Royal Jubilee Hospital
Patient Care Centre Project

Project Report

as at May 2007
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Executive Summary

The Royal Jubilee Hospital’s inpatient facilities are aging, physically and functionally obsolete, inappropriate for health care, and in urgent need of renewal. Immediate investment in new inpatient facilities is essential.

Renewal of patient facilities will provide a unique opportunity not only to increase safety, improve patient outcomes, increase quality and efficiency, reduce infection levels, but it will help create a sustainable health care system and support improved education of health care professionals through better teaching facilities and enhanced research capacity.

VIHA’s Five-Year Strategic Plan identified the replacement of inpatient facilities at Royal Jubilee Hospital as a critical element, and a top priority for capital investment. The Provincial Government formally approved the Patient Care Centre Project on May 4, 2007.

There are four parts to this Project:

- New inpatient accommodation;
- Power plant upgrade;
- Additional parking; and
- Critical Program Relocation.

The majority of this document is focused on the renewed inpatient accommodation which will:

- Provide high quality patient care that is safe, effective, efficient and forward-looking;
- Provide a centre of excellence in elder care;
- Attract and retain the best health care professionals; and
- Meet and exceed best practices in health care delivery.

This report describes the current state of inpatient accommodation at the Royal Jubilee Hospital. It shows how we have assessed future acute care needs and determined the best location and size of inpatient accommodation at Royal Jubilee Hospital. It gives an overview of the options for renewal, describes the preferred option, explains how that option aligns with VIHA strategic priorities and BC Ministry of Health direction. Also included are procurement options, a proposed timeline and an estimate of the capital cost of the new facility.
Introduction and Background

Introduction

Victoria’s 36-acre Royal Jubilee Hospital is one of two tertiary hospitals serving Vancouver Island. Together these facilities provide high-level trauma care and specialized services for all Health Authority residents. RJH also serves as a regional hospital for people living on southern Vancouver Island. Diagnostic and treatment facilities at RJH have had significant capital upgrades and expansions; but inpatient rooms have not. The rooms we have for patients at RJH do not meet modern standards for care and are in urgent need of replacement. Rates of Methicillin Resistant Staphylococcus Aureus (MRSA) — an antibiotic-resistant bacterial ‘superbug’ — are three times higher than at Victoria General Hospital, which was built in 1983. Some Royal Jubilee Hospital units and wards have been closed because of health and safety concerns.

In September 2005, the Vancouver Island Health Authority (VIHA) commissioned an expert panel of architects, engineers and other consultants to review the physical conditions of the hospital’s South, East and Centre Blocks. The panel’s Risk Assessment Report strongly recommended replacing these inpatient facilities.

The primary objective of the Royal Jubilee Hospital Patient Care Centre Project is to replace the physically and functionally obsolete inpatient accommodation. It will also replace surface parking capacity by removing obsolete facilities, upgrade utilities and renovate vacated spaces.

Renewing inpatient spaces gives us a chance to develop more effective and efficient space that will meet best practice standards, allow for optimal work-flow, and improve health outcomes for patients.

Both VIHA’s Five-Year Strategic Plan and Capital Infrastructure Plan identified a new patient care facility as the health authority’s highest priority capital project. The Provincial Government formally approved this project on May 4, 2007.
Background

VIHA operates a network of approximately 138 health care facilities, including hospitals, clinics, health centres, health units and long-term care facilities. We operate with an annual budget of over $1.4 billion and employ or contract with approximately 16,000 health care professionals, technicians and support staff, and approximately 1,600 physicians. We provide health services to over 730,000 people across a large and diverse geographic area, spanning over 56,000 square kilometers, and including Vancouver Island, the Gulf and Discovery Islands, and parts of the mainland opposite northern Vancouver Island. VIHA is made up of 14 Local Health Areas and 3 Health Service Delivery Areas. The map below shows the boundaries of the Health Authority and its Local Health Areas.

Map of the Vancouver Island Health Authority
The south area of the Vancouver Island Health Authority includes four Local Health Areas: Greater Victoria, Saanich, Sooke (which includes the Western Communities), and Southern Gulf Islands. There are four acute care facilities in the south: Royal Jubilee Hospital, Victoria General Hospital, Saanich Peninsula Hospital, and Lady Minto/Gulf Islands Hospital. This table shows the inpatient capacity of each of these acute care facilities:

<table>
<thead>
<tr>
<th>Campus</th>
<th>Inpatient Beds¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal Jubilee</td>
<td>428</td>
</tr>
<tr>
<td>Victoria General</td>
<td>369</td>
</tr>
<tr>
<td>Saanich Peninsula</td>
<td>48</td>
</tr>
<tr>
<td>Lady Minto Gulf Islands</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>863</td>
</tr>
</tbody>
</table>

As of July 2006, the Royal Jubilee Hospital’s 428 inpatient beds were located in the following buildings:

<table>
<thead>
<tr>
<th>Building</th>
<th>Year Built</th>
<th>Inpatient Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memorial Pavilion</td>
<td>1945</td>
<td>61</td>
</tr>
<tr>
<td>Royal Block</td>
<td>1958</td>
<td>116</td>
</tr>
<tr>
<td>West Block</td>
<td>1958</td>
<td>88</td>
</tr>
<tr>
<td>South, East and Centre Block</td>
<td>1921-29</td>
<td>Closed</td>
</tr>
<tr>
<td>Richmond Pavilion</td>
<td>1944</td>
<td>56</td>
</tr>
<tr>
<td>D &amp; T Building</td>
<td>2003</td>
<td>25</td>
</tr>
<tr>
<td>Eric Martin Pavilion</td>
<td>1967</td>
<td>82</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>428</td>
</tr>
</tbody>
</table>

VIHA’s tertiary care is concentrated at Victoria General Hospital and the Royal Jubilee Hospital. Between them, these facilities provide a complete network of services, and operate as a single tertiary facility.

These two hospitals provide highly specialized services and trauma care not only for the South Island, but for all of VIHA. For example, in 2004/2005, 14% of all Central Island resident cases and 9% of all North Island resident cases were treated at one of these two facilities. Between them, they also provide significant sub-specialty care in most medical and surgical services. The Royal Jubilee also functions as a regional hospital for approximately 350,000 residents of southern Vancouver Island.

¹ As at July 26, 2006
The current distribution of services provided by the two hospitals is outlined in the table below:

<table>
<thead>
<tr>
<th>Specialty</th>
<th>RJH</th>
<th>VGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Surgery</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Cardiac</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Vascular/ Thoracic</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Renal</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Respiratory</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Head and Neck Procedures</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Urology</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>✓</td>
<td>consult</td>
</tr>
<tr>
<td>ENT</td>
<td>✓</td>
<td>consult</td>
</tr>
<tr>
<td>Trauma</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Obstetrics/gynaecology</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Pediatrics</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Why change is needed at the Royal Jubilee Hospital

This section describes why we must change inpatient accommodation at the Royal Jubilee Hospital, describes the Project’s vision and guiding principles, and explains how it aligns with VIHA strategic objectives and Ministry of Health direction. It shows how the Project fits with regional and provincial perspectives, and highlights how it will help us achieve our strategic health care goals.

Finally, we explain the planning we have undertaken to identify a recommended model of care that will meet patient needs more effectively and efficiently and show that this Project is an integral element of future health care delivery within the Health Authority.

Physical Condition

The Royal Jubilee Hospital site was first established in 1888. Since then, inpatient accommodation has been developed in a piecemeal fashion in multiple buildings across the site. The oldest inpatient buildings at the Royal Jubilee site are East and South Blocks, which are 86 years old.

There is an immediate and pressing need to address inpatient care and capacity issues at the Royal Jubilee Hospital that result directly from the deteriorating physical condition and scattered layout of our existing infrastructure.

The Royal Jubilee's inpatient facilities are not only in poor condition, they are physically and functionally obsolete.

- **We have had to close portions of buildings because of health and safety concerns.** These concerns include mould, asbestos, plumbing problems such as seeping water and organic matter, and other building deficiencies. Repairs are prohibitively expensive and we cannot undertake them without significant impact - from dust and noise among other things - on patients being cared for nearby.

- **Inpatient rooms do not meet modern health care standards.** Because they were built so long ago, less than one quarter of our patient rooms are private or semi-private. Although there are hand washing sinks in most rooms, the majority of washrooms are shared. The current layout of inpatient rooms does not support efficient patient flow or staff workflow, and makes it harder to control infections.

- **Current accommodation increases the risk of infection.** The Royal Jubilee Hospital faces infection control challenges because of the design and age of its inpatient facilities. MRSA infection rates at the Royal Jubilee are three times higher than at Victoria General Hospital. Many inpatient areas do not meet recognized best practice standards for things like number of patients to a room, infection control
design, environmental contamination prevention, and hand-washing stations and fixtures.

“Infection Control, Page 15, Risk Assessment Report, September 2005

• Inpatient buildings are not built to withstand an earthquake. Canada’s National Building Code ranks seismic zones on a scale of one (least risk) to six (greatest risk) based on degree of potential horizontal velocity. Greater Victoria and its surrounding area are ranked as zone five with a potential upgrade to zone six under certain earthquake conditions. Because the Royal Jubilee Hospital would be required to play a major role in any post-disaster scenario, and because the potential for extensive damage and physical injury resulting from a seismic event is so high, it is vital that patient care buildings remain operational. The current inpatient accommodation does not meet seismic standards.

“Seismically upgrading the structures would not be economically practical given that the structures are expected to have a remaining life expectancy of 5 to 7 years.”

Recommendation, Page 5, Risk Assessment Report, September 2005

• Exterior walls are crumbling. Interior equipment is failing. We have had to put fences and protective tunnels around our older buildings because debris from crumbling walls and fascia is falling, endangering staff, patients, visitors and cars. Inside, malfunctions and breakdowns of non-medical equipment such as elevators is a common inconvenience for patients, visitors and staff.
Vision, Objectives and Guiding Principles

With this Project, we have an opportunity to address the patient accommodation problems at the Royal Jubilee Hospital by designing a state-of-the-art facility that supports best practices; provides optimum care in an effective, efficient way; and attracts the best health care professionals to care for VIHA residents. We have developed a vision, objectives and principles to guide the development of this Project.

Project Vision
- Together we will create an innovative environment that inspires caring and the pursuit of excellence.

Project Objectives
- Accommodate current and future inpatient acute care service requirements;
- Improve safety, efficiency and outcomes for patients, clinicians and staff;
- Increase quality of care provided to patients; and
- Complete the Project by 2010 to minimize cost escalation.

Guiding Principles
- Create a patient-centred facility that will support excellence and innovation in the delivery of safe, quality health care.
- Consolidate programs offered on the campus to enable seamless care and support for patients and their families.
- Design a facility that will meet the needs of patients, visitors, employees, physicians, volunteers, learners, teachers and researchers now and into the future.
- Create an environment where employees, physicians and volunteers can work collaboratively in promoting health and wellness.
- Develop and maintain a healing environment that is sensitive to diversity.
- Design a facility that will foster a safe environment that supports health care providers.
- Use evidence-based design to maximize safety for patients and staff.
- Construct a facility that will promote synergies between health care, teaching and research.
- Make the design flexible and adaptable to support future changes in health care delivery.
- Use a design that will minimize impact on the natural and physical environment.
- Use technology to achieve cost savings, integrate services and improve health outcomes.
- Create an environment that is elder-friendly.
Strategic Alignment

The Project is an essential element of VIHA's Five-Year Strategic Plan and is our top priority for capital investment. It is aligned with the Ministry of Health's Service Plan, and meets the Ministry's Capital Planning directions and criteria.

VIHA’s Five-Year Strategic Plan includes our organization’s vision, mission, values and goals, as well as major strategic themes and priorities up to the year 2010. Future service delivery is described by broad sector as well as by community. It reflects the strategic direction of the Ministry of Health and recognizes significant differences in demographics and health status across the health authority’s large and varied geography.

Royal Jubilee Hospital is located in the south area of VIHA, which currently has the greatest proportion of people over age 75 in the health authority. Although the area’s overall population growth is expected to be minimal by 2010, and the population over age 75 is expected to remain the same size, the number of people over 85 will grow by approximately 9%. This is a shift that will have a significant impact on acute care.

Compared to other health authorities, VIHA has a large proportion of people aged 75 and over. The following graph compares the population 75 and over as a proportion of total population for each health authority and the province for years 2006 and projected 2020.
VIHA, like many other health authorities, is facing a system-wide challenge in patient flow. While a number of strategies have been developed to address this, we continue to experience emergency department overcrowding and diversion, cancelled surgeries, admission delays and refused patient transfers. In some instances, this may mean elderly patients may not receive appropriate care in the most appropriate setting. Ensuring that patients receive efficient care in the most appropriate setting is a top priority for the Vancouver Island Health Authority.

We recognize that to improve access and patient flow, we need a system-wide response that increases capacity and improves the way we deliver services. We are planning for significant growth in facility and community services to better meet the needs of elderly residents. The following is a brief review of the broad planning across sectors for the south area residents. The inpatient facility at Royal Jubilee Hospital is an integral part of these plans.

**Home and Community Care**

- In January 2006 we issued an RFP seeking proposals from not for profit and for profit operators to build and operate 1,230 residential care (RC) beds and assisted living (AL) spaces throughout the health authority. This includes approximately 930 additional net new spaces by 2010 - 727 of which will be completed by December 2008 - as well as flexibility for approximately 300 replacement beds in the future.
- In addition, we have planned to increase our transitional care capacity by over 50% between now and 2008.
- In the south area to date, we have added 9 AL units at Marrion Gardens (Baptist Housing), and 14 dementia care beds at Brentwood House (Beacon Community Services). By 2008, 185 RC beds and 25 AL units will be developed in Victoria at Selkirk Place (Ahmon Group), as well as 21 AL units at Beckley Farm Lodge (CRHC) on Parry Street. The Sooke Elderly Citizen’s Housing Society will complete 30 RC and 10 AL units at Ayre Manor; and in Central Saanich, Beacon Community Services will complete 14 AL units at Sluggett House.
- We will continue to promote communities of care, where many levels of care and housing options are offered in one location (including independent housing, convalescent care, assisted living and complex care).
- In the south area to date, we have increased home support services, meeting our planned increase of approximately 12 to 15% more home support hours.
The following illustration shows how we intend to increase our capacity to provide services to 2010 by Health Service Delivery Area and VIHA overall:

### Planned Increases in Residential Care Services 2005 to 2010

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td>84</td>
<td>99</td>
</tr>
<tr>
<td>Central</td>
<td>69</td>
<td>95</td>
</tr>
<tr>
<td>North</td>
<td>78</td>
<td>96</td>
</tr>
<tr>
<td>VIHA</td>
<td>78</td>
<td>97</td>
</tr>
</tbody>
</table>

**Primary Health Care**

- We will promote accessible and integrated services that build on previous successes such as the Chronic Disease Management Model, Primary Health Care Clinics for at-risk youth and homeless populations, and Multidisciplinary Primary Health Care programs for seniors.
- We will establish networks of care providers that allow professionals to share information related to best practices, research and education, and facilitate local dialogue.
- We will explore ways to enhance access to services through visiting specialists and to incorporate more skilled health care professionals such as nurse practitioners and midwives;
- We plan to work with current primary health care providers, municipal leaders, and developers to commission a multi-disciplinary primary health care centre in Sooke.
- Continued development of the Hillside Seniors Health Centre (at Aberdeen Hospital site) will include the establishment of a frail elderly medical network that will support general practitioners in the provision of care to the frail elderly. In addition, the facility already houses a multidisciplinary family practice clinic, respite hotel, wellness centre and assisted living accommodation.

**Mental Health and Addiction Services**

- VIHA has comprehensive plans to strengthen mental health and addiction services focused on detox, and improving crisis response and emergency response services.
- In the south area, VIHA has developed 30 CISL (Community Intensive Supportive Living) units (currently accommodating 20 clients, expected to accommodate a further 10 by October 2007).
- The new Our Place facility for the homeless in Victoria is expected to be operational by October 2007; in addition to drop-in, personal support, activity/recreation and counselling
programs, the new facility includes 45 beds of transitional housing; VIHA will continue to provide funds to Our Place for support workers.

**Population Health and Wellness**
- We will promote healthy lifestyles and disease prevention to reduce demand for services and pressure on the health system.

**Acute Care**
- We will maintain our capacity to provide highly specialized care, and will continue to concentrate these services at Victoria General and Royal Jubilee Hospitals.
- We are planning to increase our bed capacity at Royal Jubilee Hospital from 428 beds to 500 beds (intended to accommodate need to 2020).
- We will enhance the range of services available at Saanich Peninsula Hospital through partnerships with specialists and sub-specialists in Victoria.
- We will expand the emergency department at the Victoria General Hospital.
- Lady Minto Hospital will continue to provide its current range of services.

**Alignment with Ministry of Health Capital Planning Directions**

In spring 2006, the Ministry of Health initiated a process with the health authorities to review and further develop the capital planning process for health projects. This process took into account emerging demographic shifts, increasing pressures on the health system, and new opportunities available because of evolving clinical models.

Key directions include:
- The need to optimize the continuum of care through greater investment in public health, primary care and ambulatory care;
- Recognition that the future role of hospitals will primarily be to treat the most acute medical and surgical cases, including trauma and complex care cases;
- Recognition that many of our health facilities have deferred maintenance issues and that we need to invest in capital assets that will play a key role in the future;
- The need to link investments with improved patient outcomes, and for new investments to be affordable and sustainable;
- The need to support investments with solid, evidence-based demand-modeling and comprehensive planning;
- The need to improve the quality, safety and efficiency of care through greater use of information technology;
- The need to carefully consider health human resource issues, such as the ongoing and increasing shortage of qualified and experienced health care professionals, in our planning; and
- The requirement that new facilities should be safe, environmentally sustainable and elder-friendly.
Royal Jubilee Hospital Patient Care Centre Project

Both VIHA’s Five-Year Strategic Plan in general, and this Project in particular, are aligned with these strategic directions.

- We have developed a comprehensive strategic plan, have consulted the public about their health needs and have sought feedback on the services we provide;
- The Project is part of an integrated service delivery plan, and is supported by plans across the continuum of care, including primary care, mental health and addictions and residential care and assisted living;
- There is a clear need for the Royal Jubilee Hospital to continue its function as a tertiary hospital. This makes it imperative that we renew inpatient bed capacity to meet modern standards for a high quality, efficient environment; and
- We have completed evidence-based demand modeling to establish the number of beds needed at the Royal Jubilee, taking into account demographic factors, such as population growth and aging, and the development and implementation of emerging models of care.

Summary

- Existing inpatient facilities at the Royal Jubilee Hospital are unsuitable for their purpose and in immediate need of renewal;
- Renewal offers a unique opportunity to meet a wide range of objectives for improved health outcomes and an improved environment for patients and staff;
- The proposed renewal is strongly aligned with regional and provincial strategic objectives; and
- This Project is part of an integrated service delivery plan, and is supported by service delivery plans across the continuum (e.g., in home and community care and primary care).
Project Scope

A new Patient Care Centre is one part of the Project overall. We will also need to ensure that there is appropriate site infrastructure such as adequate parking and power, and to relocate critical programs that will be displaced in order to develop the additional parking spaces.

There are four parts to this Project:

- New inpatient accommodation;
- Power plant upgrade;
- Additional parking; and
- Critical Program Relocation.

This section outlines the demand and capacity methodology we have used to define the size of the Project, and the options that could meet the Project’s objectives. It explains the scope of the recommended service delivery approach - the Patient Care Centre Project - and plans to further refine the scope and redesign services in the new facility. Finally, it addresses additional project components including upgrades to the power plant, parking and relocation of critical programs.

Identifying the Appropriate Number of Beds

Background
To estimate the volume of acute care beds required in future, VIHA has developed an Acute Care Projection Model. It is based on population growth, variations in population health status throughout the health authority, and anticipated changes in service delivery, and uses the most recent years’ inpatient data. We update it on an annual basis to ensure it is as reflective of current service delivery as possible. The model projects acute care inpatient capacity requirements for all VIHA facilities for the years 2010 and 2020.

What the model shows us
We developed this model initially to project inpatient acute care requirements for the year 2010, and have refined it to produce projections for every year up to 2020. We believe projections beyond 2020 are too speculative at this time. We are able to present the model results either by Local Health Area of residence, or by facility. To plan for the Royal Jubilee Hospital, we examine results at the facility level.

The model projects numbers of days by service categories for each VIHA inpatient facility. Service-specific occupancy rates are applied to days generated by the model, to estimate the number of beds required.
**How we can adjust the model**

The model was developed to provide a range of beds required, rather than a point estimate of bed needs. The range is established through the application of a number of scenarios, simulated through model adjustments.

The following table shows each of the adjustments built into the model and identifies the options available in each adjustment. Because each model adjustment has two or three possible configurations, there are a possible 324 different scenarios.

<table>
<thead>
<tr>
<th>POPULATION</th>
<th>HEALTH NEEDS</th>
<th>SERVICE DELIVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Population</td>
<td>Low Income &amp; Living Alone</td>
<td>Scope Reduction</td>
</tr>
<tr>
<td>Adjusts for: Age groups that need more services (e.g., 85+)</td>
<td>Variation in income &amp; living arrangement</td>
<td>Eliminate light care</td>
</tr>
</tbody>
</table>

**The impact of an aging population**

Population change is the single greatest factor influencing future demand for acute care services. One of our largest challenges is to provide appropriate care to a growing number of elderly people. The hospital system, which has traditionally been geared towards treating acute illnesses, works well when people are young, but not as well for older people, who have a higher incidence of chronic diseases and complex co-morbidities. In VIHA, seniors aged 75 and over represent 9% of the population but account for 27% of hospital admissions and 46% of inpatient days. Because the older population served by the Royal Jubilee Hospital (and all VIHA acute care facilities) is growing, there will be increased demands for acute care services. The following graph shows the proportion of VIHA population and inpatient days attributable to the older population.
Our aging population poses a particular challenge to VIHA. The proportion of elderly VIHA residents has surpassed that in the rest of Canada, and we are faced with increased demand for services and increased complexity of care. Elderly people with chronic conditions do not recover as well when they are treated separately for every occurrence, or reoccurrence, of their condition, although in our current system of acute care, this is exactly what happens. These people need ongoing support to maintain independence, manage their condition and remain as healthy as possible. Once a frail elderly patient is admitted to hospital it is often very difficult for them to recover sufficiently to return home. Many times, older people remain in acute care beds after they no longer need acute services, but require an alternate level of care. In 2005/2006, patients requiring alternate levels of care occupied approximately 17% of the inpatient beds at Royal Jubilee.

Why occupancy rates matter

We use occupancy rates to show how an acute care facility is actually used for a given time period, such as a reporting period or a year. In VIHA, we typically report occupancy rates for the facility, Health Service Delivery Area, and Health Authority. We can also report rates for each kind of service: Psychiatry, Medical, Surgical, Maternity, etc. We calculate occupancy rates by dividing the number of patient days by the number of bed days available.

There is no single optimal occupancy rate for all types of hospitals and services. Factors such as hospital size, the number of beds that cannot be substituted for other beds, and the relative demand for services, all influence a hospital’s occupancy rate. Research has shown that occupancy rates above 85% greatly increase the risk of periodic bed crises (Bagust et al., 1999).2

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In addition, higher occupancy rates have been correlated with higher rates of MRSA infection (University of Ulster Research, 2006).³

When hospitals have a higher proportion of single-patient rooms, they have greater flexibility to place patients because things like gender, personality, behavioural considerations and contagion are less influential. When it is easier to place patients, hospitals can operate at a higher occupancy rate. Bobrow and Thomas (2002), show that while occupancy rates in multi-patient rooms reach an average of 80 to 85%, single-patient rooms have the capacity to reach an occupancy rate of 100% without significant implications.⁵

We have used a range of target occupancy rates in our projections about service capacity, to establish bed requirements for the Royal Jubilee Hospital. We applied occupancy rates of 85% for Medical services and 90% for Surgical and Psychiatric services. These occupancy rates are significantly lower than our current actual occupancy rate, so even if the projected days for 2019/2020 were the same as baseline 2004/2005 days, we would need approximately 70 more beds.

What the model shows

The projection model generates days by Local Health Area of residence, and by facility. Typically, we have focused on facility-specific results. We convert days to beds using the occupancy rates described in the table above. Because it is easy to apply occupancy rates to days and convert them to beds, we have tested scenarios at nearly all occupancy increments between 75% and 100%. We use multiple scenarios to establish projection ranges, document results and review them with senior executive and program areas as appropriate.

- **Changing Demand to 2020**
  The following graphic illustrates the relative size of each model adjustment compared to baseline beds data (figures shown are based on a planned occupancy rate of 90%). The effect of population growth alone increases projected days by 45%. When we adjust for health needs, it has only a nominal effect on projected days (likely because the health status of south island residents is relatively good). Adjusting admission rates, acute/rehab length of stay (LOS) and alternate level of care length of stay (ALC LOS) further reduces projected bed requirements.

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⁴ Frequently hospitals need to provide a number of excess or overflow beds in addition to funded beds, thereby resulting in occupancies greater than 100%. This increases costs and can, in extreme circumstances, result in the use of stretchers for temporary bed arrangement.

How many beds will we need at Royal Jubilee Hospital?
If VIHA planned bed needs on the basis of population growth and existing service utilization alone, the estimated need for inpatient beds would be approximately 675 by 2020. However, investments in other services such as primary health care, home and community care and ambulatory care, will reduce the demand for acute care beds in the future. As a result, the new Patient Care Centre will require approximately 500 beds (+/-30).

VIHA is currently planning for an additional 658 complex care beds; 876 assisted living beds; 88 transitional care beds; 313 mental health and addictions beds; 16 youth addictions beds; 12 psychiatric intensive care beds; and up to a 26% increase in home support clients by 2010, across the health authority. In addition, we will support and promote the ongoing shift away from acute inpatient treatment to ambulatory care, and will introduce accessible and integrated primary health care services and supports.

There are a number of ways we can manage alternate level of care: we can reduce preventable admissions to hospital, implement patient care practices targeted towards alternate level of care patients in hospital, and build community supports that will allow patients to leave hospital. Currently, a minority of patients accounts for the majority of alternate level of care days. By effectively addressing the needs of people requiring alternate levels of care for long periods of time, we may achieve significant reductions.

Is our demand model valid?
The Ministry of Health has validated VIHA’s demand model assumptions, and we have compared our results to those of the InfoQuest model used by other Health Authorities. The output of the model has been found to be consistent with these third party benchmarks.
We developed physical scope requirements for the Project based on the following assumptions:

- The projected bed requirement of 500 (±30) is part of extensive redesign throughout the system, as outlined in the VIHA Five-Year Strategic Plan;
- We will meet the 2020 demand for inpatient beds in an appropriate, purpose-built environment;
- We will implement best practice standards of care, including infection control; and
- We will design patient flow and work-flow to provide maximum operational efficiency.

**Configuring spaces to provide the best care**

To develop a greater understanding of the space and configuration requirements of best practice care and to optimize effectiveness and operational efficiency, VIHA:

- Involved staff and third party experts in a master planning exercise that reviewed previous work and focused on how best to meet future capacity needs and replace substandard inpatient accommodation;
- Developed a vision and guiding principles for the Project;
- Consulted with clinicians to determine the most effective and efficient room sizes and the best ratio of single to double bed rooms to serve the unique patient population at the Royal Jubilee Hospital; and
- Held a competition among architectural design firms specializing in healthcare facilities, to find and implement efficient and effective inpatient layouts and best practices in inpatient design. The successful firm was engaged to develop a concept design for the purposes of this document.

**The benefits of using best practices design**

Expected benefits that will come from implementing best practices in the design of bedrooms within the new Patient Care Centre include:

- Clean rectangular shape of room provides greatest degree of adaptability and clearance adequacy for staff and equipment;
- Caregiver zone at the bedside allows adequate space for team consultations and health sciences student participation;
- Fully glazed corridor wall maximizes visibility of patient by staff;
- Alcove in corridor, fully glazed, allows for satellite charting stations and observation of higher acuity patients. Charting stations can be mobile or built-in;
- Full-height nurse server is located immediately adjacent to the entry door. If the decision is made that a nurse server system will not be implemented, the space may be used as a cart alcove;
- Clinical sink and extended countertop is located immediately at the entry to the room. Space is provided beneath the work surface for a supply cart. Staff does not have to turn their backs to the patient;
- Large windows extending the full width of the room maximize daylight and views from the patient bed. Daylight reinforces circadian rhythm. Daylight and views contribute to shorter stays and a decrease in the use of analgesic drugs. Solar shades provide control by the patient, staff and visitors;
- Family area next to the window allows for a sleeper chair or built-in sleeper sofa;
• Built-in patient wardrobe and desk with shelving are located within family zone, away from treatment side. Internet and web access may be provided at desk;
• Three-piece washroom is designed to be barrier-free, large enough for assistance and/or wheelchair maneuverability;
• Large flat screen TV is provided opposite the headwall, visible by patient and visitors. Remote control and headphone plug-in provided at headwall; and
• Medical headwall includes provision for touch screen bedside charting.

Additional Project Elements

Power Plant Upgrade

In 2002, we completed a mechanical and electrical service analysis for the entire Royal Jubilee Hospital site. The reports from this analysis identified aging infrastructure elements which needed to be replaced or upgraded, and showed upgrades that would be required if and when a Patient Care Centre was added. Upgrades to the power plant include an addition to the existing plant, to house new boilers, 1000-ton chiller pumps and emergency generators. We are recommending that this project run concurrently with the construction of the Patient Care Centre, so that the entire site’s servicing needs can be met when the Patient Care Centre is complete.

Additional Parking

Providing sufficient parking at the Royal Jubilee Hospital is an ongoing problem. A new 450-stall parking facility, completed in 2001 has eased the situation to a certain extent. However, the new Patient Care Centre will displace approximately 150 existing parking spaces. We must create at least enough additional surface parking to offset this loss. Our plans will achieve a net increase of approximately 77 parking spaces on the site. This, and an aggressive Traffic Demand Management strategy, will help relieve on-site parking pressure.

Critical Program Relocation

The new Patient Care Centre will require rezoning of the site. Our analysis shows that the most cost-effective way to meet the required number of parking spaces while minimizing the impact on floor space ratio is to replace our oldest patient-care buildings with parking. Most of them will be largely vacant when beds have been moved to the new facility.

However, there are some critical programs located in the obsolete buildings. They will be consolidated as appropriate, and relocated to more suitable areas of the Royal Jubilee Hospital site.
Getting the job done

The renewal of inpatient accommodation at Royal Jubilee will modernize the delivery of health care at the site, and will be based on the most up-to-date industry best practice standards. These standards include the location of inpatient accommodation next to diagnostic and treatment facilities. Because of this, we have limited our assessment of renewal options to those located at the Royal Jubilee Hospital site, not at other locations such as the Victoria General Hospital.

Renewal Options

VIHA considered three options to meet the Project objectives:

1. Repair and upgrade existing inpatient facilities

   This option would meet some of the Project objectives, but because of the condition of existing facilities, it would be a complex and expensive process, and would not allow us to reconfigure facilities to meet future needs and newer standards of design. It would also mean closing down nursing units entirely while upgrades were under way.

2. Status Quo

   Because the current condition of the facilities is so poor, health care quality and safety objectives cannot be met if we simply do nothing. We compared this option to the others to better understand the implications of not investing in new inpatient facilities.

3. Replace existing inpatient facilities with a new, stand-alone facility

   Our analysis indicates that building a new, state-of-the-art Patient Care Centre is the option that provides the best opportunity to fully meet the objectives of the Project. This option will allow us to provide the best possible care for patients and creates an opportunity to build an efficient, effective infrastructure to meet future needs. This is the recommended option for this Project.

We expect that implementing Option 3 (development of a new Patient Care Centre) will result in many benefits for patients, staff, clinicians and visitors, including:

- Enabling us to meet projected demands for health care services up to 2020.
- Improving patient flow from the emergency department, which will reduce delays in hospital admission and facilitate better patient flow throughout the system.
- Reducing post-surgical infection rates because of a better clinical environment, individual bathrooms, and enhanced air flow management.
- Improving support for health care education, including purpose-designed teaching space.
- Enabling us to recruit and retain highly skilled professionals.
- Ensuring higher standards of patient privacy, including more private and semi-private rooms.
- Improving infection control and improving our capacity to respond to outbreaks of contagious disease (such as SARS or a flu pandemic) as well as other viral or bacterial
outbreaks. Plans include specialized isolation and negative pressure rooms with anterooms and bathrooms, and a larger number of single-patient rooms.

- Enabling more efficient services, including: potential revisions to the distribution of services between Royal Jubilee and Victoria General Hospitals, locating related clinical services adjacent to one another, and a more efficient configuration of inpatient wards.
- Improving service quality and safety through investments in information technology, information management and more efficient use of resources.
- Creating a modern facility built to LEED (Leadership in Energy and Environmental Design) Silver standards of environmental sustainability.

Location on Site

Since any new inpatient facility must be located directly adjacent to the Diagnostic and Treatment Centre for the ease of patient movement, there were only two possible site locations. The first option was to locate the new facility to the west of the Diagnostic and Treatment Centre in an area that has previously been excavated and back-filled. Since 2003, this area has been used primarily as a parking lot. This option requires the removal of the Bay Pavilion and the Denman Pavilion; two older structures of which the Bay Pavilion is already vacant. Two heritage buildings in the vicinity (the chapel and Pemberton Operating Room) will be preserved.

The only other potential site is the area south of Diagnostic and Treatment Centre presently occupied by South, East and Centre Block buildings. This site is not preferred as it requires decanting of outpatient programs and offices; demolition of the buildings would impact patient care in the Royal and West Block buildings; and it would negatively impact the schedule, and therefore the project costs.

Estimating Capital Costs

Based on an independent quantity-surveying report, the estimated capital cost for the Project is $269 million +/- 20%. This estimate was based on conceptual planning information assuming a traditional procurement model (design, bid, build contract arrangement) and a gross floor area of 33,600 square meters. The estimate also includes an allowance for project costs (“soft costs”), escalation up to the mid-point of the construction for each project element, and the cost of equipment.

An escalation factor of 12% per year was used as an adjustment for inflationary pressures in the construction industry. The independent quantity-surveyor confirmed the 12% per year was reasonable given the current economic climate and taking into account predictable future factors. If any of the assumptions that the cost estimate is built on differ, the point estimate will no longer be valid. The budget contains 2% contingency to partially offset this uncertainty.

The final capital cost of the overall project is dependent on the bids that are submitted as a result of the RFP process and the market conditions throughout the competitive selection process. The Province will be contributing $150 million. The CRHD has identified $100 million in its capital plan, and the Vancouver Island Health Authority will fund the remaining $19 million.
Estimating Operating Costs

All health services will be funded and provided by the health authority in keeping with the Canada Health Act.

VIHA has developed a pre-construction operating estimate for the Project based upon best information available, projected forward. Excluding cost pressures associated with inflation, labour contracts and increased services to reflect future population growth, it is assumed the new Patient Care Centre will not increase operating costs. This estimate will be reviewed as the Project progresses and demand assumptions are revised.

The Project will require additional funding for start-up and transition costs. An estimate of these costs is to be developed.

Procurement Options

There are a number of established procurement options to assess, when planning for a major capital project such as this one. They include:

<table>
<thead>
<tr>
<th>Traditional Models</th>
<th>Partnership Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design, Bid and Build</td>
<td>Design, Build, Finance and Maintain</td>
</tr>
<tr>
<td>Construction Management</td>
<td></td>
</tr>
<tr>
<td>Design and Build</td>
<td></td>
</tr>
<tr>
<td>Build and Finance</td>
<td></td>
</tr>
</tbody>
</table>

Two of the procurement options we considered were: a traditional design-build procurement model and a partnership model.

Traditional Procurement

A traditional design-build procurement model allows an owner to establish performance requirements and seek multiple design-build proposals. This model uses a fixed price contract based on standard industry documents, with monthly payments to the selected design-build team during construction. The features of this model are:

- The owner is presented with several designs to choose from.
- The builder and designer work together, competing with other teams to provide the most innovative solution that meets or exceeds performance requirements.
- The owner assumes responsibility for the performance of the design after occupancy, once the builder’s warranty period has expired.
Partnership Procurement

In this model, the private sector assumes responsibility for the design, construction and maintenance of the facility. The owner chooses from multiple design-build solutions, and a fixed price contract, based on previous project documents, is used. The features of this model are:

- The owner contractually transfers construction risks, such as cost and schedule, design risks, long-term maintenance cost risk, and facility maintenance and performance risks to the private sector partner.
- The private sector receives a service payment over the 30-year term of the agreement, beginning when the facility is ready for use (after construction is complete).

These procurement models were analyzed based on BC government experience, empirical data from international studies, and procurement reviews.

We considered both the unique challenges of this particular Project, and the more general challenges of the construction market on Vancouver Island, and compared each model’s expected outcome against the others in terms of risk transfer, and schedule and budget adherence.

Risk Allocation

Who bears the risk? Differences between the Procurement Models.

As the table below shows, the Design, Build, Finance, Maintain model transfers key risks associated with design, construction and operation, as well as commercial and financial risks, to the private sector. In the traditional model the owner retains or shares these risks. The difference is largely due to the presence of third party financing under the partnership model.

Summary of Risk Allocations for the Procurement Models

<table>
<thead>
<tr>
<th>Project Risk</th>
<th>Design, Build</th>
<th>Design, Build, Finance, Maintain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design Risks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detailed design takes longer than anticipated</td>
<td>Shared</td>
<td>Transferred</td>
</tr>
<tr>
<td><strong>Construction Risks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated cost of construction too low</td>
<td>Transferred</td>
<td>Transferred</td>
</tr>
<tr>
<td>Under performance/default (including bankruptcy) of subcontractors during construction</td>
<td>Shared</td>
<td>Transferred</td>
</tr>
<tr>
<td>Under performance/default (including bankruptcy) of lead contractors during construction</td>
<td>Retained</td>
<td>Transferred</td>
</tr>
<tr>
<td>Labour and materials are not available in sufficient quantity or at a reasonable cost</td>
<td>Transferred</td>
<td>Transferred</td>
</tr>
<tr>
<td>Labour and materials are not available in sufficient quantity resulting in delayed completion of the Project</td>
<td>Shared</td>
<td>Transferred</td>
</tr>
</tbody>
</table>
### Project Risk

<table>
<thead>
<tr>
<th>Risk</th>
<th>Design, Build</th>
<th>Design, Build, Finance, Maintain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse unexpected ground conditions</td>
<td>Retained</td>
<td>Transferred</td>
</tr>
<tr>
<td>Operations, Maintenance, Lifecycle Risks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifecycle costs are higher than expected.</td>
<td>Retained</td>
<td>Transferred</td>
</tr>
<tr>
<td>Facility components need to be replaced more frequently or less frequently than expected</td>
<td>Retained</td>
<td>Transferred</td>
</tr>
</tbody>
</table>

In the Design, Build model, the owner makes milestone payments to the contractor without penalty clauses for missed schedule dates; there is little incentive for the contractor (except the size of milestone payments pending) to maintain or complete the Project ahead of schedule.

In the partnership model, however, third party financing provides strong incentives to the private sector partners to reduce costs and enables the private sector partners to effectively manage risks. In this procurement model, lenders provide construction financing to the private sector on the basis of several factors: the owner’s ability to make performance payments, the lead contractor’s perceived ability to complete the construction satisfactorily, and the lifecycle provider’s perceived ability to maintain the facility over time.

Lenders conduct a significant amount of due diligence on the design and construction contract before funds are advanced, to assure themselves that repayment of capital advanced is relatively certain. The private sector partners are highly motivated to perform as expected, as non-performance will affect both the Project under consideration and their ability to obtain financing for future projects at competitive rates.

The presence of an equity provider provides further discipline to this model. Equity providers receive extra payments in the event of early completion, which creates a strong financial incentive to complete the project as early as possible without sacrificing quality. Because equity providers receive their return over the entire term of the agreement between the owner and the private sector, and because their return is vulnerable if private sector partners do not perform adequately both during construction and during operation of the facility, they have a significant incentive to deal with adverse risk outcomes as quickly and efficiently as possible.

Our evaluation of the procurement models available, and our risk management analysis both clearly point to the Design, Build, Finance and Maintain (Partnership) model as the most effective option, involving the least risk to VIHA through all phases of the Project. It has been selected as the preferred option for this Project.
Implementation Schedule

VIHA is committed to completing this Project within three years of approval. Our projected schedule is based on precedents, best practices, dedicated project management, and a proven approach to design and construction.

Project Schedule

- Approval of the Project: May 2007
- Issue Request for Qualifications: May 2007
- Issue Request for Proposals: July 2007
- Commercial/Financial Close: February 2008
- Commence Construction: March 2008
- Facility Complete: April 2010