provide for the timely and systemic relocation of retained items.

Equipment Training

Working in Conjunction with Authority representatives, the Equipment Planner will contact manufacturers/reps and schedule staff in-services/training on the appropriate equipment.

Resolution of Damage Claims and Invoice Discrepancies

The Equipment Planner will provide procedural guidance to the Hospitals with respect to the routing and review of equipment invoices or requests for payments. We will negotiate damage claims on behalf of the Authority and resolve, if authorized, any invoice variances to ensure compliance with purchase order terms and conditions. All such actions will be subject to the Authority's prior approval.

Follow-Through

Subject to prior approval by the Authority, and subsequent to occupancy, the Equipment Planner will take all necessary action to assist in enforcing the obligations of any supplier of equipment or furnishings including providing in-service training, spare parts lists, maintenance manuals, warranties, and service contracts.

INTRODUCTION

Infusion takes an active role in managing the design and construction phase of its projects and will be represented on site throughout as the first point of contact for the Authority. Graham Design Builders and Stantec will operate as a fully integrated design and construction team for the project execution. The schedule for design and construction of the facilities is of vital importance to the Authority and the communities it serves. We believe that by working together with a non-traditional, collaborative approach we will deliver the project on time, reliably, safely and to the satisfaction of the Authority. Our approach will allow Graham Design Builders to fast-track the design and construction interface and to reduce overall timescales. Through this integrated relationship we share openly ideas, seek improvements and evolve solutions to meet project objectives.

Our inherent local presence speaks clearly of our commitment to the community. The key members of our team have intimate knowledge of these types of projects and the needs of both the Authority and the community.

The team will:

- Respect and prioritize the hospitals' health service mission
- Maintain high levels of technical competence and professionalism
- Ensure a consistent level of performance
- Ensure compliance with all applicable standards, guidelines and regulations as well as its contractual obligations

2.3.1. a) Describe and provide an outline management plan for the integration of the design and construction phases of the Project, showing and identifying:

Management Plan

On the selection of preferred proponent we will activate the project management plan which will give clear and concise direction on processes and procedures for project. The management plan will incorporate all necessary project controls, guidance and procedures relating to:

- Management processes
- Design processes
- Methodology and work procedures
- Schedule management
- Quality assurance
- Health and safety
- Environmental and LEED

Within the management plan there are a number of areas of particular importance to the Authority, which we make comment on below.

Design and Construction Organization

Further detail of the design build team organization is provided in section 2.3.2. of the proposal.

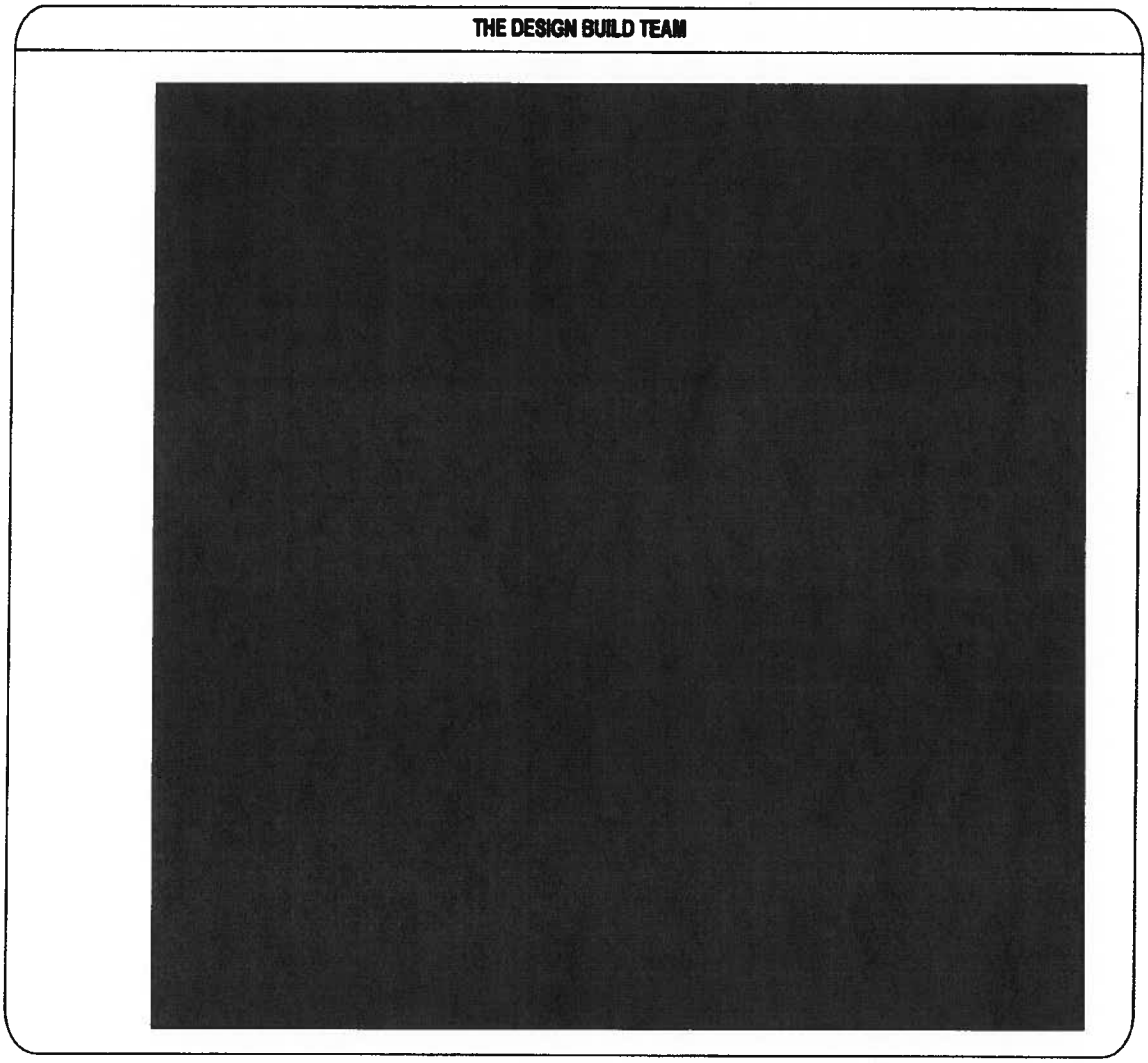


Figure 21: Design Build Organization Chart

i) Construction methodology and general approach to be adopted for the Project. Indicate the Proponent's understanding of the Project processes and roles of both the Authority and Project Co.

In determining appropriate construction methodology it is important to understand the schedule constraints as well as the design which will be constructed. Further schedule information is

provided in section 2.3.3., however, the methodology descriptions below are closely linked with the approach to design and construction schedule.

Our proposals and project delivery schedule are based on agreeing the terms of an early works contract with the Authority to enable commencement of certain design and site work immediately after the announcement of the preferred proponent. The early works will include amending the preloading at the KGH-ACC site, realignment of underground sanitary, water, gas, and electrical services, commencement of design and making applications for site development, building and demolition permits. The form and key terms of the early works contract are provided in section 4.3. of this proposal.

The project will be immediately mobilized on site to initiate the early works as agreed, in accordance with the schedule. Site offices will be set up, communication protocols will be firmed, and procedures as below will implemented.

1) The Ambulance Bay and Public Emergency Entrance will be relocated. In order for this to take place, an improvement to the existing Ambulance non-critical area will be upgraded to provide for an enclosure and necessary signage. The intent of this relocation is to allow for unimpeded access to the emergency entrance and to divert traffic away from construction activities. Two separate vehicle loops, clearly marked with signage, will be provided off Royal Avenue to coordinate flow and eliminate potential conflicts between public vehicles and ambulances. Ambulance parking will be provided on the ambulance loop and short term vehicle parking will be available on the Public loop. The primary site access and egress will be located off Pandosy Street to minimise the need for construction vehicles to drive on Royal Avenue. A secondary entrance and egress will be necessary off Royal Avenue for occasional construction events such as specific concrete pours or loading of materials to the North side of the ACC Building. Under such circumstances, flag staff, lane control, and signage will be provided to ensure uninterrupted flow of ambulance and public emergency traffic. Construction vehicles will leave the site by merging back on to Pandosy Street in the southbound direction to prevent the need to cross lanes.
2) Preloading coordination will be required as the initially placed preload will require modification to meet the final design requirements. Utilities will be realigned and the access to the front entrance will be rerouted away from the construction site. This will allow for completion of the supplementary preloading of the site for the main building.
3) The UBC / Parkade building will be constructed immediately and completed in December 2009 for service availability and occupancy. As this is a separate building

it offers considerable advantages of early completion for the hospital, UBC and all users.

4) We have attempted to eliminate the disruption within the existing facility at all costs, for which reason we have strategically located our connection points. This should assure the minimum stress on the patients and staff.

The schedule put forward to complete this project is achievable but strives to achieve the Authority's imperative of early completion. In order to complete the design during the timelines established, communications between the design team, the builder, Infusion and the facilities manager will be clear and direct. To achieve a higher degree of synergy, the core design team will be located in a single project office, along with Infusion's project leadership and key team members from the design-build contractor and the facilities manager. The team will work from a single office location which will enable a focused, coordinated approach and will encourage strong collaboration between infrastructure providers, designers, constructors and operations specialists.

We believe that this is the best way to achieve a complete design that accounts for all of the required performance outputs. Each team member can provide challenges or input to the design process, and at the same time remain informed of progress to efficiently evolve his or her particular responsibility on the project. All of the materials will be managed and stored on a dedicated project server to enable immediate access to all information and to facilitate coordination.

Underpinning the tangible measures to ensure coordination is a philosophy common to all Infusion team members: that P3 projects demand a fully integrated team approach. Our methodology is to facilitate frequent, detailed and focused communications between team members to ensure that the design is understood and owned by the whole team.

ii) List departments that will require: phasing, alterations, and/or construction in the existing facility; possible ED (KGH).

Our proposals provide for a completely new Emergency Department within the ACC, which has the benefit of avoiding extensive phased refurbishment. There are several departments that will be affected by phasing, alterations, and construction activities in the existing facility:

Phase 1 – Prior to commencing construction of ACC level 1 raft slab:

- Main Public Entrance taken out of service (Emergency egress only) and temporary public entrance established on south side of building off Rose Avenue.
- Emergency Entrance taken out of service
- Royal Building North Entrance reinstated as temporary ambulance bay and public emergency drop off entrance.
- Ambulance Bay and Ambulance Entrance relocated to Royal Building North Entrance.

- Emergency Waiting access via Royal Building North Entrance and Admissions Waiting Area.
- Triage Nurse Station. If necessary, relocate to North Entrance Corridor.
- Ambulatory Care/Gastro Intestinal Lab Waiting. Potential renovation for Triage Nurse Station.

Phase 2 – As construction of ACC nears completion and tie in to existing building is necessary:
- Removal of Main Entrance Vestibules
- Demolition of existing Emergency Waiting Entrance Vesitbule.

Our proposals have made allowance for the handling and removal of asbestos in the existing facilities to the extent revealed in the information provided by the Authority in the Data Room. Should any other sources of asbestos, or other hazardous material, be encountered on either site besides what is described in the documents, we will liaise closely with the Authority to ensure that a safe environment for construction workers, hospital staff and patients is preserved. We have assumed that any impacts on construction schedule and costs of such an event will be dealt with using the variations and compensation event mechanisms in the Project Agreement.

iii) Interfacing to existing systems including shutdowns, modifications, replacement.

The requirements for system interface tie-ins will be refined once the full details of existing systems can be ascertained from site surveys and subsequent detailed design. In principle, we will leave existing systems fully operational and untouched until such time as the new building systems are complete and separately commissioned. Only once the new and old systems are proven to be simultaneously operational will the final connections be established. In preparation for the system shutdown a communications plan will be drafted and agreed with the hospital and communicated thoroughly to staff, patients and users in advance of the predetermined time and day of shutdown. During the shutdown period the hospital will be kept informed of progress of the interface connection work and notified immediately before system operation is restored.

The tie-ins to the existing hospital buildings will not require any shut downs of the operating units. We will construct false walls in the existing buildings prior to cutting the exterior envelope and installing the new doors. Once the new entrances and walkways are connected and complete, the false walls will be removed for access. A similar process will be followed for the partial demolition. We will need to build a temporary wall in the existing building; once the rooms have been vacated we will do the selective demolition, build the permanent wall, and remove the temporary wall.

iv) The process of design being implemented through construction.

Amongst the first processes to commence after announcement of preferred proponent will be developing the bid design in consultation and cooperation with the relevant parties. The focus will be on confirming the Authority's requirements for the design and agreeing the sign-off of functionality to the satisfaction of the Authority and the user groups. This will be done by through a series of structured design meetings with the lead representatives of Infusion, Graham and Stantec led by the Project Manager. The facility manager will also participate in these meetings to ensure the design acknowledges best practice for non-clinical functionality.

Detailed design integration requirements will then be better understood, detailed design will continue in a progressive manner, and initial site mobilization will take place. The intent of this period will be to evolve the final design, give the Authority's users the opportunity to confirm preferences, and to ensure complete documentation of the design. We fully understand that the design will be refined and construction methodology will be adapted to be flexible to the Authority's requirements. This integration of the design will be a collaborative effort in a completely open approach. We are firmly committed to teamwork and communication between all players – client, constructor, facility manager and concession manager – key partners for a successful project.

We have explained in section 2.1.1. of the proposal how we intend to approach the design development stage and the enhancements to the value optimization, design submittal and review processes, which we believe will accelerate project delivery whilst providing the Authority with flexibility as well as accurate, consistent and relevant information.

v) Traffic Management Plan during the construction work.

A Traffic Management Plan during construction will commence immediately utilizing the recently received reports following notification of the preferred proponent. Improvements to the intersections, cross-walks, sidewalks, lights, turn lanes etc. will be performed in accordance with the recommendations of the traffic study.

On days where major concrete pours are scheduled, or other activities are performed with high volume construction vehicle traffic, flag staff, signage, and lane control will be provided. When appropriate, construction vehicles will stage along Rose Avenue in lieu of staging on Pandosy Street and will enter the site at the Rose Avenue Entrance.

vi) Methodology for managing industrial relations risk.

Graham Design Builders operates as an open shop contractor using unionized and non-unionized work forces. For work we self perform, like concrete and carpentry, we use a labour force that is signatory to a CLAC agreement. Our major mechanical and electrical subcontractors are also unionized. The majority of our local interior and exterior finishing trades are likely to be non-unionized.

We manage our industrial relations risk by using contracts that put the risk of labour disruptions on to the party controlling the labour. Our standard subcontract contains clauses that clearly state that it is the trade contractor's responsibility to mitigate any labour disruptions, and Graham Design Builders has the right to terminate the contract should it come to that. Graham has an exemplary record in industrial relations and has not had a labour disruption on any of its sites in over 10 years.

vii) Dust and Noise Control Plan.

Graham recognizes that noise and vibration generated from construction activities in the day may disrupt procedures and treatments taking place in adjacent areas. Likewise, noise and vibration cannot be tolerated after hours because of the need for patients to sleep. Graham will review the entire design and will suggest design and constructability solutions, such as structural connection details and construction equipment selections, that will minimise the need for activities that produce noise or vibration.

Our plan to mitigate noise will include as a minimum:

- Restricting work to within hours specified by the City of Kelowna (no night work).
- Avoid starting equipment and work before 7:00am
- Using low decibel mufflers on all diesel equipment
- Using electric powered equipment where ever possible, including our tower crane which is 100% electric.

Where noise or vibration can not be eliminated, Graham will implement a communication protocol where staff can signal to the construction crews directly when work needs to cease. For example, an alert system can be installed where foremen or superintendents, upon receipt of a paged message by a designated hospital staff member, can immediately activate a series of flashing emergency lights via remote control to indicate "stop work". All workmen on site will be trained on this emergency procedure before they will be allowed to enter the site. We believe that this safety procedure will allow for an entire site shutdown in less than a minute.
Dust control procedures will be implemented immediately and will be maintained for the duration of construction.

When performing minor renovations inside the existing hospital, we will abide by the CSA code Z317.13-03, Infection Control during construction or renovation of Health Care Facilities. These areas are classified as medium to high risk population groups, and the construction activity will be small-scale, short duration, with minimal dust, or Type B construction activity as defined by the code.

For our work we will be using Preventative Measures I -III depending on the area we are working and the type of work we are performing. Special measures include, but are not limited to:

- Notify the user group and infection control department of our plans and obtain formal sign off prior to proceeding with the work before work commences.
- Close access panels and block vents if possible
- Clean area with a HEPA filter equipped vacuum
- using drop sheets tapped and sealed to control dust
- using water misting systems if required for dust control
- sealing windows and unused doors
- placing dust mats at access points to the work site to trap dust

Silt fences will be installed on the perimeter of the construction site to prevent run off of silt to city streets, and in doing so, help keep the streets clean and reduce the dust kicked up by flow of traffic.

Wheel washes will be installed at site exits to reduce the dirt leaving site on construction vehicles, such as dump trucks during excavation, to help maintain the cleanliness on the adjacent streets.

On days where the site is dry and at risk of creating dust, sprayed water will be utilized to help keep particulates from becoming airborne.

viii) Communications Plan with Neighbourhood/community groups, Hospital Staff and Visitors.

Underpinning our whole approach to working within and on behalf of local communities is our guiding principle of 'respect for people'. Through listening and understanding the needs of the communities within which we work, we are able to respond in positive, proactive ways with solutions.

We look to engage with the community through our resident Liaison Manager, who will forge links with the Community, Hospitals, Visitors and other stakeholders ensuring that their wishes are heard and responded to.

Our Approach in Detail

The interests of our clients are paramount. We firmly believe that the success of our company depends on understanding and satisfying its clients. To our clients we must always deliver the highest level of quality and service.

Graham considers its reputation as a leading contractor to be very important. Clients, employees, consultants, subcontractors and suppliers will be treated with the highest standards of integrity and reliability.

We shall continue to deliver the Quality service in the business we know best.
Infusion will work in partnership with the Authority and each hospital, supporting their initiatives to proactively promote the Project and to ensure all stakeholders are fully informed regarding the development and any particular issues that may be of concern to them. We will take the leading role in promoting the issues surrounding the impact of demolition, construction work and operations to all stakeholders, liaising with each hospital and their communications teams on a daily basis to promote the Project.

Communication with the Community
Effective communication requires an understanding of the relevant information and channels required for each stakeholder. We therefore strive to ensure that we are in touch with stakeholders' communication needs, both in terms of the content they require and the process by which they access and deliver information. A range of communications' strategies will be used to meet the diverse communication requirements of different stakeholder groups. Additionally, Infusion will explore innovative and less conventional methods such as web sites, SMS and art competitions to augment traditional communications strategies. The range of communications tools at Infusion's disposal is shown in the chart below.

Internal communications are equally important: we will use, amongst other tools, a web based communications site based on either Infusion's or Graham's existing standards. All external communication will be handled within Infusion, in full consultation with the Authority, as a single point of public contact for the consortium members.

We will ensure that the communication to all parties is consistent and co-ordinated with each stakeholder. We will provide a 'human face' to our communication, maximising the opportunity for direct engagement with stakeholders. This will provide ongoing, personalised

communication with stakeholders, which will be escalated in intensity prior to demolition activities and during the construction and operations phase.

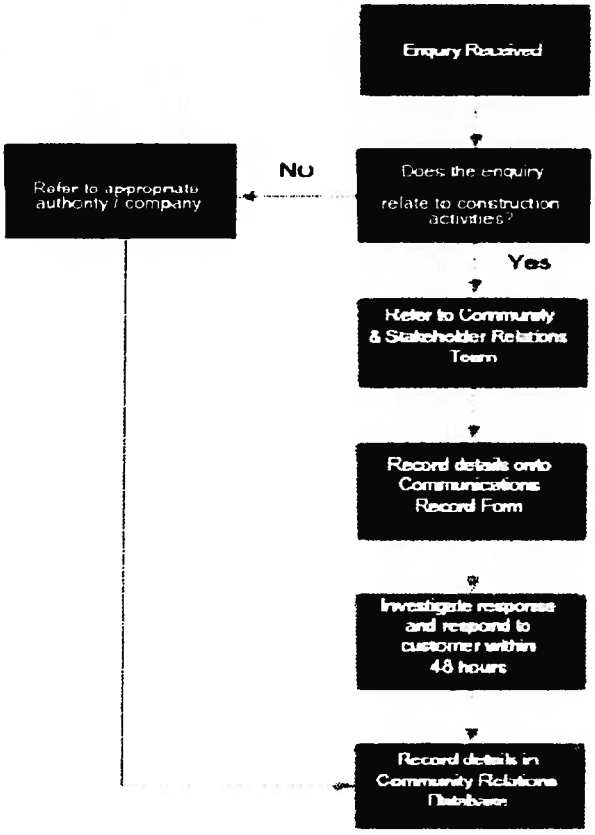
Table 5: Communications Tools

Tool	Audience	Purpose	Proposed Timeframe	Infusion Communications Team Role	IHA Communications Team Role
Hard Copy Materials					
Project Fact Sheets	Target audiences Broader community Key stakeholders	Provide information	Key milestone dates	Prepare and distribute with Project Manager approval	Provides info as necessary and signoff
Flyers/Notifications	Hospital users Local community Target audiences	Distribute information	Prior to work commencing (not less than 48 hours before)	Prepare draft for approval Facilitate distribution	Provides info as necessary and signoff
Construction Activity/ Project Milestone List	Target audiences Broader community Key stakeholders	Provide information	When required	Prepare and distribute at relevant meetings For use in various publications with Project Manager approval	Contribute as necessary
Website					
Website	Target audiences Broader community	Distribute information	When required	Manage and update	Contribute as necessary
Project Photography/ Webcam	Target audiences Broader community Key stakeholders	Provide historical information	Monthly	Plan, organise and facilitate	Coordinate location and subject of photography
Meetings and Briefings with Stakeholders					
Community briefings/ meetings	Target audiences Broader community	Collect and exchange information Educate	Regular basis/When required	Plan and facilitate and invite relevant project staff to attend when required	Attend meetings and participate
Elected representative briefings	Elected representatives	Collect and exchange information	When required	Provide assistance upon request	Manage all briefings
One-on-one briefings	Target audiences	Collect and exchange information Educate	When required	Facilitate and invite representatives and relevant project staff to attend when required	Plan, convene and facilitate meetings
Project Emergency Services Meeting	Emergency services	Provide information	When required	Plan, convene and facilitate inviting relevant project staff to attend when required	Plan, convene and facilitate meetings
Community presentations/Displays	Hospital users Local community Target audiences	Collect and exchange information Educate	Prior to construction commencing When required.	Plan and facilitate and invite relevant project staff to attend when required	Plan, convene and facilitate meetings
Media Promotion					
Celebratory Events	Target audiences Broader community Project Personnel	Celebrates achievements	As required	Develop, implement and manage celebration event	Advise and co-manage event
Articles and Awards	Target audiences Broader community Industry	Revise profile and promote success	At technical breakthroughs or achievements	Prepare articles Prepare award submissions.	Sign off all material
Media releases Media kit	Target audiences Media Broader community	Distribute information	When required	Provide suggested copy for approval No contact to be made without prior approval from Project Manager	Sign off all material
Community Information					
Community Information Line	Target audiences Broader community	Collect and exchange information	Set up before construction commences Life span of project 24/7 coverage	Develop and manage	Assist in promoting community Information line
Email/SMS Alerts	Target audiences	Collect and exchange information	Set up before construction commences Life span of project	Manage and update	Assist in promoting service
Site Tours Schools program	Target audiences/Transport users/Government/Industry bodies/Local schools	Collect and exchange information Educate	When required	Plan and facilitate and invite relevant project staff to attend when required	Assist in planning and promotion of tours to relevant bodies
Community Feedback Initiatives					
Master Database	Infusion IHA Hospital	Collect and analyse information	Ongoing	Provide updated information for site-related enquiries and complaints within 48 hours	Provide information to responses
Advertising					
Advertisements/Public notices	Target audiences Local community Broader community	Distribute information	Minimum of one week lead time	Prepare draft for approval Facilitate placement/booking of advertisements	Provide and approve information

We will work to identify any sensitive issues and engage with our partners in the development of communications strategies to effectively manage these issues, taking care to listen, understand and respond in a timely manner

The actual process for a question raised by the stakeholder is to allow free open access to the Liaison Manager who can be contacted by a number of methods yet ideally, where there can, there will be face to face contact, the Liaison Manager will then take full note of the question and details of the Stakeholder then process in a minimum period of 48 hours.

Figure 1 - Community Inquiry Flowchart



If at any time there is a failing in the processes then a full audit will be undertaken by the Liaison Committee. Recommendations will be advised by the Committee and processes updated.

ix) How facilities will be developed and the process by which commissioning will be undertaken.

Hospitals are recognized as some of the most sophisticated facilities delivered by the construction industry. Not only do they have numerous electrical, mechanical and communications systems, but they must also provide an attractive ambience for the staff and patients. We do not only check that a device works, or how the system is designed, we are

genuinely concerned by the overall building performance as it relates to patient and staff experience.

Infusion realizes the need for all building systems to function properly and in harmony and therefore has included an initial model of the Commissioning Plan to be used on this project as *Appendix 2.3.1. A: Commissioning Plan.* The initial draft was developed in conjunction with both our Construction and Facilities Management Partners, Graham and Black and McDonald. The commissioning plan will be further evolved and mandated to include all systems, identify responsible parties, and initiate a training schedule. Time lines will be incorporated in the overall construction schedule.

We at Infusion believe that planning for the commissioning of any facility must commence from day 1. Infusion will take a holistic and inclusive approach to commissioning ensuring that all stakeholders – contractors; subcontractors; Engineers of Record; the hospitals; Independent Certifiers, users and operators – participate in the commissioning process so that it is well understood that the facility has been constructed to the required performance and is operating at that optimum level. Commissioning is not viewed as just the testing of basic elements of a system but rather incorporates the Testing, Commissioning, Acceptance, Training and Turnover of a facility as a whole.

At least four months prior to the commencement of any commissioning exercises, the Commissioning Steering Committee, made up of all project stakeholders, will meet and begin to track the construction in order to ensure the commissioning schedule, previously developed, is met. During the commissioning process, the steering committee will meet on a regular basis to ensure commissioning is being completed in a timely manner and to address any issues during the process. The Committee will ensure proper progress by review of the schedule as well as monitoring of key metrics for each system being commissioned. These performance metrics will be established during the further development of the Master Commissioning Plan as well as the Detailed Commissioning Plans.

Another key element of the Commissioning process is training. The Commissioning Agent in conjunction with the Engineer of Record, the various construction trades, and the Facilities Maintainer will develop training plans for each system being procured. The training plan will include a training agenda, any relevant information of the system, as well as a training script for the Trainer. Interior Health representatives will be encouraged to participate in the training process and all training will be video recorded for training of future staff.

x) Approach to constructing and managing required mock-up rooms. Mock-up rooms will be the following: (OR (65sm); Trauma room; Renal Dialysis Bay; ICU room; Paediatric Inpatient room including isolation ante room) and LDRP.

Rooms will be mocked-up during the design development phase of the project. We will be developing these in the Alexander wing of the Vernon building (which is ultimately scheduled to be demolished by the end of the project). The intent of these is to fine tune the design and material selections, ensure the operators accept and influence the design, and to trouble shoot any workmanship issues.

These rooms will be:

- OR
- Trauma

- Renal Dialysis
- ICU
- Paediatrics
- Inpatient Room
- Isolation and Ante Room
- LDRP

We feel that constructing the mock-up rooms in one of the existing buildings scheduled for demolition is the best, and least expensive overall option for the Authority. This will eliminate having to rent or build new space for the mock-ups. Also the existing buildings are operational with heat and power with ample space to house the mock-ups. One other particular advantage of the proposed location is by using the existing buildings, the mock-ups are very close to the user groups which makes it very convenient for the review process. This requirement is important and imperative at the initial phase of design development. Once the mock-ups are reviewed, the areas including building will be demolished to allow for the Vernon project development.

It is also understood that not all elements will be available at the time of mock-up, so, in order to achieve full understanding of relationships, we will be producing full scale representations of items not available at the time.

2.4.1 Construction Drawings:

Kelowna Room Area Schedule
UBC/Parkade, Level 1 & 2
ACC Level 1 Floor Layout
ACC Level 2 Floor Layout
ACC Level 3 Floor Layout
ACC Level 1 Area Changes
ACC Level 2 Area Changes
ACC Level 3 Area Changes
Kelowna Site Development Plan
UBC/Parkade Site Development Plan

Kelowna General Hospital - Ambulatory Care Centre

SD Area Spreadsheet
08.06.11

[redacted]

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Kelowna General Hospital - Ambulatory Care Centre

SD Area Spreadsheet
08.06.11

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Kelowna General Hospital - Ambulatory Care Centre

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Kelowna General Hospital - Ambulatory Care Centre

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Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual ubmission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
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[redacted]								

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[redacted]								

Room Code	Room Data Sheet	Space	Units	Area Requirements					
				nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Room Code	Room Data Sheet	Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]									

Kelowna General Hospital - Ambulatory Care Centre

SD Area Spreadsheet
08.06.11

Room Code	Room Data Sheet Space	Units	nsm / Unit	Area Requirements Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Kelowna General Hospital - Ambulatory Care Centre

SD Area Spreadsheet
08.06.11

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

Room Code	Room Data Sheet Spnce	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm
[redacted]								

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm

[redacted]

Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual ubmission nsm	Variance nsm
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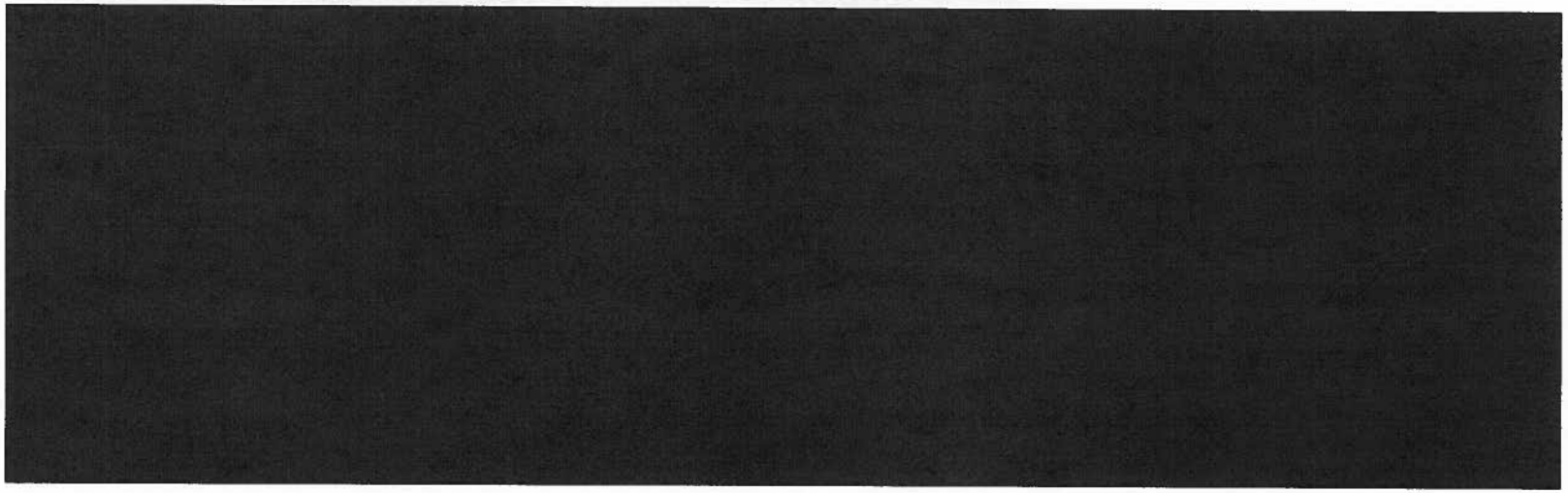
Room Code	Room Data Sheet Space	Units	Area Requirements nsm / Unit	Program nsm	Planning Factor	CGSM	Actual Submission nsm	Variance nsm



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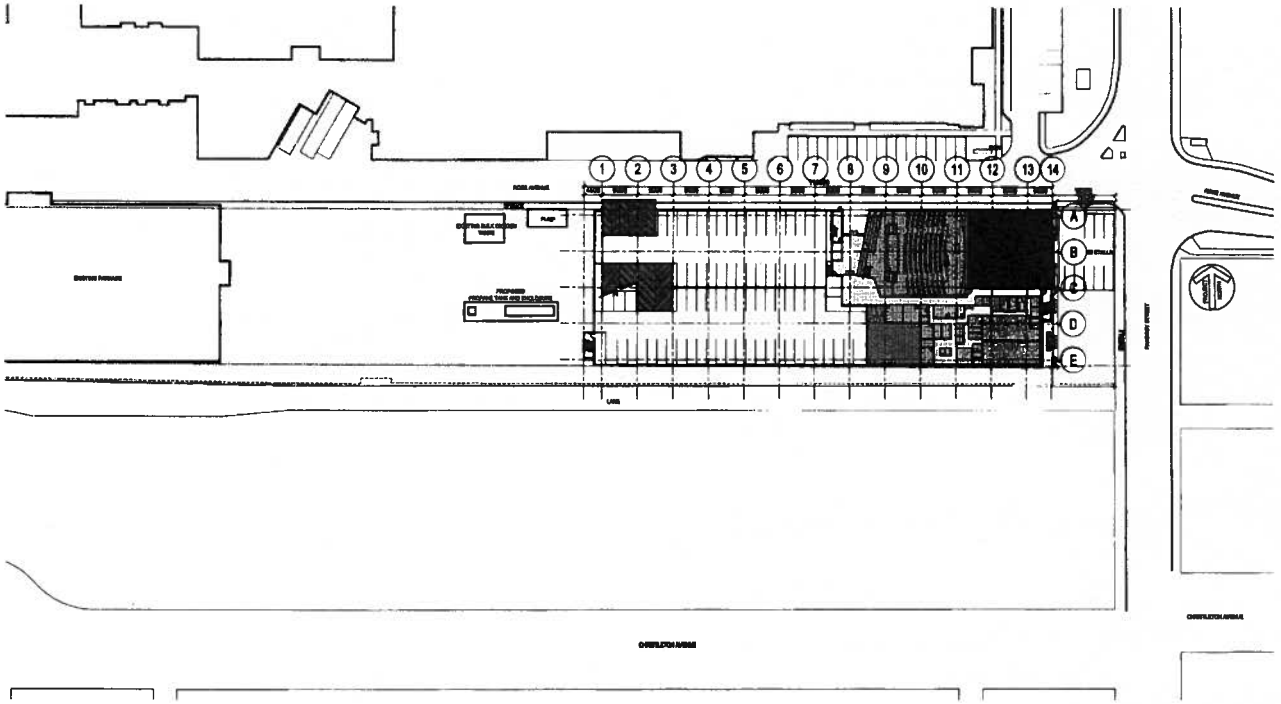

1 SITE PLAN

Stantec Architecture
400 825 Tyee Road
Victoria BC Canada
V9A 6X5
tel. 250.385.9181
fax. 250.382.0514
www.stantec.com

Stantec

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Legend

Notes

Revision | By | Appd. | YY.MM.DD

Issued | By | Appd. | YY.MM.DD

File Name | Dsn. | Dftd. | Chkd. | YY.MM.DD

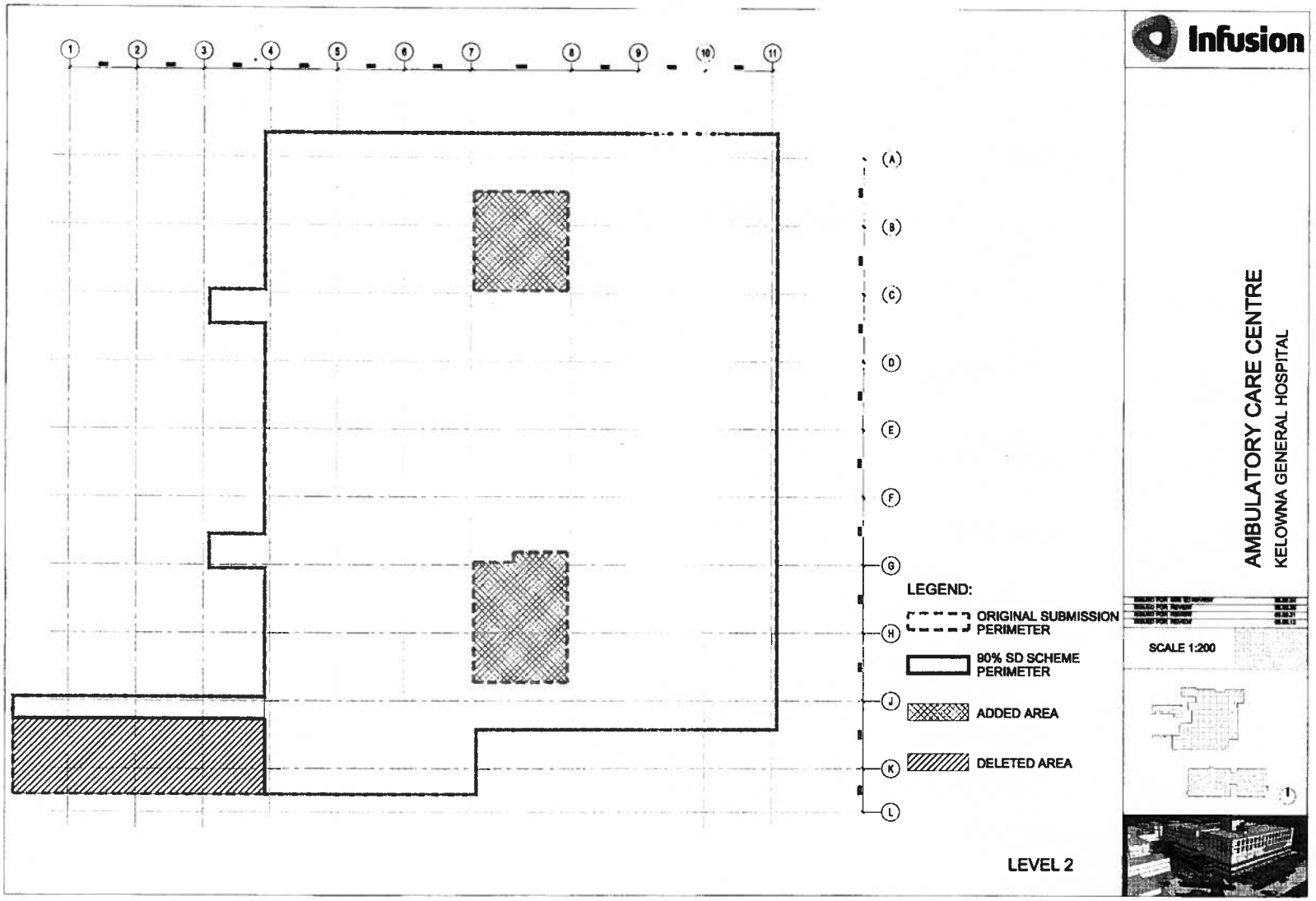
Permit Seal

Client/Project
CLIENT

KELOWNA GENERAL HOSPITAL
UBC/VISITORS PARKADE BUILDING-SITE PLAN
Kelowna BC Canada

Title

Project No.	Scale	
144388701	1:500	
Drawing No.	Sheet	Revision
A100	01 of 02	0

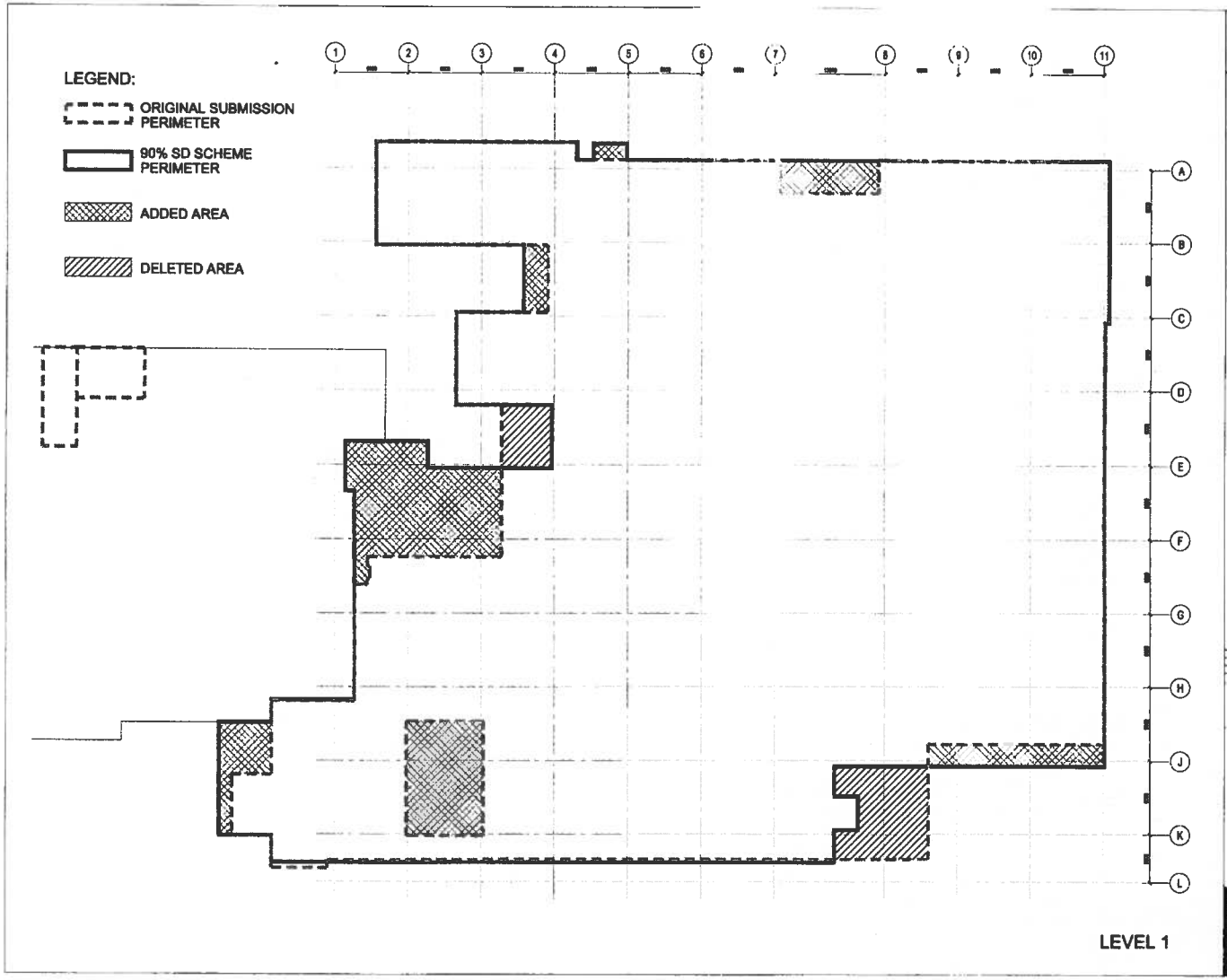


Infusion

AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

SCALE 1:200



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AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

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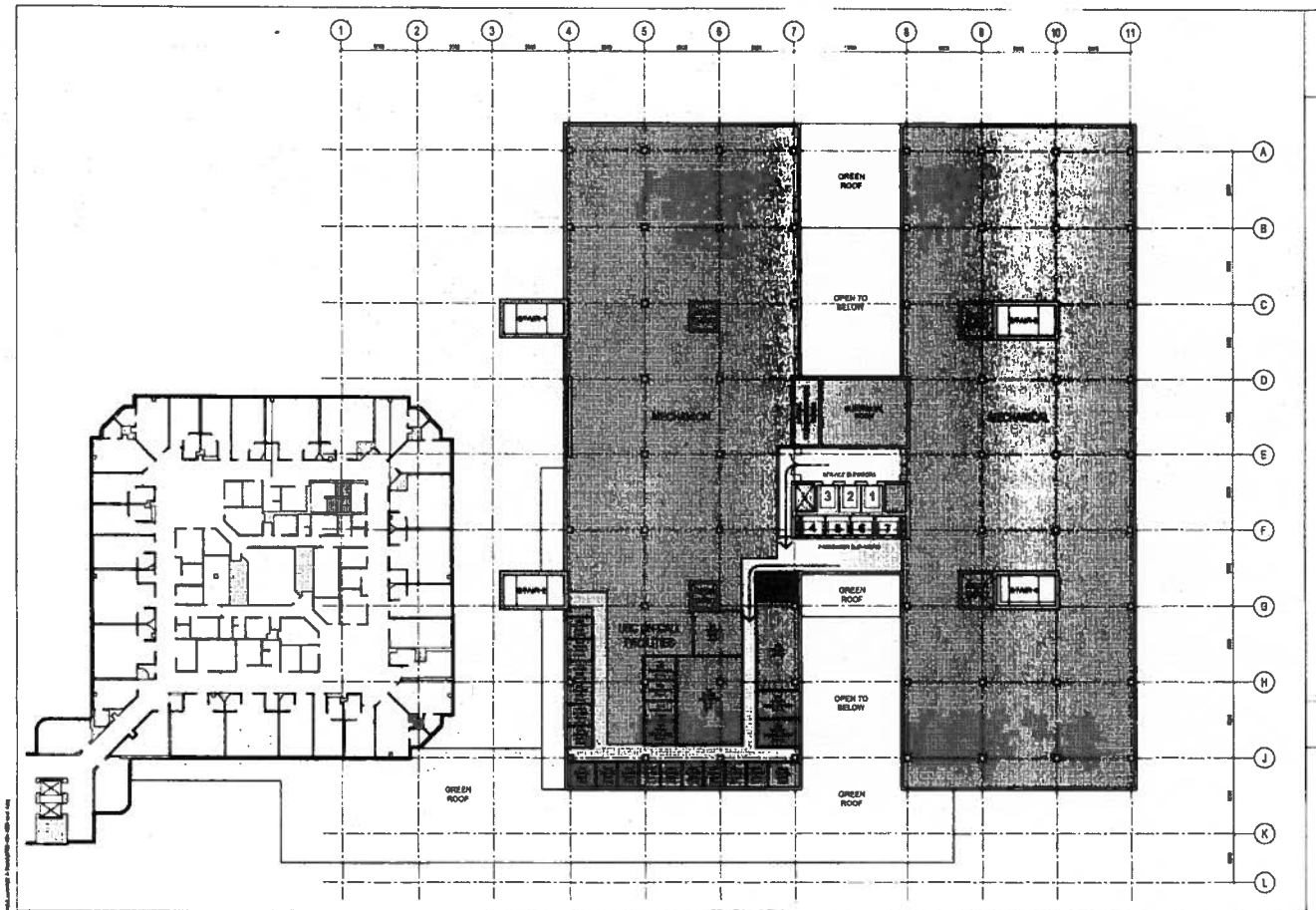


LEGEND

- PUBLIC CIRCULATION
- SERVICE CIRCULATION
- DEPARTMENTAL CIRCULATION
- STERILE CIRCULATION
- CARE STATION / RECEPTION

- B0 CENTRAL RECEPTION
- C1 EMERGENCY DEPT
- D2 INTERVENTIAL/ SHORT STAY
- D3 SPECIALTY CLINICS
- D4 PRE-ADMISSIONS
- D5 EXPRESS TESTING
- D6 RENAL SERVICES

- E1 SURGICAL SERVICES
- F1 UBC CLINICAL CAMPUS
- F2 OTHER ACADEMIC
- F3 RESEARCH
- F4 MEETING & VIDEOCONF.
- F5 STAFF SUPPORT
- F6 OTHER SPACES

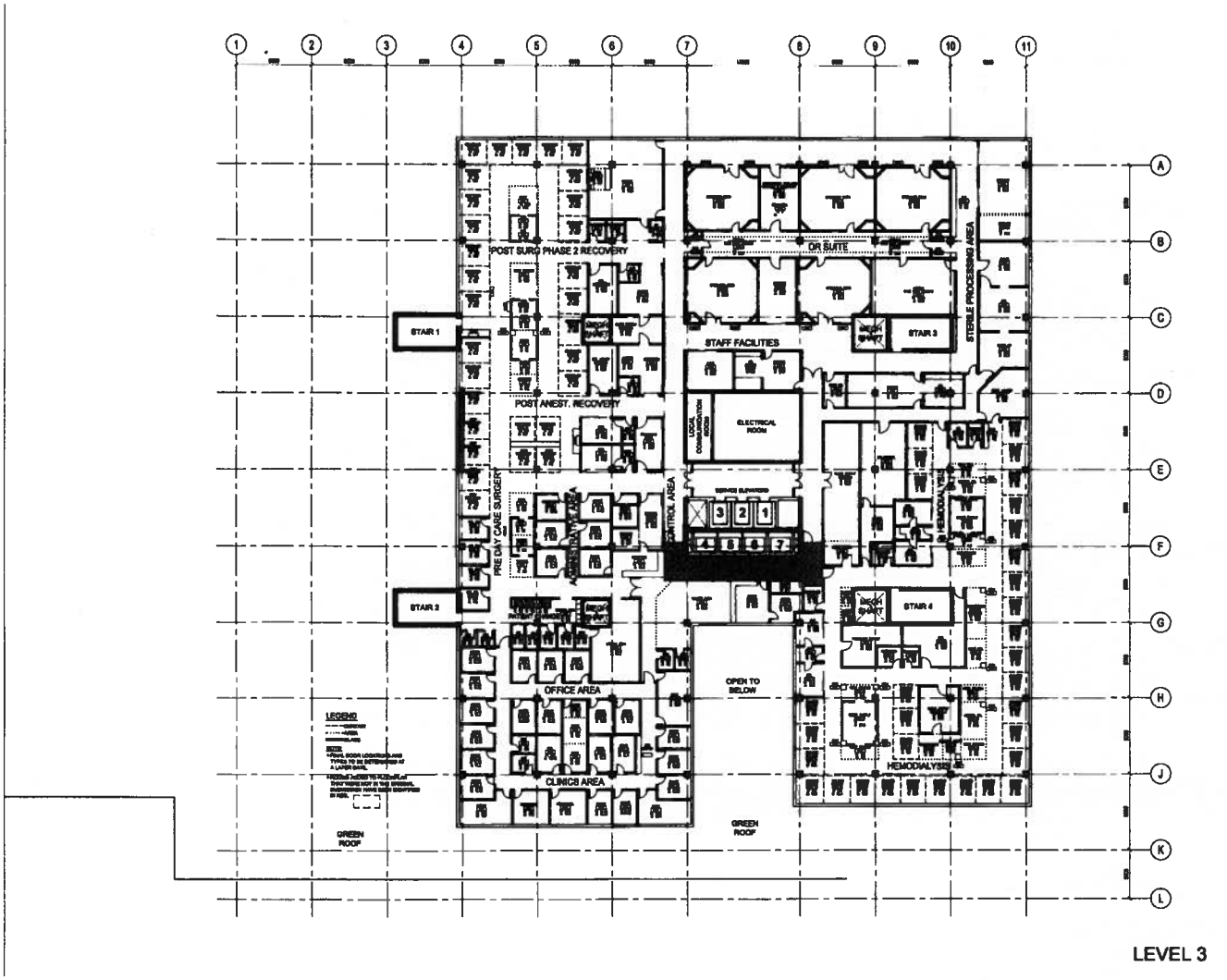
LEVEL 4

Infusion

AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

SCALE 1:200 | A008



LEVEL 3

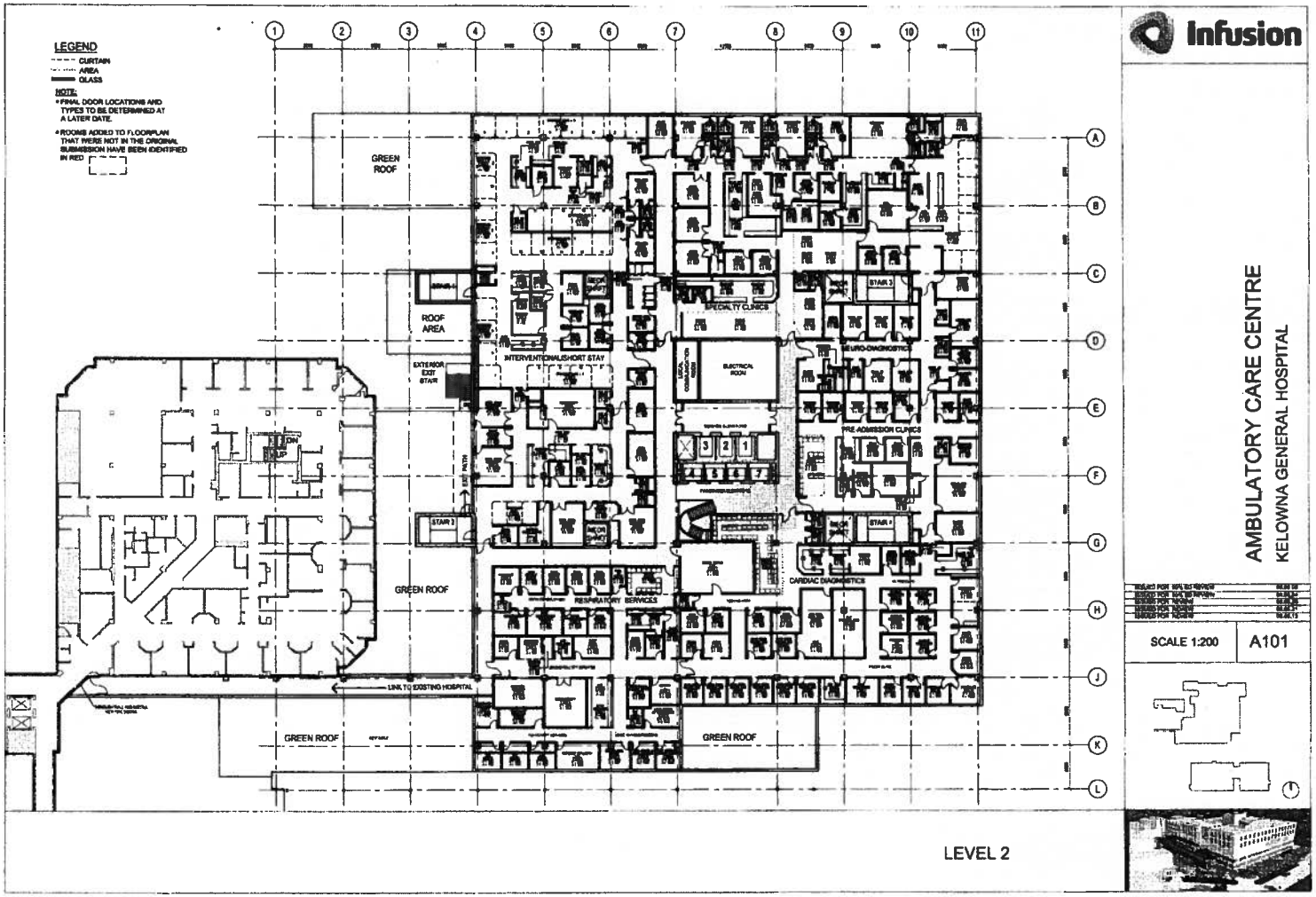
Infusion

AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

SCALE 1:200

A102



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AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

SCALE 1:200

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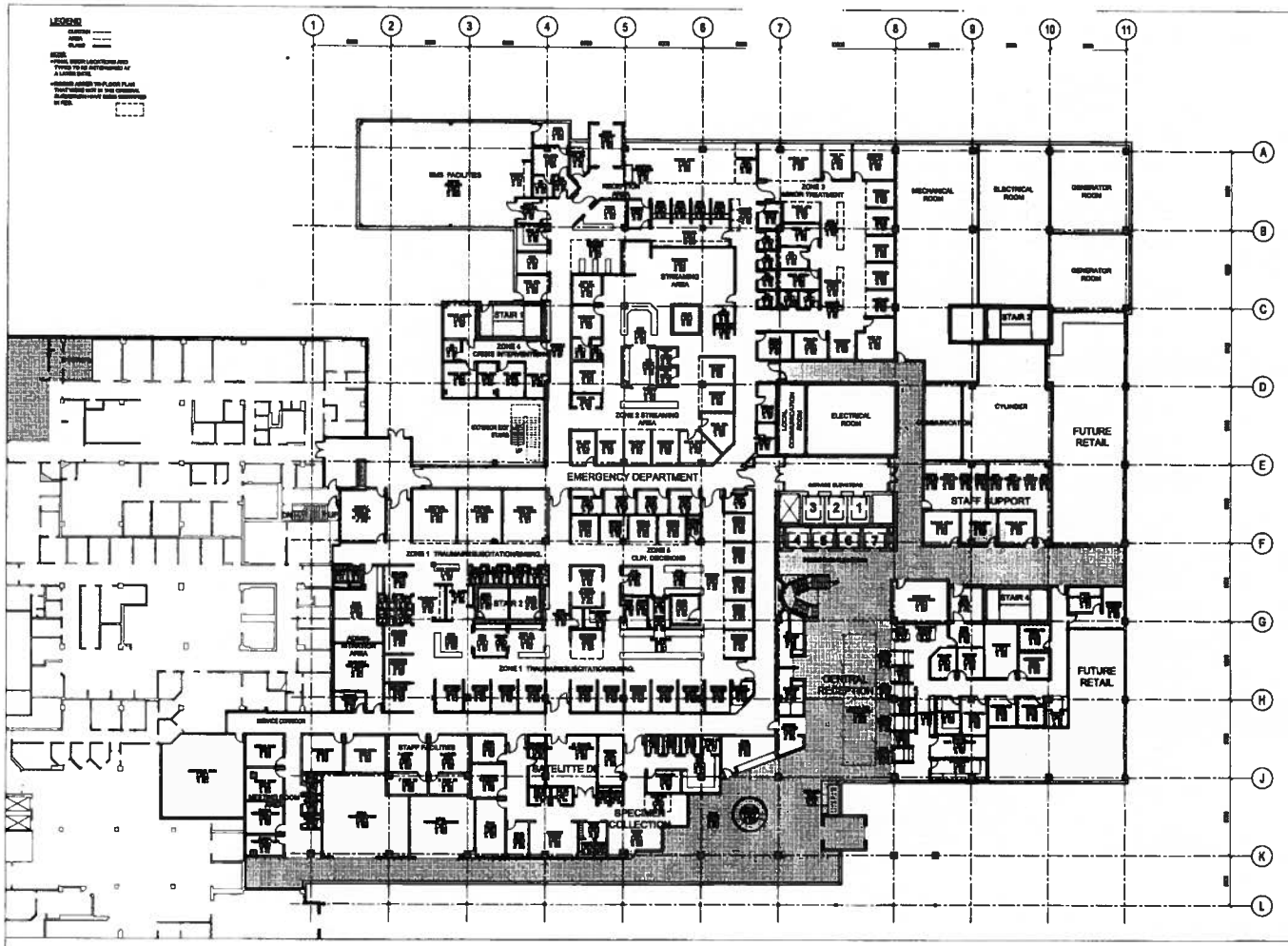


LEVEL 1

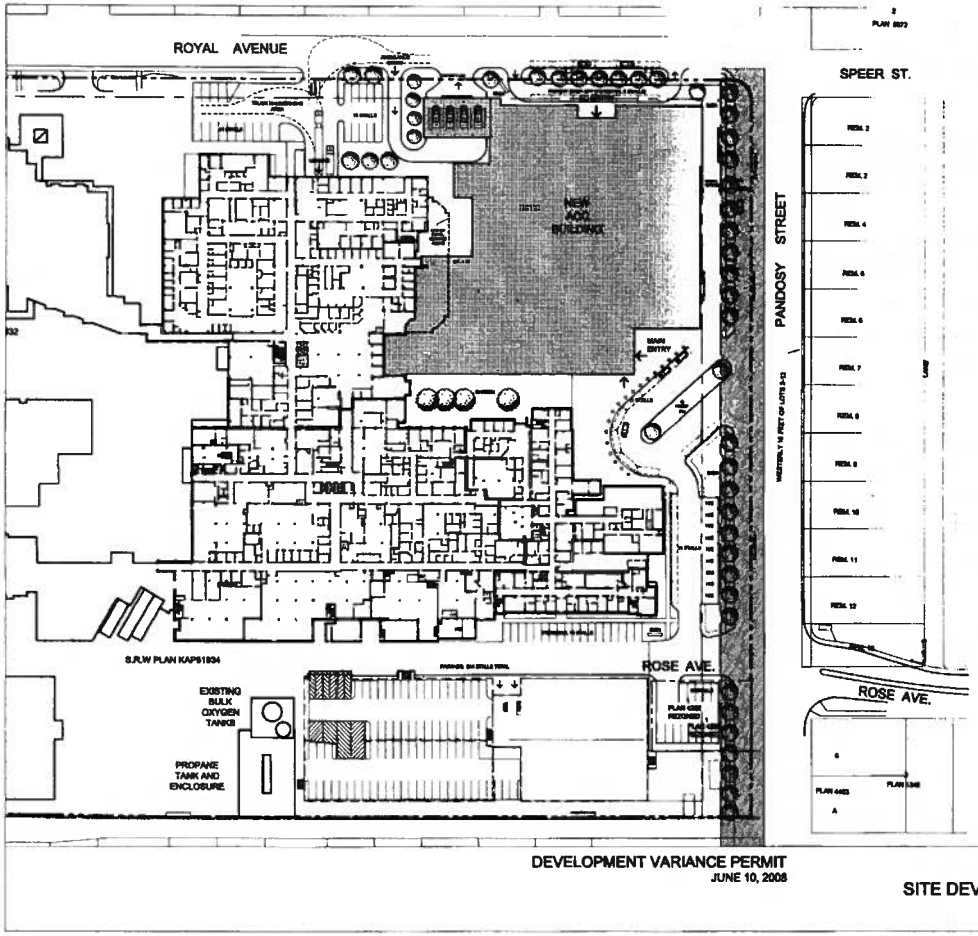
Infusion

AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

SCALE 1:200

A100



DEVELOPMENT STATISTICS

DEVELOPMENT VARIANCE PERMIT
JUNE 10, 2008

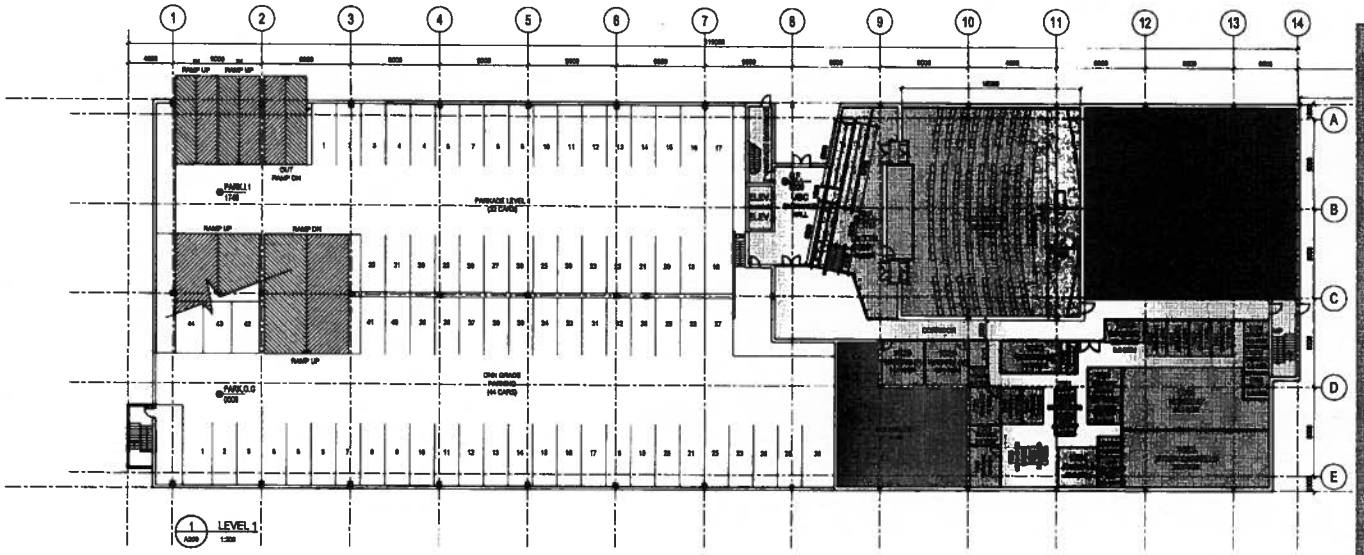
Interior Health
Infusion
Stantec
GRAHAM

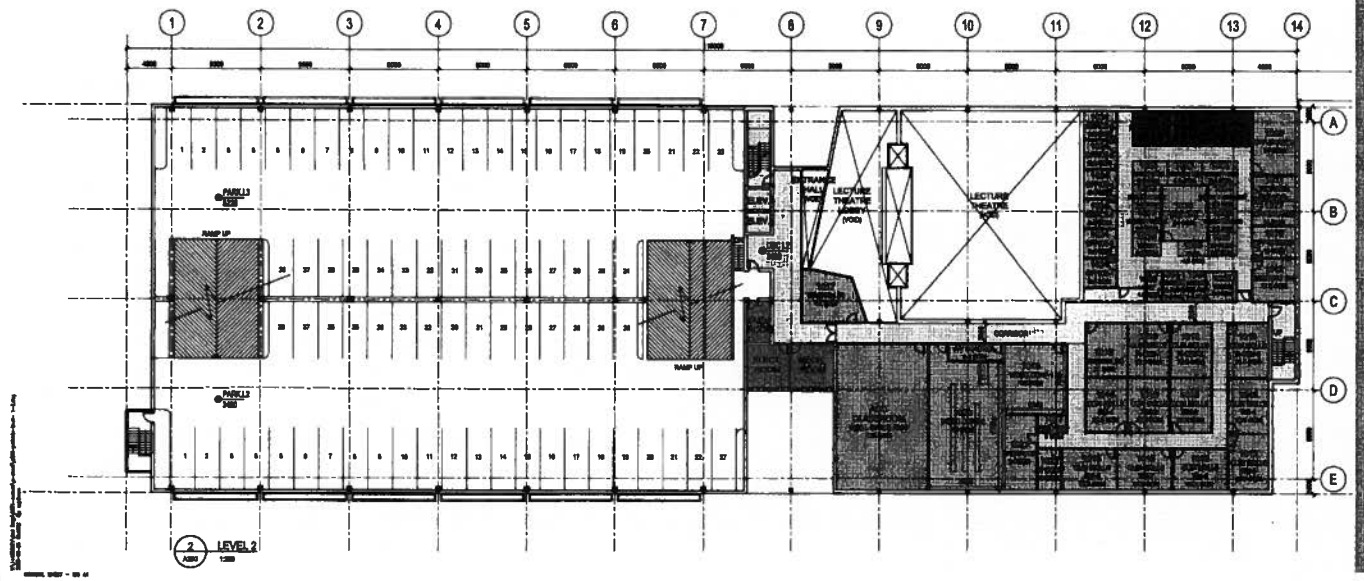
AMBULATORY CARE CENTRE
KELOWNA GENERAL HOSPITAL

SCALE 1:500 | A002

DEVELOPMENT VARIANCE PERMIT
JUNE 10, 2008

SITE DEVELOPMENT PLAN





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Notes

No.	Revision	By	Appd.	YY.MM.DD

No.	Issued	By	Appd.	YY.MM.DD

No.	Name	Date	Dwgs.	YY.MM.DD

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Client/Project
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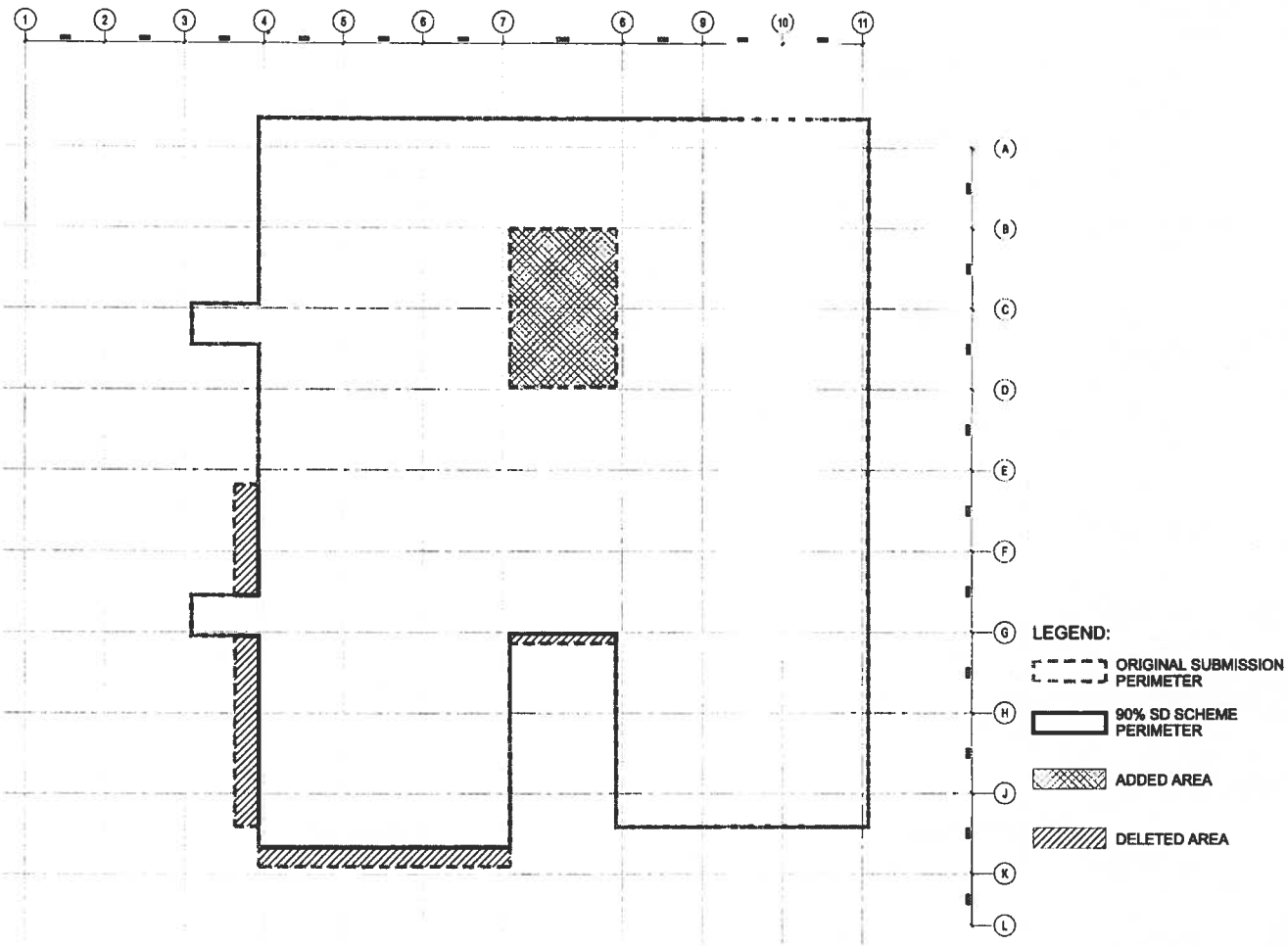
KELOWNA GENERAL HOSPITAL
UBC/VISITORS PARKADE BUILDING
Kelowna BC Canada

Title

Project No.	Scale	
144386701	1:200	
Drawing No.	Sheet	Revision
A200	01 of 02	0



LEVEL 3

Infusion

AMBULATORY CARE CENTRE

KELOWNA GENERAL HOSPITAL

SCALE 1:200