IBI HEALTHCARE+

fraserhealth

Burnaby Hospital
High-Level Master Plan

Burnaby, British Columbia

Final Draft – March 13, 2013 V-0

IBI GROUP

700–1285 West Pender Street
Vancouver BC
V6E 4B1
Tel. 604.683.8797
Fax. 604.683.0492
www.ibigroup.com

Table of Contents



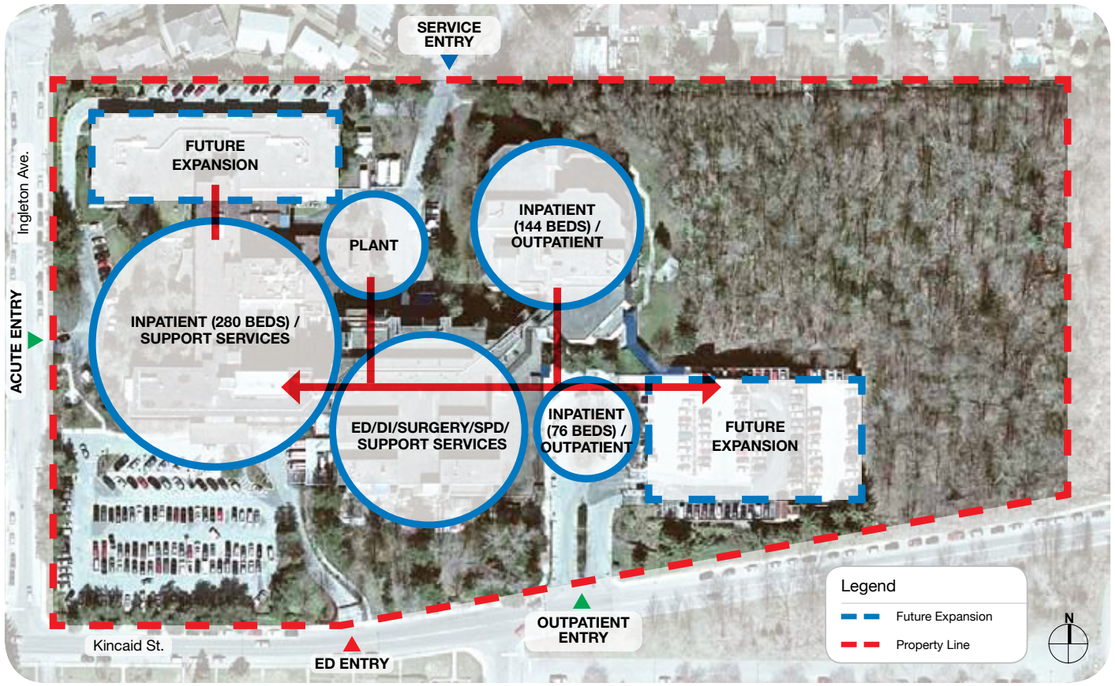

1.0 Introduction & Summary

Introduction

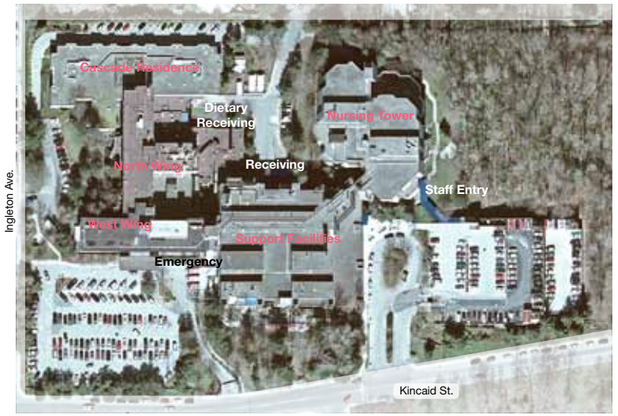
Burnaby Hospital plays is an important and vital role in providing acute care services within Fraser Health's network of care. This **High Level Master Plan** (HLMP) will provide a framework for understanding the role of this facility with respect to current and projected services, the pressures and challenges of sustaining and continuing to enhance these services and the strengths and opportunities that can be built upon to ensure the mandate of better health and best in health care.

In developing this plan, a wide range of stakeholders including staff, leadership, and community were engaged in assessing the current state of Burnaby Hospital as well as understanding its role within the communities it serves. Extensive investigation of evidence based data, interviews and accepted risk assessment and projection methodologies where incorporated in a full understanding of both current, and future fit to use. Finally, opportunities were developed and tested in developing a 10 year plan that can functionally respond in order to renew and ready Burnaby Hospital for continued excellence in the provision of care.

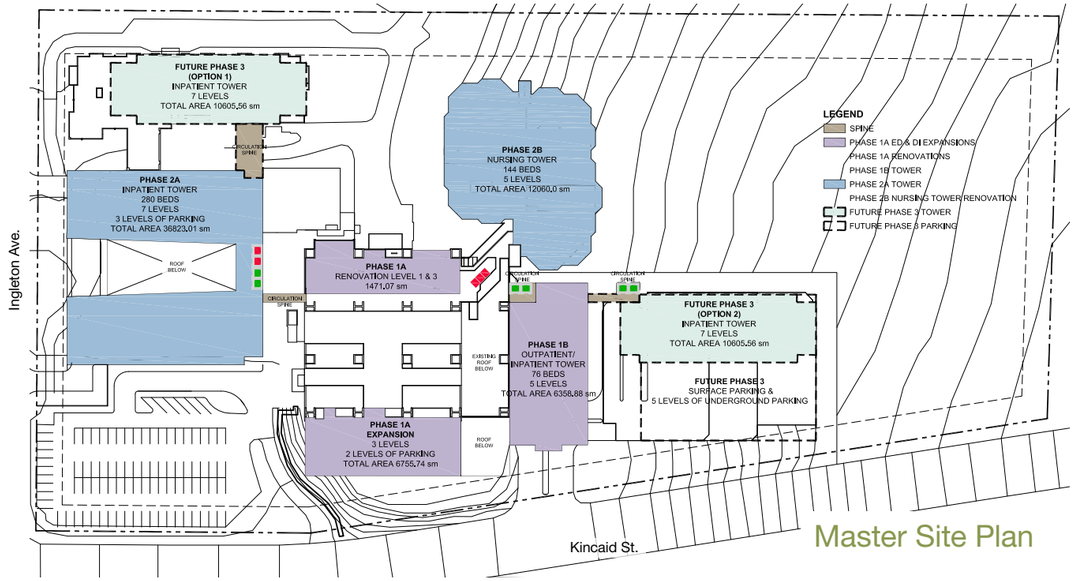
This review did find and confirm challenges and inefficiencies to sustaining operations as well as impediments to growth. The oldest facilities (1952 and 1958) have exceeded their useful life and need to be removed to enable renewal. However, the central diagnostic and treatment facility, and patient tower represent a significant investment in infrastructure that can be enhanced and continue provide great service. This plan identifies priorities for the short term investment/remediation and then provides a 10 year outlook for development that addresses service needs, opportunities for continued service advancement and innovation while maintaining a healthily reserve of site flexibility and adaptability for long term growth and renewal. While broader health service planning continues to look at the needs of communities across the lower mainland in providing the best care in the best setting for the best outcomes, Burnaby Hospital is ready and able to continue to play a vital role in providing acute care services for its community for years to come.



CLASS D COSTING BY PHASE		
PHASE	**PHASE DESCRIPTION**	**CLASS D COST ESTIMATE BUDGET RANGE (2012 $, EXCLUDES TAX, INCLUDES FEE)**
IMMEDIATE	ED, Endoscopy, SPD	$5.0 Million
IMMEDIATE	Emergency Replacement Generator	$3.5 Million
PHASE 1A	Renovations and Addition Support Building	$106.4 Million to $120M (13% variance)
PHASE 1B	New Acute Tower with Outpatient, Demolish N&W Wings	$67.2 Million to $97.1M (44% variance)
TOTAL PHASE 1 BUDGET RANGE		**$173.6M TO $217M (25% VARIANCE)**
PHASE 2A	New Accute and Support Tower	$245.7 Million to $307.4M (25% variance)
PHASE 2B	Renovate Nursing Tower	$98.0 Million
TOTAL PHASE 2 BUDGET RANGE		**$343.7M TO $405.5M (18% VARIANCE)**
TOTAL DEVELOPMENT (500 BED)		**$517.4M TO $622.5M (20% VARIANCE)**



Existing Site Plan



Master Site Plan

Intent

The HLMP is a decision making guide informing clinical services, physical expansion and improvement of a health care site. It enables decision making on capital improvements and land use planning within a comprehensive framework. This comprehensive view provides one document that ensures all interests and service plans are accounted for and provides for future flexibility. It establishes the needs and issues that require attention in order to develop a successful healthcare site as a key resource for the community. The process undertakes a comprehensive and collaborative process to ensure all interests are heard to provide a clear understanding of the short, medium and long term priorities of the site. A key component of the HLMP is the Master Program that describes the projected program requirements for the services that will be provided at Burnaby Hospital.

This document will be used by provincial and Fraser Health leadership to help determine and develop priorities for operational and capital planning and investment. It is based provincial policy for the management of capital assets (Capital Asset Management Framework) , informed by MoH and FH's strategic plans and guided by principles to ensure value for patients, staff, health leadership and communities. The *Guiding Principles* include:

Evidence Based Design:

- Evidence-based design (EDB) is the process of basing decisions about the built environment on credible research to achieve the best possible outcomes. Evidence-based design enables demonstrated improvements in the organization's outcomes, economic performance, productivity, customer satisfaction, and cultural measures.

Performance Optimization:

- The development of the facility provides an opportunity to re-design processes to improve patient care and the overall patient experience. This leads to better clinical outcomes improving the safety, quality, delivery; increased efficiency; and an improved patient experience.

Master Planning and Integration:

- Integration provides for accessibility and seamless layering of services and purpose to both optimize utilization of resources and enable growth through connectivity across the network of care. Integration takes place in terms of strategy, planning and service delivery looking not just within sites but across communities.

Adaptability, Flexibility and Expandability:

- Facilities and Infrastructure needs to accommodate the rapid cycle of innovation and change in the development and implementation of clinical and work processes. Design for flexibility reduces obsolescence and increases effectiveness of clinical services enabling both increased capacity and improved health outcomes.

Innovation:

- Enabling and embracing innovation means providing for state of the art strategies and the development of future strategies in the continual improvement of both patient and staff health and wellness. This means providing not only for the best care of patients and families but the best work environment for staff.

Sustainability and High Performance Integrated Design:

- Hospitals and communities need to be healthy places that enable healing within an interconnected and integrated environmental context. As in nature, systems should be designed to be open ended "learning" systems. Renew-ability and regeneration are key to community, corporate and individual health. Integrated design enables optimization of means and resources by leveraging results from integrated systems.

The HLMP proposes a 10 year redevelopment plan as show on these illustrations. This plan entails an interim investment of $5M to address critical issues (immediate plan) within Emergency Services, SPD and Endoscopy. This enables continued sustainment and development of core services while reading for renewal. The next recommended priorities for investment are to enhance the diagnostic and treatment platform while replacing the most aged buildings. Phase 1 captures this with the expansion and renovation of the central Support Building then creating a new Ambulatory and Inpatient Tower with sufficient sustaining capacity for patient care. Phase 2 is then enabled, providing for a 500 Bed Community Hospital. This opportunity represents a capital plan of with an investment range of $520 million to $625 million in order to fully bring the site up to projected requirements in alignment with best practice and contemporary standards as shown in the attached table. A final investment plan will need to be evaluated within the health system context based on risk, value for investment and opportunity.

The plan also tests the viability of the site and proposed redevelopment against potential long term aggressive growth scenarios. Future expansion of patient care or other health service that may include Inpatient Care Beds, Primary Care, Ambulatory Care, an expanded academic role and specialized or alternate modalities of care is show as feasible and viable on this site.

The HLMP is divided to the following sections:

- **Project Background** – describes prior work, and the project methodology
- **Strategic Context** – describes the health care system context, role of Burnaby Hospital and the populations served
- **High Level Service Plan** – describes the services and projections informing growth
- **Real Estate Assessment** – describes current investments of capital, land, buildings and leases support health services across Burnaby
- **Master Program Findings and Clinical Priorities** – describes the priorities for investment and as well as space requirements up to 2020 and test scenarios for beyond.
- **Academic & Research Plan** – provides UBC School of Medicine's plan for academic services and growth (to follow)
- **Existing Site Analysis** – shows current land and facilities utilization, potential and infrastructure issues
- **Urban Planning Analysis** – provides assessment of impact on urban environment and potential opportunities
- **Site Development Plan** – defines a framework for renewal of facilities based on risk mitigation, service delivery needs and site opportunities
- **Costing** – provides preliminary impact assessment of cost for development

Next Steps

It is anticipate that this High Level Master Plan will be reviewed and endorsed as a basis for ongoing service and facility planning. Ongoing planning will align, define and develop solutions for best value investment. This work will engage stakeholders both within government, health authorities and the community in order to improve understanding of needs, and develop opportunities in partnership. The identified immediate priorities have already been endorsed and are being enacted. A balanced capital and operational plan continues to be developed in anticipation of the development of subsequent detailed business cases and solutions.

Ongoing Activities

In addition to the above development planning this plan will also inform site space committee decisions on space allocation and ongoing improvements as well as inform and update annual capital planning. It is further recommended that the assessment be refreshed for current priorities every 3 to 5 years and for projections every 5 to 7 years.

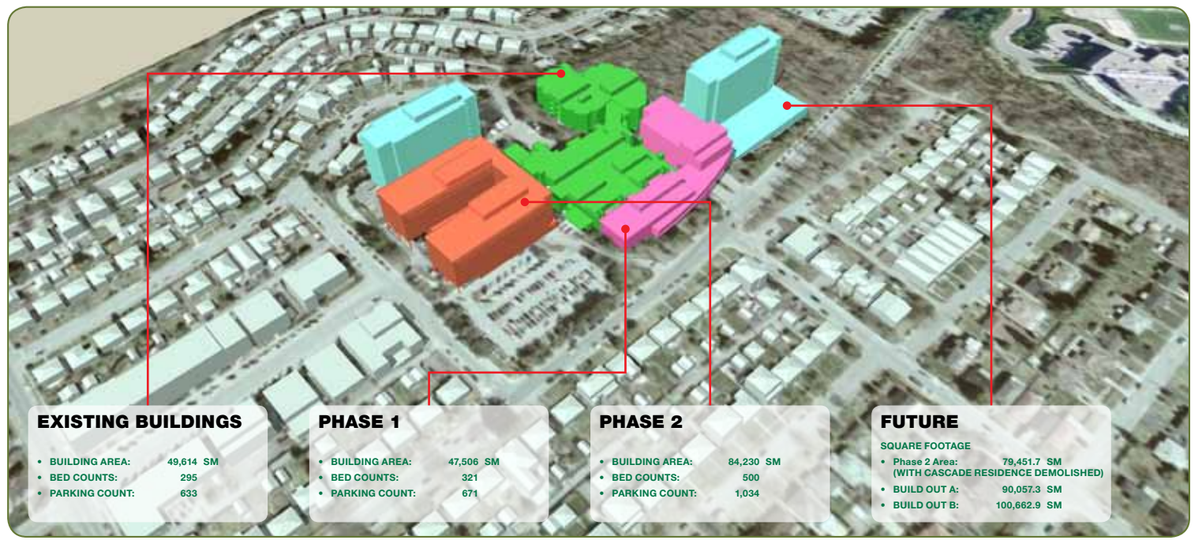
1.1 Phasing Diagrams

Existing

Phase 1

Phase 2

Future



1.2 Renderings (Phase 1 & 2 Completion)

OVERALL VIEW LOOKING NORTHEAST

OVERALL VIEW LOOKING NORTHWEST

OVERALL VIEW LOOKING SOUTHWEST

VIEW FROM KINCAID STREET

VIEW FROM KINCAID STREET

2.0 Project Background

Lower Mainland Facility Management (LMFM) has embarked on an initiative of developing High Level Master Plans (HLMP) for acute care hospital sites within the 4 health organizations served. The intent is to evaluate each site in terms of the service planning, demand projections, existing infrastructure and potential for site development and inform a long term capital plan.

Past reviews of Burnaby Hospital (BUH) programs have identified several areas that are struggling to provide a high level of service among expanding volumes, increasing complexity, aging infrastructure and lack of space. As volumes increase it will become more difficult to maintain the current quality of service provision. A plan identifying future capital project priorities to support the expanding programs and other services is needed to help move capital requests forward.

The completion of this project will result in the following benefits to BUH:

- A consolidated Clinical Service Plan for Acute Care Services at Burnaby Hospital,
- The advancement of capital requests for immediate priorities,
- A framework for site development based on a clear understanding of risk, needs and opportunity in alignment with BC's Capital Asset Management Framework,
- Site opportunities to inform Regional Planning decisions,
- A framework to inform a balanced capital plan and 10 year investment outlook for site sustainment and enhancement.

The following Master Plans were reviewed as background for the Burnaby Hospital High Level Master Plan 2013:

1. Burnaby Hospital Master Plan , Resource Planning Group Ltd., August 1991
2. Simon Fraser Health Region, Burnaby Master Plan , Resource Planning Group Ltd. in Association with Stantec Architecture Ltd., August 2001

The HLMP project was initiated in April 2012 and was developed in partnership with the Burnaby Hospital Foundation who also participated in the process as a key stakeholder.

The Burnaby Hospital was constructed in a number of phases with the first phase being the North Wing in 1952. Subsequent phases include the West Wing (1958), Cascade Residence (1972), parking structure (1974) and the Nursing Tower and Support Building in 1978.

The buildings and infrastructure have also been continually upgraded and renovated with capital investment of over $36 million since 2007. The Burnaby Hospital Foundation played a vital role in these improvements by contributing $9.5 million or over 26% of the capital cost.

Burnaby Hospital currently has 295 beds and 49,614 square meters of floor area with parking capacity for 636 cars.

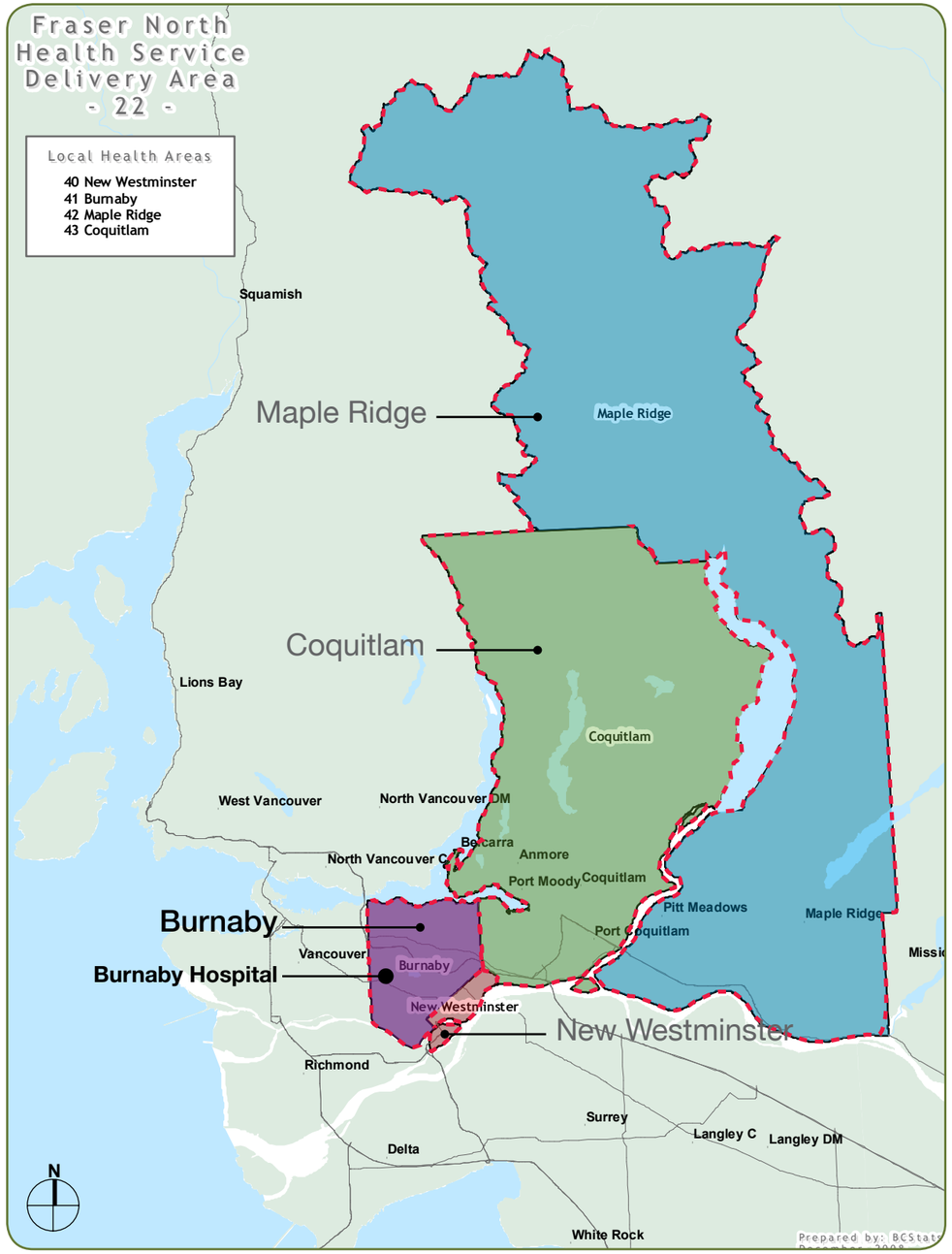
Recently Burnaby Hospital has received attention by the news media and public for the condition of some of the building infrastructure, particularly the West and North Wings. These buildings have outlived their useful life and their replacement is integral to the strategy for site renewal as demonstrated in this High Level Master Plan. Parallel to this project, a Community Consultation Committee was formed by local MLAs. This Committee produced a "Citizen's Report" that was provided to FH in November 2012. This report was also reviewed to inform the HLMP.

The HLMP was developed between November 2011 and February 2013. The development of the plan followed the established methodology of LMFM's High Level Master Planning Framework as endorsed by Leadership and MoH. This methodology is evidenced based and conforms to industry standard processes of analysis, consultation and screening, evaluation and synthesis of findings. Goals and objectives were established that identified the short and long term site development and facility infrastructure required to sustain effective and efficient delivery of health care services at BH. Program parameters and key assumptions were identified for all key components to ultimately provide space allocations. The allocations were used to develop site opportunities that were presented in a workshop setting for evaluation and feedback. Preferred site development options were selected and a preliminary phasing plan and costing developed.

A professional team of planners lead the project as directed by FHA sponsor and Project Steering Committee. A wide range of stakeholders were consulted and engaged though interviews, presentations, workshops and reviews. Stakeholders included:

- Ministry of Health
- Local MLAs
- Fraser Health Executive Team
- Fraser Health Program Management Executive Directors and Leaders
- Site Leadership and MHCC
- Site Service Leads
- Lower Mainland Support Service Leads
- Fraser Health Support Services
- Fraser Health Residential Care Services
- Fraser Health Capital Committee
- Burnaby Hospital Foundation
- Burnaby Hospital Foundation Consultative Committee
- Burnaby Hospital Auxiliary
- City of Burnaby
- UBC School of Medicine
- BCIT School of Health Sciences
- Burnaby Board of Trade
- Various physician, citizens and allied health professionals who connected through community sessions

Engagement level varied as per a high level planning processes. As planning continues to be developed for Health Service Planning, Capital Development and site sustainment – consultation will continue and be focused as appropriate to these processes.



3.0 Strategic Context & Hospital Profile

Burnaby Hospital (BH) plays a critical role within the Fraser Health network of care, and this context is best understood within the population and service needs of Fraser Health generally and the Burnaby community specifically. This population context is broadened in Section 4 where Burnaby Hospital health services are described using both the historical visit volumes and future projected demand for services. In Section 6 the Master Programming findings are highlighted and the outcomes discussed in terms of the short, medium, and long term priorities for site development.

The Fraser Health Authority is one of five regional health authorities in the province of British Columbia. Fraser Health provides health care services across the continuum of care. These services are provided to approximately 1.64 million people living in the geographical area encompassed by Boston Bar (in the North) to White Rock (in the South), and Hope (in the East) to Burnaby (in the West). Fraser Health is anticipated to experience a population growth rate of approximately 21% over the 10-year period from 2011 – 2021, which is the highest rate of population growth of all the health authorities. Fraser Health has 12 hospitals that are categorized as either "regional" or "community"; Burnaby Hospital is one of nine community hospitals, with the remaining three being regional[1].

Burnaby's population is approximately 230 000; it is the second largest Local Health Area (LHA) within Fraser Health with about 14% of Fraser Health's total population. The population profile of Burnaby is similar to that of Fraser Health as a whole, though Burnaby currently has a slightly smaller proportion of children ≤ 16 years of age and slightly higher proportion of adults 17-64. British Columbia government population projections (P.E.O.P.L.E. 36) indicate that Burnaby will experience an average population growth rate of 7.1% over 5-year intervals between now and 2036. These projections suggest that the highest rates of population growth will be in those aged 65 and over. However, city development plans may result in a shift in the age demographics with the planned addition of high-density residential dwellings. Burnaby already has a rich and diverse cultural/ethnic mix in its population and this is likely to continue to grow in the future.

As a community hospital, BH delivers primary acute and community-based health care services for the local population. In keeping with the vision of an integrated network of care and given its size, location, BH also provides some specialty services (see Section 5.0, Figure 2 for the inpatient services provided at BH), and thus, as part of the Fraser Health network, BH acts as a receiving hospital for higher levels of care. The primary referring hospital to BH is Eagle Ridge Hospital (ERH); in 2010/11 BH received 149 transfer cases with 80% of these coming from ERH. There are also cases that require transfer from BH to regional hospitals for higher levels of care not provided at BH; in 2010/11 BH transferred 156 cases, with 87% of these going to Royal Columbian Hospital (RCH).

1. Refer to *Hospital Profiles*, July 2012; Fraser Health, for more information on hospital classification

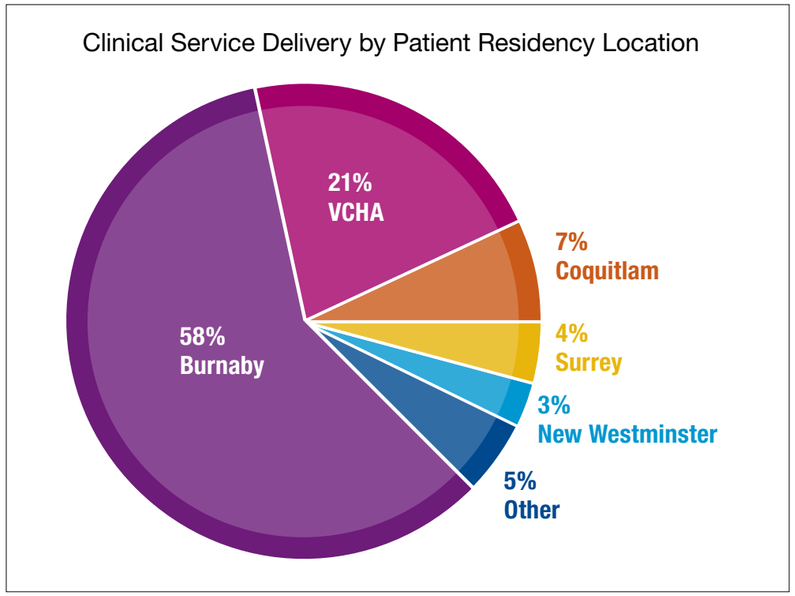
While BH is considered the local community hospital for the city of Burnaby, its location makes it easily accessible to residents of neighbouring communities. Analysis of the residency of patients served at Burnaby Hospital indicates that just over half (58%) come from within Burnaby. A unique effect of BH's location (less than 1km to the border shared with Vancouver) is that nearly ¼ of services (21%) are delivered to residents who live in the Vancouver Coastal Health Authority; after Burnaby residents, this is the next largest population served by the hospital. **Figure 1** provides a breakdown of the percentages of populations served at Burnaby Hospital for fiscal year 2010/11.

In 2012 Burnaby Hospital operated 286 funded beds; most of these beds (~60%) were general medical or general surgical beds, but the bed allocation also included the following specialty beds: Cardiac Stepdown, Orthopaedic Surgery, ICU, Maternity, Neonatal ICU, Acute Psychiatric, and Palliative Care. See **Table 3** in Section 5.0 for quantification of all beds.

The Emergency Department (ED) at Burnaby Hospital saw 70,008 visits in 2010/11 and is the second busiest ED in Fraser Health. Burnaby Hospital has ten operating rooms and an Ambulatory Care Centre for endoscopy and minor procedures, plus support services such as pre/post operative care, preadmission clinic, and centralized Medical Device Reprocessing department. The typical clinical support services of a large general hospital are provided at BH, such as Lab, Medical Imaging, Pharmacy, along with the requisite support services such as Housekeeping, Waste Management, Laundry and Linen, Biomedical Engineering, etc. Finally, there are a wide range of additional outpatient and community-based services that are provided out of Burnaby Hospital. All programs/departments are listed in **Tables 8** and **9** in Section 6.0 and more detailed information for each is available in the Burnaby Hospital Master Program (2012).

In addition to service provision and in the context of a developing academic organization, BH is a community education facility affiliated with UBC's Family Practice Residency Program, the Pharmacy Practice Residency, and the Department of Orthopaedics. This role will be further expanded upon in alignment with UBC Academic Service planning (Refer to Section 7.0). The site being situated in close proximity to BCIT is ideally suited to develop partnerships in advancing basic and continuing education for nursing, allied health and other healthy practitioners.

FIGURE 1: BREAKDOWN OF POPULATIONS SERVED AT BURNABY HOSPITAL; AS DEFINED BY RESIDENCY OF PATIENTS. (SOURCE: CACTUS DATABASE, FISCAL YEAR 2010/11)



4.0 High-Level Service Plan & Volumes

Service Overview

Figure 2 outlines the inpatient services that are provided, available and not available at Burnaby Hospital.

Service Demand – Current And Projected

Historical Inpatient Demand and Performance Metrics

Historical service demand and performance metrics for inpatient cases at BH are shown in **Tables 1** and **2**. These data show that the number of cases has been increasing slightly, while the average length of stay has fluctuated year to year. Particularly revealing are the occupancy data of **Table 2**, and specifically the yellow and red cells in this table, which indicate that the service is operating at/above capacity and that there may be unmet demand.

Inpatient Projections

Projections for inpatient bed requirements were done for Burnaby Hospital using the planning time horizon of 2020 to 2030; the results of this exercise were an estimated range of 500 projected beds for 2020 (10 year outlook). Projections beyond this period were reviewed but due to high variables cannot accurately inform growth requirements. 2030 Projects are considered a "test" scenario for the purposes of future proofing development planning feasibility. Projections were applied to the existing service mix ratios to allocate potential bed growth by program as shown in **Table 3**. It is important to note that these are notional bed counts and assignments; and are specifically designed to test the capacity of the site rather then to determine the actual beds requirement for a specific time frame. Any future formal redevelopment process will require considerable investigation and research and will likely require some modifications of final bed counts and service assignments. It is also expected that the ongoing Bed Allocation Method (BAM) processes will impact current and future bed mixes based on real time utilization requirements.

FIGURE 2: LISTING OF SERVICE AVAILABILITY AT BURNABY HOSPITAL
FROM: *HOSPITAL PROFILES*; JULY 2012; FRASER HEALTH

SERVICES AVAILABLE – SPECIALISTS AVAILABLE ON SITE OR ON CALL 24/7

- 24/7 Emergency Department
- Psychiatric Inpatient
- Level 1 Obstetrics
- Adult Elective Inpatient Surgery
- Adult Elective Outpatient Surgery
- Adult Unscheduled Surgery
- Gynecology
- General Surgery
- Ophthalmology
- Orthopaedic Surgery
- Orthopaedic Reconstruction
- Orthopaedic Trauma
- Otolaryngology
- Urology
- General Medicine
- Internal Medicine
- Intensive Care Unit
- Acute Care for the Elderly

Modalities:

- General Radiography
- Interventional Radiography
- Diagnostic Mammography
- Computerized Tomography
- Ultrasound
- Echocardiography
- Magnetic Resonance Imaging

SERVICES AVAILABLE – SPECIALISTS (SERVING ENTIRE FH) AVAILABLE ON SITE OR ON CALL 24/7

- Level 2 Obstetrics
- Level 2 Neonatal ICU
- Tertiary Palliative Care

SERVICES AVAILABLE – SPECIALIST SUPPORT AVAILABLE, BUT MAY NOT BE 24/7

- Psychiatric Emergency
- Paediatric Surgery
- Oral Maxillofacial Surgery
- Dental Surgery
- Plastic Surgery
- Thoracic Surgery
- Gastroenterology
- Pulmonary/Respiratory
- Neurology
- Hematology
- Infectious Disease
- Oncology Inpatient
- Patient Assessment and Transition to Home
- Endocrimology
- Rheumatology
- Cardiology

SERVICES NOT AVAILABLE AT BH

- Paediatric Inpatient
- Paediatric Psychiatric
- Cardiac Surgery, Vascular Surgery, Neurosurgery
- Endocrinology, Rheumatology, Dermatology, Nephrology
- Inpatient Rehabilitation
- CSICU, Interventional Cardiology
- Angiography
- Screening Mammography
- Bone Densitometry

TABLE 1: FISCAL YEAR INPATIENT DEMAND BY CASES, TOTAL DAYS, AND AVERAGE LENGTH OF STAY (ALOS)

	* ACUTE (EXCL. NEWBORNS)			NEWBORNS			* ACUTE (INCL. NEWBORNS)		
FISCAL YEAR	CASES	DAYS	ALOS	CASES	DAYS	ALOS	CASES	DAYS	ALOS
2005/2006	12,052	100,249	8.3	1,412	3,770	2.7	13,464	104,019	7.7
2006/2007	12,206	108,060	8.9	1,519	4,152	2.7	13,725	112,212	8.2
2007/2008	12,751	97,766	7.7	1,742	4,410	2.5	14,493	102,176	7.1
2008/2009	12,981	109,601	8.4	1,807	4,693	2.6	14,788	114,294	7.7
2009/2010	13,275	104,114	7.8	1,782	4,354	2.4	15,057	108,468	7.2
2010/2011	13,305	111,382	8.4	1,667	4,259	2.6	14,972	115,641	7.7
2011/2012 Q2 YTD	6,279	52,383	8.3	750	1,782	2.4	7,029	54,165	7.7

Data Source: CABSTRACT *Q2 YTD includes periods 1-6; up to 2012.09.15

TABLE 2: INPATIENT UNIT OCCUPANCY; AS CALCULATED AGAINST FUNDED BED NUMBERS

PROGRAM	UNIT	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Intensive Care Nursing	ICU	72.8%	72.1%	77.1%	84.9%	87.8%
	NICU	90.4%	85.9%	83.3%	78.5%	77.9%
Medical Nursing Unit	2A PATH	102.8%	111.8%	99.0%	107.4%	104.7%
	2B	98.1%	99.5%	99.8%	102.0%	102.2%
	3B	97.9%	99.4%	98.5%	102.2%	98.8%
	3C	92.2%	95.3%	95.6%	98.7%	100.3%
	3D	98.1%	98.7%	99.6%	101.6%	100.7%
	4W			118.9%	140.4%	105.6%
	5A ACE		72.6%	105.0%	131.8%	148.7%
Obstetrics Nursing Unit	MATERNITY	88.3%	90.1%	85.3%	91.3%	82.5%
	NURSERY	61.1%	62.4%	61.3%	58.7%	55.5%
Palliative Nursing Unit	2D	93.3%	98.7%	99.2%	100.4%	103.1%
Psych/Addiction Nursing	PSYCH			110.2%	110.5%	111.9%
Surgical Nursing Unit	4BD	78.1%	92.7%	95.0%	99.4%	99.0%
	4C	88.3%	94.3%	96.3%	97.1%	98.9%

Data Source: FH Finance Occupancy Report *Q2 YTD includes periods 1-6; up to 2012.09.15

TABLE 3: INPATIENT BED PROJECTIONS FOR BURNABY HOSPITAL

BED TYPE	CURRENT STATE 2012	2020 ESTIMATED PROJECTIONS	*2030 TEST SCENARIO*
Medical	111	118	*132*
Surgical	60	129	*181*
Rehab	0	24	*61*
GENERAL PURPOSE SUBTOTAL	**171**	**271**	***384***
Cardiac Care	20	30	*44*
ICU	11	20	*26*
ACE	29	45	*62*
Tertiary Hospice	10	16	*21*
Neuroscience	0	31	*36*
Mental Health	25	60	*98*
Paediatrics	0	0	*0*
Maternity	12	20	*19*
Neonatal ICU	8	7	*10*
SPECIAL PURPOSE SUBTOTAL	**115**	**229**	***316***
TOTAL	**286**	**500**	***700***

Emergency Department Historical and Projected Demand

Burnaby Hospital has the second busiest ED in Fraser Health. The historical data for ED visits and 2020 projections and 2030 "test" are shown in **Table 4**. This data demonstrates an average year-to-year increase in demand of 11% until the fiscal years 2009/10 and 2010/11, where the demand plateaus; this suggests that there is ongoing annual increases in demand, but the ED appears to have reached its operational capacity. This is finding is subjectively validated by those working in the BH ED.

Projections based on population growth (and thus disregarding capacity limits) indicate growth in demand of approximately 17% every 10 years.

Differentiation of ED visits by CTAS score is demonstrated in **Figure 3**, which shows that almost nine out ten ED visits is categorized as CTAS 3 (43%) or CTAS 4 (44%).

Surgical Program Historical and Projected Demand

Historical and projected service demand indicators (cases) for surgical services are shown in **Table 5**.

Laboratory Medicine Historical and Projected Demand

Historical and projected service demand for Laboratory Medicine are shown in **Table 6**.

Medical Imaging Historical and Projected Demand

Historical and projected service demand for Medical Imaging modalities are shown in **Table 7**.

TABLE 4: HISTORICAL AND PROJECTED EMERGENCY DEPARTMENT VISITS; BY DISPOSITION AND BY CTAS

	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2020 PROJECTION	2030 PROJECTION
Total ER Outpatients	44,175	48,155	54,749	61,802	61,355	70,640	82,357
Total Admissions Via ER	7,178	7,461	7,676	8,412	8,653	10,630	13,597
Percent Admits	14.0%	13.4%	12.3%	12.0%	12.4%	15.0%	16.5%
TOTAL ER VISITS	**51,353**	**55,616**	**62,425**	**70,214**	**70,008**	**81,270**	**95,954**

SUMMARY BY CTAS PRIORITY	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2020 PROJECTION	2030 PROJECTION
CTAS #1 – Resuscitation (immediate)	166	185	190	140	136	165	205
CTAS #2 – Emergent (< 15 mins)	4,661	4,978	5,511	5,809	6,599	7,955	9,893
CTAS #3 – Urgent (< 30 mins)	21,669	24,463	26,381	31,401	30,140	35,214	42,093
CTAS #4 – Semi-urgent (< 1 hr)	15,655	18,763	26,000	29,996	30,605	35,109	40,565
CTAS #5 – Non-urgent (< 2 hrs)	3,115	3,292	3,652	2,158	2,302	2,580	2,921
Not recorded	6,087	3,935	691	710	226	248	276
TOTAL ER VISITS	**51,353**	**55,616**	**62,425**	**70,214**	**70,008**	**81,270**	**95,954**

FIGURE 3: PROPORTION OF ED VISITS BY CTAS

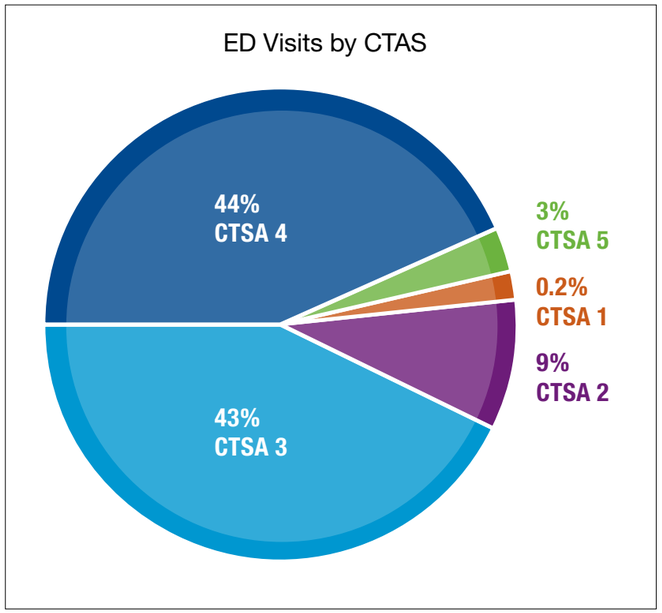


TABLE 5: HISTORICAL AND PROJECTED SURGICAL SERVICE INDICATORS

MEASURE	HISTORICAL			PROJECTED	
	SEP-08	OCT-09	NOV-10	2020	*2030*
Inpatient Surgical Cases	4481	4218	3808	4610	*6145*
Surgical Day Care Cases	N/A	N/A	5531	8247	*11339*
PACU Cases	N/A	N/A	9339	12851	*17484*

TABLE 6: HISTORICAL AND PROJECTED LABORATORY SERVICE INDICATORS

MEASURE	HISTORICAL			PROJECTED	
	Sep-08	Oct-09	Nov-10	2020	*2030*
Specimen Outpatients	3552	3283	982	1215	*1491*
Laboratory	4270	5682	4891	6130	*7356*
Sunset Laboratory	7379	7527	7213	9506	*12509*

TABLE 7: HISTORICAL AND PROJECTED MEDICAL IMAGING INDICATORS

MEASURE	HISTORICAL			PROJECTED	
	Sep-08	Oct-09	Nov-10	2020	*2030*
General Procedures	41564	44141	45711	53558	*61989*
Computed Tomography	14832	15303	15953	18568	*21491*
Diagnostic Ultrasound	13270	13735	10962	16665	*19289*
Nuclear Medicine	11595	10392	9508	12609	*13594*
Special Procedures	1064	1294	1122	1570	*1817*
MRI	-	2182	2445	2647	*3064*

Data Source: FHA Cost Accounting; Projections done by HBA, based on B.C. STATS, P.E.O.P.L.E. 36

5.1 Capital Investments

A report for the last six years indicates that Fraser Health has invested over $36 million on capital projects and major equipment for Burnaby Hospital. The Burnaby Hospital Foundation has played a key role in providing funding for hospital projects and has invested over $9.5 million in the same period.

Capital Investments follow two streams – Sustainment and Enhancement Funding. Funding for sustainment is based upon management of site risk, life cycle renewal and ongoing adjustments to standards and best practice. Investments are prioritized annually with funding from Minor Capital Funds (operating capital) MoH routine capital and some Foundation grants. Enhancements include major renovations, upgrades, additions and new builds. These are prioritized and informed by program growth pressures, strategic transformational changes to programs, and service renewal. Enhancements are funded by capital programs such as MoH Priority Funding and specific foundation campaigns. The HLMP forms the framework for establishing a 10 year priority capital outlook to inform both ongoing sustainment plans and site renewal.

Fraser Health
Burnaby Hospital - Capital Investments
2006/07 to 2012/13

	Approved Capital Investments - Cash Flow ($000's)							
	2012/13	2011/12	2010/11	2009/10	2008/09	2007/08	2006/07	Total
Approved Equipment Plans							-	
CT scanner 64 slice	-	-	-	-	-	-	1,370	**1,370**
Digital radiographic unit	-	-	-	-	-	-	600	**600**
Digital fluoroscopic unit	-	-	-	-	-	1,041	-	**1,041**
Ultrasound equipment	-	-	362	-	-	202	349	**913**
Digital Radiographic mobile unit / C-Arm	-	-	-	-	-	194	-	**194**
Physiological monitoring systems	-	-	-	-	-	339	-	**339**
Anaesthesia systems	-	-	1,369	-	-	-	-	**1,369**
OR navigation system	-	-	-	-	-	158	-	**158**
OR microscope (ceiling mounted)	-	-	-	-	-	246	-	**246**
Lasers (holmium/carbon dioxide/green light/argon beam)		-	-	145	-	-	-	**145**
Analyzers (lab)	-	-	104	-	-	435	-	**539**
Equipment between $5,000 and $100,000	-	2,825	2,171	1,852	2,362	2,182	3,605	**14,997**
Subtotal Equipment	**-**	**2,825**	**4,006**	**1,997**	**2,362**	**4,797**	**5,924**	**21,911**
Approved Facility Projects Plans	**-**	**-**	-					
Emergency Department Renovations	-	-	-	1,804	426	-	-	**2,230**
MRI Renovations (incl. equipment)	-	-	-	-	4,209	-	-	**4,209**
CT Scanner Renovation	-	-	-	-	41	336	-	**377**
Multipurpose Room Renovation	-	-	-	-	4	148	-	**152**
SPD Vertical Transport System	-	-	-	636	534	-	-	**1,170**
Arthroplasty Program	-	-	156	1,104	700	-	-	**1,960**
Boiler Replacement	-	-	-	-	1	821	-	**822**
Anotomical Pathology Renovation	-	-	-	-	5	290	-	**295**
Patient & Family Education Centre	-	-	175	17	-	-	-	**192**
BUH Lighting Retrofit	-	-	-	95	130	-	-	**225**
Energy Upgrade (variable speed drives to air)	-	-	-	235	-	-	-	**235**
Chiller Replacement	-	-	582	-	-	-	-	**582**
Parkade	-	80	166	-	-	-	-	**246**
Fire Alarm System Replacement		229	189	-	-	-	-	**418**
BUH Building Envelope	200	-	-	-	-	-	-	**200**
SPD Upgrades (Cart Washers)	-	-	-	137	368	-	-	**505**
Facility Capital Projects under $100,000	-	18	50	147	101	96	82	**412**
Subtotal Facility Projects	**200**	**327**	**1,318**	**4,175**	**6,519**	**1,691**	**82**	**14,230**
Total Capital Investment	**200**	**3,152**	**5,324**	**6,172**	**8,881**	**6,488**	**6,006**	**36,141**
Total Foundation Funding (note 1)	**n/a**	**1,195**	**1,534**	**1,248**	**4,241**	**1,292**	**1,460**	**9,510**
% Foundation Funding /Capital Investment		**37.9%**	**28.8%**	**20.2%**	**47.8%**	**19.9%**	**24.3%**	**26.3%**

Notes:

1) The amounts reported in the above schedule are from Fraser Health's Audited Financial Statements and include contributions made to both operating and capital funds.

Data Sources:

Equipment: Approved Equipment Plans for the site
Facility Projects: WebCAPS/FH Capital Plan
Foundation Funding: Audited Financial Statements

5.2 Current Real Estate

Fraser Health utilizes leased facilities to provide a variety of programs and services to the Burnaby community. These leases are constantly being reviewed to assess their fit in terms of location and the types of services provided. Opportunities for consolidation of leases are also being considered where applicable.

The following table provides as summary of current real estate assets in Burnaby. Leases are managed by LMFM Real Estate to ensure fit to use, functional alignment and ongoing upkeep. A Strategic Real Estate Plan informs renewal of leases. This plan is based upon the following principles:

Strategic Alignment: The plan will be aligned with the Ministry of Health Service Plan, Province of British Columbia's 5 Great Goals, and the strategic initiatives and goals of the lower Mainland Health Authorities.

Transparency: Development and reporting of the plan will be open with demonstrated accountability for decision making.

Evidence Based Design: Decisions will be based on evidenced best practices with a focus on patient centred care and improvement of health, quality or productivity outcomes.

Performance Optimization: Solutions will be developed to enable workplace optimization, improving utilization and functionality

Adaptive to Change: Standardization and flexibility will enable future proofing of accommodations and investment.

Planning Integration: planning will be carried out as part of an integrated health care delivery system. Emphasis is placed on enabling a continuum of care and development of a network of service. Special focus is placed on the co-dependency of clinical, HR, technological and site master planning integration.

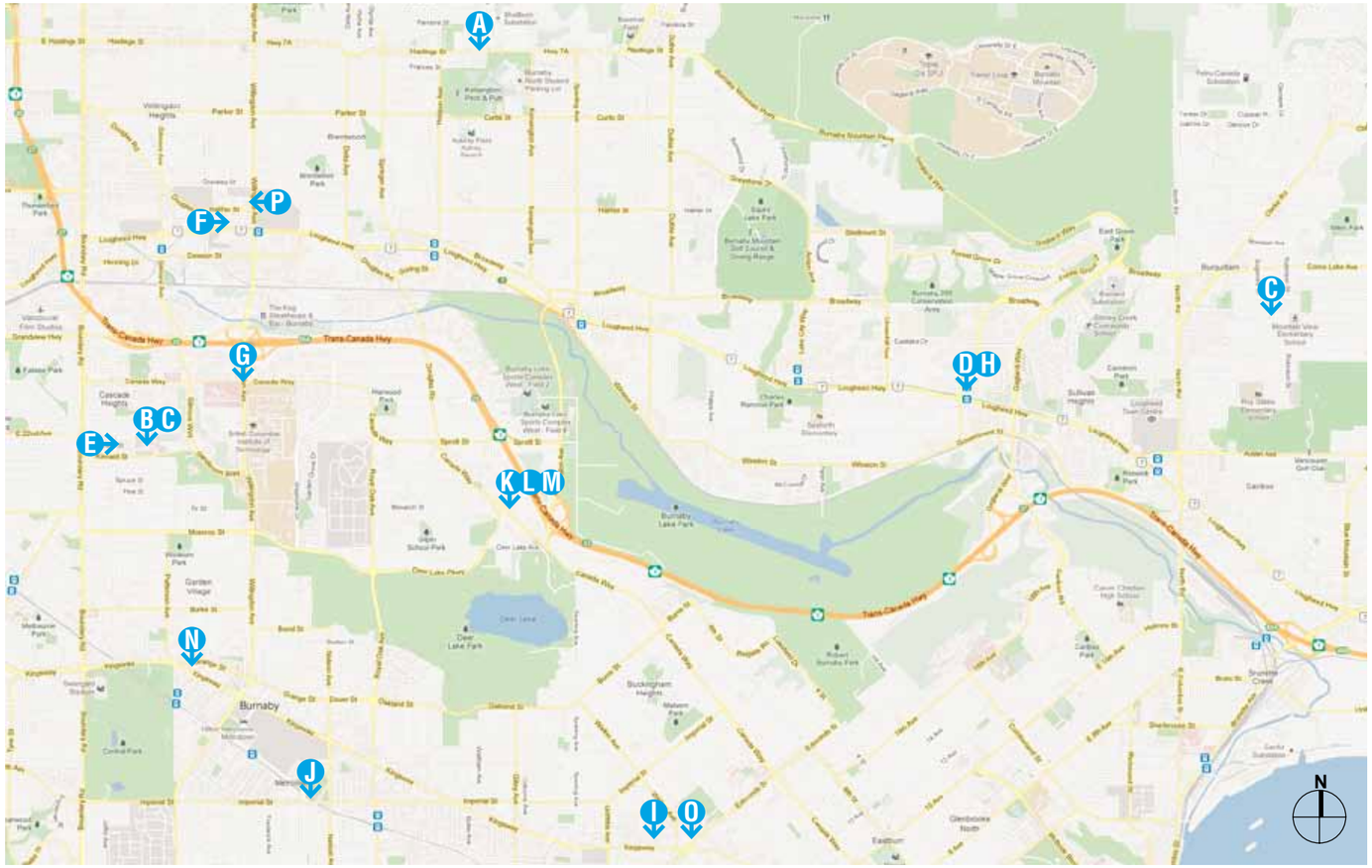
People Centric: the plan, its application, sustainment and evolution is to be guided within a humane and compassionate perspective that puts the quality and impact on human experience first and foremost.

Sustainability: life cycle thinking and analysis will be applied within a framework of measuring economic, societal and environmental sustainability.

Key Strategies Include:

- Service Planning Alignment – providing care in the environment best suited to the program and patient
- Lease Consolidation – enabling integrated service delivery, flexibility and transformation though the creation of Regional, Community or Local Service Hubs.
- Strategic Partnerships – developing partnerships with local government, NGOs, private practice, developers and government
- Workplace Optimization – implementing increase mobility and collaboration though integrated workplace design

The strategy for community site development, through owned or lease, will continue to be developed and informed by both the HLMP for Burnaby Hospital, the Real Estate Strategic Plan and Fraser Health's Service delivery planning.

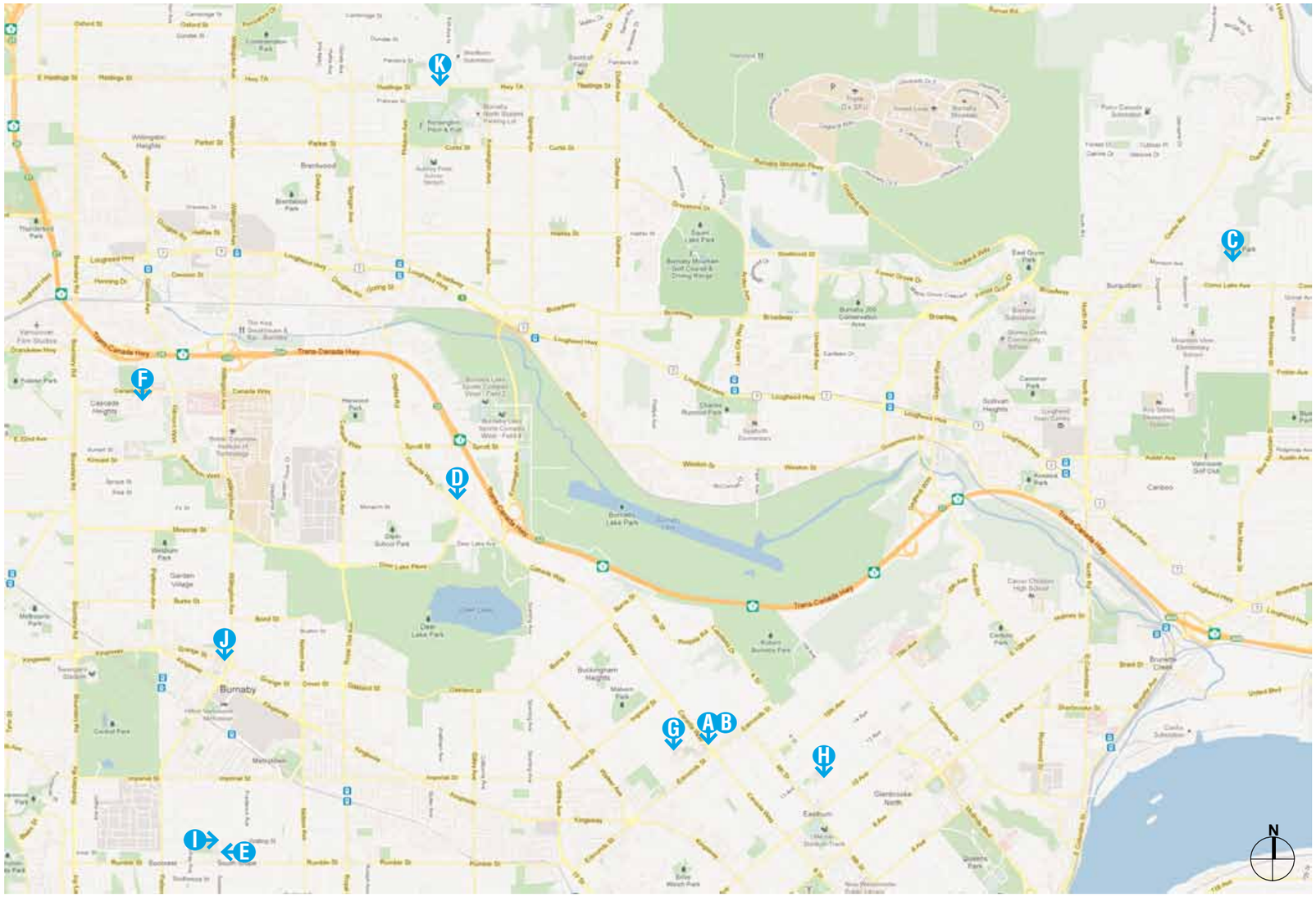


	LEASE NAME	SUITE	ADDRESS	CITY	POSTAL CODE	LANDLORD / BILLING CONTACT	TERM (YEARS)	LEASE END DATE	AREA - RENTABLE	PROPERTY TYPE	LEASE CATEGORY	HA
A	Fellburn Care Centre		6050 - East Hastings Street	Burnaby	V5B 1R6	Fraser Health Authority	0			Owned	N/A	FHA
B	Burnaby General Hospital		3880 - Ingleton Avenue	Burnaby		Fraser Health Authority	0			Owned	N/A	FHA
C	Burnaby General Hospital		3935 - Kincaid Street	Burnaby	V5G 2X6	Fraser Health Authority	0		538077.0	Owned	N/A	FHA
D	EFAP - Burnaby	5th Floor - Office #10	3292 - Production Way	Burnaby	V5A 4R4	North Road Office Services Ltd	1	2012-03-31	190.0	Leased	Sublease	VCHA
E	Acute (Lab) - Burnaby		3827 - Sunset Street	Burnaby	V5G 1T4	Tara Borgi Investment Ltd.	2	2012-12-31	340.0	Leased	Lease	FHA
F	FH-VCH Collaboration Centre - Burnaby	300	1901 - Rosser Avenue	Burnaby	V5C 6S3	Appia Developments	2	2013-02-28	4306.0	Leased	Lease	VCHA
G	Burnaby Centre for Mental Health & Addictions		3405 - Willingdon Avenue	Burnaby	V5G 3H3	Minister of Finance	5	2013-06-30	55200.0	Leased	Lease	VCHA
H	Acute - Inter-Rai - Burnaby	504	3292 - Production Way	Burnaby	V5A 4R4	Industrial Alliance Pacific Insurance & Financial Services Inc.	5	2014-03-31	3758.0	Leased	Lease	FHA
I	Mental Health - Burnaby	320	7155 - Kingsway	Burnaby	V5E 2V1	Bosa Development Corporation	10	2014-10-31	4284.0	Leased	Lease	FHA
J	Public Health - Burnaby Youth Hub		4750 - Imperial Street	Burnaby	V5H	Lower Mainland Purpose Society	5	2015-08-16	500.0	Leased	Sublease	FHA
K	Mental Health - Burnaby	L48 and L50	4946 - Canada Way	Burnaby	V5G 4H7	City of Burnaby	0	2016-04-30	4888.0	Leased	Lease	FHA
L	Home Health / Public Health - Burnaby	105, 300 & 400	4946 - Canada Way	Burnaby	V5G 4H7	City of Burnaby	5	2016-04-30	36755.0	Leased	Lease	FHA
M	Storage	Unit #5B	4946 - Canada Way	Burnaby	V5G 4H7	City of Burnaby	5	2016-04-30	67.0	Leased	Lease	FHA
N	Deaf Well-Being	300	4211 - Kingsway	Burnaby	V5H 1Z6	Hollyburn Estates Ltd.	5	2016-10-31	2700.0	Leased	Lease	VCHA
O	Public Health - New Canadian Clinic - Burnaby	204	7315 - Edmonds Street	Burnaby	V5E 1G8	D. Bosa Land Corporation	10	2019-03-31	1972.0	Leased	Lease	FHA
P	Vancouver Consolidation		1795 - Willingdon Avenue	Burnaby	V5C 5J2		0	2099-01-01	0.0	Leased	Lease	PHSA

5.3 Current Residential Facilities

Fraser Health provides over 1000 complex care residential beds in the City of Burnaby either being owned and operated by FH or through long term contract service providers. The attached map and table shows current facilities that FH owns or contract with to deliver residential care.

The facilities are assessed and managed by FH to ensure alignment to quality of care, demand, fit to use per patient needs and effective delivery of care as an integrated health delivery system. FH continues to develop care for this population's needs though the integrated planning of acute care, home care an residential services for the fit best and quality of care for investment.



BURNABY RESIDENTIAL FACILITIES				
	BUILDING NAME	**NUMBER OF BEDS**	**ADDRESS**	**NOTES**
A	Harmony Court	55	7195 Canada Way	
B	Harmony Court ACM-D	25	7195 Canada Way	
C	Carlton Lodge	116	4108 Norfolk Street	Opens Nov. 2012
D	Dania	67	4279 Norland	
E	Fairhaven	100	7557 Sussex	
F	Finnish Manor	60	3460 Kalyk	
G	New Vista	236	7550 Rosewood	
H	Normanna	100	7725 4th Street	
I	St. Michael's	128	7451 Sussex	
J	Willingdon Park	95	4435 Grange	
K	O&O Fellburn	110	6050 Hastings	
TOTAL NUMBER OF BEDS		**1092**		

6.0 Master Program Findings & Clinical Priorities

In this section the clinical priorities that arose out of the Master Program are presented first, followed by the global and specific findings for the 41 program components that make up the Master Program.

Clinical Priorities

Based on the information collected throughout the project, the Project Team identified potential capital improvements that are required on the site and classified them in terms of priority. These potential capital improvements were reviewed with the Project Steering Committee which endorsed the short (immediate), medium and long term priorities for Burnaby Hospital site redevelopment that are outlined below.

Short Term Clinical Priorities (0 – 3 years)

SCOPE CLEANING IN ENDOSCOPY

The current scope cleaning space within the Ambulatory Care Centre does not comply with space/design standards nor does it meet accreditation requirements, thus posing a challenge to managing infection control risks. The scope cleaning room requires a detailed assessment of the space/infrastructure against standards, clinical requirements with the goal of providing an immediate plan to address the findings and provide an operationally appropriate solution.

SURGICAL PROCESSING DEPARTMENT SPACE (SPD) / INFRASTRUCTURE ISSUES

Initial review of the SPD suggests that the space/infrastructure does not comply with space and design standards, nor does it meet accreditation requirements. The SPD requires a detailed assessment of the space/infrastructure against these standards, requirements, and risks, with the goal of developing an immediate plan to prioritize and resolve the issues.

EMERGENCY DEPARTMENT SUPERTRACK SPACE

The Supertrack assessment functions in space that is separated from the main Emergency Department. The demand for Supertrack services is growing and the current space configuration does not adequately meet the service demand. A more detailed functional assessment of the Supertrack operations, clinical processes and volumes is required (and adjoining services) to determine if the space can be redeveloped to improve service delivery and space optimization.

These are considered critical “immediate” priorities. Actions plans are recommended to implement solutions in 2013-2014. The other priorities will be further developed in conjunction with the site capital investment planning for sustainment and renewal.

Medium Term Clinical Priorities (4 – 10 years)

INPATIENT CAPACITY AND UPGRADE EXISTING TO CURRENT STANDARDS

Demand projections for 2020 indicate the need for approximately 500 inpatient beds in total. The current stock of 286 patient rooms and the inpatient units they are on fall short of compliance with many contemporary space/design features. In particular:

- There are too few single-occupancy rooms,
- Multiple-occupancy rooms put patients too close in proximity,
- There is insufficient space in patient rooms for storage, visitors, and clinical work space
- There is insufficient space on the units for clinical collaboration, storage, etc.
- Clinical workflow, quality and functionality are difficult to align with best practices.

The site development plan provides for both increased capacity and includes a strategy for upgrading the current patient rooms and inpatient units.

EMERGENCY DEPARTMENT CAPACITY AND UPGRADE TO CURRENT STANDARDS

The current ED is operating at, or near capacity, and falls short of contemporary space/design features as supported by best practice. Demand projections indicate that the BH ED can expect to see an additional 10,000 visits annually by 2020.

The medium term site planning includes a redevelopment/expansion of the Emergency Department that will increase capacity and enhance operational efficiency.

CLINICAL SUPPORT AND SUPPORT SERVICES CAPACITY

Increases in inpatient capacity and Emergency Department capacity will have a direct impact on many support and clinical support services; the medium term site development planning includes an impact analysis of these two major capacity initiatives and development plans as appropriate to ensure that flow of patients, supplies and services is maintained through the site and the system.

OUTPATIENT AND COMMUNITY-BASED SERVICES

As the site evolves, outpatient and community-based services that operate out of BH need to be reviewed to determine the most appropriate place from which to deliver these services. Outpatient and community-based services that remain on the campus should be co-located in logical groupings that support patient/visitor wayfinding, to optimize use of space, and enable flexibility in delivery of services that are susceptible to changes in service delivery models (i.e. location and space requirements).

Long Term Clinical Priorities (11 – 20 years)

ADDITIONAL CAPACITY FOR MAJOR SERVICE TYPES

The 20 year vision for the site based on population demand projections will require substantial review and a more robust understanding of the role of hospitals within the network of care across Fraser Health Authority. Likewise the potential increase in annual ED visits may not necessarily be met by BH if there are changes across the lower mainland in terms of service delivery and capacity. All site redevelopment plans undertaken should include a refresh of the longer term demand projections for these drivers, and proceed with an embedded plan to meet the ongoing needs of the community served by Burnaby Hospital.

Master Program Findings

The Burnaby Hospital Master Program (2012) consisted of 41 distinct programs; some of which had further service sub-components within. The Master Program investigation included a Functional Space Evaluation, with the major issues/opportunities noted in **Table 8**. In reviewing these findings, it is noted that there were a number of universal issues based on stakeholder feedback, that applied to many programs; in order to avoid substantial repetition these universal issues are noted below and generally apply wherever "universal issues" are listed for a given program (in **Table 8**, anywhere else in this report, or in the BH Master Program).

Universal Issues:

- Space is undersized to support both current and future demand (both not enough spaces and inadequate space allocation per patient)
- Insufficient numbers of single rooms – do not meet current target of 80%
- Family support space is insufficient
- Infection control precautions (lack of space separation between patients, insufficient number of patient toilets and staff handwashing sinks, insufficient number of isolation rooms) – this is being addressed within ongoing operations and will continue to be assessed for renewal
- Lack of adequate and sufficient critical clinical support space (medication rooms, supply and equipment rooms)
- Lack of adequate critical support space (laundry, waste management, soiled utility)
- Lack of interdisciplinary team support space

TABLE 8: MAJOR SPACE EVALUATION FINDINGS FROM MASTER PROGRAM

#	PROGRAM / SERVICE	FUNCTIONAL SPACE EVALUATION MAJOR FINDINGS
A	**CLINICAL SERVICES**	
A.1	Cardiac Inpatient Unit	• Universal issues
A.2	Healthy Heart Program	• Space inadequate to support current services and expected growth • Poor access and wayfinding • Service could potentially be moved off-campus to gain on-site capacity
A.3	Rapid Access OP Clinic	• N/A
A.4	Diagnostic Cardiology	• Unable to expand to accommodate increasing demand
A.5	Critical Care Program	• Universal issues
A.6	Emergency Department	• Inefficient layout of department impacts patient flow • Lack of appropriate care spaces for specialized types of patients; e.g. paediatrics, mental health, elderly, patients in correctional care, etc.
A.7	Tertiary Hospice Palliative Care Unit	• Universal issues
A.8	Community Connections – Home & Community Care Program	• Universal issues
A.9	Maternity/Newborn Inpatient Unit	• Poor adjacency between Labour & Delivery and NICU, and L&D and IPU
A.10	Primary Care Maternity Clinic	• Universal issues • Service could potentially be moved off-campus to gain on-site capacity
A.11	Neonatal Intensive Care Unit	• Poor adjacency between Labour & Delivery and NICU • Universal issues
A.12	Paediatrics	• Universal issues
A.13	General Medical/Surgical Inpatient Units	• Inpatient services located in two separate buildings – confusing for patients and visitors and added travel time for staff • Environmental deficits (lack of access to daylight, poor air circulation and temperature control) impact patient testing and healing environment
A.14	Medicine Outpatient Services	• Outpatient services located in two separate buildings - confusing for patients and visitors and added travel time for staff • Environmental deficits (lack of access to daylight, poor air circulation and temperature control) impact patient testing and healing environment • Some services could be moved off campus to gain on-site capacity
A.15	Mental Health and Substance Use Inpatient Unit	• Poor access/wayfinding • Inefficient layout • Patient safety related to location of IPU on Level 2
A.16	Mental Health and Substance Use Outpatient Services	• Poor access/wayfinding • Inefficient layout (oversized spaces) • Possible candidate program to move off campus to gain on-site capacity
A.17	Older Adult Program – ACE Unit and Consultation	• Universal issues
A.18	Diabetes Education Centre – Primary Care Program	• Poor access/wayfinding • Service could potentially be moved off-campus to gain on-site capacity
A.19	Transitional Care Unit	• Universal issues
A.20	Surgical Daycare Unit and Surgical Suite	• Universal issues
A.21	OR Booking, Preadmission Clinic & Ambulatory Care Clinic	• ACC has major infrastructure and internal design issues that affect patient care and patient and staff safety • ACC has poor adjacency with SPD/MDR
A.22	Surgical Processing Department (Medical Device Reprocessing)	• Major infrastructure issues that affect operations and ability to meet standards • Inefficient department layout negatively impacts workflow • Department landlocked and unable to expand to meet growing surgical services volumes

#	PROGRAM / SERVICE	FUNCTIONAL SPACE EVALUATION MAJOR FINDINGS
B	**CLINICAL SUPPORT SERVICES**	
B.1	Clinical Nutrition	• Universal issues
B.2	Infection Prevention & Control	• Universal issues
B.3	Laboratory Medicine & Pathology, Morgue	• Poor access/wayfinding and poor adjacency to some patient care areas (West Wing) • Inefficient layout • Technical areas in Lab are oversized for current demand • Morgue requires larger viewing area and ergonomic improvements
B.4	Medical Imaging	• Main department is landlocked and therefore unable to add imaging rooms • Current administrative area is poor use of space • Nuclear Medicine requires space improvement to address patient and staff safety issues (exposure to testing agents)
B.5	Pharmacy	• Infrastructure issues that affect operations and ability to meet standards • Insufficient space to layout department efficiently • Department landlocked and unable to expand to meet increasing demand for services
B.6	Rehabilitation Program (PT, OT, SW, SLP)	• Services dispersed across the site • Poor access/wayfinding to some services • Some services could be moved off campus to gain on-site capacity
C	**SUPPORT SERVICES**	
C.1	Biomedical Engineering	• Additional space required to support current service delivery
C.2	Facilities Maintenance and Operations	• Service areas dispersed throughout several buildings
C.3	Food and Nutrition Services	• Oversized for current number of beds • Poor adjacency to patient care areas • Inefficient layout due to size
C.4	Housekeeping & Waste Management	• Additional space required for equipment cleaning and storage
C.5	Laundry & Linen	• Additional space required to support future growth • Enclosed storage required for emergency supplies
C.6	In-Hospital Replenishment	• Inefficient layout of department • Lacks modern ergonomic aides to transfer and move supplies
C.7	Information Management	• Network and telephone system upgrade required
C.8	Integrated Protection Services	• Additional workspace in ED required
C.9	Health Information Management	• Poor access/wayfinding to Registration • Inefficient layout of Registration area
D	**ADMINISTRATION**	
D.1	Administration and Related services	• Emergency Operations Centre is undersized • Opportunity to improve space utilization through better design of administrative and related operations
D.2	Burnaby Hospital Foundation	• Undersized to accommodate future growth
D.3	Volunteer Resources	• Space widely dispersed throughout site is inefficient • Space for Volunteers is inadequate to support program growth

(For an all-inclusive list of findings the reader is referred to the Burnaby Hospital Report of Clinical Findings Related to Development of Master Program; in this report findings are listed by building in Appendix B and by program component in Appendix C.)

Space Summary

Table 9 presents program-based space requirements; these requirements are based on application of current space design benchmarks and evidence-based best practices to service demand projections for year 2020 and a test scenario for 2030.

The data presented in **Table 9** provides estimates of space requirements for the timeframes presented. As site development takes place the space recommendations of impacted programs will undergo further validation.

TABLE 9: CURRENT AND PROJECTED SPACE REQUIREMENTS BY PROGRAM

#	PROGRAM / SERVICE	2012	2020	*2030*
A	**CLINICAL SERVICES**	**CGSM**	**CGSM**	***CGSM***
A.1	Cardiac Inpatient Unit	496	2367	*3408*
A.2	Healthy Heart Program	312	445	*462*
A.3	Rapid Access OP Clinic	18	Incl in A.4	*Incl in A.4*
A.4	Diagnostic Cardiology	146	355	*355*
A.5	Critical Care Program	563	2864	*3265*
A.6	Emergency Department (incl Resp Therapy & Pulmonary Function Lab)	1350	4406	*4675*
A.7	Tertiary Hospice Palliative Care Unit	630	1421	*1659*
A.8	Community Connections – Home & Community Care Program	124	132	*132*
A.9	Maternity / Newborn Inpatient Unit	1521	2061	*2061*
A.10	Primary Care Maternity Clinic	45	80	*80*
A.11	Neonatal Intensive Care Unit	225	764	*875*
A.12	Paediatrics	130	85	*285*
A.13	General Medical / Surgical Inpatient Units	4935	23265	*31725*
A.14	Medicine Outpatient Services	1138	1772	*1918*
A.15	Mental Health and Substance Use Inpatient Unit	1506	5931	*6670*
A.16	Mental Health and Substance Use Outpatient Services	2745	1995	*2188*
A.17	Older Adult Program – ACE Unit and Consultation	1263	3814	*5058*
A.18	Diabetes Education Centre – Primary Care Program	212	233	*278*
A.19	Transitional Care Unit	1066	0	*0*
A.20	Surgical Daycare Unit and Surgical Suite	2076	4043	*4647*
A.21	OR Booking, Preadmission Clinic & Ambulatory Care Clinic	557	1319	*1393*
A.22	Surgical Processing Department (Medical Device Reprocessing)	598	1355	*1355*
B	**CLINICAL SUPPORT SERVICES**			
B.1	Clinical Nutrition	250	260	*292*
B.2	Infection Prevention & Control	19	82	*106*
B.3	Laboratory Medicine & Pathology, Morgue	1864	2165	*2519*
B.4	Medical Imaging	1452	2814	*2814*
B.5	Pharmacy	444	989	*1319*
B.6	Rehabilitation Program (PT, OT, SW, SLP)	940	1436	*1589*
C	**SUPPORT SERVICES**			
C.1	Biomedical Engineering	169	456	*502*
C.2	Facilities Maintenance and Operations	911	906	*906*
C.3	Food and Nutrition Services	2033	2294	*2310*
C.4	Housekeeping & Waste Management	263	469	*477*
C.5	Laundry & Linen	260	196	*229*
C.6	In-Hospital Replenishment	255	396	*514*
C.7	Information Management	360	410	*410*
C.8	Integrated Protection Services		22	*22*
C.9	Health Information Management	679	810	*810*
D	**ADMINISTRATION**			
D.1	Administration and Related services	1632	3451	*3451*
D.2	Burnaby Hospital Foundation	86	269	*269*
D.3	Volunteer Resources	331	565	*565*
	Optimization Clinic (shared space)	57		
	TOTAL	**33561**	**76897**	***91593***

Adjacency Matrix

Figure 4 highlights the program/departmental adjacencies that should be considered in any/all site redevelopments.

FIGURE 4: ADJACENCY MATRIX

- Immediately Adjacent
- Close Proximity
- Convenient Access

	FUNCTIONAL COMPONENT	CARDIAC INPATIENT UNIT	HEALTHY HEART PROGRAM	RAPID ACCESS OP CLINIC	DIAGNOSTIC CARDIOLOGY	CLINICAL CARE PROGRAM	EMERGENCY DEPARTMENT	THPCU	COMMUNITY CONNECTIONS	MATERNITY/NEWBORN INPATIENT UNIT	PRIMARY CARE MATERNITY CLINIC	NEONATAL INTENSIVE CARE UNIT	PEDIATRICS	GENERAL MED SURG INPATIENT UNITS	MEDICINE OUTPATIENT SERVICES	MHBU INPATIENT UNIT	MHBU OUTPATIENT SERVICES	DIABETES EDUCATION CENTRE	TRANSITIONAL CARE UNIT	SDCU & SURGICAL SUITE	OR BOOKING PREADMIN & AMBULATORY CARE	SPDMDR	CLINICAL NUTRITION	INFECTION PREVENTION & CONTROL	LAB MEDICINE, PATHOLOGY & MORGUE	MEDICAL IMAGING	PHARMACY	REHAB PROGRAM	BIOMEDICAL ENGINEERING	FMO	FOOD & NUTRITION SERVICES	HOUSEKEEPING & WASTE MANAGEMENT	LAUNDRY AND LINEN	IN-HOSPITAL REPLENISHMENT	IM/IT	INTEGRATED PROTECTION SERVICES	HEALTH INFORMATION MANAGEMENT	ADMINISTRATION & RELATED SERVICES	BURNABY HOSPITAL FOUNDATION	VOLUNTEER RESOURCES
A.1	CARDIAC INPATIENT UNIT				○	◎	●																																	
A.2	HEALTHY HEART PROGRAM																																							
A.3	RAPID ACCESS OP CLINIC				●		◎																																	
A.4	DIAGNOSTIC CARDIOLOGY			○			●																			◎														
A.5	CRITICAL CARE PROGRAM				●		◎														◎					◎													
A.6	EMERGENCY DEPARTMENT (INCL. CAST CLINIC)					●								○							●					◎													
A.7	TERTIARY HOSPICE PALLIATIVE CARE UNIT (THPCU)																								◎	◎													
A.8	COMMUNITY CONNECTIONS						○							◎																									
A.9	MATERNITY/NEWBORN INPATIENT UNIT											◎									●																○			
A.10	PRIMARY CARE MATERNITY CLINIC																								○	○													
A.11	NEONATAL INTENSIVE CARE UNIT									◎											●																		
A.12	PEDIATRICS																								◎	○													
A.13	GENERAL MEDICAL SURGICAL INPATIENT UNITS					◎															●																	
A.14	MEDICINE OUTPATIENT SERVICES																																						
	COMMUNITY CANCER CENTRE																								○	○	◎												
	MEDICAL DAY UNIT																																						
	COMMUNITY IV/DVT PROGRAM																																						
	NEURODIAGNOSTICS CLINIC – EEG/EMG																																						
	MS/NEUROLOGY CLINIC																	○																					
A.15	MENTAL HEALTH & SUBSTANCE USE INPATIENT SERVICES						●									◎																							
A.16	MENTAL HEALTH & SUBSTANCE USE OUTPATIENT SERVICES																																						
A.17	ACUTE CARE FOR ELDERS (ACE) UNIT						○							●												◎	◎												
A.18	DIABETES EDUCATION CENTRE								◎																														
A.19	TRANSITIONAL CARE CENTRE							◎																														
A.20	SDCU AND SURGICAL SUITE																																						
	SURGICAL DAY CARE																				●	○																	
	OR/PACU													○							●	○																	
A.21	OR BOOKING, PREADMISSION CLINIC & AMBULATORY CARE CLINIC																																						
	AMBULATORY CARE CLINIC																				◎	●																	
	OR BOOKING																																						
	PREADMISSION CLINIC																					◎				○													
A.22	SPD/MEDICAL DEVICE REPPROCESSING								○					○							●	●													◎				
B.1	CLINICAL NUTRITION													◎																			●						
B.2	INFECTION PREVENTION & CONTROL													◎												○													
B.3	LABORATORY MEDICINE, PATHOLOGY & MORGUE	◎				●	●	◎		◎				◎							●																		
B.4	MEDICAL IMAGING					●	●							●							◎						◎												
B.5	PHARMACY													○	◎																			●						
B.6	REHAB PROGRAM (PT OT SW SLP)	●												●																									
C.1	BIOMEDICAL ENGINEERING																																	●					
C.2	FMO																																						
C.3	FOOD & NUTRITION SERVICES													○																				●					
C.4	HOUSE KEEPING & WASTE MANAGEMENT													◎																				○					
C.5	LAUNDRY & LINEN													◎																				●					
C.6	IN-HOSPITAL & REPLENISHMENT													○																									
C.7	IM/IT																															●	●					
C.8	INTEGRATED PROTECTION SERVICES						●		◎					○	◎																								
C.9	HEALTH INFORMATION MANAGEMENT						●		○					○																									
D.1	ADMINISTRATION & RELATED SERVICES													○																									
D.2	BURNABY HOSPITAL FOUNDATION																																				○		
D.3	VOLUNTEER RESOURCES													○																									

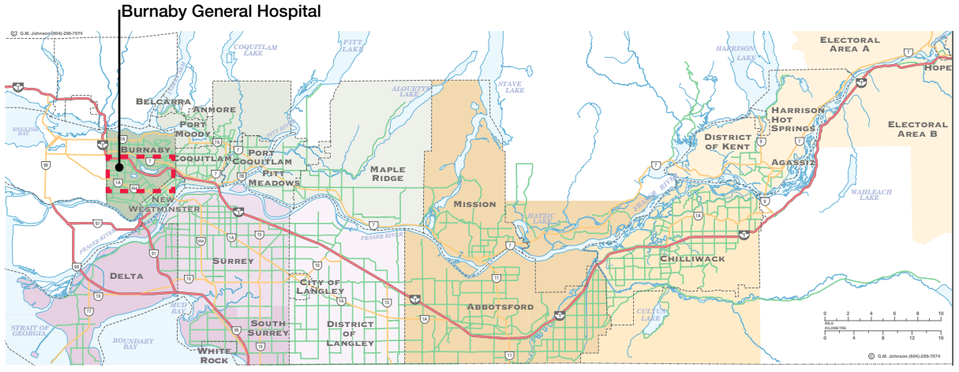
7.0 Academic & Research Service Plan

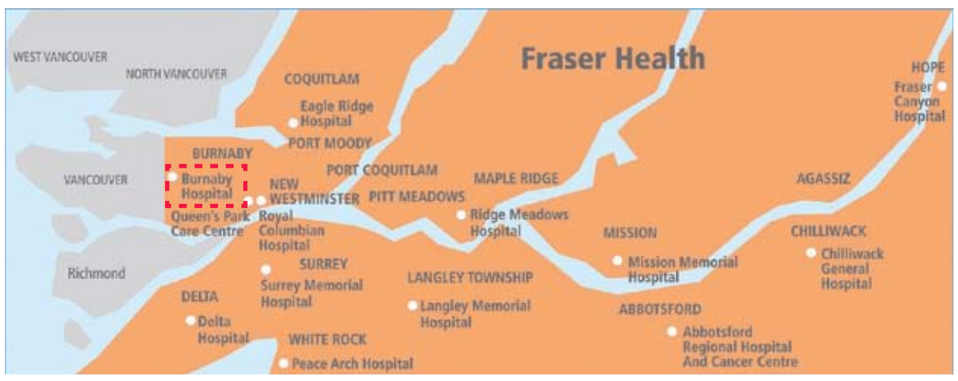
to be provided by UBC, May 2013

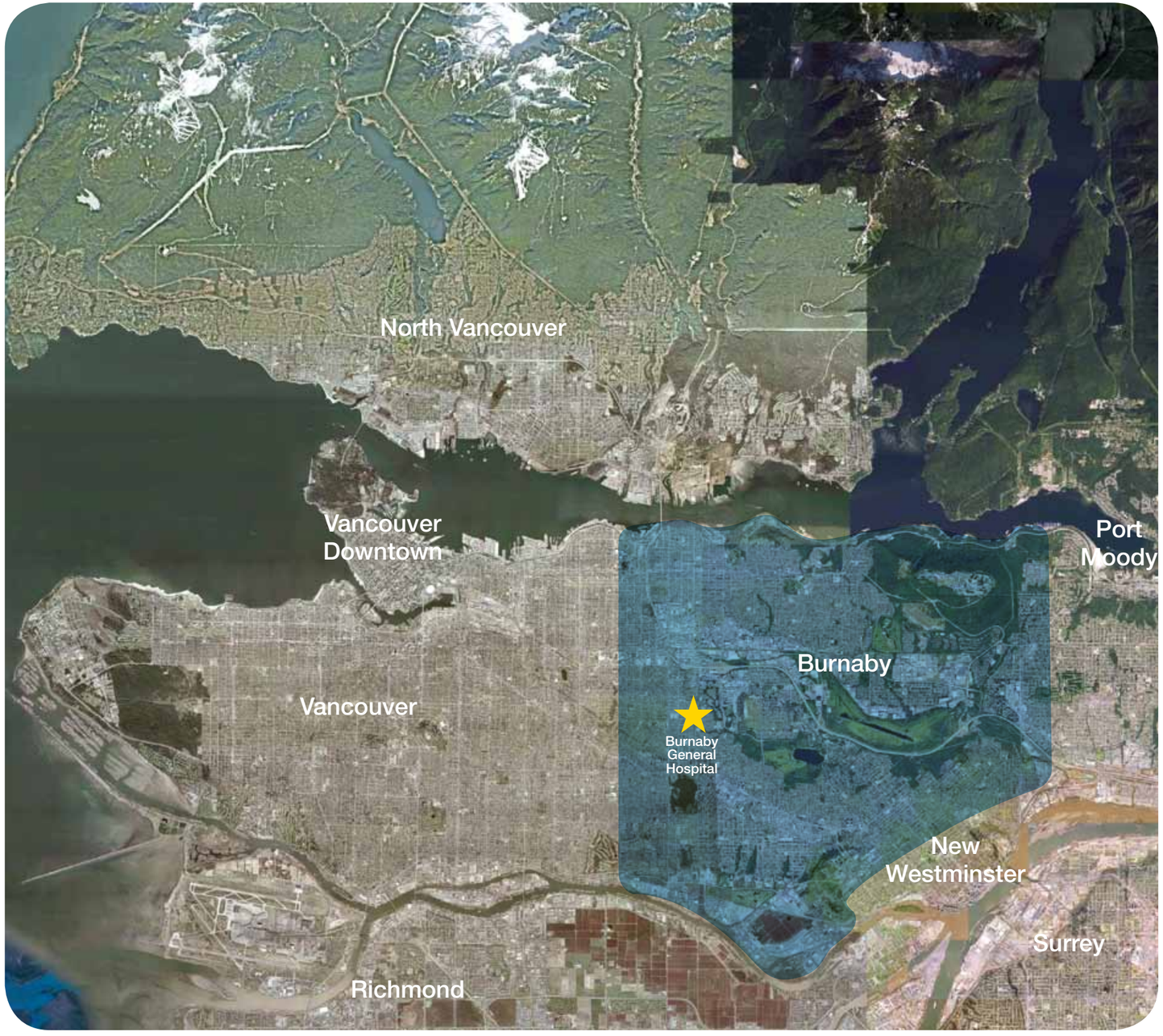
8.1 Site Location

Burnaby Hospital forms part of the Fraser Health Acute Care Network and is located at the border of Vancouver. Fraser Health provides services to many other communities including New Westminster, Surrey, White Rock, Delta, Langley, Maple Ridge, Port Coquitlam, Port Moody, Pitt Meadows, Maple Ridge, Abbotsford, Mission, Chilliwack and Hope

As one of the twelve acute care hospitals serving the Fraser Health, Burnaby Hospital is a large community hospital outside the City of Vancouver that serves the communities of Burnaby and East Vancouver. It is operated by the Fraser Health Authority. The other eleven acute care hospitals serving the Fraser Health are Surrey Memorial Hospital, Abbotsford Region Hospital and Cancer Care Centre, Mission Memorial Hospital, Delta Hospital, Langley Memorial Hospital, Chilliwack General Hospital, Peach Arch Hospital, Ridge Meadows Hospital, Royal Columbian Hospital, and Eagle Ridge Hospital.

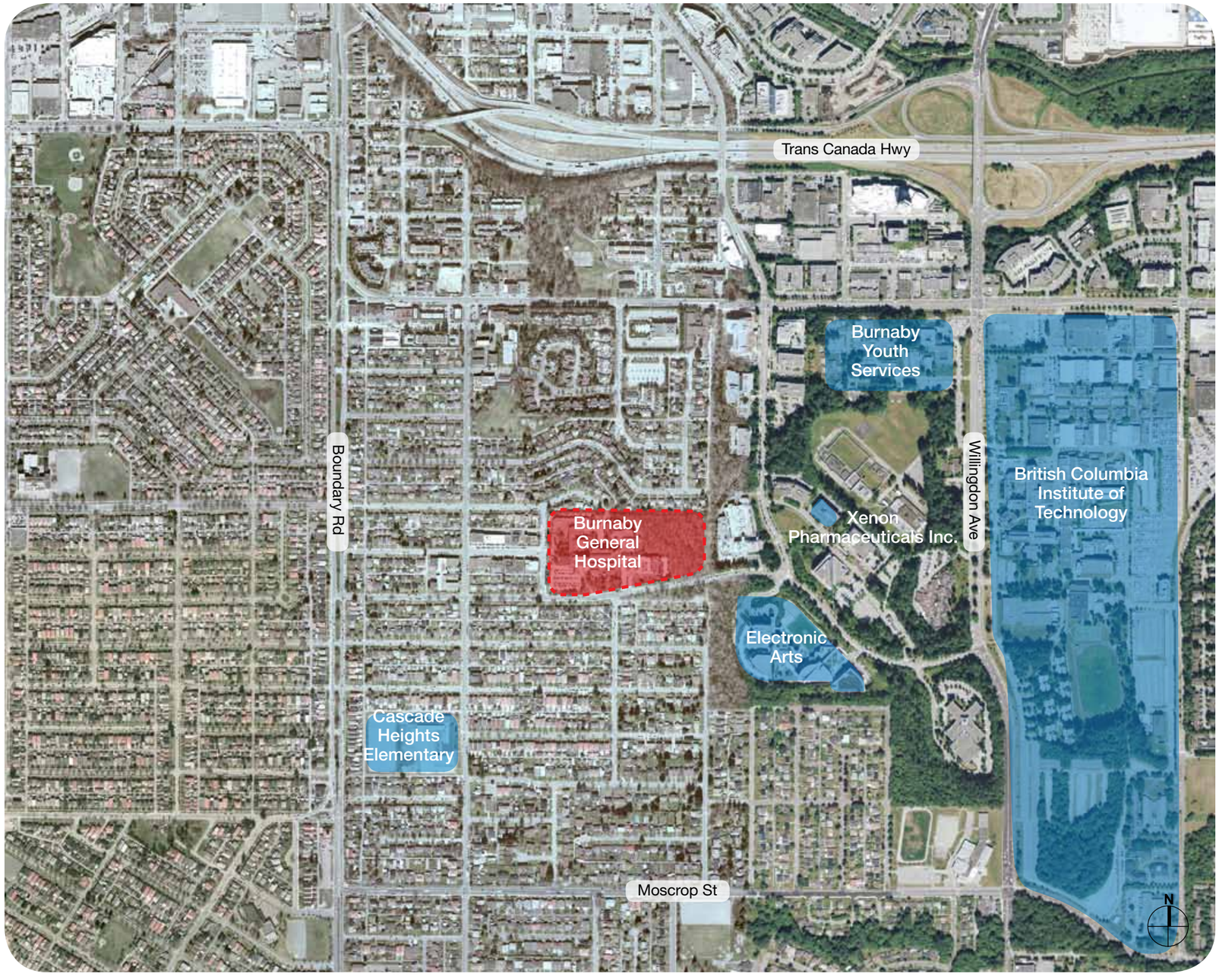






8.1 Site Location

The major arterial roads surrounding Burnaby Hospital is Canada Way and the Trans Canada Highway to the north, Boundary Road to the west, Willingdon Avenue to the east, and Moscrop Street to the South. To the east there is the Discovery Parks research/ business park with the north and south mainly consisting of two family residential homes, and multi-family residential homes to the west and several small commercial buildings on Sunset Street. The streets adjacent to the hospital are Kincaid Street to the north, Ingletown Avenue to the West and Elmwood Street to the north. The hospital is located on a hill resulting in quite a variation in elevation from west to east. To the west there are views towards Vancouver, to the north there are views of the mountains and to the east there are views toward Deer Lake Park and BCIT. The hospital buildings are grouped at the westerly portion of the site due to a drop in terrain in the east. The easterly portion of the property consists of a dense treed area that is relatively steep with a creek bed near the bottom of the slope. Main power lines run in the north-south and east-west direction along the northern and eastern boundary of the site.



8.2 Existing Site

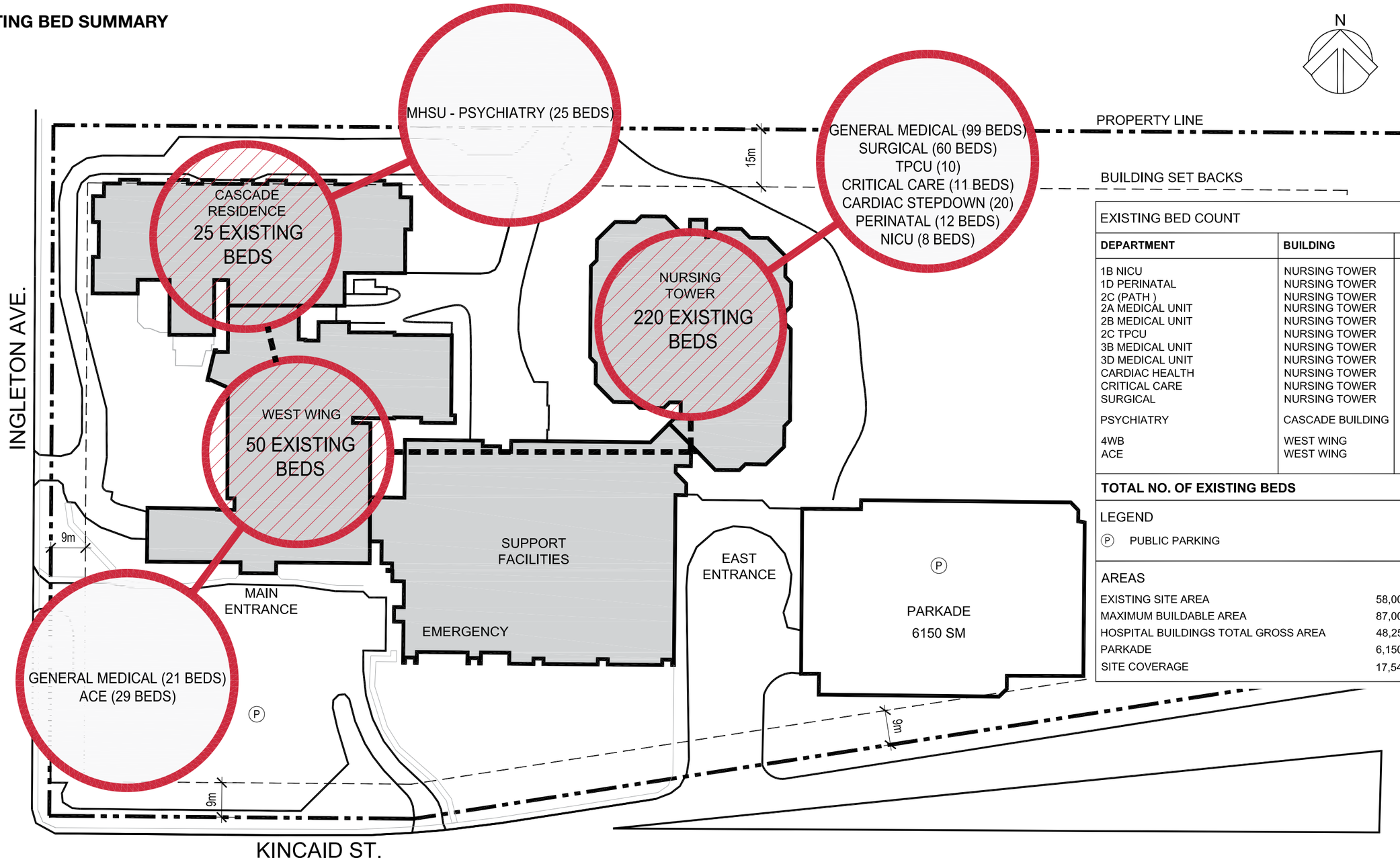
Burnaby Hospital has been constructed over many years and in phases with additions, expansions and renovations. The main buildings were constructed as follows:

1952	North Wing	Hospital opens with 121 beds and 29 bassinets.
1958	West Wing	South expansion increasing to 237 beds and 48 bassinets.
1973	Cascade Residence	Extended Care addition to north adding 147 beds.
1974	Parkade	Construction of multi-level parkade to east.
1978	Additions	Support Facilities Building and East Wing Nursing Tower adding 300 beds, ICU/CCU, Surgery, Radiology, Pharmacy, Material Management and Food services.

Legend

- Property Line
- Greenscape
- Existing Buildings and Parking Garage
- Roadways and Surface Parking

8.2.1 EXISTING BED SUMMARY



EXISTING BED COUNT

DEPARTMENT	BUILDING	LEVEL	BED NO.
1B NICU	NURSING TOWER	1	8
1D PERINATAL	NURSING TOWER	1	12
2C (PATH)	NURSING TOWER	2	19
2A MEDICAL UNIT	NURSING TOWER	2	19
2B MEDICAL UNIT	NURSING TOWER	2	20
2C TPCU	NURSING TOWER	2	10
3B MEDICAL UNIT	NURSING TOWER	3	21
3D MEDICAL UNIT	NURSING TOWER	3	20
CARDIAC HEALTH	NURSING TOWER	3	20
CRITICAL CARE	NURSING TOWER	3	11
SURGICAL	NURSING TOWER	4	60
PSYCHIATRY	CASCADE BUILDING	-	25
4WB	WEST WING	4	21
ACE	WEST WING	4	29
TOTAL NO. OF EXISTING BEDS			**295**

LEGEND

(P) PUBLIC PARKING

AREAS

EXISTING SITE AREA	58,000 SM
MAXIMUM BUILDABLE AREA	87,000 SM
HOSPITAL BUILDINGS TOTAL GROSS AREA	48,250 SM
PARKADE	6,150 SM
SITE COVERAGE	17,542 SM (30% OF SITE)

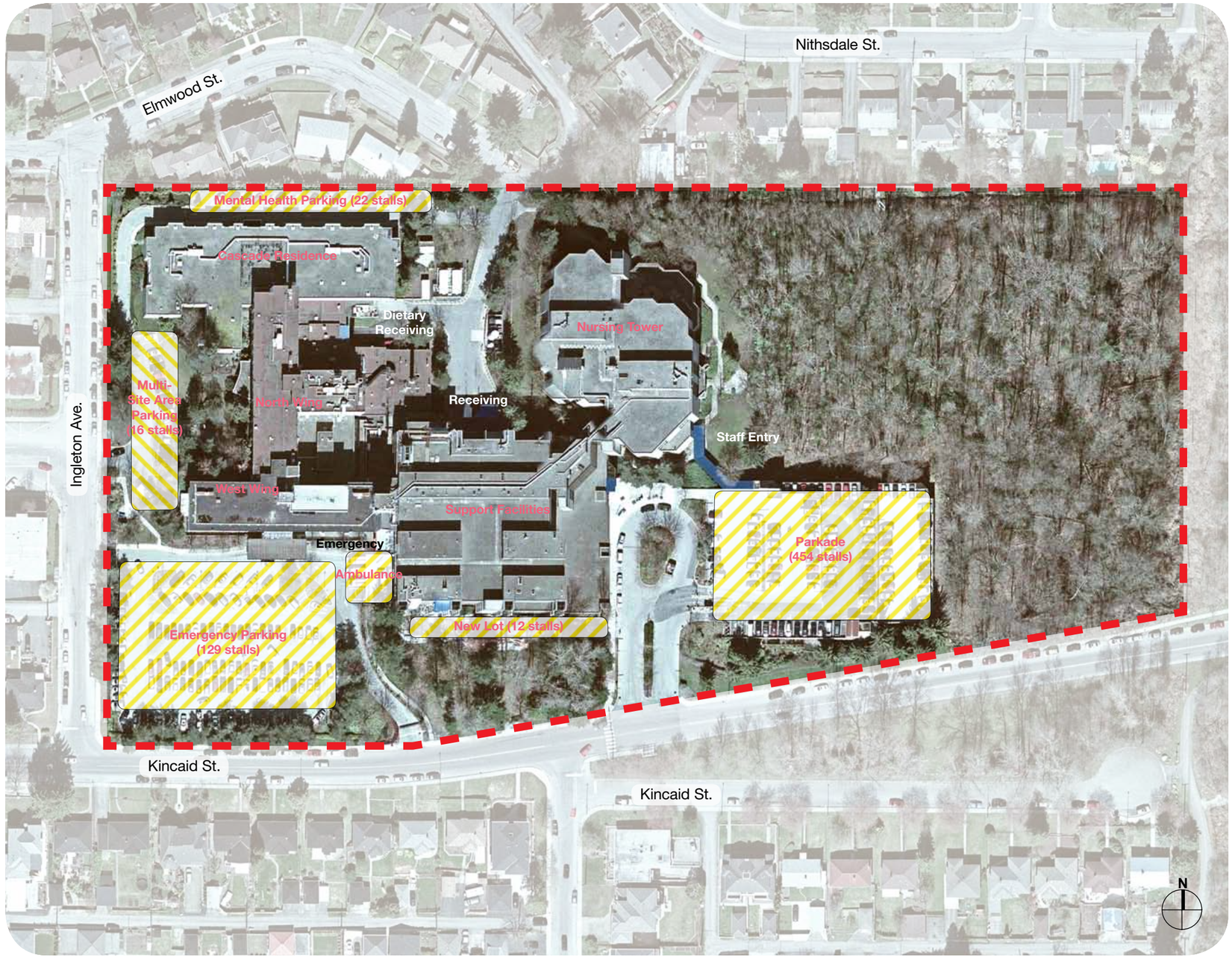
Scale: 1:500

8.2.2 PARKING SUMMARY

The Burnaby Hospital site currently provides 633 parking stalls and 3 ambulance parking bays. Most vehicular access is from Kincaid Street.

There is short term parking stalls near the main and emergency entrances and the majority of visitor and staff parking is in the east parkade. In addition, there are several at grade parking stalls outside the entrance of the Cascade building and a few more stalls west of the West Wing Building and south of the Support Facilities.

PARKING SUMMARY	
LOCATION	**NUMBER OF PARKING STALLS**
Mental Health	22
Multi-Site Area	16
Emergency	129
Ambulance	3
New Lot	12
Parkade	454
TOTAL	**636**



Legend

- Property Line
- Greenscape
- Existing Buildings and Parking Garage
- Roadways and Surface Parking

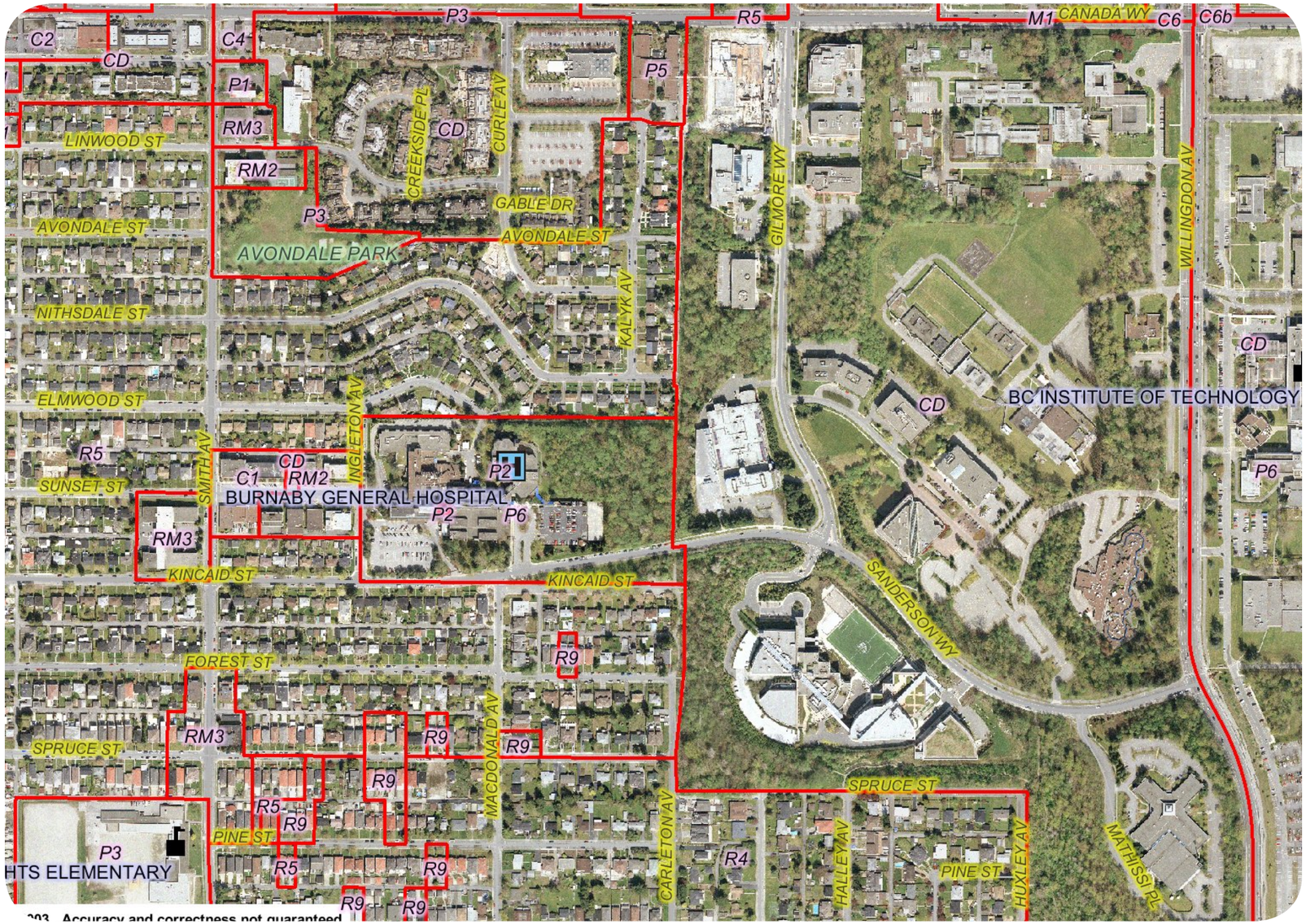
8.3 Zoning OCP

Burnaby Hospital is zoned P6 – Institutional which is limited to the following uses:

- Hospitals
- Colleges, Universities and Vocational Schools
- Prisons & Reformatories
- Government Offices
- Public Services and Utilities
- Residential accommodation serving an institution

There exists a 15m municipal right of way on most of the northern and westerly portion of the site between the property line and building set back.

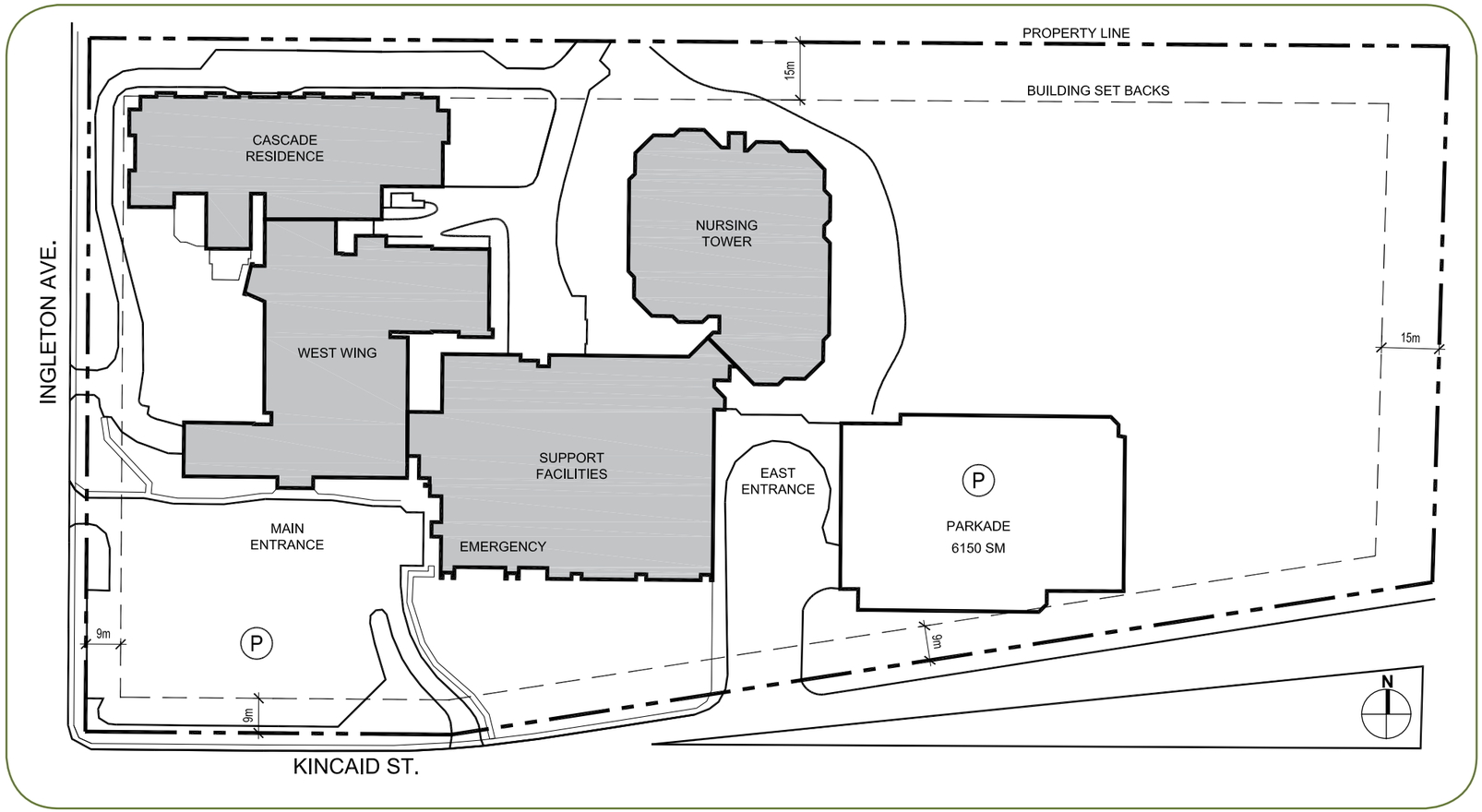
The adjacent zoning to the north and south is mainly R5 – two family residential. To the west it is zoned RM2 – Multi-family residential and CD – Comprehensive Development to the east.



8.4 Zoning & Land Use Analysis

Three separate meetings were held with the Burnaby City Planning Department. Discussions were related to the Burnaby Hospital Site and provided a status update on the development of the Master Plan for the Burnaby Hospital Site only.

SUMMARY OF EXISTING SPACE				
BUILDING	**LEVEL**	**FLOOR TO FLOOR HEIGHT (M)**	**TOTAL FLOOR GROSS AREA (GSM)**	**TOTAL GROSS FLOOR AREA**
Cascade Residence	Basement	2.90	408.3	
	Ground	3.20	2155.2	
	Level 2	3.20	2155.2	
	Mech. Penthouse		159.0	
Sub-Total		9.30		4877.7
West Wing	Boiler Room	2.21 (varies)	1310.8	
	Basement	3.20	3591.3	
	Ground Floor	3.20	3591.3	
	Level 2	3.20	1935.6	
	Level 3	3.20	1935.6	
	Level 4	3.20	1935.6	
	Mech. Penthouse		922.0	
Sub-Total		18.21		15222.2
Support Facilities	Tunnel Level	3.66 (varies)	1571.9	
	Level 1	4.17	4227.3	
	Level 2	4.19	3377.1	
	Level 3	4.14	3453.8	
	Level 4	4.17	3377.1	
	Mech. Penthouse		1446.9	
Sub-Total		20.33		17454.1
Nursing Tower	Tunnel Level	3.66 (varies)	1687.2	
	Level 1	4.17	2711.2	
	Level 2	4.19	2414.1	
	Level 3	4.14	2378.9	
	Level 4	4.17	2378.9	
	Mech. Penthouse		489.7	
Sub-Total		20.33		12060.0
TOTAL HOSPITAL BUILDING GROSS FLOOR AREA				**49614.0**



BUH SITE	ALLOWABLE	EXISTING	PHASE 1	PHASE 2	FUTURE PHASE
Zone	P-6		P-6	P-6	P-6
Height	37.0m (121.39 ft)		21.3m (69.88 ft)	30.0m (98.43 ft)	38.1m (125.0 ft)
Lot Area	1 ha (4.9419 ac)	5.8 ha (14.33 ac) (58,000 sm)			
Lot Width	< 91m (298.56 ft)				
Lot Coverage (40%)	23,200 sm				
FSR (1.5)	87,000 sm	48,250 sm (Building)	0.81	1.4	1.74
		6150 sm (Parkade)			
Setback	9.0m (Kincaid)	9.0m	9.0m	9.0m	9.0m
	15.0m (Side/Rear)	15.0m	15.0m	15.0m	15.0m

Zoning: P6

Uses:

- Hospitals
- Colleges, universities and vocational schools
- Prisons and reformatories
- Government offices
- Public services and utilities
- Residential accommodation serving institution

Floor Space:

Maximum Allowable = Site Area x 1.5

Building Height:

37m Above Grade

Lot Coverage:

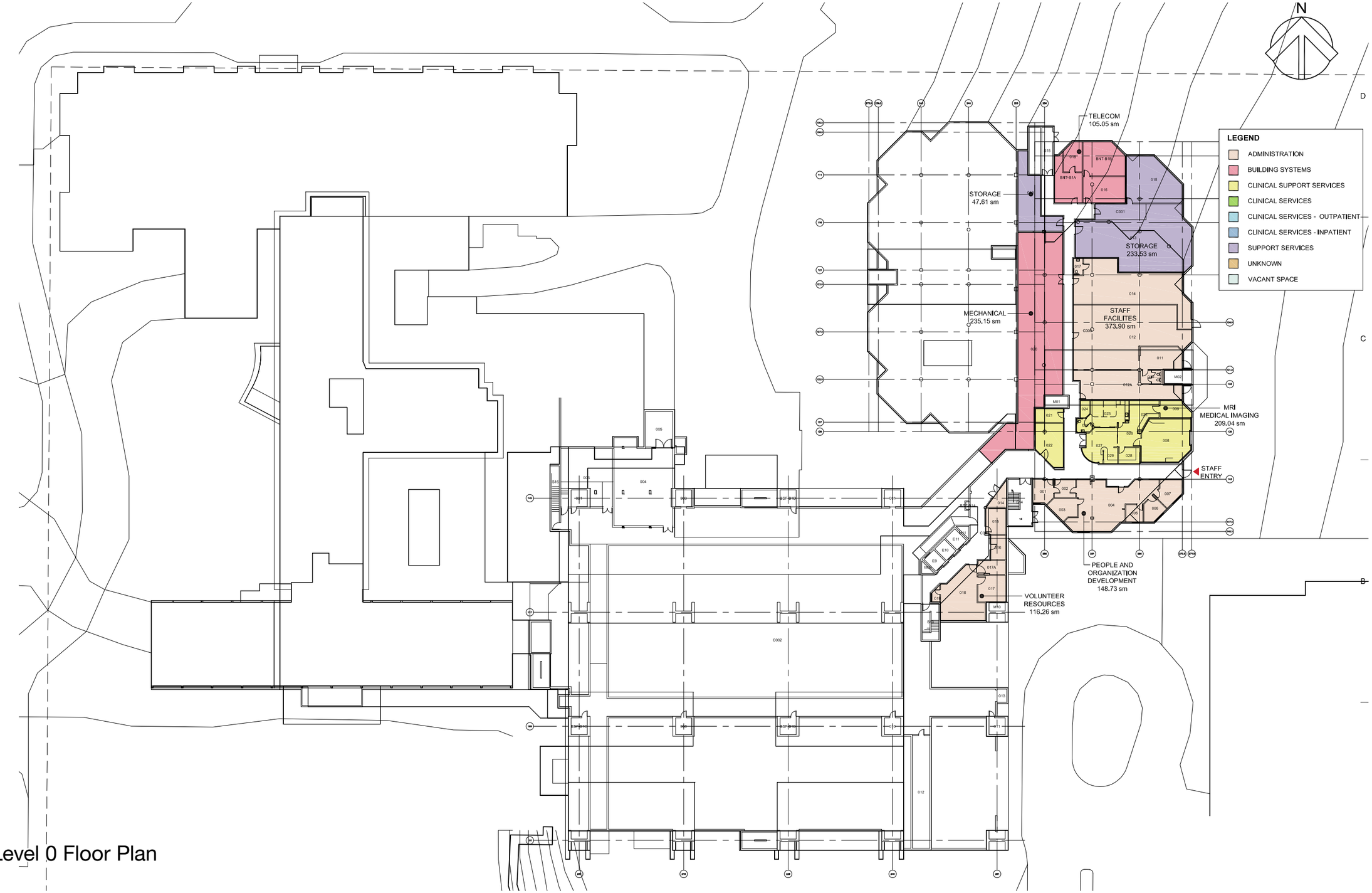
40% of Site Area

Adjacent Zoning:

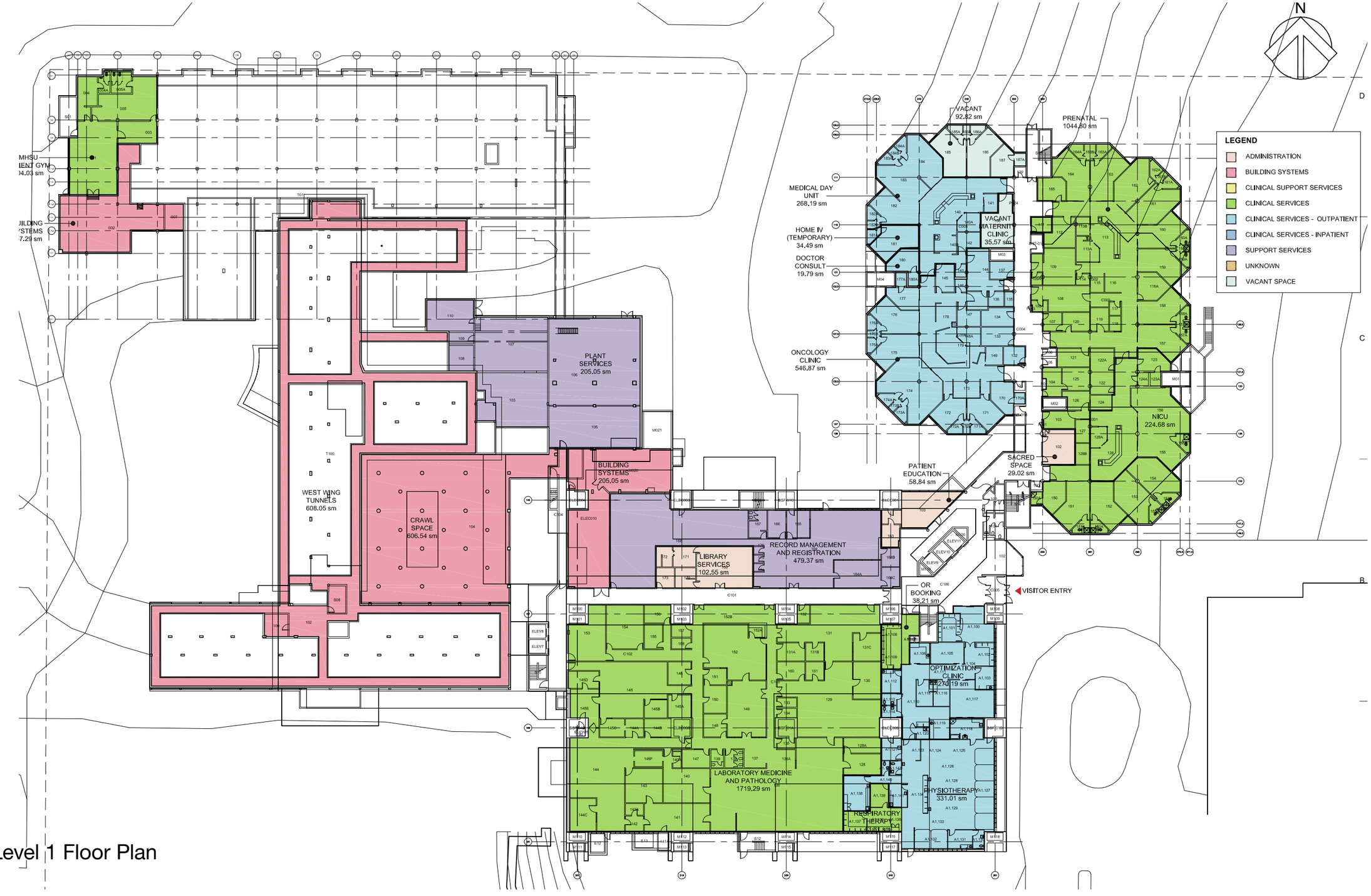
North – R5
South – R5
East – CD
West – RM2

8.5 Existing Floor Plans

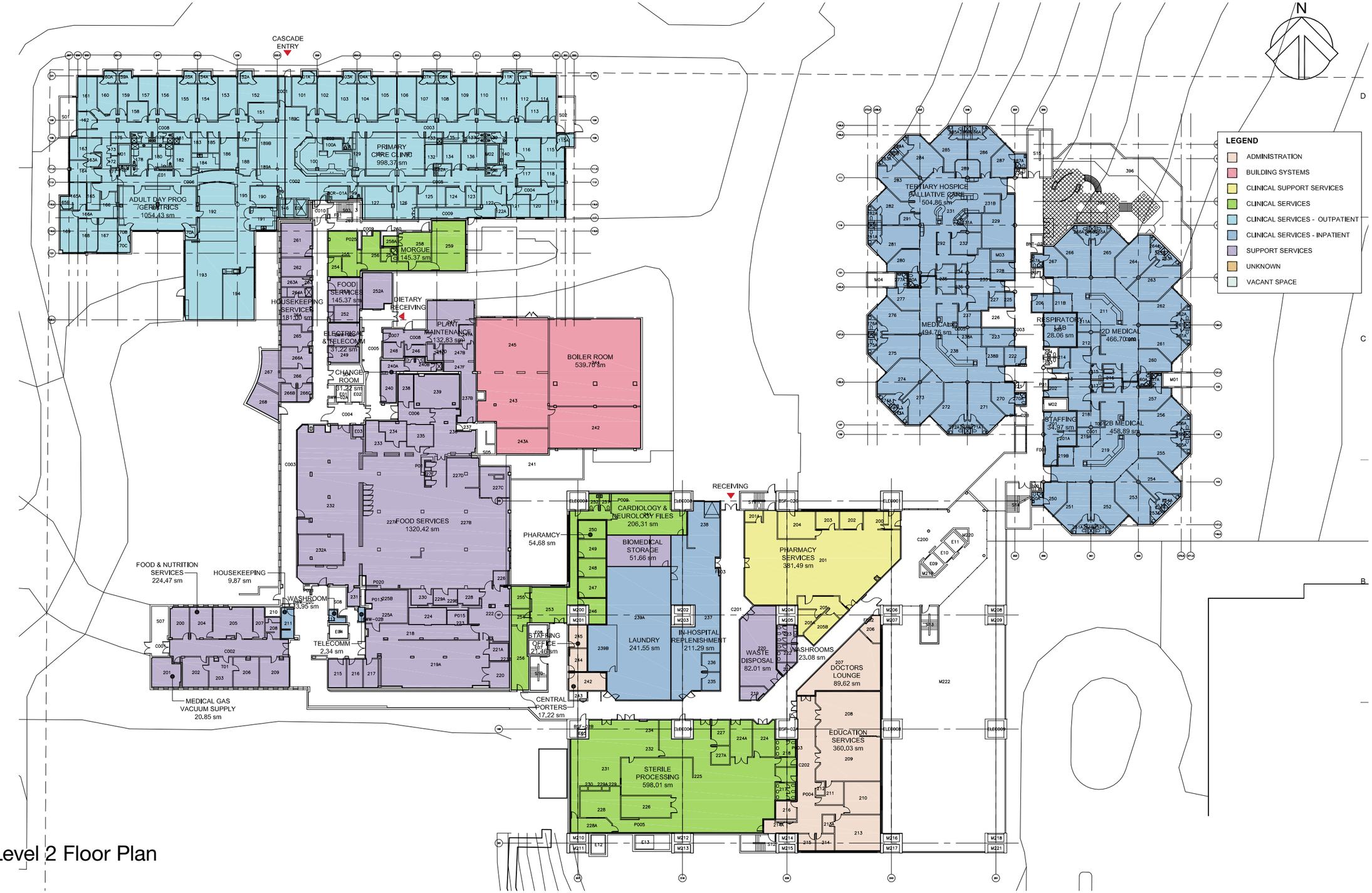
Existing plans are provided as a reference for identifying all existing department locations on Burnaby Hospital Campus. The existing plans have not been surveyed and are not as-built drawings.



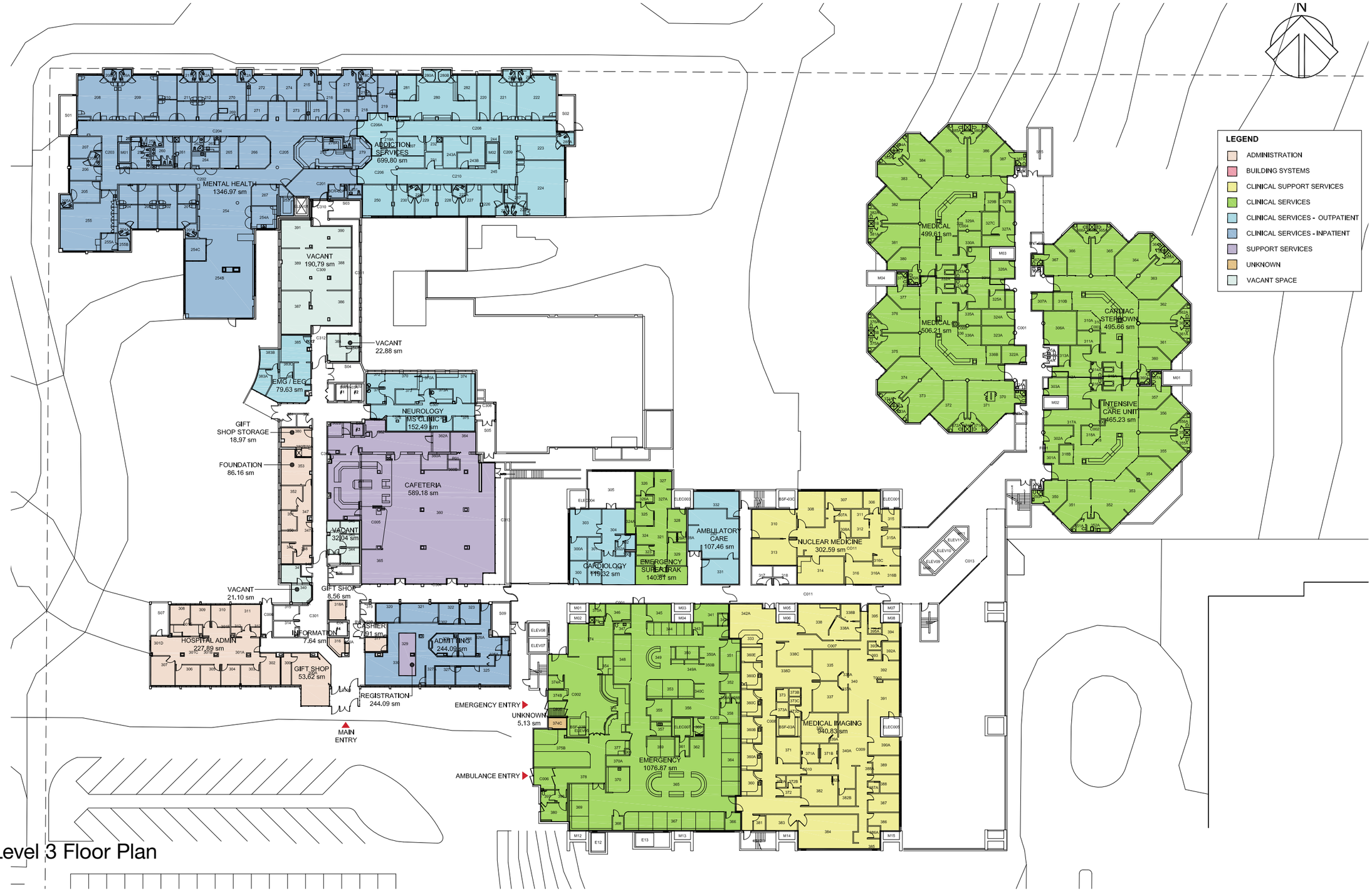
8.5 – Level 0 Floor Plan



8.5 – Level 1 Floor Plan

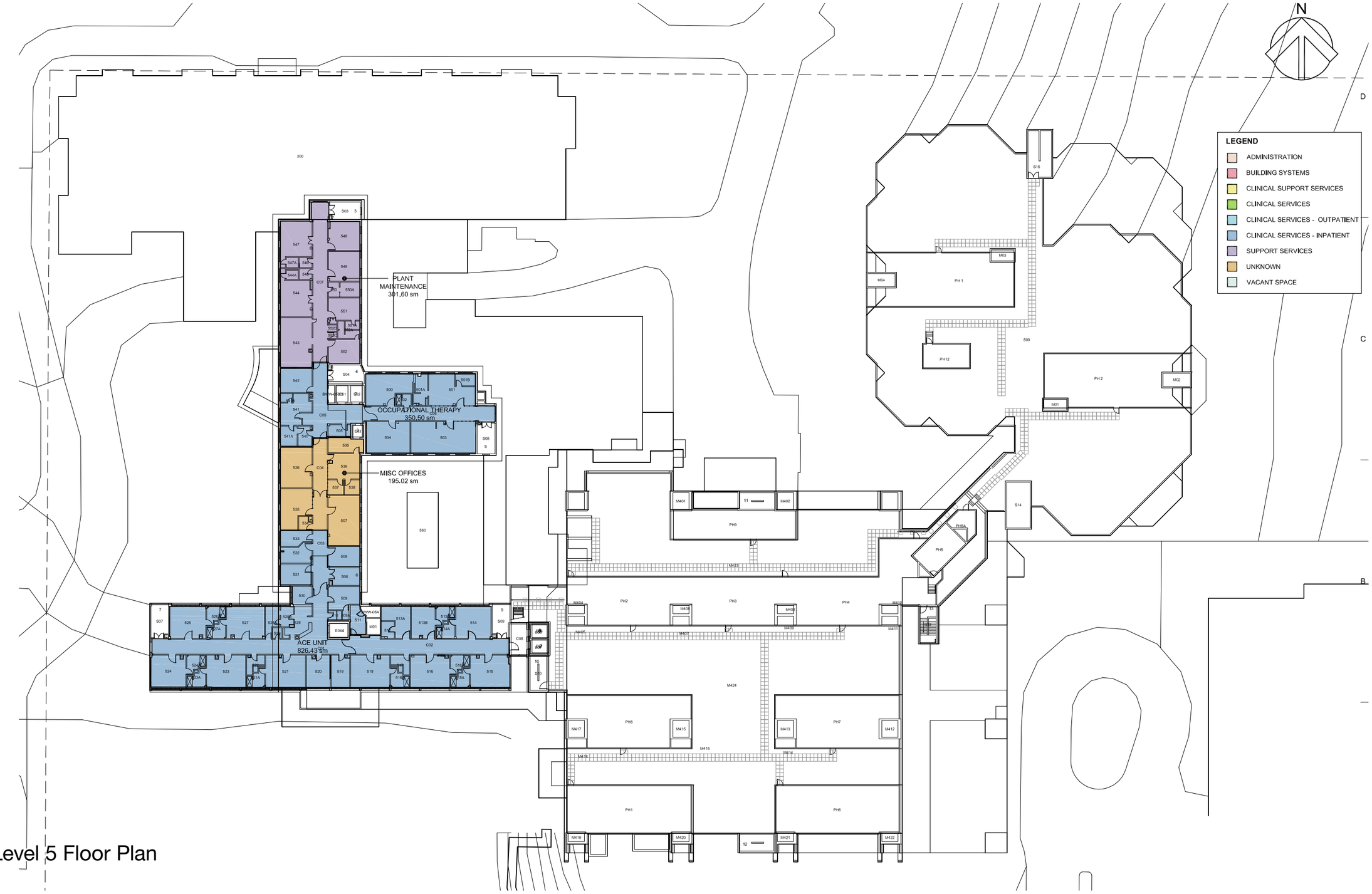


8.5 – Level 2 Floor Plan

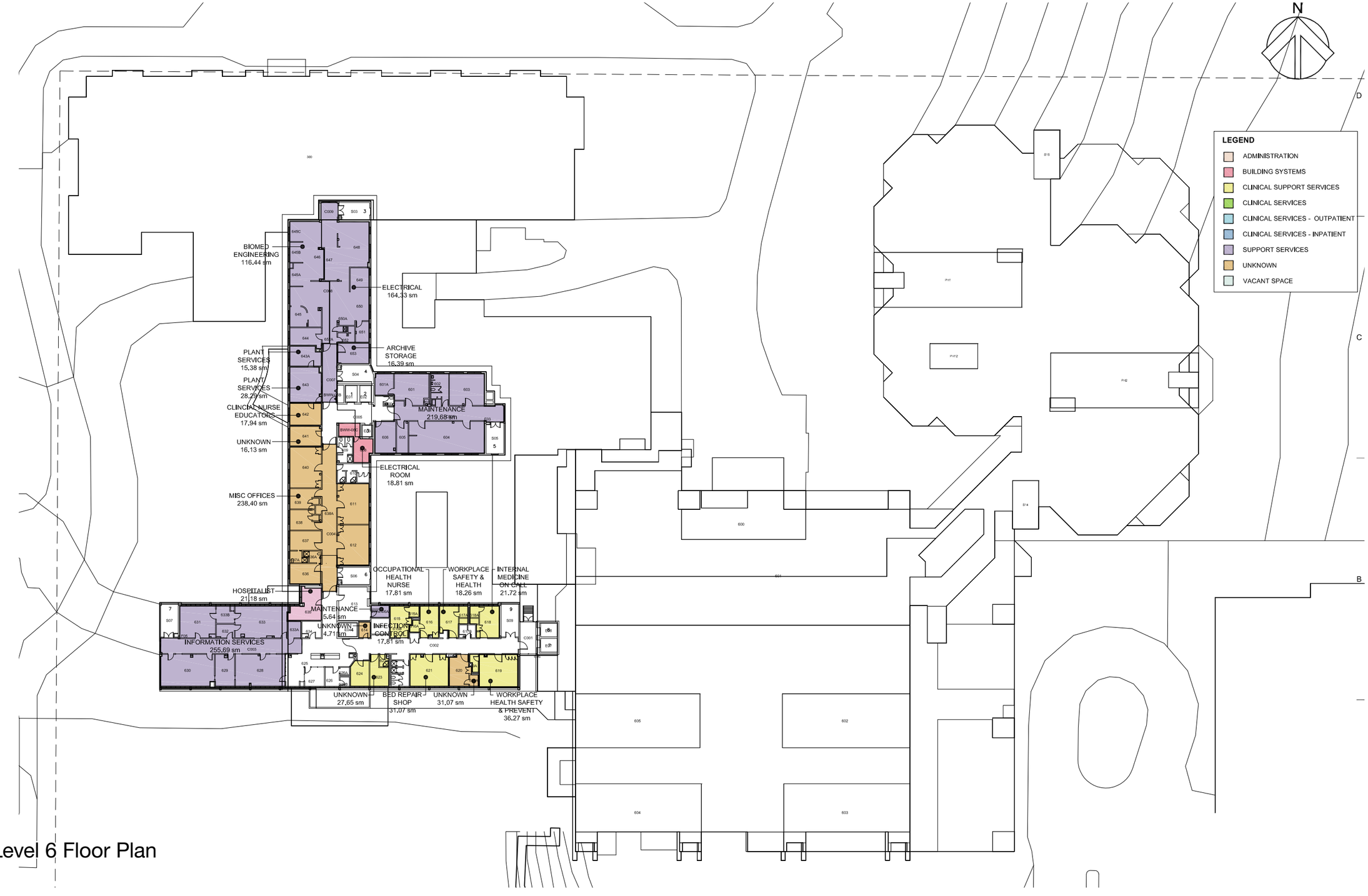


8.5 – Level 3 Floor Plan

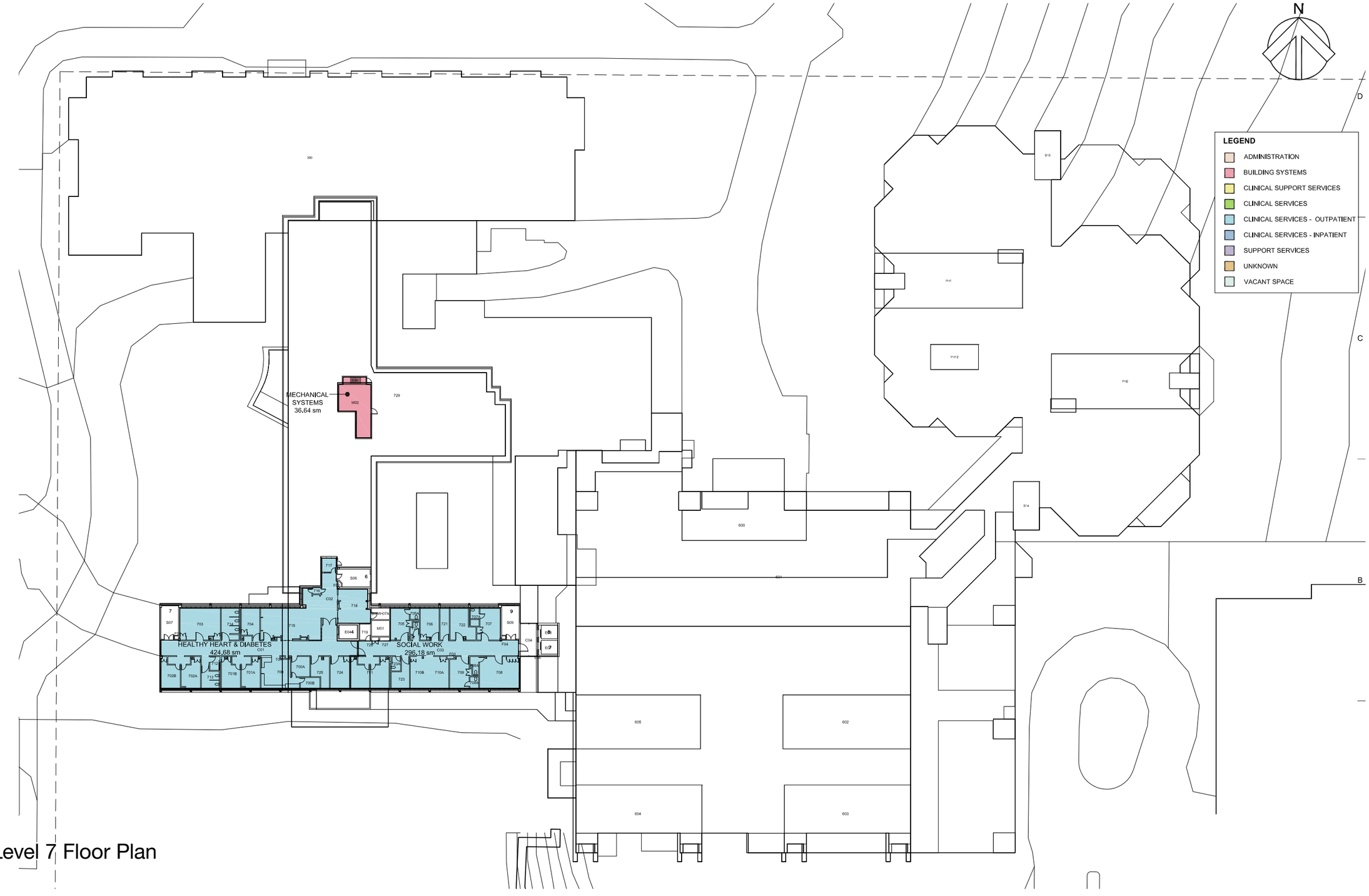
8.5 – Level 4 Floor Plan



8.5 – Level 5 Floor Plan

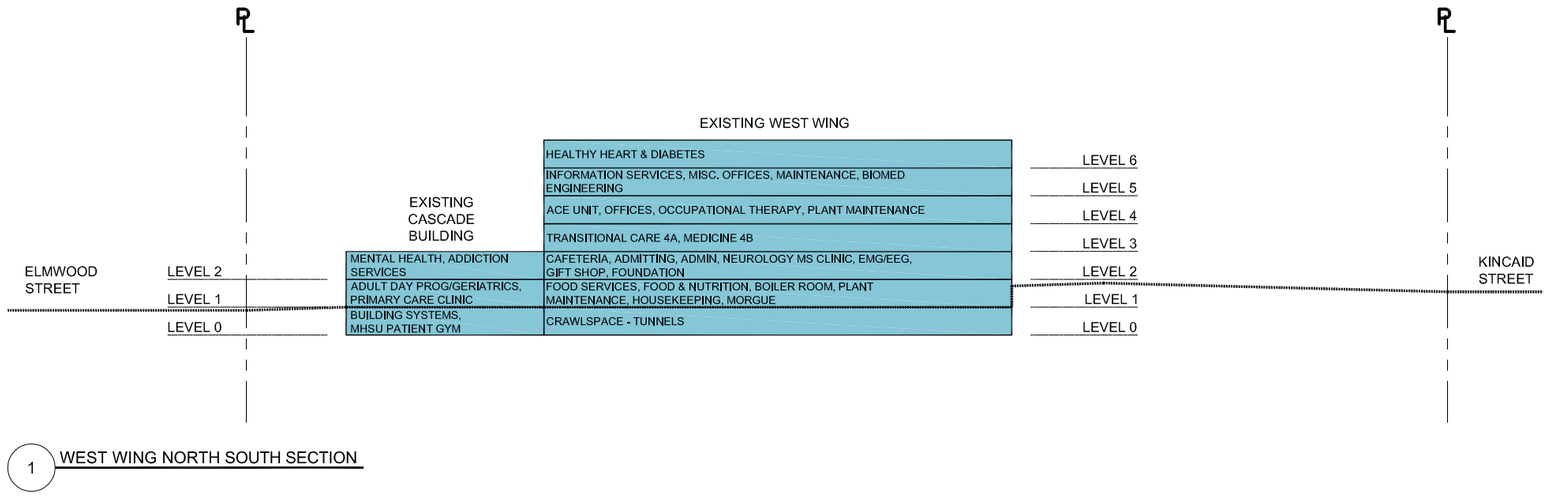


8.5 – Level 6 Floor Plan

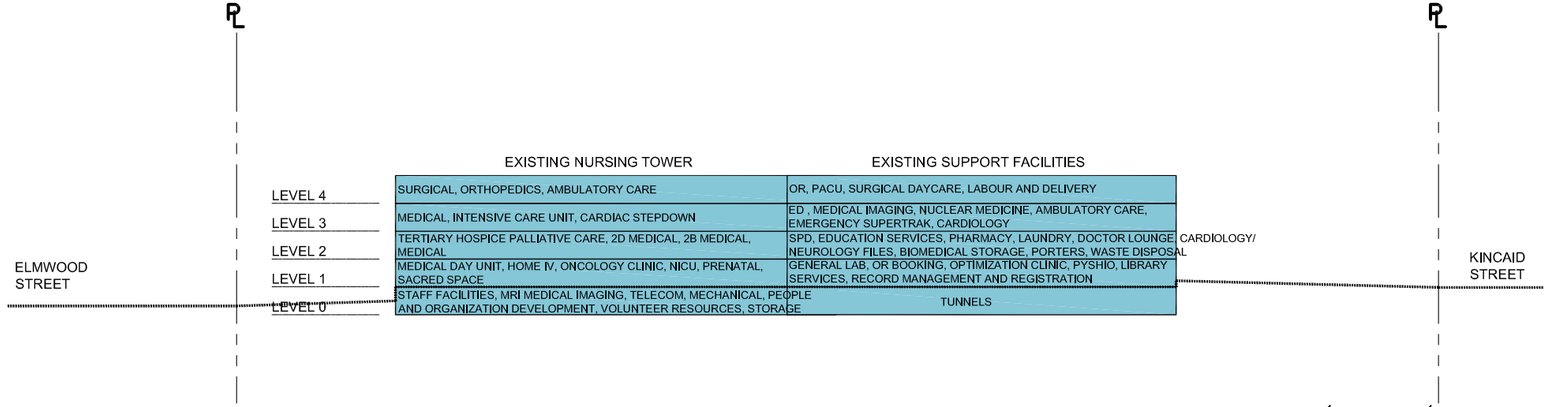


8.5 – Level 7 Floor Plan

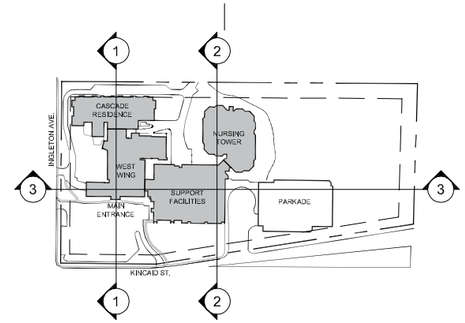
8.6 Building/Site Sections



1 WEST WING NORTH SOUTH SECTION



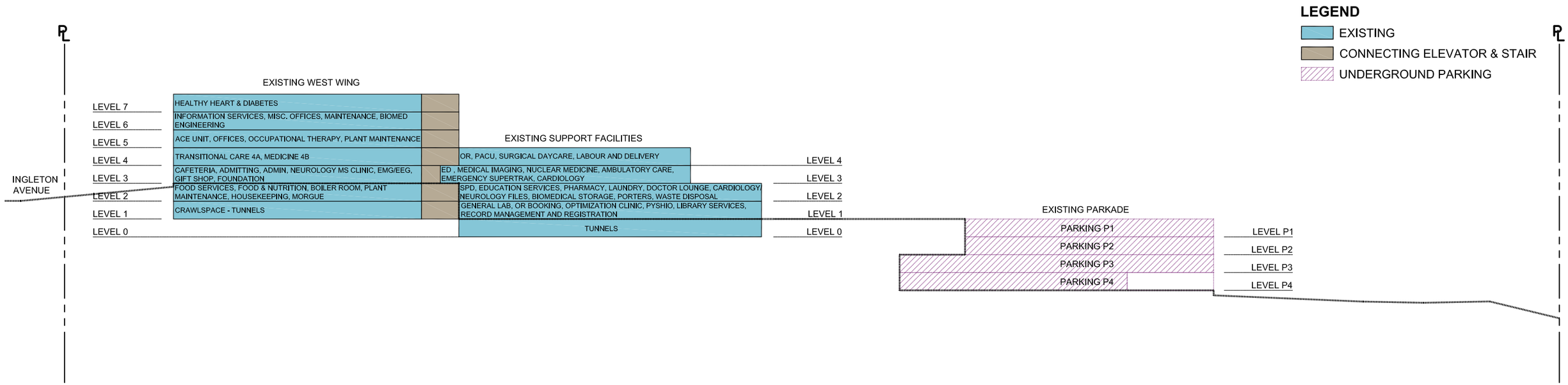
2 NURSING TOWER & SUPPORT FACILITIES NORTH SOUTH SECTION



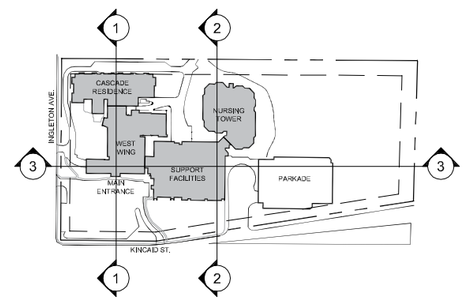
LEGEND

- EXISTING
- CONNECTING ELEVATOR & STAIR
- UNDERGROUND PARKING

8.6 Building/Site Sections



3 WEST WING & SUPPORT FACILTIES EAST WEST SECTION



8.7 Site Photos

8.7 Site Photos

8.7 Site Photos

8.8 Existing Structural Review

Please see Appendix C for List of Operational and Functional Components.

BUSH, BOHLMAN & PARTNERS consulting structural engineers
SUITE 1550 - 1500 WEST GEORGIA STREET, VANCOUVER, BC V6G 2Z6
T: (604) 688-9861 E: info@bushbohlman.com www.bushbohlman.com

July 26, 2012 **Project: 5680**

Fraser Health Authority
c/o IBI/HB Architects
700 – 1285 West Pender
Vancouver, B.C. V6E 4B1

BURNABY GENERAL HOSPITAL MASTER PLAN STUDY
STRUCTURAL CONDITION REPORT

1. **BACKGROUND**

Burnaby Hospital consists of six buildings constructed in the 1950's through to the 1970's. The buildings are generally concrete construction although methods of construction vary between one another.

Structural drawings of the existing the Nursing Tower, Support Facilities Building and Parkade were available for review. A site walk through was conducted on July 6th 2012 to review the existing condition and view the general arrangement and structural systems. The inspection was limited to what was visually accessible. No testing or exposing of existing structure was performed.

The following summarizes the existing buildings structural systems and condition

2. **EXISTING BUILDINGS**

West Wing

The West Wing consists of three sections, the North Building, West Building and the Mechanical Building. The West Building and North Building were built in phased construction.

The North Building was built in 1952 and the West Building was constructed in 1958. Both buildings are constructed of the same type of cast in place concrete construction. As no drawings were available for the West Wing buildings, the actual design loads of these buildings are unknown. However, the minimum capacities that were required by the National Building Code at the time of construction required 4.8 kPa live load at the ground floor and corridors. Upper floor patient wards would have been designed to a minimum of 2.0 kPa live load.

The Mechanical building is a one story concrete building with various steps in the foundations to meet grade changes.

BUSH, BOHLMAN & PARTNERS *Consulting Structural Engineers*

BUSH, BOHLMAN & PARTNERS consulting structural engineers
SUITE 1550 - 1500 WEST GEORGIA STREET, VANCOUVER, BC V6G 2Z6
T: (604) 688-9861 E: info@bushbohlman.com www.bushbohlman.com

Foundations
Foundations are conventional reinforced concrete pad and strip footings.

Suspended Floors
Typical to all the suspended floors the building the construction consists of cast in place concrete joists supporting concrete slabs.

Lateral Loads
The West Wing was built prior to seismic design provisions being adapted by the National Building Code. A code based comparison of the lateral design criteria between the code at the time of construction and the current code is not appropriate.

The building's design inherently provides some nominal lateral resistance through stair and elevator cores and concrete beam/column frame action. The capacity provided is not sufficient to resist the demands of current code. Previous reports have indicated concerns with pounding between buildings due to inadequate joints. Further, the North Building has been noted in previous structural reports to have virtually no lateral support in the East-West direction.

The buildings actual seismic performance requires an in-depth analysis of the existing systems beyond the scope of this report. Previous studies have shown these building pose a high risk of failure in a seismic event. An updated analysis would not likely significantly change the risk rating but could provide new retrofit schemes and costs.

Floor Elevations

Boiler Room	118.945 Varies
Basement	121.155
Ground Floor	124.355
Level 2	127.555
Level 3	130.755
Level 4	133.955
Roof Slab	137.155

Support Facilities

The Support Facilities Building was built in 1975 as part of a larger expansion that included the Nursing Tower. The Support Facility building is vertically and horizontally separated from the adjacent West Wing and Nursing Tower. All three buildings are independent of one another. All floors are designed for a 7.2 kPa live load.

Foundations
Foundations are conventional reinforced concrete pad and strip footings. Elevator and stair cores sit on moderate sized pads.

BUSH, BOHLMAN & PARTNERS *Consulting Structural Engineers*

BUSH, BOHLMAN & PARTNERS consulting structural engineers
SUITE 1550 - 1500 WEST GEORGIA STREET, VANCOUVER, BC V6G 2Z6
T: (604) 688-9861 E: info@bushbohlman.com www.bushbohlman.com

Ground Floor
The ground floor is typically a 100 mm thick slab on grade. Some areas transition to a suspended flat slab over top of the service tunnels running beneath the area. Tunnels run on the east west and north side of the building. As well as an east to west tunnel about the middle of the floor plate.

Levels 2-5
Levels two through five are constructed of precast 760mm deep Double T joists supported by precast girders. The precast girders are supported by cast in place concrete vertical cores at 18.3 metres on centre extending full height of the building. Typically, a suspended slab running north to south between vertical cores links each one to another. A 75 mm concrete topping is poured over top of the Double T's and integrally with cast in place suspended slabs and dowelled to the vertical cores.

Lateral Loads
Lateral loads of the building are resisted by the vertical concrete cores supporting the girders. The buildings diaphragm is the 75 mm bonded concrete topping reinforced with a wire mesh and cast integrally with the 150 mm thick concrete slabs spanning between core elements. Connections of the topping to the cores rely on threaded rebar inserts and rebar dowels to make the connection.

A comparison of 1975 code to the upcoming 2010 NBCC shows the building would have originally been designed to 20% of today's lateral force requirements for a post disaster building. A more detailed seismic review is required to evaluate the actual capacity and predicted seismic performance of the structure.

Floor Elevations

Tunnel Level	115.570+- Varies
Level 1	119.228
Level 2	123.393
Level 3	127.588
Level 4	131.724
Level 5	135.890

Nursing Tower

The Nursing Tower was built in 1975 as part of a larger expansion that included the Support Facilities building. Although built together, the Nursing Tower and Support Facilities Building are built with different construction techniques and are structurally separated. Floors are designed for a 2.4 kPa live load at the east and west side patient areas. The central service area of the building was designed to support a 3.6 kPa live load.

Foundations
Foundations consist of both conventional reinforced concrete spread foundations and expanded concrete base piles. Piles are limited to the east side of the building where

BUSH, BOHLMAN & PARTNERS consulting structural engineers
SUITE 1550 - 1500 WEST GEORGIA STREET, VANCOUVER, BC V6G 2Z6
T: (604) 688-9861 E: info@bushbohlman.com www.bushbohlman.com

the natural grade in the area begins to slope away from the building. Drawings indicate the pile caps are tied together with concrete grade beams running between pile caps.

Tunnel Level
The tunnel level consists of a slab on grade over the eastern half of the floor plan. The western half is unexcavated.

Level 1
The western portion of level 1 consists of slab on grade. The eastern portion of the slab is a suspended 200 mm thick concrete slab with 200 thick drop panels at the columns.

Levels 2-5
Similar to level 1, levels 2-5 consist of 200 mm thick suspended flat slab with 200 mm drop panels at column locations. The floor plans vary slightly over the buildings height with a step back in the north east corner at level 3.

Lateral Loads
Lateral loads are resisted by stair cores on all four sides of the building. The building also has small segmented shear walls around the buildings perimeter that would contribute to its capacity.

A comparison of 1975 code to the upcoming 2010 NBCC shows the building would have originally been designed to 20% of today's lateral force requirements for a post disaster building. A more detailed seismic review is required to evaluate the actual capacity and seismic performance of the structure.

Floor Elevations

Tunnel Level	115.570+- Varies
Level 1	119.228
Level 2	123.3931
Level 3	127.588
Level 4	131.724
Level 5	135.890

Cascade Residence

Built in 1970, the Cascade Residence is a cast in place 3 storey concrete building. No drawings were available for the building but the original design criteria can be inferred from the National Building Code at the time. The ground floor would have been designed for a minimum 4.8 kPa live load, the patient floors for a minimum 2.0 kPa live load.

Foundations
Foundations are conventional pad and strip footings.

BUSH, BOHLMAN & PARTNERS *Consulting Structural Engineers*

BUSH, BOHLMAN & PARTNERS consulting structural engineers
SUITE 1550 - 1500 WEST GEORGIA STREET, VANCOUVER, BC V6G 2Z6
T: (604) 688-9861 E: info@bushbohlman.com www.bushbohlman.com

Ground Floor to Roof
Construction consists of concrete suspended slabs.

Lateral Loads
The building being built in 1970 was subject to the codes at the time. Those codes would have required a nominal amount of lateral seismic design to be included.

A comparison of 1970 code to the upcoming 2010 NBCC show the building would have originally been designed to 20-30% of today's lateral force requirements (non-post disaster). A more detailed seismic review is required to evaluate the actual capacity of the structure.

Floor Elevations

Basement	121.462
Ground Floor	124.358
Level 2	127.558
Roof	130.758

Parkade

The parking structure located at the east side of the hospital campus. The parkade was designed to meet the 1970 National Building Code. The building is constructed of cast in place concrete. The typical floor to floor elevation is 2.59 m typical. The structural drawings provided did not list the design loads. However, the base minimum capacities that was required by code at the time of construction was 2.4 kPa

Foundations
Foundations are conventional pad and strip footings. Stair cores sit on moderate sized pads and are not anchored.

Level 1
Ground Floor is a 100 thick reinforced concrete slab on grade

Levels 2-5
Levels 2-5 consist of 215mm thick flat slab with 190 drop panels at the columns. The ramp between levels is located at the north end of the parkade.

Lateral Loads
Lateral loads are resisted by three stair cores and one internal shear wall. Two stair cores are located on the north side of the parkade, one on the south side. The internal shear wall runs continuous over the structures height. The building appears to be eccentric which could create raise the hazard of potential failure.

A comparison of 1970 code to the current 2005 NBCC and the upcoming 2010 NBCC show the building would have originally been designed to 20-30% of today's lateral

BUSH, BOHLMAN & PARTNERS consulting structural engineers
SUITE 1550 - 1500 WEST GEORGIA STREET, VANCOUVER, BC V6G 2Z6
T: (604) 688-9861 E: info@bushbohlman.com www.bushbohlman.com

force requirements (non-post disaster). A more detailed seismic review is required to evaluate the actual capacity and performance of the structure.

3. CONDITION REVIEW

A walk through inspection was conducted on July 6th 2012. Generally the building appears to be in good condition and well maintained. There were no observed signs of settlement, structural deterioration or distress. Hospital maintenance staff had no concerns with the building structure.

There were no observed cracks excluding one area in the lower mechanical room where there were signs of water ingress and a previous patch job. This area should be reviewed and patched as required. The parkade has had the membrane replaced in the past 2 years.

4. EXPANSION OPPORTUNITIES

The buildings site limits potential expansion to the current footprint of the hospital campus.

Vertical expansion is limited to the Support Facilities Building. The one story front entrance has been designed to allow for a three storey vertical addition. However, this expansion would require a seismic assessment and possible upgrade of the entire Support Facilities Building to current post disaster requirements.

We understand the West Wing is coming to the end of its life span for various reasons. Previous reports have shown the lack of a lateral system and the extensive retrofits that would be required to retrofit the building to meet current code for a post disaster building. The West Wing can be demolished and rebuilt in phases. A phased demolition would allow for portions of the buildings to remain occupied during the construction minimizing the impact of construction on the hospital.

BUSH, BOHLMAN & PARTNERS *Consulting Structural Engineers*

8.9 Existing Seismic Assessment Review

January 28, 2013 **Project: 5785**

Fraser Health Authority

RE: BURNABY GENERAL HOSPITAL - SEISMIC EVALUATION REPORT

1. **BACKGROUND**

Burnaby Hospital consists of five buildings constructed in the 1950's through to the 1970's. The buildings are generally concrete construction although methods of construction vary between one another.

The National and Provincial Building Codes have significantly changed in respect to seismic design since the original construction of Burnaby General Hospital. The West Wing structures and its support buildings, mechanical plant and dietary infill, were constructed prior to the adoption of seismic design into the Building Code. By 1970, seismic design had been incorporated to the building code and the designs of the newer buildings on the Burnaby Hospital Site reflect this change.

Structural drawings of the existing the Nursing Tower, Support Facilities Building, and Cascade Building were available for review. No structural drawings of the older West Wing Buildings were available.

A site walk through was conducted in September 2012 to review the existing condition and view the buildings general arrangement and structural systems. The site review was limited to what was visually accessible. No testing or exposing of structure hidden by finishes was performed.

This seismic evaluation report should be read in conjunction with the July 26, 2012 Structural Condition Report prepared by Bush, Bohlman & Partners as part of the Master Plan Study prepared by IBI. A copy of the Bush, Bohlman & Partners report has been attached at the end of this document for information. The Cascade building seismic evaluation was carried out by Ausenco as a sub-consultant to Bush, Bohlman & Partners. Their report is also attached for information.

2. **EVALUATION CRITERIA**

To provide an evaluation of the performance of the existing buildings Lateral Drift Resisting Systems (LDRS) we have calculated the system's capacity and compared it to the design base shear as per the current 2012 British Columbia Building Code (BCBC). The following information was taken from the 2012 BCBC and was used to generate a design base shear for comparison against the capacity of the existing LDRS systems.

Sa(0.2) = 0.94
Rd,Ro = 1.5,1.3 (Conventional Concrete Construction)
Site Class C
I_E = 1.5 Post Disaster Building
$V_{DEMAND} = 0.48W_S$
W_S = Building weight associated with seismic forces

1550 – 1500 West Georgia Street, Vancouver B.C. V6G 2Z6 • Tel: 604-688-9861 • Fax: 604-688-7039 • www.bushbohlman.com

BUSH, BOHLMAN & PARTNERS
consulting structural engineers

BURNABY GENERAL HOSPITAL
SEISMIC CONDITION REPORT

We have also identified deficiencies in the buildings detailing that affect the overall performance of the structures during an earthquake.

3. **WEST WING**

The West Wing consists of the original 1952 hospital building and the 1958 expansion. Further to these main components, small additions of the mechanical/boiler room and dietary building are also included in the West Wing assessment. The capacities of these smaller support buildings are governed by the larger 1952 and 1958 buildings.

Figure 1: West Wing South Elevation

Both the 1952 and 1958 buildings are of similar construction but orientated perpendicular to one another. Their lateral systems are formed by concrete shear walls on the end of each wing with interior stair cores providing some additional capacity. The buildings shear walls are orientated in the transverse direction of each building. No lateral shear wall system is provided in the longitudinal direction of either wing. The lateral drifts in the longitudinal direction are resisted by slab to column and spandrel beam to column frame interaction.

The primary seismic deficiencies of the building as follows:

- Interior partitions in various areas are hollow clay tile. These partitions are at high risk of out of plane failure.
- The West Wing buildings perimeter columns are non-ductile short columns. The stiff concrete up stand spandrel beams framing into the columns restrain and limit their ability to drift with the building during a seismic event. Lateral movement of the building develops high shear and bending stresses in the columns that they cannot tolerate leading to shear failure and potential loss of vertical capacity.
- The Cascade and the Support Facility buildings at the north and east sides are inadequately separated from the West Wing with a 25 mm expansion joint. The buildings may begin to move out of phase during an earthquake and pound into the West Wing causing damage.
- The 1958 expansion has a weak lateral system the E-W direction
- The 1952 building has a weak lateral system the N-S direction.

1550 – 1500 West Georgia Street, Vancouver B.C. V6G 2Z6 • Tel: 604-688-9861 • Fax: 604-688-7039 • www.bushbohlman.com

- The 1952 and 1958 addition along with their boiler room and dietary infill are inadequately connected to one another and may separate and pound during an earthquake resulting in damage to the building at these tie-in locations.

The West Wing buildings were built prior to the adoption of seismic design provisions in the National or Provincial Building Code. The building's design inherently provides some lateral resistance through concrete stair cores and exterior end walls of the building. However, the capacity is limited by the lack of any significant LDRS in the longitudinal direction of each building.

The buildings of the West Wing have a LDRS capable of resisting 2-3%W_S. This resistance is the equivalent of 5% -10% of the 2012 BCBC design base shear. The West Wing is a high risk for significant damage or collapse during the design earthquake. We recommend that the buildings be considered a priority for upgrade or decommissioning and replacement.

4. CASCADE RESIDENCE

Cascade Residence seismic evaluation was carried out by Ausenco Engineering Canada as a sub-consultant to Bush, Bohlman & Partners. Their report is appended to this document. The conclusion of Ausenco's review is quoted below.

Figure 2: Cascade Residence North Entrance

"Overall the Cascade Building is in good condition with no evidence of distress or deterioration. The presence of critical structural weaknesses, as well as the insufficient LDRS capacity, deem this building to be significantly inadequate to meet the seismic provisions in the current code (only some 30-40% of capacity required)"

Accordingly, we rate the cascade residence as a high risk for significant damage during the design earthquake

5. SUPPORT FACILITIES

The Support Facilities Building was built in 1975 and was designed in accordance with the 1975 National Building Code of Canada (NBCC) including the seismic provisions therein.

The LDRS consists of a 20 reinforced concrete H-shaped and square cores that also serve as the buildings vertical load carrying elements. The cores are regularly and evenly spread throughout the building. Each core is heavily reinforced with tied rebar zones at the wall ends. The buildings floors are constructed with double-tee precast concrete sections supported on a combination of precast and cast in place concrete girders that span between concrete cores. A 75 mm thick reinforced concrete topping bonded to the double-tee acts as the diaphragm for the structure. The topping is cast integrally with 150 thick concrete slabs that run north to south between each core. The topping is also connected to the cores by rebar dowels threaded into cast in place inserts.

Figure 3: East Elevation Support Facilities Building

The Support Facility building is separated from the adjacent West Wing and Nursing Tower by 25 mm expansion joints. The expansion joint does not provide adequate distance to allow the buildings to move without pounding. Also, the expansion joint at the West Wing has a ledger angle that provides vertical support to the slab of the Support Facilities building. Excessive drifts that exceed the bearing width of the angle can lead to a loss of vertical support for the edge of the support facilities building at the joint.

The buildings LDRS provides a 0.29W_S resistance which is the equivalent of 60% capacity of the current BCBC base shear demand. The building is orthogonal, repetitive, uniform and nearly symmetric, all aspects that help the seismic performance. Accordingly, we rate the Support Facilities building as a moderate risk for damage during the design earthquake and we would expect it to perform satisfactorily in a moderate earthquake. The building may sustain damage that may affect its functionality post disaster.

6. NURSING TOWER

The Nursing Tower was built in 1975 and was designed in accordance with the 1975 NBCC including the seismic provisions therein.

The building is a flat slab construction consisting of 200 mm thick slab with 200 mm thick drop panels on a rough 7.6 m x 7.6 m grid. The LDRS consists of concrete stair cores on all four sides of the building. The building also has small segmented shear walls around the buildings perimeter that contribute to its overall capacity. These segmented shear walls have concrete headers and up stand spandrels that frame the windows. These elements restrict the buildings drift capacity by fixing the shear wall ends effectively shortening their overall length. This leads to racking and failure in high seismic loads.

Figure 4: South-East Elevation Nursing Tower

The building is half set into the hill side with the East half of the structure supported on a pile foundation a full storey below the western half of the building. The piles are linked together with grade beams between pile caps. The west half of the building sits on conventional concrete strip and pad footings.

The building set back into the hillside presents some unknowns that cannot be addressed in the scope of this report. Lateral earth pressures on the basement storey add to the overall lateral load on the structure. Further, the piles on the eastern half of the building are indicative of poor soils and liquefaction may be a concern. A soils analysis by a geotechnical engineer would be required to fully understand the soil-structure interaction and its impact on the base building and pile foundation performance.

Not taking into account of the added lateral loads and soil stability of the buildings foundations the LDRS provides a $0.26W_S$ resistance which is the equivalent of 55% capacity of the current BCBC base shear demand. Accordingly, we rate the Nursing Tower as a moderate risk for damage during the design earthquake. We would expect it to perform satisfactorily in a moderate earthquake. The building may sustain damage that may affect its functionality post disaster.

7. NON-STRUCTURAL SEISMIC ASSESSMENT

Previous earthquakes in other regions have shown that the most costly and disruptive aspect of an earthquake can often be the damage to the non-structural components in a building. A review of the existing building services and their susceptibility to damage during an earthquake has been performed by Terra Firm. Their report is appended to the document. The conclusion of Terra Firm's review is quoted below.

"Our current estimate is that Burnaby Hospital is about 30% of the way along that continuum (100% restraint) due to the extensive work that was done during the Program (previous non-structural seismic mitigation program)."

Areas that are a critical to the operations of the hospital should be prioritized for seismic restrain. The IT room in the basement of the Nursing Tower is of special concern as it houses the servers for the hospital and highlighted in Terra Firm's report as inadequately braced.

1550 – 1500 West Georgia Street, Vancouver B.C. V6G 2Z6 • Tel: 604-688-9861 • Fax: 604-688-7039 • www.bushbohlman.com

8. Summary

The hospital campus seismic performance varies directly with the age of the individual buildings. The buildings LDRS resistance capacity in terms of W_S and their corresponding capacity compared to current BCBC 2012 base shear is summarized below.

Building	Resistance	% Code
West Wing	$0.03W_S$	5%-10%
Cascade Building	$0.14W_S$	30-40%
Support Facilities	$0.29W_S$	60%
Nursing Tower	$0.26W_S$	55%

The newer mid 1970 vintage Cascade Building, Support Facility Building and Nursing Tower do not meet the seismic demands of current code. However, these buildings can be considered a moderate risk and are not expected to experience significant structural failure during a major earthquake. The buildings may have limited structural damage that may affect the operational capacity of the buildings post-earthquake. Restricted operational capacity of these buildings should be expected.

The West Wing is a high risk of structural failure during a major earthquake. A collapse or critical failure of the vertical system to the West Wing buildings would impact public and health care access to the surrounding area directly impacting the functional capacity of the Support Facility building and Cascade Building. Further, the West Wing houses portions of the boiler plant and if damaged may cause shutdowns of critical services to the hospital.

The West Wing buildings and the boiler plant should be prioritized for seismic upgrade or decommissioning and replacement.

Seismic restraint is often an overlooked or underappreciated aspect of seismic mitigation. Terra Firm's review shows that Burnaby Hospital, while above average, is still a long way from being properly restrained. Elements that are imperative to the day to day operations of a hospital need to be prioritized for seismic restraint.

Prepared by: Brett Halicki P. Eng.
Bush, Bohlman & Partners

Reviewed by: Clint Low P.Eng., Struct.Eng.

Attached:
BBP - Structural Condition Report
Ausenco - Burnaby General Hospital – Seismic Evaluation Report
Terra Firm – OFC Seismic Risk Screening Report

1550 – 1500 West Georgia Street, Vancouver B.C. V6G 2Z6 • Tel: 604-688-9861 • Fax: 604-688-7039 • www.bushbohlman.com

TERRA FIRM

Burnaby Hospital

OFC Seismic Risk Screening Report

January, 2013

Executive Summary

Over a three day period, Terra Firm Earthquake Preparedness walked through Burnaby Hospital to screen for seismic hazards associated with nonstructural building components (operational and functional components - OFCs). Some 1250 images of OFCs were obtained in order to determine the seismic resilience of the building in this particular aspect. As Terra Firm did the seismic risk mitigation work at Burnaby Hospital during the BC Seismic Mitigation (SMP) Program from 2000 to 2004, we were able to compare the resilience levels between then and now.

Much of the work done under the SMP is still in place, with a few exceptions. Some of the new equipment and systems added to the hospital since 2004 has been seismically restrained, most has not. Highlighted in particular is the IT room equipment, the pharmacy storage systems and the laboratory equipment. The areas could be show stoppers for the hospital following strong ground motion. In general, Burnaby hospital is on its way to seismic resilience, but still has some way to go. There are no technical obstacles in the way of obtaining that status.

Introduction

Terra Firm Earthquake Preparedness Inc. has conducted a seismic screening project of nonstructural building components (operational and functional components - OFCs) at Burnaby Hospital. The work as commissioned by Bush Bohman Partners for the British Columbia Ministry of Health, looked at the state of seismic resilience of the electrical, mechanical, plumbing and architectural elements in this critical, post-disaster facility as defined by the BC Building Code. The following is an analysis of the work completed under the project.

BACKGROUND

While rudimentary seismic performance requirements entered the Canadian Building Codes in the 1950s, not much attention was paid to them until the 1990s, when damaging earthquakes occurred in San Francisco (1989), Los Angeles (1994) and Kobe, Japan (1995). Terra Firm was founded in 1994 and soon began work on Lions Gate Hospital under the direction of facility manager Don Friesen, in collaboration with M Wang Engineering. Techniques developed at Lions Gate were rapidly deployed in the field, when the BC Seismic Mitigation Program was launched in 1999. During the period to 2004, when the Seismic Mitigation Branch was closed, an estimated 12% of the identified seismic mitigation work on OFCs was completed in the provincial hospitals, located in higher risk earthquake zones.

From 2000 to 2004, Terra Firm completed OFC seismic mitigation at Burnaby Hospital on a yearly basis. At the time, Terra Firm had engineering, fabrication and installation divisions, which took on the design of the restraint systems, the fabrication of the custom fittings and the installation work. Hospitals are the most difficult of all facilities in which to do work, due to the 24-7 nature of their operations, stringent health, safety and security requirements, and the very

high density of the sensitive and expensive equipment packed into the building (see Attachments 1 and 2).

METHODOLOGY

A number of risk assessment and screening formats have been developed for determining the seismic resilience of facility's OFC's. The two used most often in North America are ASCE/SEI 31-03 (US), ***Seismic Evaluation of Existing Buildings*** and CSA S832-06 ***Seismic Risk Reduction of Operational and Functional Components (OFCs) of Buildings***. We chose for this particular project, a screening system, which was faster, but set up for more detailed analysis at a later date. This places the project within the budget allocated, produces a good picture of the current state of OFC seismic resilience, and uses a format, which lends itself to mitigation work in the future.

The framework and associated software was developed over the past few years during projects associated with the Federal government's central heating and cooling plants in Ottawa, the Memphis International Airport and the Metro Vancouver Waste-to-Energy plant. It uses some elements of the US risk assessment standard ASCE/SEI 31-03 and the Canadian CSA S832-06. (Attachment 3)

The methodology involves a walkthrough of all areas of the hospital. In this case, we started at the basement level of the Cascade building, moved up to the top floor and then proceeded with the same routine through the North and West Wings, the Mechanical/Electrical Plant, the Dietary infill, the Support Facility and the Nursing Tower.

Upon entering each area or room, we introduced ourselves to the person in charge, explained our mission and procedures and then began capturing images, some 1250 finished pictures in total, over three work days. No identifying facial images were produced for privacy and security reasons. Image capture begins at the door of each room or area and proceeds clockwise. Overall layout of OFCs is shown along with visual confirmation of whether the component is unrestrained, partially restrained or fully restrained. This approach incorporates a key element of the CSA standard S832-06. It works particularly well with a screening process as it yields the best overall picture of the current state of seismic OFC resilience.

OVERVIEW

As noted earlier, Burnaby hospital began seismic upgrade work on its OFCs in 2000. Meetings were held with facilities staff to explore areas of seismic risk concern and a data and image collection process was begun in selected areas. An early version of the Canadian Standards Association's CSA S832 (***Seismic Risk Reduction of Operational and Functional Components(OFCs) of Buildings***) was used to assess risk levels, with a view to tackling the work with the greatest value for the investment.

The facility was like others in the region in terms of its earthquake resiliency. Equipment that might displace due to normal operating mechanical loads or vibration were secured, not necessarily to Code based seismic standards. All other equipment and systems were largely unsecured. In the four years to 2004, high risk OFCs were selected from an inventory list each year. Emphasis was placed on critical equipment (show stoppers), systems that lead to fire or flooding and egress routes from the hospital.

SEISMIC RISK SCREENING OBSERVATIONS

Cascade Building

The Cascade building contains mechanical systems, a gym and two floors of mental health services. The mechanical systems in the basement and tunnels below the Cascade building were largely restrained during the Seismic Mitigation Program. There is some work to do on the steam lines and some of the other linear piping systems.

The gym equipment is entirely unrestrained as in most gyms. It is possible to establish systems for securing most of the machines and weight without obstructing use. It appears that gym use is low, so a restraint program in this area would be low on the list of priorities.

On the upper two floors of Cascade, the suspended ceilings on egress routes and common areas are restrained to standard ASTM - E580. The office equipment is all unrestrained. Generally, these OFCs are lower priorities, but there is some risk of injury and impacts on operations continuity.

Boiler Plant/ Mechanical- Electrical Services

The boiler plant and the associated mechanical/electrical services are a critical part of the hospital in terms of seismic resiliency. As a consequence, this area received substantial attention during the Seismic Mitigation Program.

Virtually all equipment has been anchored to the structure. Of the vast amounts of linear piping systems, those runs closely attached to the floor, walls or ceiling are restrained. Those hanging on longer rod in the middle of the various rooms, are unrestrained generally. There are significant engineering challenges is securing these pipes.

Various fluids in plastic tanks, some toxic if released or combined with other chemicals, are unrestrained.

A significant number of the OFCs in this area were restrained, but are old and their anchors are heavily corroded. These can now be classified as partially restrained. To some degree, paint is the main restraint. Further, some of the anchors are "drop in" types, which do not have seismic rating or were in housekeeping pads, not integrated into the slab.

Importantly, the main emergency generators are mostly new and fully restrained to current standards.

Many of the medical gas bottles are only partly restrained and the current method of restraint put them at higher risk of damage than if nothing had been done. A compressed gas bottle with a broken valve stem turns into a rocket.

North &West Wings

The North Wing houses staff, the food services operations, biomedical engineering, special support services, some patient rooms and various administration offices.

Food services areas in hospitals are always difficult situations for seismic restraint work as much of the equipment is on wheels, is of stainless steel construction and the floors are tiled with substantial hygiene requirements. This makes seismic restraint difficult. At the same time, there is much equipment with hot oils and very sharp components producing a substantial safety threat. Some of the equipment is anchored to the floor, but much is not. Often the anchorage present is inadequate for seismic purposes.

A small portion of the office equipment and furnishings in the administration areas are restrained. The unrestrained OFCs may present some risk of injury to staff and some temporary loss of operations continuity.

Equipment and storage racking in the maintenance area are mostly unrestrained. Some cabinets in the hallway were restrained.

The biomedical engineering area is partially restrained due to the nature of the organization of the material in the area. There are, however, products and equipment which can dislocate.

Patient rooms in this area have similar characteristics to those in most hospitals. Many of the patient utilities are mounted on the headboard wall and are generally secure from seismic damage. The bed itself and various specialty equipment carts and stands are on wheels. In a seismic event, walls may collide with these items and set off a chain reaction similar to bump-um cars. To avoid this scenario, bed wheel locks should be on and other wheeled components should be arranged in docking stations. There are hundreds and perhaps thousands of wheeled components in the hospital and none are secured. Further, some of this equipment is very expensive.

Support Facilities

The support facility building houses critical hospital elements. The building is relatively new and should be operational during a post quake period. We have noted, however, a number of OFC issues which can effect hospital operations continuity.

While the laboratory had significant work done on it during the SMP, it has seen very little seismic risk mitigation work done on OFCs since 2004. Further, some of the original restraint systems are no longer attached due to maintenance, movement or replacement. The laboratory is critical to hospital operations and replacement of equipment would take some time during a post quake period.

The pharmacy product storage and dispensing systems are not seismically restrained. Much of it would end up on the floor during strong ground motion, where it may be damaged due to trampling or flooding. There are virtually no effective restraint systems in place in the pharmacy.

The operating theatres are also at risk. Again, the wall and ceiling mounted equipment is largely secure, but the wheeled equipment and supply carts are at risk and consequently, cam damage other things around them. The two Zeiss OR microscopes have been mounted seismically. During this screening process, it was not possible to to examine the attachments of other ceiling mounted equipment. Our opinion from our previous work above the fixed OR ceilings is that most of the attachments are okay. The concrete planks between floors do make attachment a challenge.

Nursing Tower

The nursing tower is not as equipment intensive as the other hospital buildings. It is filled with wheeled carts and stands.

Of particular concern is the IT room in the basement of the building. The equipment on the raised access floor is either not effectively restrained or not restrained at all. Given the critical nature of computer operations in a modern hospital, this area is of concern. Even with effective data backup and even the possibility of shifting to a hot site, the loss of the central computer would present serious challenges for operations continuity. Apparently the central computer system is operated by an outside organization.

CONCLUSIONS

As a result of our OFC seismic risk screening process, we are confident that we have a good sense of the degree of resilience of Burnaby Hospital. As noted, most of the seismic risk

mitigation work was done during the SMP from 2000 to 2004. This of course, does not include base building equipment which was anchored at the time of installation. While some OFCs have been anchored since 2004 (the Zeiss microscopes), the hospital seismic situation has not changed much since then.

It was generally estimated at the end of the Seismic Program that the average hospitals were about 12% of the way toward mitigation OFC seismic hazards. Our current estimate is that Burnaby Hospital is about 30% of the way along that continuum due to the extensive work that was done during the Program.

There are no insurmountable obstacles to completing the seismic mitigation work in order complete the process to obtain full resilience. Hospitals in the US, Italy, Chile, New Zealand and Japan had to be evacuated following recent earthquakes. There is no need for that to happen here.

Jay Lewis
604-254-3311

Ausenco

Ausenco Engineering Canada Inc.
855 Homer Street
Vancouver, BC V6B 2W2
Canada

T +1 604 484 9311
F +1 604 688 5913
W www.ausenco.com

Brett Halicki
Bush, Bohlman & Partners
Suite 1550
1500 West Georgia Street
Vancouver BC V6G2Z6
Canada

Our Ref: 143286

1 October 2012

Dear Brett,

Subject: Burnaby General Hospital – Seismic Evaluation Report

This report summarises our evaluation of the seismic capacity of the Cascade Residence building on the Burnaby Hospital Campus.

The Cascade Building was constructed in 1973, and is a two storey reinforced concrete building, with a partial basement and underfloor crawlspace. The structure is made up of interior concrete columns with 4 inch thick concrete 2-way floor slabs, spanning between the columns and to exterior load bearing reinforced concrete walls. The building was designed in 1970 to the requirements of NBC 1965, which was the applicable structural design code of the time.

Based on a visual inspection on 20th September 2012 by Ausenco's Mr. Alistair Russell and Ms. Tanja Kalamar, and a review of the available structural drawings, our conclusions from the evaluation are as follows.

- The exterior concrete appears in good condition, with no evidence of cracking or settlement. The interior concrete is concealed by drywall and as such, no condition assessment was conducted.
- The primary lateral deformation resisting system (LDRS) is made up of reinforced concrete shear walls around the perimeter of the building, as well at the elevator shaft. The concrete shear walls and columns qualify as "conventional construction" per current code and material standard requirements.
- The primary LDRS deficiencies (and comments) are as follows.
    - The stairwell at east end of the building appears to be structurally separate from the main building, and its contribution to the LDRS was neglected in the analysis.
    - There are large and long window openings in the walls on the south face, in the S-E corner; and also similarly large window openings on the west face of the multi-purpose room in the S-W corner. See Figures 1, 5 & 6 below. These portions of the exterior walls do not contribute to the LDRS.
    - There are short columns in between the windows and below the deep spandrels above; these are very vulnerable to damage and/or collapse in a seismic event.
    - Torsionally the building is somewhat vulnerable; there are inconsistent distributions of LDRS elements in the N-S and E-W directions. The plan eccentricity is approximately 12% in the N-S direction and approximately 15% in the E-W direction.
    - Shear walls are well distributed on the north wall of the building, but there are fewer LDRS elements on the south wall. Similarly, there are shear walls on the west wall, but the shear walls on the east face (outside wall of stairwell) are not well connected to the main building.
- The building was analysed for an equivalent static base shear of 48% W_s, based on the 2010 NBCC, and can withstand 14% W_s in the N-S direction and 20% W_s in the E-W direction. As such the building does not meet the requirements of NBCC 2010. The parameters used for the analysis are as follows:
    - R_d = 1.5, R_0 = 1.3 (conventional construction)
    - Site class C
    - I_E = 1.5 (post-disaster facility)
- The floor diaphragms were assumed as stiff, and drawings indicate a 100 mm (4 in.) concrete slab.
- An unrestrained concrete canopy above the north wall entrance poses a seismic risk, and should be restrained or removed as part of any seismic upgrade scheme.
- Additionally an unreinforced masonry cantilever wall at the S-E corner of the building next to the morgue (see Figure 5), although not connected to the Cascade Building, presents a seismic risk. This wall should be removed (or replaced with code compliant cantilever wall) as part of any seismic upgrade scheme.

Overall the Cascade Building is in good condition with no evidence of distress or deterioration. The presence of critical structural weaknesses, as well as the insufficient LDRS capacity, deem this building to be significantly inadequate to meet the seismic provisions in the current code (only some 30-40% of capacity required).

Yours sincerely

John Sherstobitoff

2

Report prepared by:

Alistair Russell

Reviewed by:

John Sherstobitoff, P.Eng

Attachments:

Figure 1 – North face window openings

Figure 2 – North face shear walls

Figure 3 – North east corner stairwell separation

Figure 4 – Cantilever canopy over north wall entrance

Figure 5 – South wall window openings above URM wall

Figure 6 – East wall multi-purpose room window openings

8.10 Mechanical Existing Services Review

8.10 Mechanical Existing Services Review

Burnaby Hospital

High Level Master Plan Report

Mechanical

Prepared for:

IBI Architecture.

700 – 1285 West Pender Street

Vancouver, BC,

Prepared by:

Rocky Point Engineering Ltd.

#208 – 20171 92A Avenue

Langley, BC V1M 3A5

Project # 12086-M376

July 23, 2012

Table of Contents **Page No.**

1.0 Purpose of the Report

The intent of this report is to present review the current status of the mechanical systems at Burnaby Hospital (BUH) and to provide high level master plans of the mechanical and plumbing, medical gas and fire protection systems for the purpose of establishing a broad scope budget for the project. The report will provide high level information on proposed mechanical systems which can be reviewed by the Owner, Project Manager, other members of the design team for coordination and assist the cost consultant in confirming the mechanical system budget for the project. Rocky Point Engineering (RPE) met with the design team and the Plant Service Manager at BUH to review the building mechanical systems on July 6, 2012.

2.0 Design Philosophy

Provide cost effective, easy to maintain and energy efficient mechanical systems that will respond to the Owner's requirements and the available project funding.

The goal of the mechanical system design will be to provide plumbing, fire protection and mechanical systems which are durable, long life, easy to maintain and provide a high level of comfort, air quality and energy efficiency. The systems are to be designed to meet LEED Canada NC Gold certification and the mechanical energy saving measures is to be optimized through whole building energy modeling. A minimum target of the project is to achieve the LEED EAc1 minimum 8 points and energy intensity targets of below 250 kW/m2 in its building operation.

3.0 Design Criteria

All systems will be designed in accordance with applicable codes, local city bylaws and industry best practices.

CODES/Standards:

- 2006 British Columbia Building Codes
- 2006 British Columbia Plumbing Code
- CAN/CSA-Z8000-11, Canadian Health Care Facilities
- CAN/CSA-Z317.2-10, Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities
- CSA Z317.1-09, Special requirements for plumbing installations in health care facilities
- Works Safe BC Standards
- British Columbia Gas Code
- Works Safe BC Standards
- ASHRAE 90.1-2007 (energy standards)
- Model National Energy Code for Buildings(MNECB)
- ASHRAE 62-2005 (ventilation\air quality standards)
- NFPA 13 Standards
- LEED Canada Sustainability Guidelines

4.0 Existing Services

The following is a summary of the existing mechanical services and their conditions on the site and in each of the buildings at the Burnaby Hospital campus.

4.1 Power Plant:

The existing power plant is original and dates back to 1952 construction of the West Wing. It is classified as a 2nd Class Steam Plant. It consists of a total of 3 boilers with 2 original boilers and 1 relatively new replacement installed 5 years ago. The plant totals over 50,000 MBh input capacity. The plant is of sufficient capacity to service the campus however one of the existing boilers will need replacement within the next 3 years.

Steam is distributed to the older buildings for heating while various steam-to-hot water heat exchangers are used to provide hot water heating to the newer buildings.

The existing chiller plant consists of 2 chillers. Chiller 1 is only 1 year old and totals 500 tons in capacity. Chiller 2 is 30 years old and has a capacity of 250 tons. The two respective cooling towers for the chillers were refurbished approximately 10 years ago. The chillers only provide cooling to the Nursing Tower and Cascade building. No other buildings on the campus have air conditioning. The plant is adequately to service the current buildings.

Central domestic hot water tanks are located in the power plant to serve hot water for the West Wing and the Kitchen. These tanks are heated with immersion steam-to-hot water heat exchangers from the boiler plant.

4.2 Mechanical Systems:

West Wing / North Wing

The West and North Wings are original buildings on campus and date back to 1952 / 1958 respectively. The buildings have limited ventilation to the central core of the building and no central air conditioning. Perimeter rooms are ventilated through operable windows. Other dedicated ventilation units are provided for newer renovated areas of the building. The building is heated by steam via perimeter radiators and convectors. Window air conditioning units have been added to provide local air conditioning where required.

The building mechanical systems have outlived its useful life.

Cascade Building

The Cascade building was built in 1973. The building is heated by steam from the boiler plant through steam-to-hot water heat exchangers. Perimeter hot water convectors provide heat to the building. An air handling unit located in the basement provide minimum ventilation to the building.

The building mechanical systems have outlived its useful life.

Clinical Support

The Clinical Support Building was constructed in 1975 along with the Nursing Tower. It houses departments such as MDR, Pharmacy, etc. The building is fully heated, cooled and ventilated. Steam from the boiler plant via a steam-to-hot water heat exchanger provides hot water to various heating systems in the building. Perimeter radiant panels provide heating to exterior rooms. Central air handling units consisting of constant volume and

variable volume systems located in the penthouse mechanical room provide ventilation, heating and cooling to the building. VAV boxes provide zone control for parts of the building which has variable volume systems.

The building is generally adequately serviced by heating, cooling and ventilation systems.

Nursing Tower

The Nursing Tower was built in 1974. The building is fully heated, cooled and ventilated. Steam from the boiler plant via a steam-to-hot water heat exchanger provides hot water to various heating systems in the building. Perimeter radiant panels provide heating to exterior rooms. Central air handling units located in mechanical rooms provide ventilation, heating and cooling to the building. VAV boxes throughout the building provide zone control.

In general the systems are sufficient to serve the building however there have been complaints of lack of ventilation in parts of the Nursing Tower. Parts of the building façade (south facing) is subject to large solar loads in the summer causing overheated spaces throughout the building

4.3 Plumbing Systems:

West Wing / North Wing

The West and North Wings plumbing systems have outlived its useful life. The building requires immediate plumbing infrastructure upgrade. The building lacks sufficient hand sinks and various infection control fixtures throughout.

Cascade Building

The Cascade building plumbing systems are adequate however they are nearing the end of their useful life. The building lacks sufficient fixtures such as shower and washrooms.

Clinical Support

The Clinical Support Building houses many of the support type departments of the hospital. Many departments are plumbing intensive such as MDR and Laboratory programs. In general the plumbing infrastructure is nearing the end of its useful life. Plumbing pipes are starting to leak. Plumbing infrastructure replacement will be necessary within the next 5 to 10 years. The building lacks sufficient hand sinks and various infection control fixtures throughout.

Nursing Tower

The Nursing Tower plumbing infrastructure is in adequate condition. In general the building is lacking plumbing fixtures such as hand wash sink and washroom groups.

4.4 Medical Gas Systems:

West Wing / North Wing

Original medical gas outlets are located throughout the building. These outlets are served by the central gas systems. Many of the outlets have been decommissioned or not used due to the reprogramming of spaces inside the building.

Cascade Building

There are no medical gases in this building.

Clinical Support

Medical air compressors, vacuum pumps, compressed air are provided for this building to service the medical air requirements. It appears that the medical gas infrastructure is adequate to serve this building. Bottled gases such as nitrogen and nitrous oxide are also centralized in a gas storage room.

Nursing Tower

Oxygen, Medical Air and Vacuum outlets are located throughout the building. These outlets are served by the central gas systems. There appears to be adequate service for the medical gas requirements in this building.

4.5 Fire Protection Systems:

West Wing / North Wing

The building is partial sprinklered with hose valves and fire hose cabinets throughout the building.

Cascade Building

The building is partial sprinklered with hose valves and fire hose cabinets throughout the building.

Clinical Support

The building is fully sprinklered.

Nursing Tower

The building is fully sprinklered.

4.6 Controls Systems:

The entire campus is controlled by an Endover DDC Controls system. The control devices are a mix of pneumatically control devices with electronically control devices. Not all devices and system have the required feedback to the central DDC Controls system. An upgrade to the DDC controls is recommended.

5.0 High Level Master Plan

The High Level Master Plan proposes that the following areas be developed on the Burnaby Hospital campus.

- Demolition of the 1952 / 1958 West / North Wing
- Build a new Parking structure and Support building with 4 levels of Inpatient Beds in the place of the West / North Wing
- The expansion of the Clinical Support Building with a larger Emergency Department, Food Service and Cafeteria renovations, DI and Nuclear Medicine expansion, shelled space and 2 storeys of parking
- The creation of a 5 storey Out Patient Facility (OPF) which includes 2 storeys of InPatient Beds.

5.1 Future Capacity of Mechanical Systems:

The existing steam plant has the capacity to accommodate the proposed building additions on the site provided that they are designed to operate in an energy efficient manner. However a majority of the steam plant is original and steam is a very intense source of heating energy and it will require significant capital and operating costs to keep the steam plant operating long into the future.

The plumbing infrastructure throughout the BUH campus has outlived its useful life. Any buildings to be retained or significantly renovated in the Master Plan should be considered for a plumbing infrastructure upgrade.

The medical gases should be considered for an entire system upgrade in the Master Plan. New medical air compressor station, vacuum station and gas storage compound should be considered in the new Plan to serve the new and renovated buildings. The outdoor bulk oxygen facility should be upgraded and upsized to accommodate the new and renovated building requirements.

The existing fire protection system should be modified to suit the new and renovated buildings.

A DDC Control upgrade should be provided for the entire BUH campus.

5.2 New Parking Structure and Support Building:

5.2.1 Plumbing:

New plumbing and drainage is required for all new fixtures.

All plumbing fixtures including all hand wash sinks will be CSA-Z8000 compliant.

Low flow faucets, urinals and water closets will be used throughout the building to reduce water and sanitary discharge flow rates. These fixtures will incorporate infrared sensing in all public areas to further reduce water consumption and it is anticipated that a 30% or greater water reduction use will be achieved.

New copper domestic hot, cold and recirculation piping will be provided for all fixtures throughout the building.

A central domestic hot water plant will be located in the mechanical room to provide domestic hot water to the building.

Storm connections from all new roof drainage will be provided and taken to a separate system from the perimeter drain tile. All rainwater leaders will be installed internally in the building and discharged to the site storm drainage system.

New perimeter drain tile will be installed around the new parking garage and building.

5.2.2 Fire Protection:

The new building will be provided with a new sprinkler system. The new sprinkler system will tie back to the existing sprinkler station.

A new sprinkler standpipe system will be required.

5.2.3 HVAC:

All mechanical systems will incorporate heat recovery system for the main ventilation air-handling units.

5.3 Clinical Support Building Expansion:

5.3.1 Plumbing:

New plumbing and drainage is required for all new fixtures in the new addition.
New plumbing and drainage is required for all existing renovations.

All plumbing fixtures including all hand wash sinks will be CSA-Z8000 compliant.

Low flow faucets, urinals and water closets will be used throughout the building to reduce water and sanitary discharge flow rates. These fixtures will incorporate infrared sensing in all public areas to further reduce water consumption and it is anticipated that a 30% or greater water reduction use will be achieved.

New copper domestic hot, cold and recirculation piping will be provided for all fixtures throughout the new building addition and existing renovations.

The central domestic hot water plant will be upgraded in the Plant Building to provide domestic hot water to the building.

Storm connections from all new roof drainage will be provided and taken to a separate system from the perimeter drain tile. All rainwater leaders will be installed internally in the building and discharged to the site storm drainage system.

New perimeter drain tile will be installed around the new additions.

5.3.2 Fire Protection:

The renovated building and new additions will be provided with a new sprinkler system. The new sprinkler system will tie back to the existing sprinkler station.

A new sprinkler standpipe system will be required.

5.3.3 HVAC:

All new mechanical systems will incorporate heat recovery system for the main ventilation air-handling units.

5.4 New Out Patient Facility (OPF):

5.4.1 Plumbing:

New plumbing and drainage is required for all new fixtures.

All plumbing fixtures including all hand wash sinks will be CSA-Z8000 compliant.

Low flow faucets, urinals and water closets will be used throughout the building to reduce water and sanitary discharge flow rates. These fixtures will incorporate infrared sensing in all public areas to further reduce water consumption and it is anticipated that a 30% or greater water reduction use will be achieved.

New copper domestic hot, cold and recirculation piping will be provided for all fixtures throughout the building.

A central domestic hot water plant will be located in the mechanical room to provide domestic hot water to the building.

Storm connections from all new roof drainage will be provided and taken to a separate system from the perimeter drain tile. All rainwater leaders will be installed internally in the building and discharged to the site storm drainage system.

New perimeter drain tile will be installed around the new parking garage and building.

5.2.2 Fire Protection:

The new building will be provided with a new sprinkler system. The new sprinkler system will tie back to the existing sprinkler station.

A new sprinkler standpipe system will be required.

5.2.3 HVAC:

All mechanical systems will incorporate heat recovery system for the main ventilation air-handling units.

6.0 Energy and Sustainability

6.1 Energy Target:

As per the design philosophy of Fraser Health to be sustainable and energy efficient, the mechanical system is to be cost effective, easy to maintainable and be energy efficient that can respond to the dynamic load of the buildings.

The goal of the mechanical system design will be to provide plumbing, fire protection and mechanical systems which that can meet a minimum sustainability target of LEED Canada NC Gold Certification standard. Energy saving target of the building shall target a minimum

of 40% better than the current baseline reference model of a building of similar size and use as defined by ASHRAE 90.1-2007. In addition, the type of energy performance target should be less than 250 kW/m2.

6.2 Measurement and Verification (M&V):

There will be a requirement for measurement and verification systems for the new buildings and renovated buildings and this will involve metering of plug, lighting and mechanical loads throughout the building. M&V provides a plan to ensure the design, construction, implementation and operation of the building executed in a organized and efficient manner. A building and/or “energy user dashboard” should also be incorporated into the building’s automation system and allow staff and building occupants to interact and monitor the buildings energy performance.

8.11 Electrical Existing Services Review

8.11 Electrical Existing Services Review

BURNABY GENERAL HOSPITAL
BURNABY, BC

HIGH LEVEL MASTER PLAN
EXISTING ELECTRICAL SYSTEMS REPORT

DRAFT

PREPARED BY

MMM GROUP LIMITED
SUITE 700 – 1045 HOWE STREET
VANCOUVER, B.C.
V6Z 2A9

TELEPHONE: 604.685.9381
FAX: 604.683.8655
E-MAIL: vancouver@mmm.ca
WEBSITE: www.mmm.ca

MMM GROUP

July 31, 2012
Project # 5012614

K:\Projects\5012 Series (2012)\5012614 Burnaby Hospital Concept Site Master Plan\1. Master Files\1.3 Reports\BGH Existing Electrical Systems Report 18 July 2012.doc

INDEX

.1 GENERAL INTRODUCTION

.1 The following report has been prepared by the MMM Group Limited for the **Burnaby General Hospital (BGH).**

.2 The intent of this report is to provide an overview of the existing electrical systems in the various buildings on the BGH campus in particular the:

- **Cascade Residence (CRB)**, built in the mid 1970's,
- **West Wing (WWB)**, built in the early1950's
- **North Wing (NWB)** includes **Power House Building (PHB)** built in early1950's
- **Support Facilities (SFB)**, built in the mid 1970's,
- **Nursing Tower (NTB)** built in the mid 1970's.

.3 The first half of the report provides an overview of campus wide major electrical/ communications systems. The second half of this report provides specific information for each of the buildings noted above. The electrical/communications systems that have been reviewed include:

- power,
- lighting,
- fire alarm,
- data/telephone,
- security,
- nurse call
- clock
- emergency public address system.

.4 This report is based upon:

- review of existing VFA report,
- review of existing drawings,
- review of previous master plan
- discussions with various hospital personnel,
- site reviews.

.2 CODES & STANDARDS

.1 The electrical systems referenced above will be reviewed in the context of the following codes and standards:

- CSA C22.1 and CSA Electrical Bulletins in force.
- Provincial Government Electrical Inspection bylaws, rules, and ordinances in force.
- All relevant sections of National Building Code and B.C. Building Code as adopted and amended by the local jurisdiction.
- British Columbia Building Code, as adopted for use in B.C.
- Latest Canadian Electrical Code, Part 1-C22.1.
- CSA-Z32 Emergency Power and Electrical Safety for Health Care Facilities.
- CSA-Z317.5, Illumination Systems in Health Care Facilities.
- CSA-C282, Emergency Electrical Power Supply for Buildings.
- ULC-CAN4-S115, Standard Method of Fire Tests for Fire Stop Systems.
- Worker's Compensation Board Regulations.

.3 GENERAL PARAMETERS

3.1 Seismic Requirements

.1 In general the majority of the electrical, technology, and communication equipment including (but not limited to) luminaries, transformers, distribution equipment, UPS, speakers, raceway racks, switchgear have had minimal if any seismically restraint systems installed.

.2 Those seismic measures that have been installed fall short of what the current B.C. Building Code (BCBC) requires for this type of facility.

.3 The lack of seismic systems supporting and restraining the existing electrical equipment within the various buildings and other service areas diminishes the overall reliability associated with the electrical systems. The electrical systems operation may be compromised as a result of a seismic event.

.4 The concern is that by keeping the existing systems installation as they are currently it places the buildings, patients, staff and visitors at risk.

.5 At a minimum we would expect that the measures outlined in the Seismic Restraint Standards Manual from the Electrical Contractors Association of B.C. CSA 5832 would be incorporated in this type of facility.

.4 ELECTRICAL SYSTEMS OVERVIEW

4.1 Power Service

.1 The power supply to the BGH site is fed overhead via a BC Hydro Pole located on the north side of the property. At the pole a 12.47KV HV cable transitions to below grade and runs underground into the hospital via a HV service duct bank.

.2 The service from BC Hydro Power Authority (BCHPA) is a single High Voltage (HV) 12.5KV circuit distributed to the site in a radial service configuration (one normal power primary circuit). As defined in CSA Z32 (and recommended by IEEE 602) modern Acute Care Hospitals should be serviced by at least two HV feeders in a dual radial configuration (one normal and one standby HV power primary circuit).

.3 The existing HV feeder is terminated in an electrical room that is in the existing Power House Building (PHB). This is a significant concern due to the age of the PHB (1952) and the fact that it's non-compliant to today's codes and standards making it questionable if this area (and the associated equipment) could operate during/after a natural disaster.

.4 The hospitals main incoming HV service electrical room is on Level 0 of PHB. The room is accessible from adjacent corridors and a series of tunnels that distribute throughout the site.

.5 The HV switchgear is rated at 15kv, 600 amps and comprises:

- an incoming wireway (*)
- a primary load break switch(*),
- -a primary oil circuit breaker(*),
- -BC Hydro meter equipment(*),
- -two fused load break isolation switches, LBS#1, LBS#2(**).
- (*) = Original equipment.
- (**) = Equipment added at a later date.

.6 The original equipment (noted by (*)) is showing signs of age. The existing main breaker and load break switch should be completely modified or replaced.

.7 Around the HV switchgear is a series of pull pits that have removable metal cover plates.

.8 Each of the fused load break isolation switches feeds a HV transformer (15kv-600/347volt, solidly grounded).

.9 Load break switch LBS#1 is used to feed existing transformer T1 and LBS#2 is used to feed existing transformer T2.

.10 Transformer T1 was installed at the same time as the HV switchgear and is located in the same room as the HV switchgear. T1 is made up of 3x1000kva dry type transformers. The life of a transformer is dependent on a number of factors including the amount of preventative maintenance and cleaning that has been performed on it; we are not aware of how much servicing has been performed on this transformer. Acute care hospitals require at a minimum two transformers of equal KVA capacity with similar characteristics which is not the case at BGH. This system should be upgraded to have greater overall system capacity and improved system redundancy.

.11 Transformer T2 is located in the hospitals main electrical room (level 1 of SFB). T2 is a 2000kva dry type unit; it was installed in 1998 as part of the power distribution upgrade that added in LBS#1 and LBS#2.

.12 The transformers T1 and T2 feed the main distribution centre which is located in the main electrical room. The main distribution includes:

- distribution ND1,
- distribution ND2.

.13 Main distribution centres ND1 and ND2 are both rated at 600v, 3800amps, 3 phase 3 wire. They contain a series of drawout breakers that are used to feed:

- vital power automatic transfer switch VTS1,
- delay vital power automatic transfer switch DVTS1,
- conditional power manual load transfer system CTS1.

.14 There are provisions for tie breakers that would link ND1 and ND2 together. The existing transformers are rated for 15KV; new BC Hydro standards are requiring all HV transformers be dual wound for 12.5/25KV which means the existing transformers would both need to be replaced.

.15 Four 400kw diesel generators are located in a generator room (near the room housing the main HV switchgear) in the PHB. The fuel tank is an outdoor buried type feeding indoor 200 gallon day tanks.

.16 The generators are varying vintage but are all at or near the end of their service lives.

.17 The generators are synchronized through a 'dead-bus' paralleling scheme.

.18 The power generation system should be replaced with a new system that uses an auto parallel scheme with closed transition transfer switches and has more capacity and a higher degree redundancy and reliability. If a generator failed in the existing power generation system arrangement the balance of the system would not have capacity to carry all of the vital and delay vital loads (load shedding would need to take place to address this condition).

.19 The facility loads for the site are recorded by plant maintenance via their power measurement system.

.20 Other issues with the exiting main power system include:

.1 Reliability, the existing service is fed from a single BC Hydro source. If there is a failure of the existing incoming power feeder the site is entirely dependent on the essential power generation system which is also located within PHB and is therefore suspect.

.2 Reliability, the existing substation layout creates a number of single points of failure such as the two HV transformers that have different ratings and are in different locations.

.3 Capacity, the new transformers are not rated the same and a major expansion with large mechanical and equipment loads could compromise the existing substations and associated distribution and overload them.

.4 Age, the older components in the substation including the generators have reached the end of their service lifespan and are now dated, failure of any component within the system would compromise staff, visitors and patients safety.

.5 Maintenance, some of the equipment is old and cannot safely be maintained without placing workers at risk.

.6 Grounding, the integrity of the grounding in the switchgear, main electrical and generator rooms should be quantitatively assessed to determine if it would comply with modern codes and standards for this type of facility.

.7 Clearances, the equipment does not have adequate height and clearances for new 25 KV equipment (if required to comply with the new BC Hydro service requirements).

.8 Seismic, aspects of the equipment do not appear to have adequate seismic bracing installed.

.9 Arc Flash, the distribution equipment has no signage indicating the potential danger that someone in the main electrical could be exposed to during a fault condition.

.10 Pathways, the main electrical room has minimal space for any new conduits to be run to other areas of the facility.

.11 Power Quality, the power services have minimal power conditioning equipment measures installed.

.12 Replacement parts, due to the vintage of the equipment it is becoming very difficult to service and maintain any of the older equipment due to the scarcity of replacement parts and non-compliance to new standards.

4.2 Lighting

.1 Most of the existing lighting is fluorescent type fixtures; the majority of the fixtures used throughout the campus is made up of the four foot recessed and surface mounted types.

.2 The majority of the light fixtures have been retrofitted with newer four foot T8 fluorescent lamps, however there are still some T12 lamps used in fixtures scattered around the hospital.

.3 In general the light levels in corridors appeared acceptable.

.4 Lighting levels in other areas of the facility was varied and in some of the clinical spaces the light levels may not be adequate in particular in surgical rooms.

.5 The use of premium grade light luminaires with emphasis on energy efficiency and high colour rendition is the standard that is used today in newer acute care hospitals. The expectation would be that all luminaires would be used to enhance safety and allow personnel to circulate and perform all tasks required. light fixtures that control glare are used in treatment rooms, offices, nurse stations and corridors where patients are transported. The existing light fixtures did not offer many options to staff and patients in terms of glare control and comfort.

.6 The lighting should create a comfortable working environment that is conducive to healing.

.7 It appeared that the light fixtures in many locations did not have adequate seismic restraints.

.8 The lighting controls offered minimal flexibility to adjust lighting to suite the various functions and activities required; there did not appear to be any integrated controls that offered simple operations for staff and patients use. The light switches were not easily located nor were they obvious in terms of their operations. The facility did not appear to incorporate lighting control system and devices that can be completely disinfected without requiring any disassembly, it also did not appear to have connections to other system to allow it to be used as part of an ensure energy management scheme.

.9 The existing lighting density levels would probably not comply with ASHREA standards.

.10 Many of the fixtures installed did not appear to be of the type that would permit ease of cleaning.

.11 Exit signs utilize various types of lamps, new exit sighs should standardize on LED type.

.12 As renovation take place the lighting levels within the space should be modified to suite the type of activity; areas with multiple light levels should meet IESNA RP29 and comply with WCB regulations.

4.3 Fire Alarm System

.1 There existing site wide Siemens Fire Alarm system was recently replaced with new panels and devices in all areas of the site. The system that has been installed incorporates a number of high rise requirements including:

- fire fighters telephone system,
- fire fighters paging system,
- CACF,
- smoke control system.

.2 The majority of the fire alarm panels have been installed in service rooms; the wiring between panels appears to use a variety of types including MI cable and fire alarm cabling. The wiring is distributed using a series of network trunk cables that radiate out from the main panel located at the fire fighters response point (main entrance of SFB) to the various building fire alarm nodes.

.3 The new system is a two stage (general and evacuation), supervised, fire detection and alarm system that includes intelligent automatic and manual initiation devices and audio/visual alarm devices with pre-recorded voice evacuation capabilities.

.4 The existing fire alarm system graphics, displays and annunciators reflect the new fire compartment and all of the new fire alarm zones.

.5 The fire alarm system uses a fully addressable product and appears to be in good shape.

.6 The recent fire alarm system was a replacement not an upgrade without replacing or revising any of the wiring. The fire resistance rating of the existing field device wiring did not appear to be adequate or meet BCBC requirements for a high rise building. Newer installations would incorporate two fires rated cables to meet survivability requirements identified in NFPA 72.

.7 If a fire detection device is activated an alarm condition is transmitted to the off-site F/A monitoring agency and to the FHA off-site switchboard (switchboard will page into the hospital noting a fire alarm condition).

4.4 DATA/Telephone Systems

.1 The telephone service to the BGH site is fed overhead via a service pole located on the north side of the property. At the pole a Telus multi-pair cable transitions to below grade and runs underground into the hospital via a communications service duct bank.

.2 The telephone service entrance room where the incoming telephone cable terminates is on the lowest level of the West Wing (WW).

.3 The telephone cable is cross connected and runs through a series of tunnels to the main communications room located on level 2 of SFB (adjacent the server room).

.4 There should be a completely separate and redundant:

- service entrance cable into the site with a separate demarcation,
- pathway that links the telephone terminations to the server room.

.5 The backbone wiring includes fiber optic cables that have been distributed from the main communication room to the various communications closets located throughout the site. The backbone cable is not distributed in a redundant fashion.

.6 The server room UPS is a single module. The unit has been flagged by HSSBC as not having adequate capacity; the battery backup time is questionable.

.7 The communications infrastructure includes the distribution of copper to all edge communications closets and terminations. The backbone cable is not distributed in a redundant fashion.

.8 HSSBC follows a very strict structured cable plant approach that mirrors the requirement of EIA/TIA. The existing system has been installed in a manner that would not be considered to be acceptable by today's standards. The existing communications systems infrastructure does not comply with these standards in a number of ways, including:

- numbers of communications rooms per floor,
- size of communications rooms,
- pathways for distribution of services,
- power services for communications systems,
- security of communications rooms,
- sharing rooms with non-communications systems,
- cooling of communications rooms,
- etc.

4.5 Security Systems

.1 The access control system at the BGH site is manufactured by Andover (distributed, installed and serviced by Houle Electric).

.2 Andover satellite field panels are distributed around the hospital site.

.3 The panels are networked together and communicate with the Andover head end equipment. The network used in the hospital does not appear to be managed or controlled by the hospitals IT network system. There does not appear to be very many locations that have access control on the site; the system should be expanded throughout the campus to enhance the levels of controlled access.

.4 The site wide security system is monitored by the security office.

.5 The CCTV system uses a variety of cameras including analog cameras from Pelco. The existing system records information to DVR's.

.6 The cameras are analog type equipment.

.7 The cameras have coax cable run back to control switches.

.8 The CCTV security systems equipment should be upgraded to use modern IP based technology and expanded to provide increased coverage (similar to what is done in modern acute care hospitals) in areas that service a large and varied community. The wiring should be upgraded to the same quality as the data structured cable plant.

4.6 Nurse Call System

.1 The nurse alarm system used on the BGH campus was recently upgraded to the Rauland Responder 1V system. Nurse call system control cabinets are located in various electrical rooms around the site; certain departmental cabinets and systems have been networked together.

.2 The code blue system is a sub-set of the nurse call system, it is integrated into the emergency response protocols developed for the Fraser Health Authority (FHA) sites including having code blue calls monitored off site by switchboard. Response to code blue is such that the off-site switchboard makes an emergency page into the campus via the emergency overhead paging systems to notify staff of the code blue condition.

.3 The Responder 1V is still used in many health care facilities and the supplier has confirmed to us that this product will continue to be supported product for the foreseeable future.

.4 The Nurse Call System has been deployed throughout clinical spaces and in general is used as the primary method of communications between patients and staff.

.5 The nurse call systems has also been deployed in some of the clinical spaces as means of communications between staff.

.6 The existing system relies on patient call stations at the bed side, not pillow speakers as is used in newer facilities. The devices are activated by pressing the push button on the call cards. Calls are distributed to nurse call master consoles; when a call is responded to at the master station a full duplex communications link is established between the patient nurse call station and the master console.

.7 Other nurse Call system devices used include: emergency call stations in bathrooms, and showers, staff assist and duty station have been made available for staff communications in a number of locations.

.8 In general the nurse call system appears to be operating satisfactorily. The existing system should be re-verified and the code blue devices re-tested to ensure the integrity of signals transmitted to the off-site monitoring switchboard are sound.

.9 New nurse call system installations are often integrated to other systems such as:

- patient wandering,
- infant tagging,
- wireless communications devices,
- low voltage lighting control (at patient bed-side),
- equipment alarms etc.

.10 Over and above what has been mentioned within this report integration between the nurse call system and other technologies and systems has not been incorporated in the BGH site.

4.7 Clock System

.1 An older centralized Simplex synchronized hard wired clock system has been used throughout the BGH site.

.2 The master controller is located in the hospitals main electrical room (level 1 of SFB).

.3 The clocks are typically:

- 300mm in diameter,
- sweeping hands,
- 24 hour numbering,
- 1-12 hour in large numbers,
- 13-24 hour in smaller numbers.

.4 Synchronized clocks can be found in some:

- corridors,
- patient treatment rooms,
- care stations,
- procedure rooms,
- imaging rooms,
- staff work rooms,
- etc.

.5 This type of clock system is still used in health care facilities; however most facilities are in the process of retro-fitting their exiting sites with new synchronized wireless clock systems that use GPS, satellite transmitter type technologies to provide signals to all clocks in the hospital to ensure common information is displayed.

4.8 Emergency Public Address System

.1 The public address system (PA) is an older system that is intended to be used as an emergency paging system.

.2 Speakers have been located: in most corridors throughout the hospital campus, in some large common areas and most service rooms. It appears that there are some potential areas where there could be 'dead' zones. The system should be tested to ensure complete coverage in all areas since it is used to provide life-safety instructions.

.3 The emergency PA system has been installed such that it is separate and appears to act completely independent of the fire alarm system speakers (this is to ensure that it can remain operational during a fire alarm condition).

.4 This system can also can be used as a redundant method for providing staff and the public general emergency commands if other systems in the buildings fail.

.5 The PA system has an interface to the telephone system in order to provide the capability of making pages via a telephone handset.

.6 Overhead pages however tend to be restricted to being made from the offsite switchboard; the switchboard operator has the capability to provide a campus wide emergency code page to all areas of the facility.

.7 The system would be more reliable if the speaker were wired to redundant amplifiers and the wiring was supervised.

.5 CASCADE RESIDENCE

5.1 Overview

1 The Cascade building is a two level structure with about 2100 square meters of space per floor; it was constructed in the mid-1970's. It appears that the purpose of this building was for it to be used as an extended care facility. The clinical aspects of the Cascade building are now primary associated with providing mental health care services and support to the public.

5.2 Power

.1 The Cascade building receives its power services from the main distributions equipment found in the main electrical room in SFB.

.2 There are a series of electrical rooms that rise up through the building with power distribution equipment located on every level. There does not appear to be adequate quantities of panelboards with spare breakers or space for future breakers. The concern is that this building may not have a system that complies with modern standards in particular those related to the requirements associated with redundancy in the power distribution systems.

.3 The building uses tech feeders in the backbone and a combination of armoured cable and conduit for branch wiring. Modern health care facilities would use conduit with wiring and restrict the use of Teck and limit the use of armoured cable to feeding light fixtures only.

.4 The existing power receptacles that were visible were primarily colour coded white or ivory. The electrical code requires that all power outlets be hospital grade in patient care locations and that they are colour coded red if there are connected to the essential power systems.

.5 Raceways did not appear to have any spare capacity to facilitate future wiring or wiring changes. The branch wiring to devices that service patient care areas did not appear to be sized to prevent voltage drop. The number of circuits that have been provided in patient care areas did not appear to be adequate to service the quantity of connections required.

.6 The faceplates on devices used a combination of various types of materials including PVC and metal. Modern facilities use high impact nylon so they are not easily damaged and are non-conductive (which eliminate shock hazards).

.7 Grounding in the patient care areas did not appear to comply to current CEC and CSA Z32 Essential Power and Electrical Safety in Health Care standards.

.8 All receptacles and other permanently wired equipment should be bonded to a reference ground point within the patient care area.

.9 Modern acute care facilities use a room reference ground bus (often located in the patient's headwall or in the ceiling space above the bed. The reference point should connected by a green insulated ground wire to the panel feeding the electrical devices.

.10 The exposed non-current-carrying metal parts at the patient care locations should be grounded to the patient reference grounding bus.

.11 The existing system should be re-tested to Z32 standards to determine all deficiencies.

5.3 Lighting

.1 The existing lighting concepts appear to rely on a combination of recessed and surface mounted fluorescent fixtures. An energy upgrade program to modernize the types of lamps appears to have taken place; most fluorescent lamps are now the four foot T8 type.

.2 In general the light levels in corridors appeared acceptable.

.3 Lighting in the patient care areas should be re-evaluated in terms of adequacy from a durability perspective and to determine if the lighting controls are adequate in terms of ability control light from staffed and other controlled areas.

5.4 Fire Alarm

1. The existing fire alarm system has been manufactured by Seimens.

2. It does not appear that fire resistant rated wiring has been used to feed power to the fire alarm node in this building from the main panel in SFB.

.3 The fire alarm system devices, panels, annunciators and components have been recently replaced however the fire resistance rating of the wiring is questionable.

.4 The fire alarm system devices are fully addressable; smoke detectors have been installed in all patient bed rooms and corridors leading to exits. Manual pull stations have been located at exits to floors. LCD displays can be found in staff stations.

5.5 DATA/Telephone

.1 The telephone and data cablings has been installed in a structured cable plant approach. The majority of the branch wiring from device outlets to the associated terminations appears to be category 5E rated.

.2 The installation does not comply with the newer strategies and methodologies that FHA is implementing for structured cabling.

.3 Horizontal cabling in general appears to have been run from each communications outlet to a wall mounted termination that is usually located in a service closet on the floor.

.4 The backbone cable to each service closet has not been distributed in a redundant fashion.

5.6 Security Systems

.1 The access control system used to enter the secure areas in this building is the Andover system (wired back to the site wide system).

.2 It appears that the existing access control coverage should be expanded further.

.3 The CCTV system uses a variety of cameras including analog cameras from Pelco. The existing system records information to DVR's.

.4 The cameras are analog type equipment and should be expanded to provide increased coverage.

5.7 Nurse Call System

.1 The nurse alarm system is the Rauland Responder 1V which was installed a few years ago.

.2 The nurse call system is relatively new and should have the capability of being expanded to address the hospitals requirements.

.3 The existing system appears to be limited in its operation in this building and should be reviewed with the users.

5.8 Clock

.1 The clocks in this building are wired back to the main panel in the hospitals main electrical room (level 1 of SFB).

.2 Minimal use of clocks was noted in this building, they were primarily located in staff spaces.

.3 Clocks were the ceiling mounted analog type with sweeping hands.

5.9 Emergency Public Address System

.1 The emergency public address system (PA) in this building is wired back to a series of amplifiers in nearby electrical rooms and controlled by the main control panels located in the main electrical room on level 1 of the SFB.

.2 Speakers appear to have been located in strategic locations; the hospital should review these locations in the context of security of the devices and ensuring proper coverage in order to minimize 'dead' zones.

.6 WEST WING / NORTH WING

6.1 Overview

1 The West and North wings (commonly called the "West Wing", WWB) are multi-level (6-7 levels) structures that were constructed in the mid-1950's. The buildings are used for a variety of purposes including administration, support services and some clinical services. The Power House Building was constructed as part of the "West Wing" development.

6.2 Power

.1 The WWB receives distribution power services at 600/347 volts from the main distributions power facilities located in SFB. The feeders distributed to the buildings are via Tech cables that have been run in a variety of ceiling spaces and corridors (supported in some instances from cable trays). Transformers have been located in a few locations to transform the voltage down to 120/208 volts for distribution to panelboards located on every level.

.2 There are a series of stacked electrical rooms that rise up through the buildings with distribution panelboards located on every level.

.3 There does not appear to be adequate quantities of panelboards with spare breakers or spaces for additional breakers. There appeared to be minimal spare capacity in the distribution feeders.

.4 By today's standards the power systems are undersized and do not have the level of spare capacity and redundancy that would be expected for this type of facility.

.5 The use of tech cables for feeders in the backbone is not considered acceptable by today's standards nor does it provide the flexibility for changes that may be required nor do these types of feeder cable provide the size and rating of bonding wires that are typically used in health care facilities.

.6 The existing power receptacles that were visible were primarily colour coded either white or ivory. The electrical code requires that all power outlets are required to be hospital grade in patient care locations and devices are required to red if there are connected to the essential power systems.

.7 The existing raceways did not appear to have any spare capacity to facilitate ease of future additional wiring or to enable wiring changes. The branch wiring to devices that serviced patient care areas did not appear to be sized to prevent voltage drop. The number of circuits that was provided in patient care areas did not appear to be adequate to service the needs to todays increased service connection requirements.

.8 The faceplates on branch wiring devices was a combination of various types of materials including PVC and metal. Modern facilities use high impact nylon so they are not easily damaged and are non-conductive which eliminate shock hazards.

.9 Grounding in the patient care areas did not appear to in conformance to current CEC and CSA Z32 Essential Power and Electrical Safety in Health Care Standards.

.10 All receptacles and other permanently wired equipment should be bonded to a reference ground point within the patient care area, this was not readily evident.

.11 Modern acute care facilities use a room reference ground bus (often located in the patient's headwall or in the ceiling space above the bed. The reference point should be connected by a green insulated ground wire to the power panels feeding the electrical devices.

.12 The exposed non-current-carrying metal parts at the patient care locations should be grounded to the patient reference grounding bus.

.13 The existing system should be re-tested to Z32 standards to determine all deficiencies.

6.3 Lighting

.1 The existing lighting concepts appear to rely on a combination of recessed and surface mounted fluorescent type fixtures. An energy upgrade program to modernize the types of lamps used appears to have taken place; most fluorescent lamps are now four foot T8 type.

.2 In general the light levels in non-clinical spaces appeared acceptable.

.3 Lighting in the patient care areas should be re-evaluated as it did not appear acceptable in terms of light levels, comfort, durability and serviceability.

.4 The lighting controls did not appear to be adequate in terms of its ability to control light in staffed and other areas.

6.4 Fire Alarm

.1 The existing fire alarm system has been manufactured by Seimens.

.2 It does not appear that fire resistant rated wiring has been used to feed power service to the fire alarm node in this building; the system is connected to the main site wide panel in SFB.

.3 The fire alarm system devices, panels, annunciators and components have been recently replaced however the fire resistance rating of the wiring may not be two hour rated.

.4 The fire alarm system uses fully addressable devices with smoke detectors in patient bed rooms and corridors, pull stations at exits to floors and LCD displays in staff stations.

6.5 DATA/Telephone

.1 The majority of the telephone and data cablings appears to be category 5E rated.

.2 It appears that the telephone and data sub-system have all been wired as part of a structured cable plant; however the installation does not comply with the newer strategies and methodologies that FHA is implementing for structured cabling.

.3 Horizontal cabling in general appears to have been run from each communications outlet to a wall mounted terminations that is usually located in a local service closet on each floor.

.4 The backbone cable to each service closet has not been distributed in a redundant fashion.

6.6 Security Systems

.1 The access control system is the Andover system (wired back to the site wide system).

.2 It appears that at the perimeters of this building and at other strategic locations the existing access control coverage should be expanded further.

.3 The CCTV system uses a variety of cameras including cameras from Pelco. The existing system records information to DVR's.

.4 The cameras are analog type equipment; should be expanded to provide increased views of in sensitive areas.

6.7 Nurse Call System

.1 The nurse alarm system is the Rauland Responder 1V which was installed a few years ago.

.2 Nurse call system field devices are wired back to local control cabinets as per vendor requirements.

.3 The nurse call system is relatively new and should be able to be expanded to address the hospitals requirements.

6.8 Clock

.1 The clocks in this building are wired back to the main panel in the hospitals main electrical room (level 1 of SFB).

.2 Clocks were primarily noted in building corridors and in some of the larger staffed locations.

.3 The majority of the clocks appeared to be ceiling mounted analog type with sweeping hands.

6.9 Emergency Public Address System

.1 The emergency public address system (PA) speakers in this building are wired back to a series of amplifiers located in an electrical room on the lowest level of the west wing.

.2 The amplifiers are wired back to the main control panel located in the main electrical room on level 1 of the SFB.

.3 Speakers have been located in: most corridors (throughout the west wing and north wing) some large common areas and most of the local service rooms.

.4 It appears that there are some potential areas where there could be 'dead' zones. The system should be tested to ensure complete coverage in all areas since it is used to provide life-safety instructions to staff and the public.

.5 Pages tend to be restricted to being made from the offsite switchboard; the operator has the capability to provide a campus wide emergency code page to all areas of the facility.

.7 SUPPORT FACILITIES BUILDING

7.1 Overview

1 The Support Facilities Building (SFB) is a four story approximately 19 thousand square meter structure that was constructed in 1975.

2 This building supports the following departments and activities: OR surgical suites, PARR, birthing, lab, ICU, medical imaging and emergency.

7.2 Power

.1 The SFB houses the following major power systems that feed the site:

- HV transformer substations,
- main distribution,
- transfer switches.

.2 The main distribution on level 1 feeds power throughout the SFB at 600/347 volts via Teck cables that run up major risers.

.3 There are a series of electrical rooms on every floor of the building. The electrical rooms have not been located in areas that are readily accessible; often the electrical rooms can be found within clinically sensitive departments.

.4 Within each electrical room there are 600v distribution centres that feed local distribution transformers (600 volt to 120/208 volts). The transformers feed local 120/208 volt distribution equipment that sub-feeds local 120/208 volt distribution power panelboards which are also primarily located in the electrical rooms.

.5 The power panelboards in the sub-electrical rooms typically distribute vital or delay vital power to loads on each level.

.6 The wiring that is run from each paneboard to the loads that is serviced from it is a combination of armoured cable, flexible wiring and conduit with wire.

.7 The use of armoured cable is not permitted by the electrical code in patient care areas and would not be used in hospitals.

.8 The backbone feeders do not appear to be run in any fire resistant shafts and may not have the necessary fire resistance protection required by the electrical and building codes.

.9 There does not appear to be adequate quantities of panelboards to service all of the facility requirements (power bars and extension cords have been used to provide additional connection points for equipment). The panelboards require space for additional breakers and connections to new loads.

.10 By today's standards the power systems are undersized and do not have the level of spare capacity and redundancy that would be expected for this type of facility. Electrical rooms tend to be crowded and warm.

.11 The existing power receptacles that were visible were primarily colour coded white or ivory. The electrical code requires that all power outlets are hospital grade in patient care locations and colour coded red if they are connected to the essential power systems.

.12 Raceways did not appear to have any spare capacity to facilitate ease of future additional wiring or wiring changes. The branch wiring to devices that serviced patient care areas did not appear to be sized to prevent voltage drop. The number of circuits that was provided in patient care areas did not appear to be adequate to service the increased connection requirements.

.13 The faceplates on devices was a combination of various material types including PVC and metal. Modern facilities use high impact nylon so they are not easily damaged and are non-conductive which eliminate shock hazards.

.14 Grounding in the patient care areas did not appear to be in conformance to current CEC and CSA Z32 Essential Power and Electrical Safety in Health Care Standards.

.15 All receptacles and other permanently wired equipment should be bonded to a reference ground point within the patient care area. This was not readily available to view.

.16 Modern acute care facilities use a room reference ground bus (often located in the patient's headwall or in the ceiling space above the bed). The reference point should be connected by a green insulated ground wire to the power panels feeding the electrical devices.

.17 The exposed non-current-carrying metal parts at the patient care locations should be grounded to the patient reference grounding bus.

.18 The existing system should be re-tested to Z32 standards to determine all deficiencies.

7.3 Lighting

.1 The existing lighting concepts appear to rely on a combination of recessed and surface mounted fluorescent fixtures. An energy upgrade program to modernize the types of lamps used appears to have taken place; most fluorescent lamps are four foot T8 type.

.2 In general the light levels appeared acceptable in common spaces, however light levels in some of the clinical spaces did not appear adequate.

.3 Lighting in the patient care areas should be re-evaluated in terms of adequacy from a quality of lighting, appearance, glare, infection control and durability perspective.

.4 The lighting controls did not appear to offer the user and patients the ability to provide various light levels as would be expected for this type of facility.

7.4 Fire Alarm

.1 The existing fire alarm system has been manufactured by Seimens.

.2 The main fire alarm panel is located at the fire fighters response at the main entrance in SFB.

.3 The fire alarm system devices, panels, annunciators and components have been recently replaced however the fire resistance rating of the wiring is questionable.

.4 The fire alarm system uses a fully addressable devices with smoke detectors in patient bed rooms and corridors, pull stations at exits to floors and LCD displays in staff stations.

7.5 DATA/Telephone

.1 The majority of the telephone and data cablings appears to be category 5E rated.

.2 It appears that the telephone and data sub-system have all been wired as part of a structured cable plant; however the installation does not comply with the newer strategies and methodologies that FHA is implementing.

.3 Horizontal cabling in general appears to have been run from each communications outlet to a wall mounted termination that is usually located in an electrical room on each floor; the philosophy of having the terminations in an electrical room is not acceptable.

.4 The backbone cable to each communications closet has not been distributed in a redundant fashion.

7.6 Security Systems

.1 The access control system used to enter critical care and secure areas is the Andover system (wired back to the site wide system).

.2 It appears that the existing access control coverage should be expanded further to prevent unwanted access into sensitive areas.

.3 The CCTV system uses a variety of cameras including analog cameras from Pelco. The existing system records information to DVR's.

.4 The cameras are analog type equipment and should be expanded to provide increased coverage.

7.7 Nurse Call System

.1 The nurse call system is the Rauland Responder 1V.

.2 Nurse call system control cabinets have been installed in a number of electrical rooms to provide services as required.

.3 The nurse call system is relatively new and could expanded to address increased requirements.

.4 The existing system appears to be limited in its current operation in this building and should be reviewed by the users to see if it offers the level of communications currently required.

7.8 Clock

.1 The clocks in this building are wired back to the centralized panel in the hospitals main electrical room (level 1 of SFB).

.2 Minimal use of clocks was noted in this building mostly in corridors and in some of the larger staffed locations.

.3 The majority of clocks noted appeared to be ceiling mounted analog type with sweeping hands.

7.9 Emergency Public Address System

.1 The emergency public address system (PA) in this building is wired back to a series of amplifiers and controls located in the main electrical room on level 1 of the SFB.

.2 Speakers have been located in: most corridors throughout SFB, some large common areas and most of the local service rooms.

.3 It appears that there are some potential areas where there could be.

.8 NURSING TOWER BUILDING

8.1 Overview

.1 The Nursing Tower Building (NTB) is a four story approximately 16.5 thousand square meter structure that was constructed in 1975.

.2 This building supports the following departments and activities: Ambulatory Care, Endoscopy, Palliative Care, Maternity, Surgical Care, Medical Care, and Critical Care.

8.2 Power

.1 The NTB receives electrical services at 600v from the 600v main distribution located in SFB.

.2 The 600 volts services fed to NTB is via a series of Teck cables that do not run in 2 hour rated shaft.

.3 Within NTB there is a series of stacked electrical rooms on every floor of the building. The rooms are crowded and warm.

.4 Within each electrical room there are 600v distribution centres that feed local distribution transformers (600 volt to 120/208 volts). The transformers feed a local 120/208 volt distribution panel that sub-feeds local 120/208 volt distribution power panelboards.

.5 The power panelboards in the sub-electrical rooms typically distribute vital and delay vital power to loads on each level.

.6 The wiring that is run from each paneboard to the various equipment loads and patient outlets is via a combination of armoured cable, flexible wiring and conduit with wire.

.7 The use of armoured cable is not permitted by the electrical code inpatient and would not be used in hospitals in modern installations.

.8 The backbone feeders are not 2 hour resistant rated nor do they appear to be run in any fire resistant shafts in order to have the necessary fire protection as required by the electrical code.

.9 There does not appear to be adequate quantities of panelboards to service all of the facility requirements (power bars and extension cords have been used to provide additional connection points for equipment). The panelboards require space for additional breakers to service new connections.

.10 By today's standards the power systems are undersized and do not have the level of spare capacity and redundancy that would be expected for this type of facility.

.11 The existing power receptacles that were visible were primarily colour coded either white or ivory. The electrical code requires that all power outlets are required to be hospital grade in patient care locations and red if there are connected to the essential power systems.

.12 Raceways did not appear to have any spare capacity to facilitate ease of future additional wiring or wiring changes. The branch wiring to devices that serviced patient care areas did not appear to be sized to prevent voltage drop. The number of circuits that was provided in patient care areas did not appear to be adequate to service the connection requirements.

.13 The faceplates on devices was a combination of various types of materials including: PVC and metal. Modern facilities use high impact nylon so they are not easily damaged and are non-conductive which eliminate shock hazards.

.14 Grounding in the patient care areas did not appear to in conformance to current CEC and CSA Z32 Essential Power and Electrical Safety in Health Care Standards.

.15 All receptacles and other permanently wired equipment should be bonded to a reference ground point within the patient care area. This was not readily available to view.

.16 Modern acute care facilities use a room reference ground bus (often located in the patient's headwall or in the ceiling space above the bed). The reference point should connected by a green insulated ground wire to the power panel feeding the electrical devices.

.17 The exposed non-current-carrying metal parts at the patient care locations should be grounded to the patient reference grounding bus.

.18 The existing system should be re-tested to Z32 standards to determine all deficiencies.

8.3 Lighting

.1 The existing lighting concepts appear to rely on a combination of recessed and surface mounted fluorescent fixtures. An energy upgrade program to modernize the types of lamps used appears to have taken place; most fluorescent lamps are now four foot T8 type.

.2 In general the light levels appeared acceptable in common spaces, however light levels in some of the clinical spaces did not appear adequate.

.3 Lighting in the patient care areas should be re-evaluated in terms of adequacy from a quality of lighting, appearance, glare, infection control and durability perspective.

.4 The lighting controls did not appear to offer the user and patients the ability to provide various light levels as would be expected in a new facility.

8.4 Fire Alarm

.1 The existing fire alarm system has been manufactured by Seimens.

.2 The fire alarm node in NTB has been fed from the main site fire alarm panel that is located at the fire fighters response at the main entrance in SFB.

.3 The fire alarm system devices, panels, annunciators and components have been recently replaced however the fire resistance rating of the branch wiring is questionable.

.4 The fire alarm system uses a fully addressable devices with smoke detectors in patient bed rooms and corridors, pull stations at exits to floors and LCD displays in staff stations.

8.5 DATA/Telephone

.1 The majority of the telephone and data cablings appears to be category 5E rated.

.2 It appears that the telephone and data sub-system have all been wired as part of a structured cable plant; however the installation does not comply with the newer strategies and methodologies that FHA is implementing for structured cabling.

.3 Horizontal cabling in general appears to have been run from local electrical rooms that have been partitioned off with an area zoned to service communications including wall mounted termination field.

.4 The backbone cable to each communications closet has not been distributed in a redundant fashion.

8.6 Security Systems

.1 The access control system is the Andover system (wired back to the site wide system).

.2 It appears that the existing access control coverage should be expanded further to control access into sensitive areas.

.3 The CCTV system uses a variety of cameras including analog cameras from Pelco. The existing system records information to DVR's.

.4 The cameras are analog type equipment and should be expanded to provide increased coverage. Newer acute care installations use IP based cameras that provide a greater opportunity to view camera images.

8.7 Nurse Call System

.1 The nurse alarm system is the Rauland Responder 1V system.

.2 Nurse call system control cabinets have been installed in the local electrical rooms.

.3 The nurse call system appears to have expansion capability to address future requirements.

.4 The quantity and types of devices appears to be limited in operation in this building and should be reviewed by the clinicians to see if the current layout of nurse call devices offers the level of communications required.

8.8 Clock

.1 The clocks in this building are wired back to the main panel in the hospitals main electrical room (level 1 of SFB).

.2 Clocks were primarily noted in this buildings corridors, in some of the larger staffed locations and some patient bedrooms.

.3 The majority of the clocks appear to be ceiling mounted analog type with sweeping hands, wall mounted type were used in patient bedrooms.

8.9 Emergency Public Address System

.1 The emergency public address system (PA) in this building is wired back to a series of amplifiers and controls located in the main electrical room on level 1 of SFB.

.2 Speakers have been located in: most corridors throughout the NTP, some large common areas and most of the local service rooms.

.3 It appears that there are some potential areas where there could be limited coverage; this should be reviewed to ensure that there are no 'dead' zones since the hospital provides emergency life safety instructions to staff and visitors.

.9 CONCLUSIONS

.1 The existing electrical systems within BGH vary in terms of age, quality, compliance to modern codes, standards and installation philosophies.

.2 As changes happen to the delivery of health care services at BGH various electrical systems should be updated to accommodate these needs. Other considerations that would necessitate modifications would be to improve the systems quality and efficiencies and ergonomic/usage upgrades.

.3 The existing fire alarm and nurse call system appeared to be able to be expandable to be able to address changes and modifications.

.4 The power systems including the power generation system and the normal power transmission and distribution systems (HV switchgear, substations, feeders, transfer switches, etc.) do not address current needs in the hospital nor do they comply with modern codes and standards. The service entrance switchgear and HV transformer T1 are all in Power House Building (which is in the West Wing the oldest building on the site and is the least reliable from a structural perspective).

.5 The lighting has been upgraded in terms of types of lamps used in most locations; however the quality of lighting fixtures used does not address issues of glare, infection control, aesthetics, etc.

.6 Lighting levels appear to be low in some clinical areas.

.7 Security systems appeared acceptable; however the quantity of devices and controls should be reviewed to ensure all sensitive and critical areas have controlled access and are under observation.

.8 The data and telephone systems utilizes a structured cable plant with wiring rated at Cat 5e; however the majority of the terminations have been shoehorned into small electrical rooms (a practice that is not acceptable by today's standards and codes) and the wiring that runs to the servers has not been run in a redundant fashion. The main incoming telephone system enters the West Wing which is old and structurally sound.

.9 The clock and emergency public address systems appear to operate however they are old and newer more reliable product are now available.

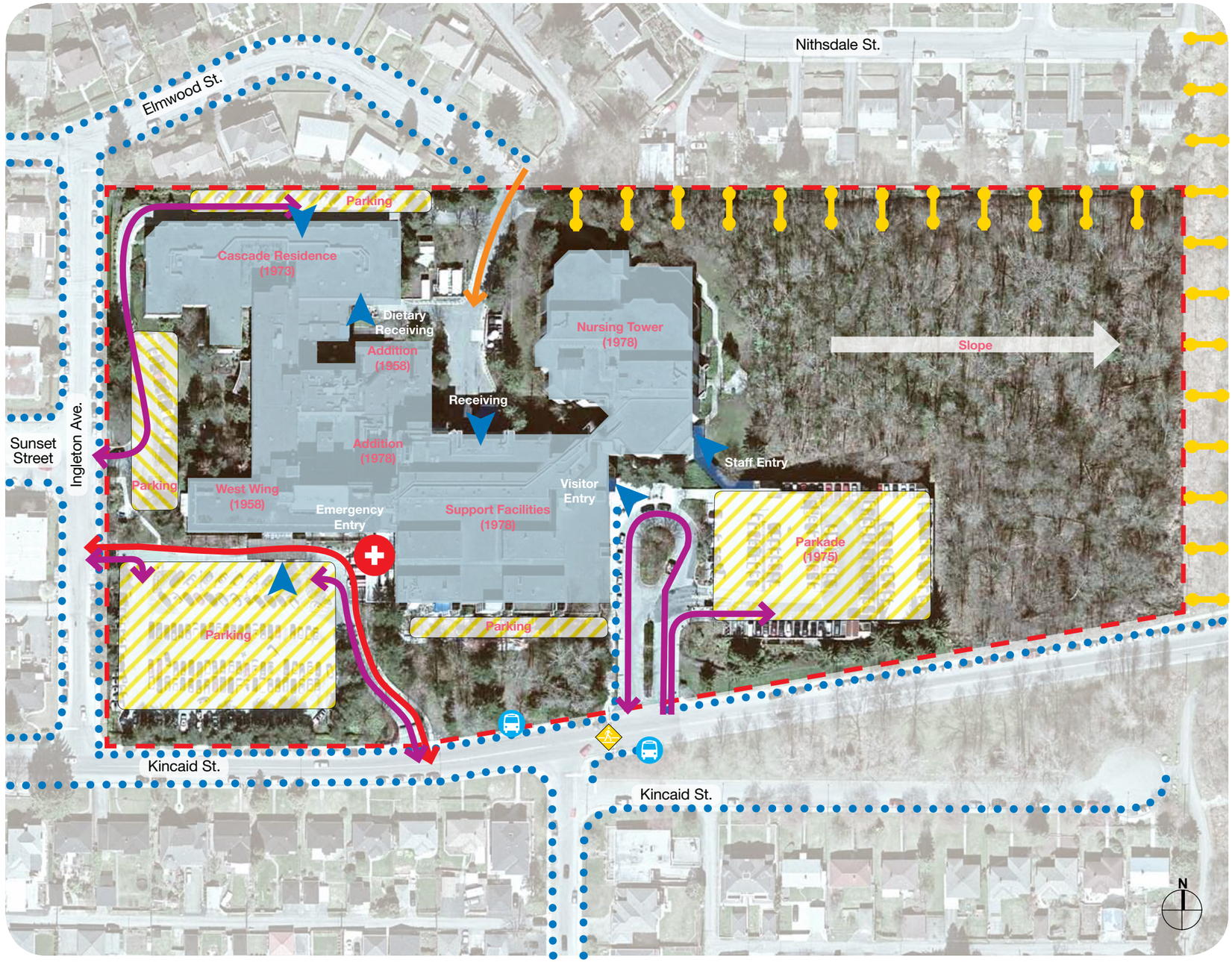
END OF REPORT

9.1 Urban Land Use Context

9.1 Urban Land Use Context Photos

9.2 Transportation – Vehicular & Pedestrian / Cyclists

- The primary access route to the site is from Willingdon Avenue, Canada Way and west bound on Kincaid Street.
- The secondary access route to the site is east bound on Sunset Street.
- Main entrance and ED entry is from Kincaid Street and Ingleton Avenue.
- Loading and deliveries are at the north side of the site on from Elmwood Street.
- Vehicular access to the Cascade Residence is from the entry on Ingleton Street.
- From Kincaid Street there is also a vehicular pick-up/drop-off round about as well as entry to the parkade.
- Transit routes run east west along Kincaid Street and north south along Ingleton Avenue



Legend

- Property Line
- Buildings and Parking Garage
- Staff Entry
- Pedestrian Entry
- Pedestrian Circulation
- Bicycle Path
- Short Term Bicycle Parking
- Long Term Bicycle Parking
- Power Lines
- Crosswalk
- Bus Stop
- Shuttle Stop
- Existing Signalized Intersection
- Service and Fire Access
- Ambulance
- Vehicular
- Services

9.3 Green/Landscape Area

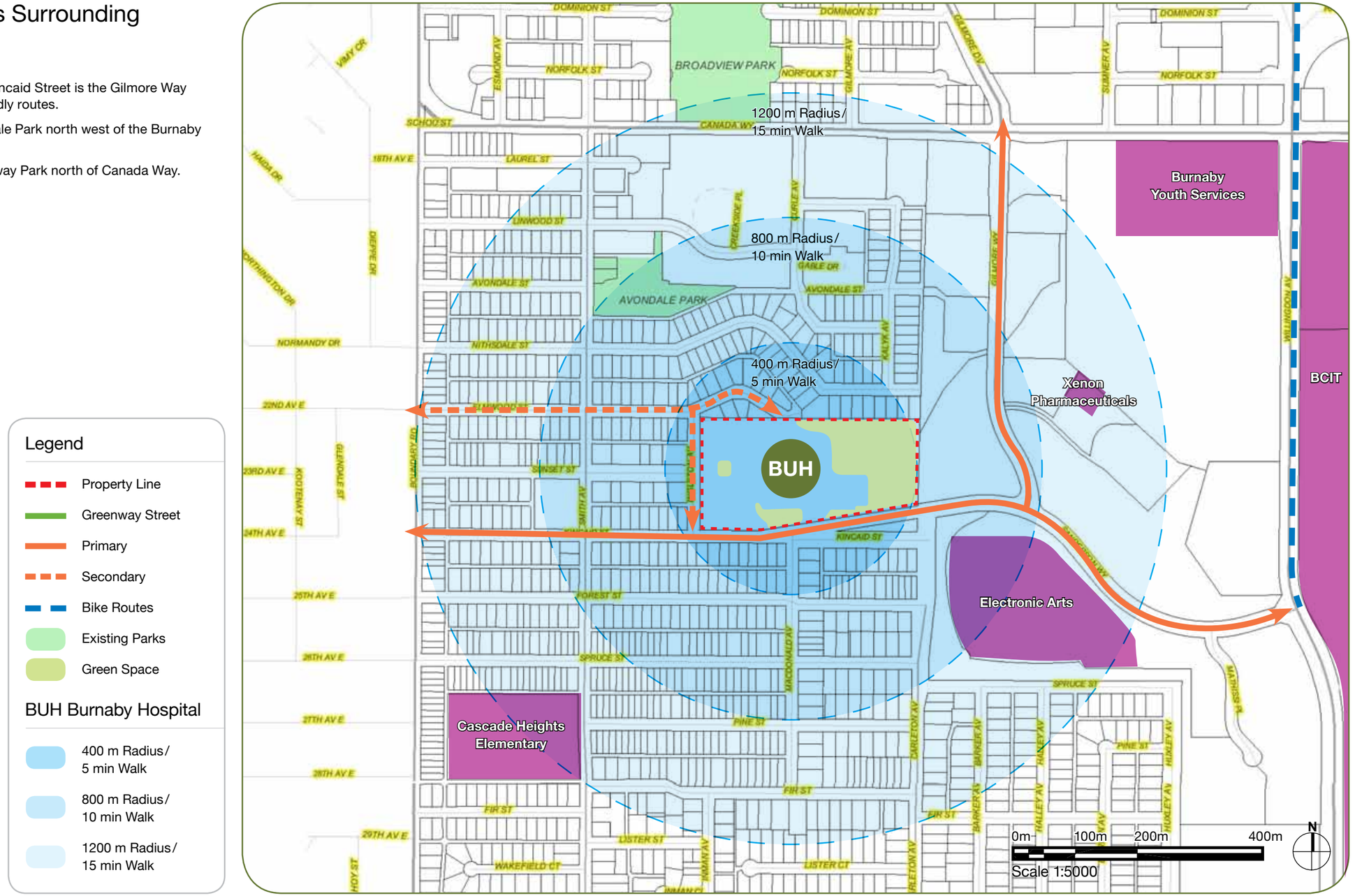
- Large treed area to the east of the site on a steep slope with limited access.
- At the bottom of the slope is a creek bed.
- South of the Facilities Support Building is a treed buffer on a steep slope.
- A landscaped treed barrier runs along the perimeter of the Main Entry/ED parking lot.
- West of the West Wing building is a treed landscaped area.

Legend

- Property Line
- Greenery
- Creek Bed

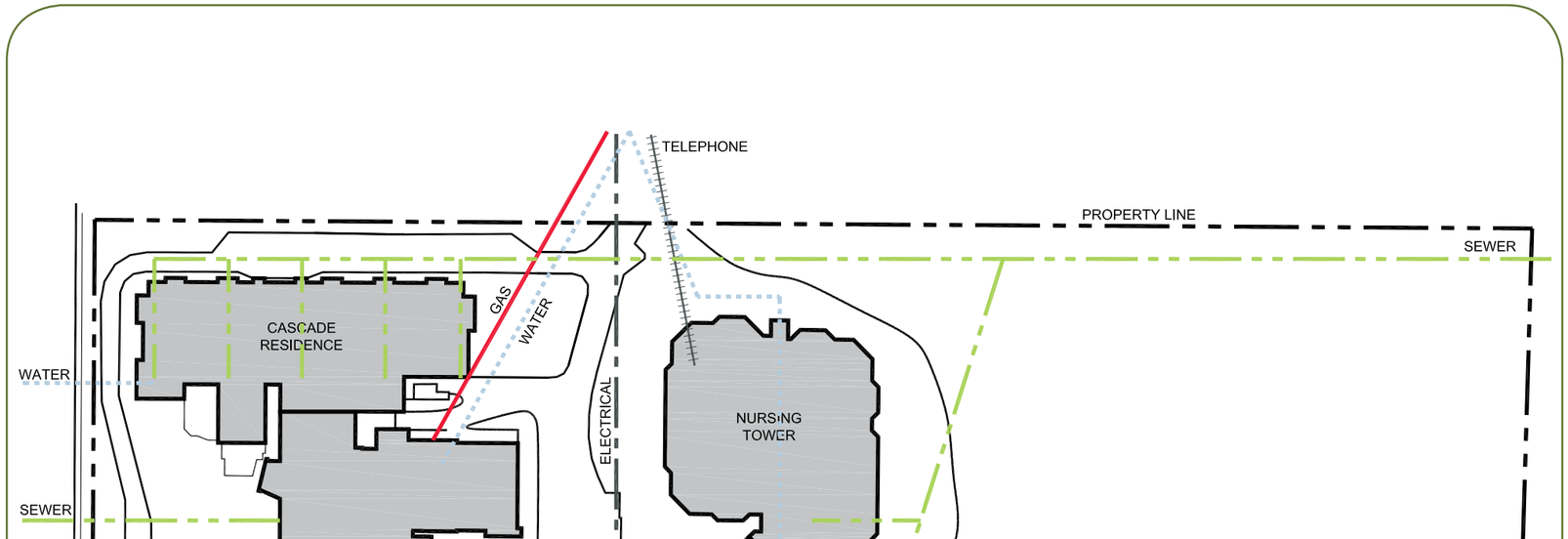
9.4 Existing Parks & Greenways Surrounding Burnaby Hospital Site

- Within a 5 min walking radius, going east along Kincaid Street is the Gilmore Way Urban Trail which has dedicated and bicycle friendly routes.
- Within a 10 min walking radius there is the Avondale Park north west of the Burnaby Hospital site.
- Within a 20 min walking radius there is the Broadway Park north of Canada Way.



9.5 Underground Services

In the materials receiving area there are extensive underground service lines that run north–south into the Burnaby Hospital site and a sewer line that runs east-west along the northern property line which may be a constraint to the site development. These services include electrical, gas, water, telephone and sewer lines from Elmwood Street.



Legend

- Property Line
- Electrical
- Gas
- Sewer
- Telephone
- Water

9.6 Energy Use & Goals

ENERGY INTENSITY (2010-2011)		
	ekWh/m²/YR	
BURNABY HOSPITAL	607	(30% elec & 70 % gas)
EAGLE RIDGE HOSPITAL	460	(46% elec & 54 % gas)
DELTA HOSPITAL	592	(38% elec & 62 % gas)
Note: The floor area included in the intensity above is based upon internal gross, excluding parkades, interstitial and mechanical rooms (if applicable)		

SUSTAINABILITY GOALS				
	2010–11	**2011–12**	**2013–14**	**2019–20**
ENERGY REDUCTION	2%	4%	8%	20%
GREEN HOUSE GAS REDUCTION	2%	7%	13%	33%
WATER REDUCTION	2%	4%	8%	20%
WASTE RECYCLED	23%	35%	70%	70%
STAFF PARTICIPATION IN GREENCARE	15%	25%	45%	85%

ENERGY TARGETS FOR NEW BUILDS	
	EUI (KWH/M²/Y)
SUPPORT	150
INPATIENT	250
ACUTE CARE AND RESEARCH	375

10.1 Master Program & Space Requirements

Burnaby Hospital Master Program Space List
2012.10.03

Ref. #		2012 CGSM (based on floor plans)	Master Program 2020 CGSM	Master Program 2030 CGSM
	CLINICAL SERVICES			
A.	**Cardiology Program**			
A.1	Cardiac Inpatient Unit	496	2367	3408
A.2	Healthy Heart Program	212	445	462
A.3	Rapid Access OP Clinic (incl in A.4)	18	incl in A4	incl in A4
A.4	Diagnostic Cardiology	146	355	355
B.	**Critical Care Program**			
B.1	Critical Care Program	473	2521	2905
	Respiratory Therapy	46	136	153
	Pulmonary Function Lab	44	207	207
C.	**Emergency Program**			
C.1	Emergency Department (incl Cast Clinic)	1350	4406	4675
D.	**End of Life Program**			
D.1	Tertiary Hospice Palliative Care Unit	630	1421	1659
E.	**Home & Community Care Program**			
E.1	Community Connections	124	132	132
F.	**MICY Program**			
F.1	Maternity/Newborn Inpatient Unit	1521	2061	2061
F.2	Primary Care Maternity Clinic	45	80	80
F.3	Neonatal Intensive Care Unit	225	764	875
F.4	Pediatrics			
	Pediatric Asthma Clinic	100	248	248
	Pediatric Urgent Care Clinic (shared space with Asthma)	30	37	37
G.	**Medical Surgical Program**			
G.1	General Medical Surgical Inpatient Units	4933	23265	31725
	Med Surg IPUs			
	CNEs Level 6 West Wing			
H.1	**Medicine Outpatient Services**			
	Community Cancer Centre (incl Sat Pharmacy @ 112 CGSM)	547	653	681
	Medical Day Unit	322	576	658
	Community IV/DVT Program		56	56
	Neurodiagnostics Clinic - EEG/EMG	117	291	327
	MS/Neurology Clinic	152	196	196
I.	**MHSU Program**			
I.1	Mental Health and Substance Use Inpatient Unit	1506	5931	6670
I.2	Mental Health and Substance Use Outpatient Services	2745	1995	2188

Burnaby Hospital Master Program Space List
2012.10.03

Ref. #		2012 CGSM (based on floor plans)	Master Program 2020 CGSM	Master Program 2030 CGSM
J.1	**Older Adult Program**			
	ACE Unit	1263	3757	4986
	Acute Care Consultation		57	72
	GENC (located in C.1)			
K.	**Primary Care Program**			
K.1	Diabetes Education Centre	212	233	278
L.	**Residential Care**			
L.1	Transitional Care Unit	1066	0	0
M.	**Surgical Services Program**			
M.1	SDCU and Surgical Suite			
	Surgical Day Care	236	898	968
	OR/PACU	1840	3145	3679
M.2	OR Booking, Preadmission Clinic & Ambulatory Care Clinic			
	Ambulatory Care Clinic	481	1138	1195
	OR Booking	38	44	61
	Preadmission Clinic	38	137	137
M.3	SPD/Medical Device Reprocessing	598	1355	1355
N.	***CLINICAL SUPPORT SERVICES***			
N.1	Clinical Nutrition	250	260	292
N.2	Infection Prevention & Control	19	82	106
N.3	Laboratory Medicine & Pathology and Morgue	1864	2165	2519
N.4	Medical Imaging	1452	2814	2814
N.5	Pharmacy (incl Sat ICU pharmacy @ 276 CGSM)	444	989	1319
N.6	Rehab Program (PT OT SW SLP) (incl Allied Hlth)	940	1436	1589
	Physio (Optimization Clinic)			
	Social Work			
O.	***SUPPORT SERVICES***			
O.1	Biomedical Engineering	169	456	502
O.2	FMO	911	906	906
O.3	Food and Nutrition Services	2033	2294	2310
O.4	Housekeeping & Waste Management (excl ext. hldg areas)	263	469	477
O.5	Laundry and Linen	260	196	229
O.6	In-Hospital Replenishment	255	396	514
O.7	IM/IT (excl commun. closets on each floor)	360	410	410
O.8	Integrated Protection Services (excl SCC in C.1)		22	22
O.9	Health Information Management	679	810	810

10.1 Master Program & Space Requirements

Burnaby Hospital Master Program Space List
2012.10.03

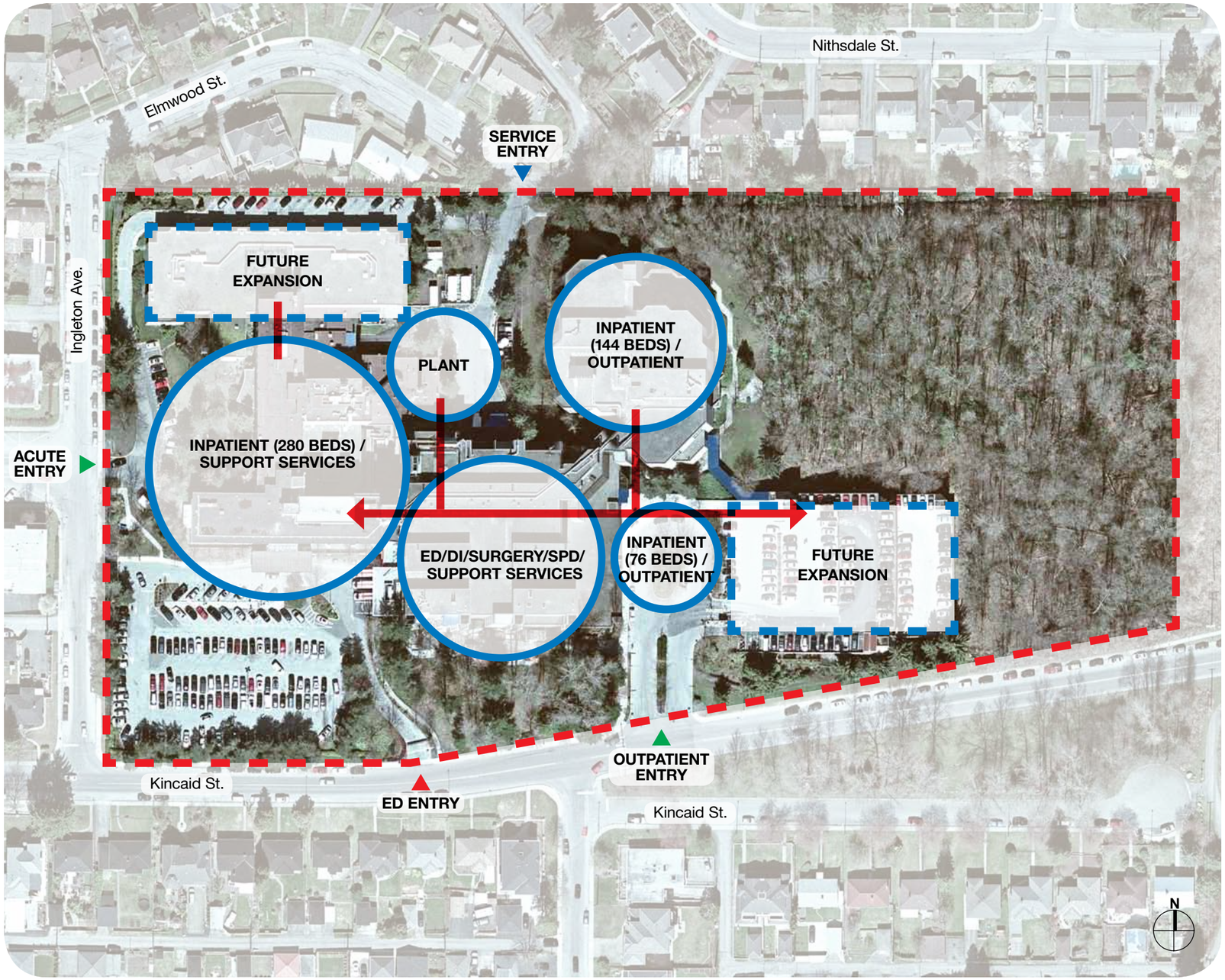
Ref. #		2012 CGSM (based on floor plans)	Master Program 2020 CGSM	Master Program 2030 CGSM
P.	***ADMINISTRATION***			
P.1	Administration and Related Services	1632	3451	3451
	Site Administration, Site Leaders, Reg'l Programs			
	Cashier			
	Central Porters			
	Central Staff Facilities			
	Clinical Capacity Optimization			
	Education Resources			
	Library			
	Mail			
	Main Entry			
	OHS & Workplace Health			
	People & Organization Development			
	Physician Facilities			
	Staffing Office			
	Union Office			
	UBC Medical School			
P.2	Burnaby Hospital Foundation	86	269	269
P.3	Volunteer Resources	331	565	565
	Pastoral Care			
No #	Optimization Clinic (shared space, W/R etc)	57		
	TOTAL PATIENT CARE	**33559**	**76897**	**91593**

Burnaby Hospital Master Program Space List
2012.10.03

Ref. #		2012 CGSM (based on floor plans)	Master Program 2020 CGSM	Master Program 2030 CGSM
No #	Building Services	4268		
	West Wing Level 1			
	West Wing Level 2			
	West Wing Level 4			
	West Wing Level 6			
	West Wing Level 7			
	Cascade Basement			
	Support Facilities Basement			
	Support Facilities Level 1			
	Nursing Tower Basement			
No #	Vacant West Wing Level 3 Physio	191		
No #	Vacant Nursing Tower Level 1 SLP	93		
No #	Unknown Support Facilities Level 2	240		
No #	Storage Nursing Tower Level 1	336		
No #	ECU	0		
	TOTAL	**38687**	**76897**	**91593**

10.2 Planning Principles

- Develop separate and distinct entrances for
  - ED
  - Acute
  - Outpatient
  - Services
  - Parking
- Maintain and enhance the central circulating route as a spine to organize and structure movements through the site.
- Improve beds which includes a:
  - New 280 bed inpatient tower.
  - New 76 bed inpatient tower.
  - Renovation of the Nursing Tower to 144 beds.
  - Allowance for potential future beds.
- Improve existing support services through renovations and new expansion for ED, DI, Surgery, SPD and support services.
- Provide clear distinction and separation from outpatient services and acute care services.
- Maintain and renovate existing service plant.
- Provide street presence along Ingleton Avenue and Kincaid Street.



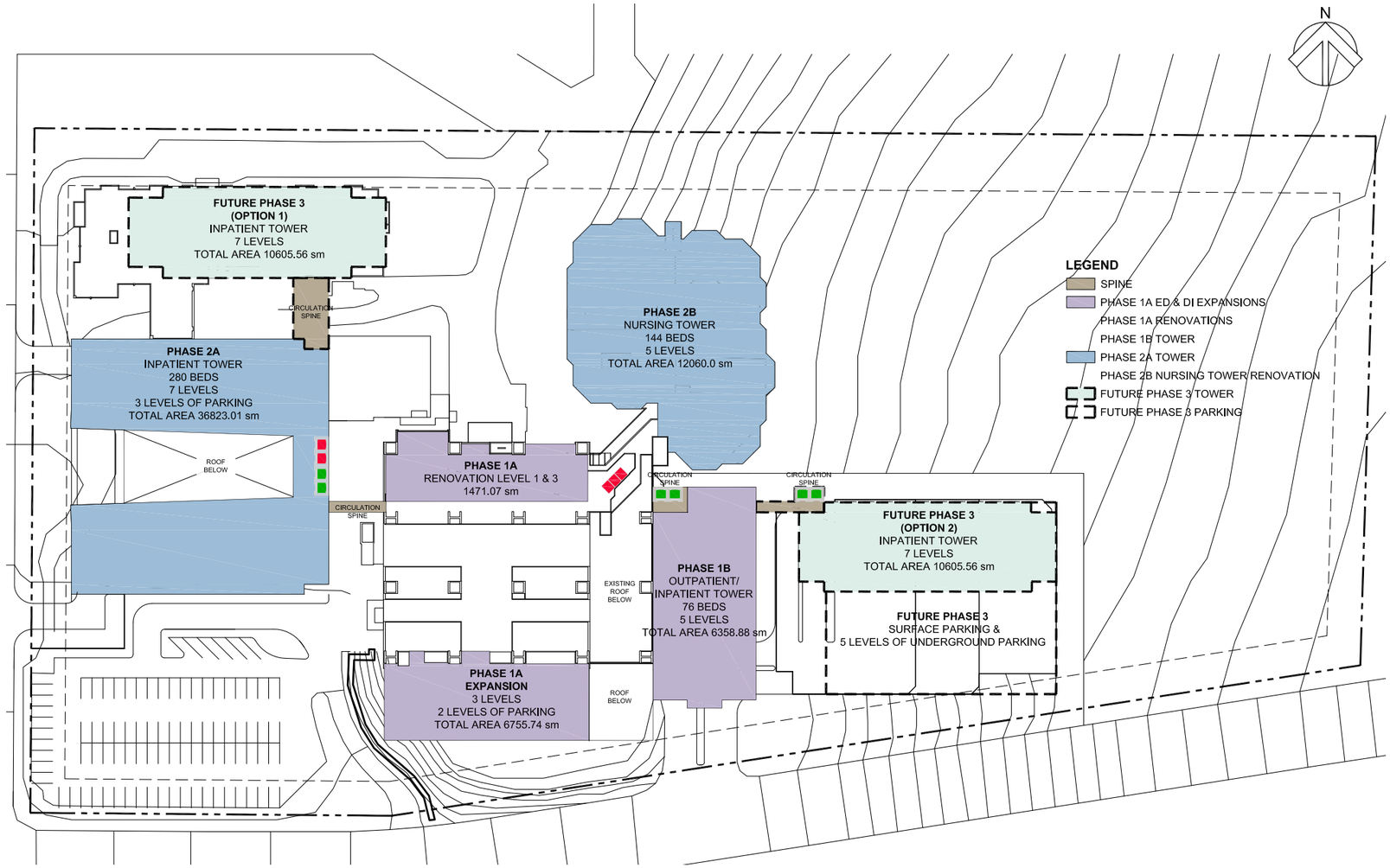
Legend

- Future Expansion
- Property Line

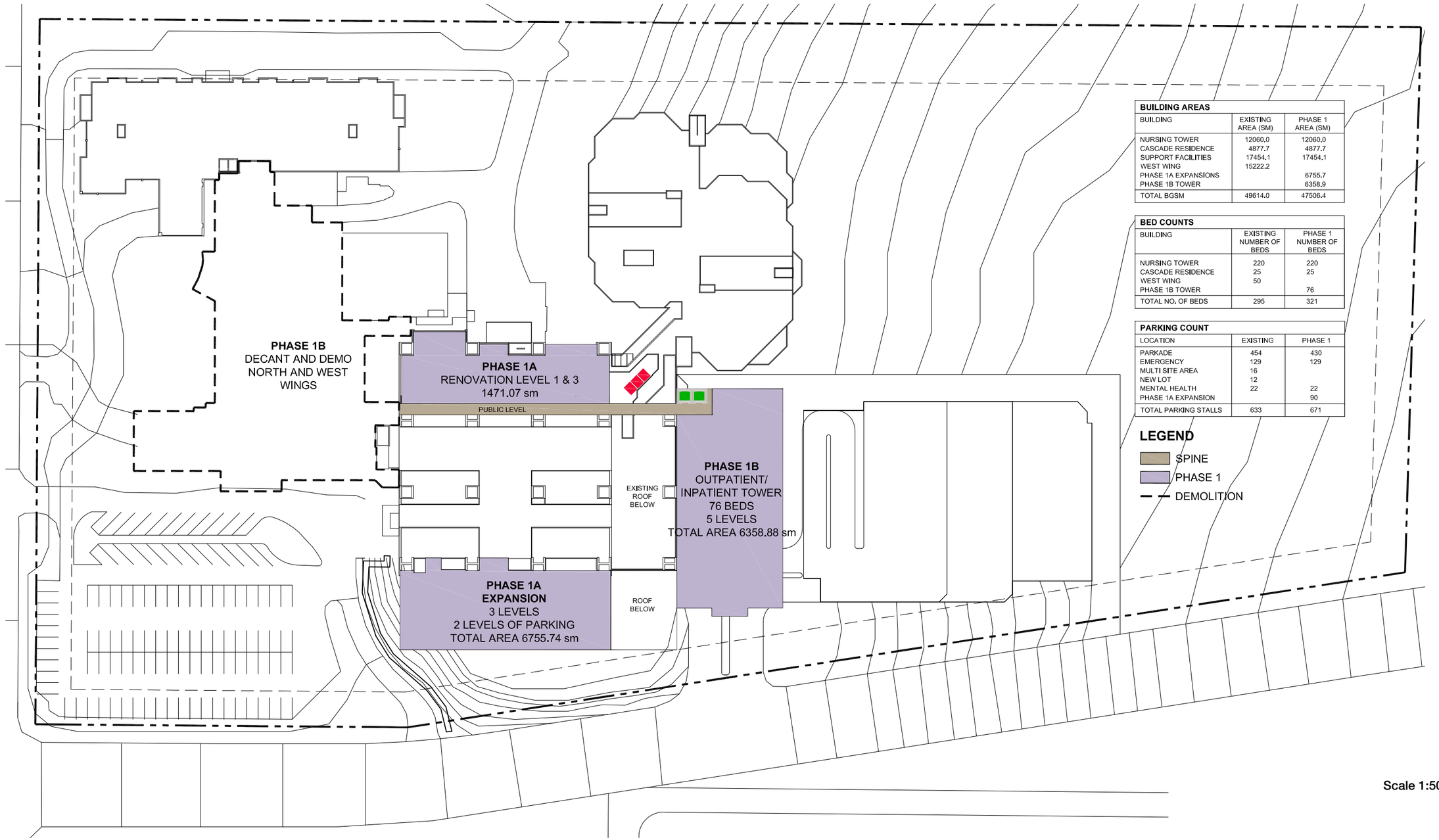
10.2 Planning Principles

Phases

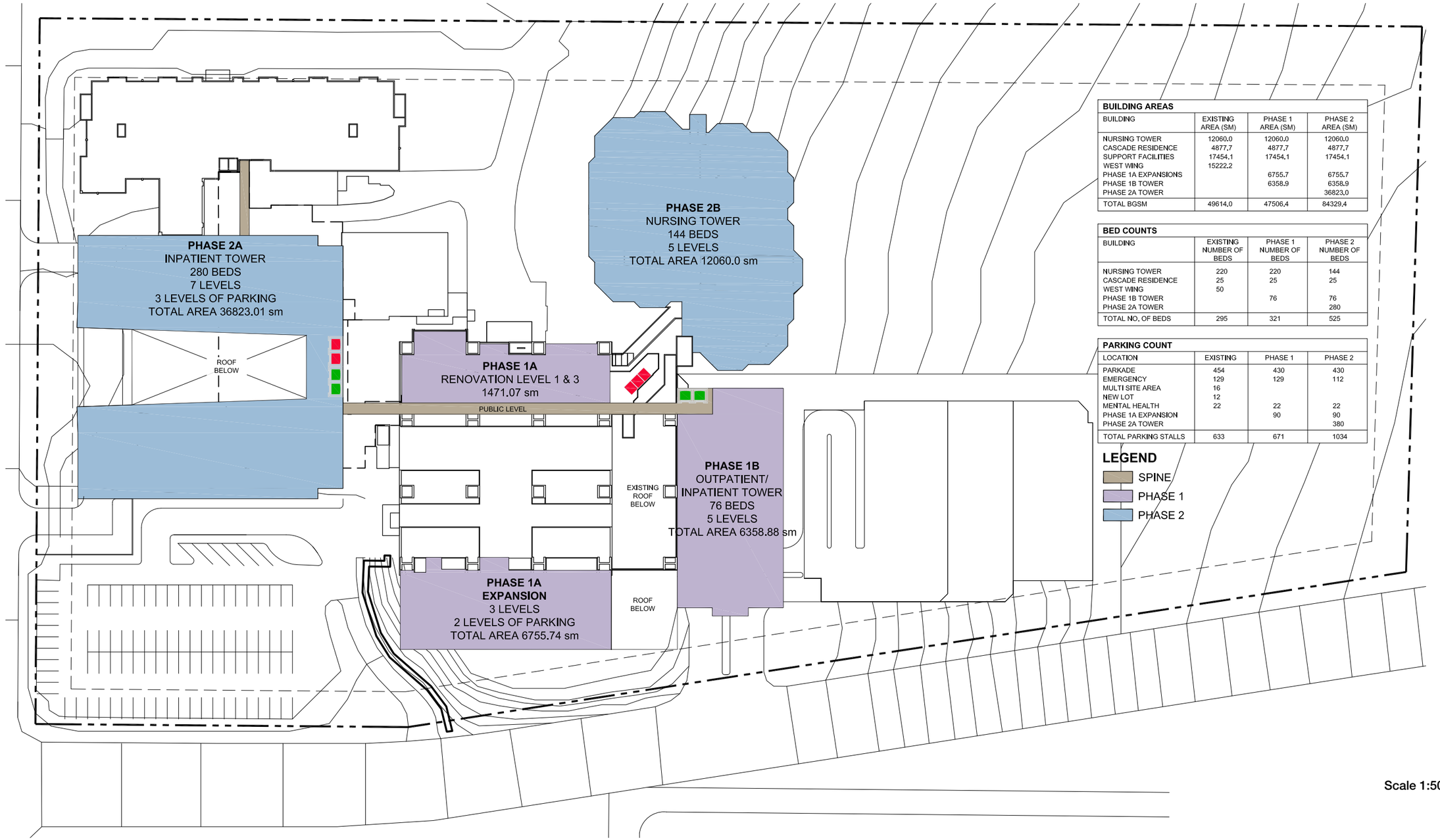
- Phase 1
  - 1A SPD Expansion and Renovation
  - 1A ED/DI Expansion and Renovation
  - 1A OR Expansion
  - 1A Renovation of Food Services
  - 1A Parking Expansion (2 Levels)
  - 1B New Outpatient/Inpatient Tower (76 Beds)
  - 1B Demolition of North and West Wing (Morgue and Plant to remain)
- Phase 2
  - 2A New Inpatient Tower (280 Beds)
  - 2A Parking Expansion (3 Levels)
  - 2B Nursing Tower Renovation (144 Beds)
- Future Opportunity
  - Future Inpatient Towers
  - New Parkade



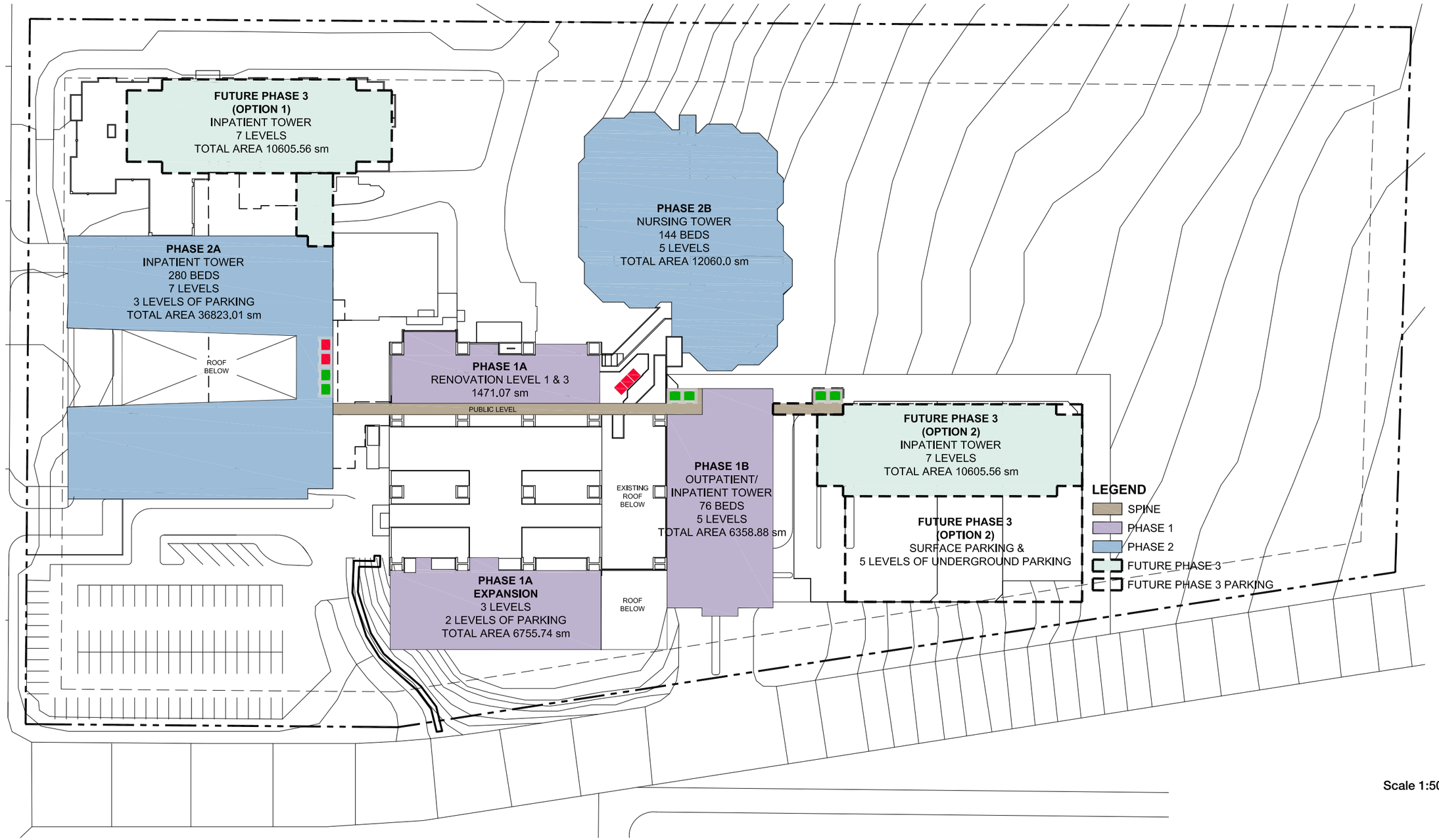
10.3 Site Opportunities Summary — Phase 1 Summary



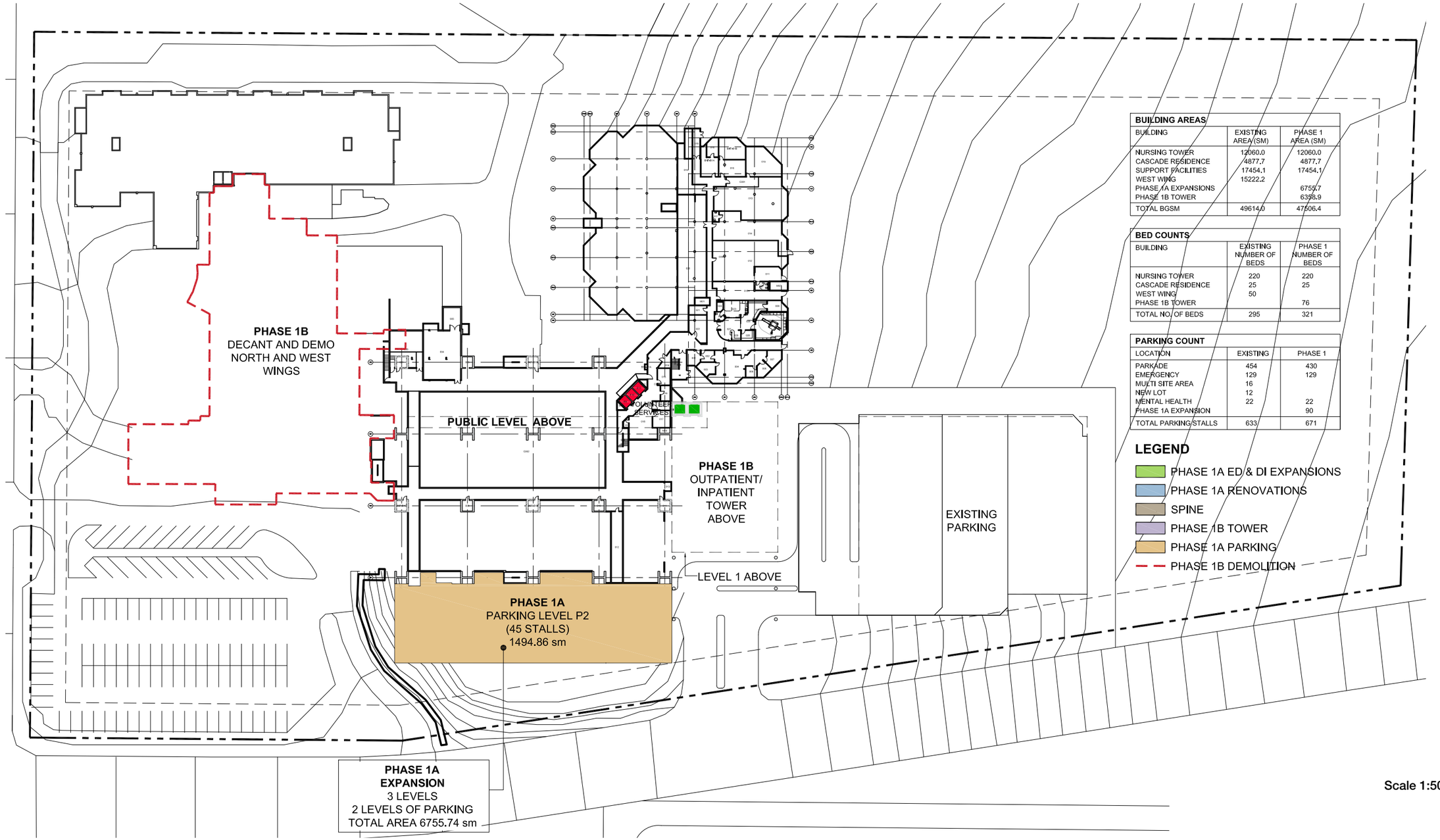
10.3 Site Opportunities Summary — Phase 2 Summary



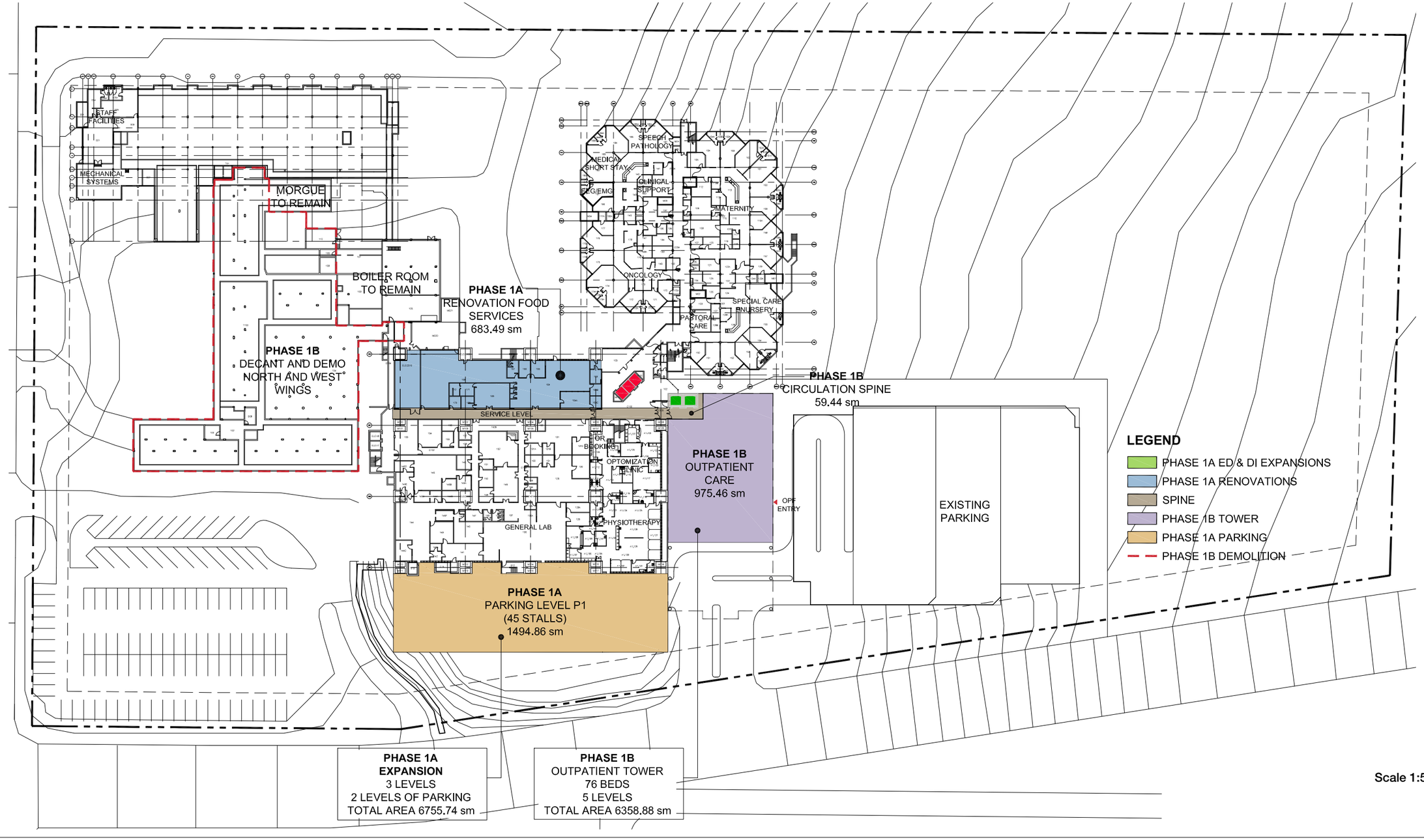
10.3 Site Opportunities Summary — Phase 3 Summary



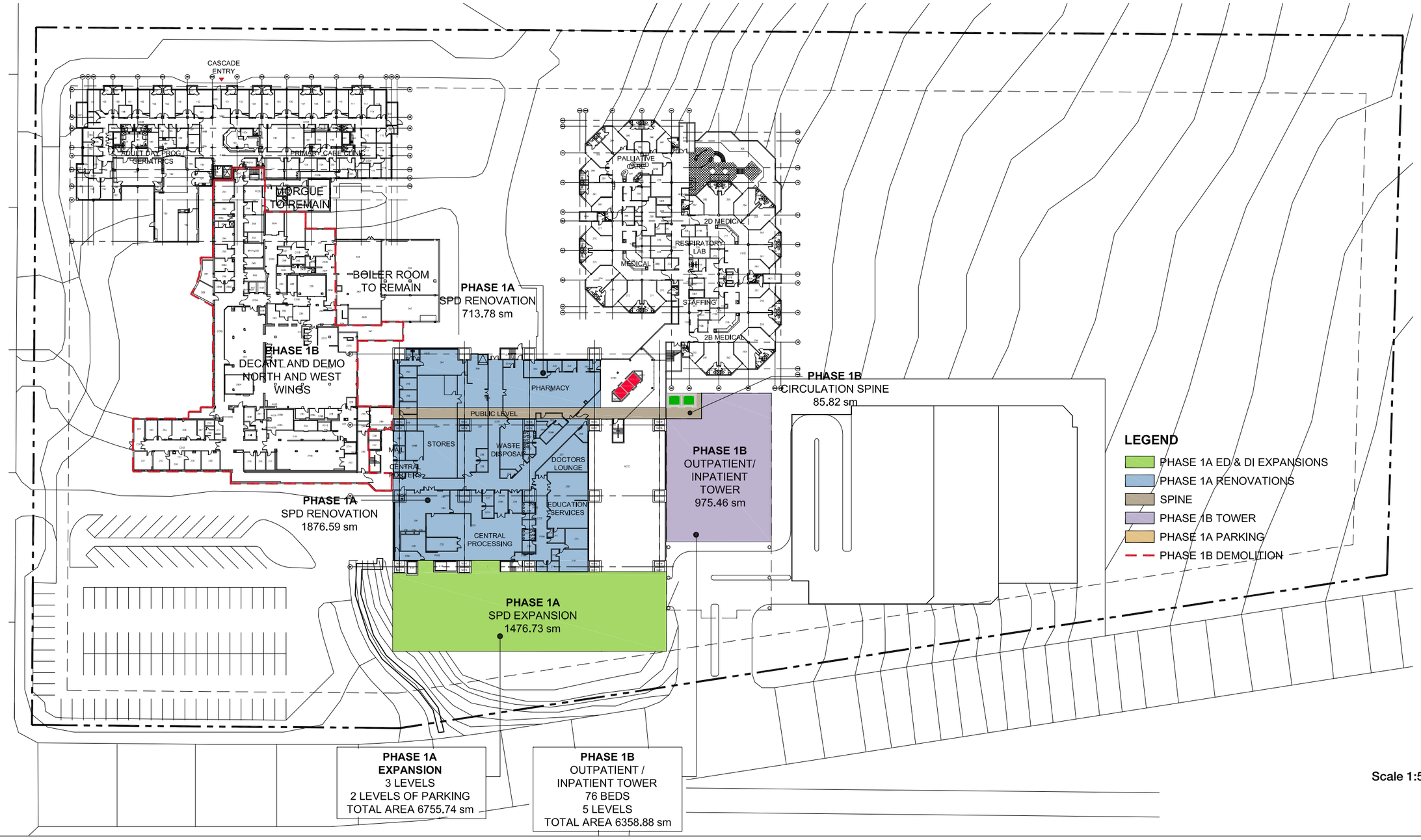
10.4 Site Opportunities by Level — Phase 1 Level 0



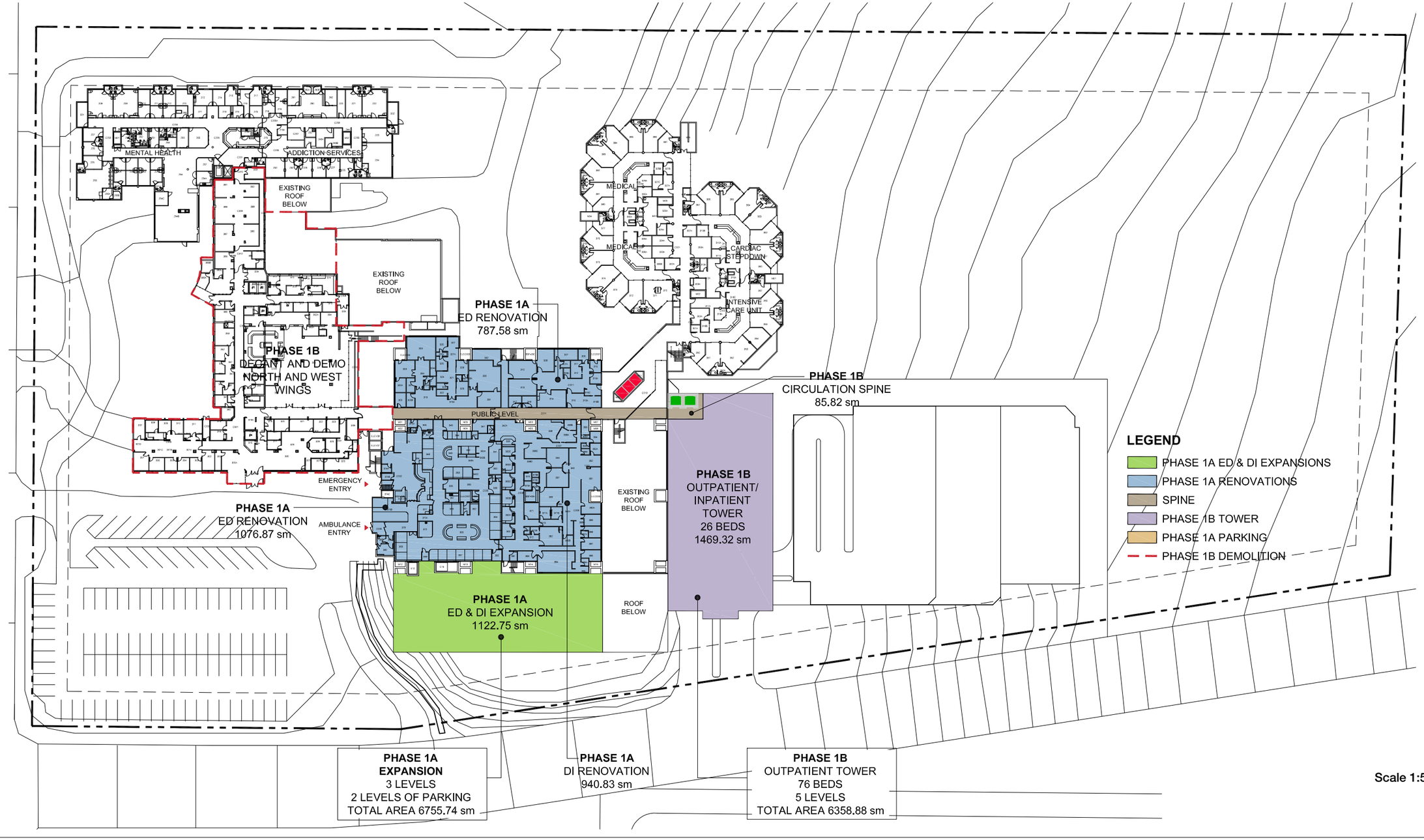
10.4 Site Opportunities by Level — Phase 1 Level 1



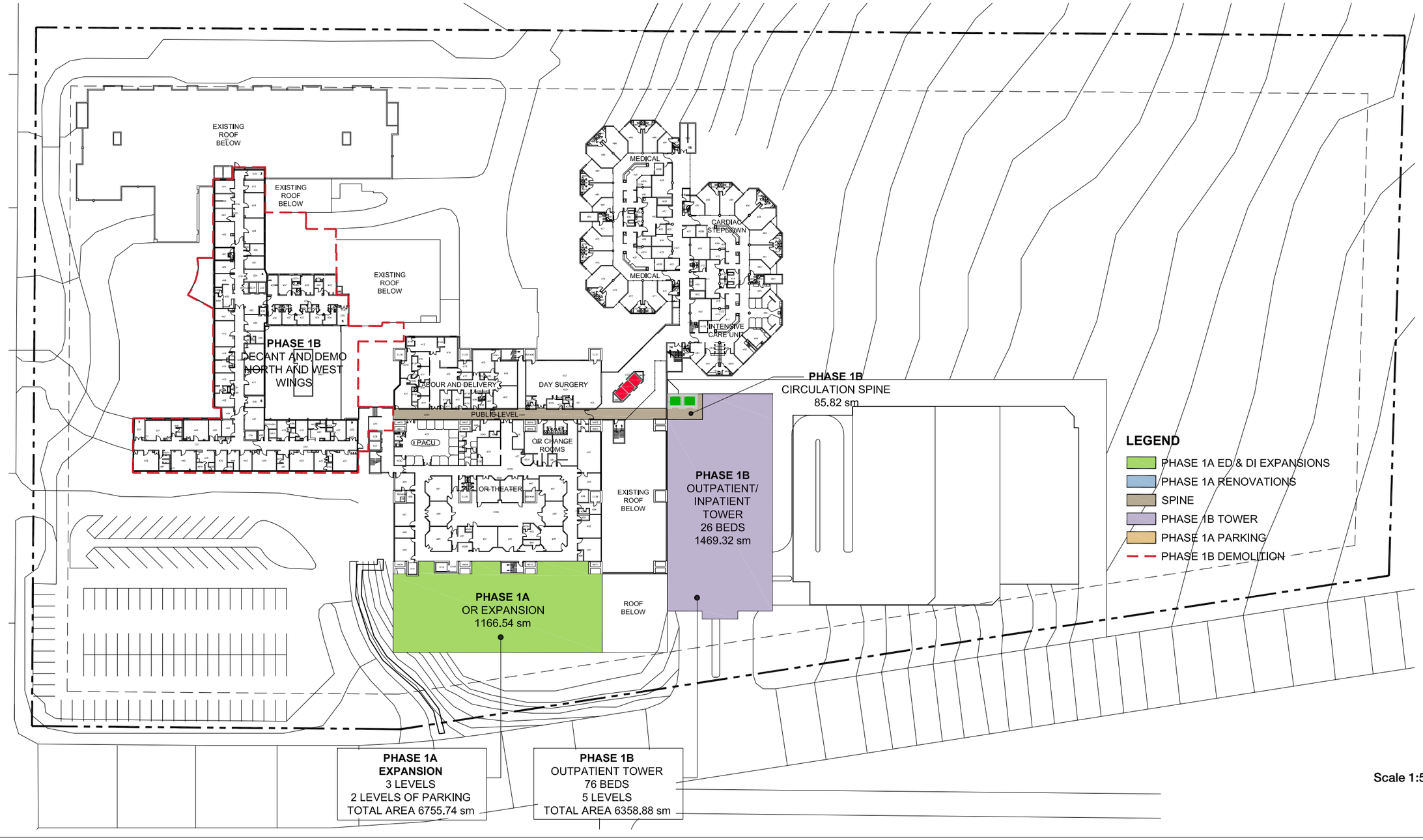
10.4 Site Opportunities by Level — Phase 1 Level 2



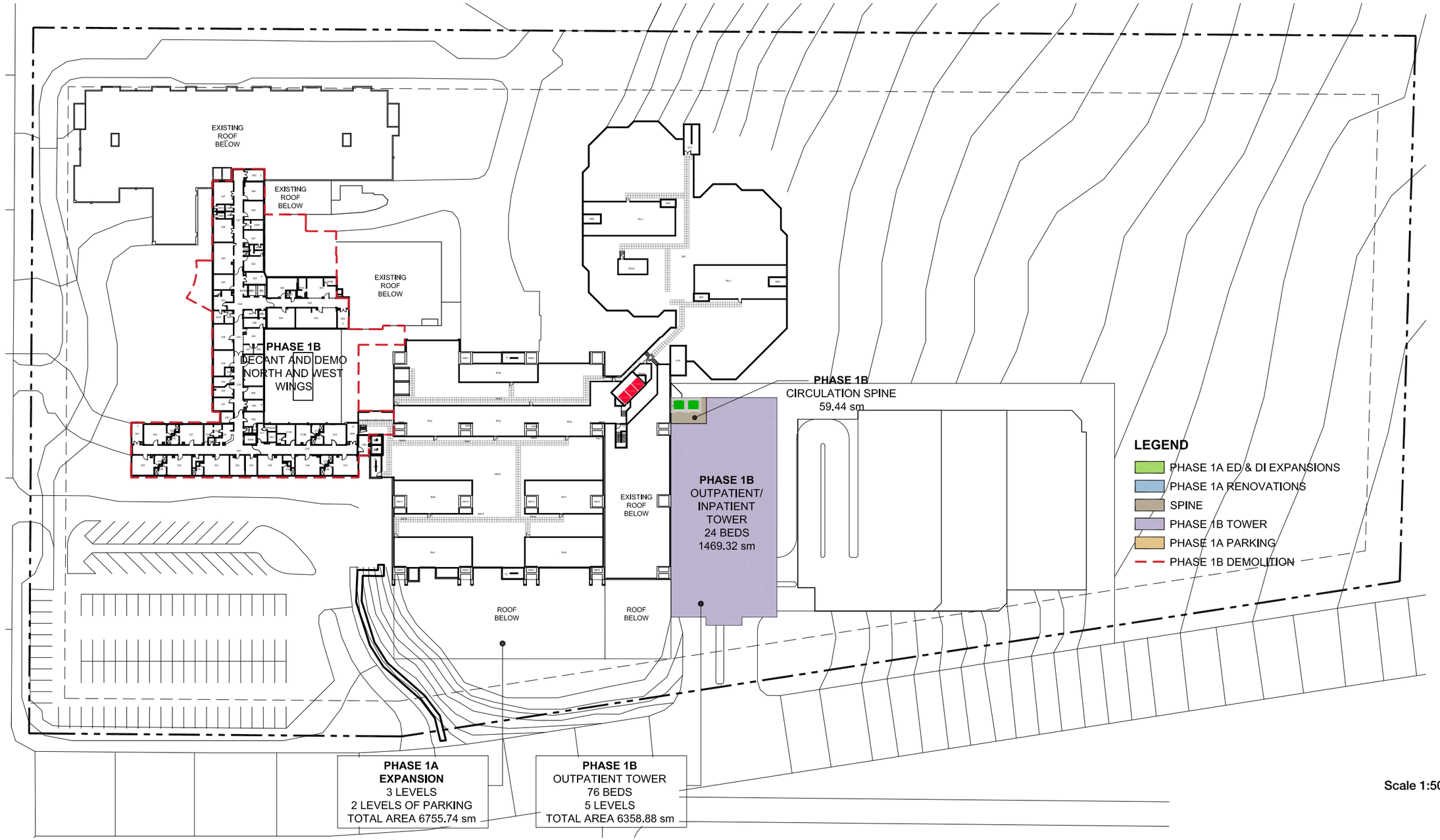
10.4 Site Opportunities by Level — Phase 1 Level 3



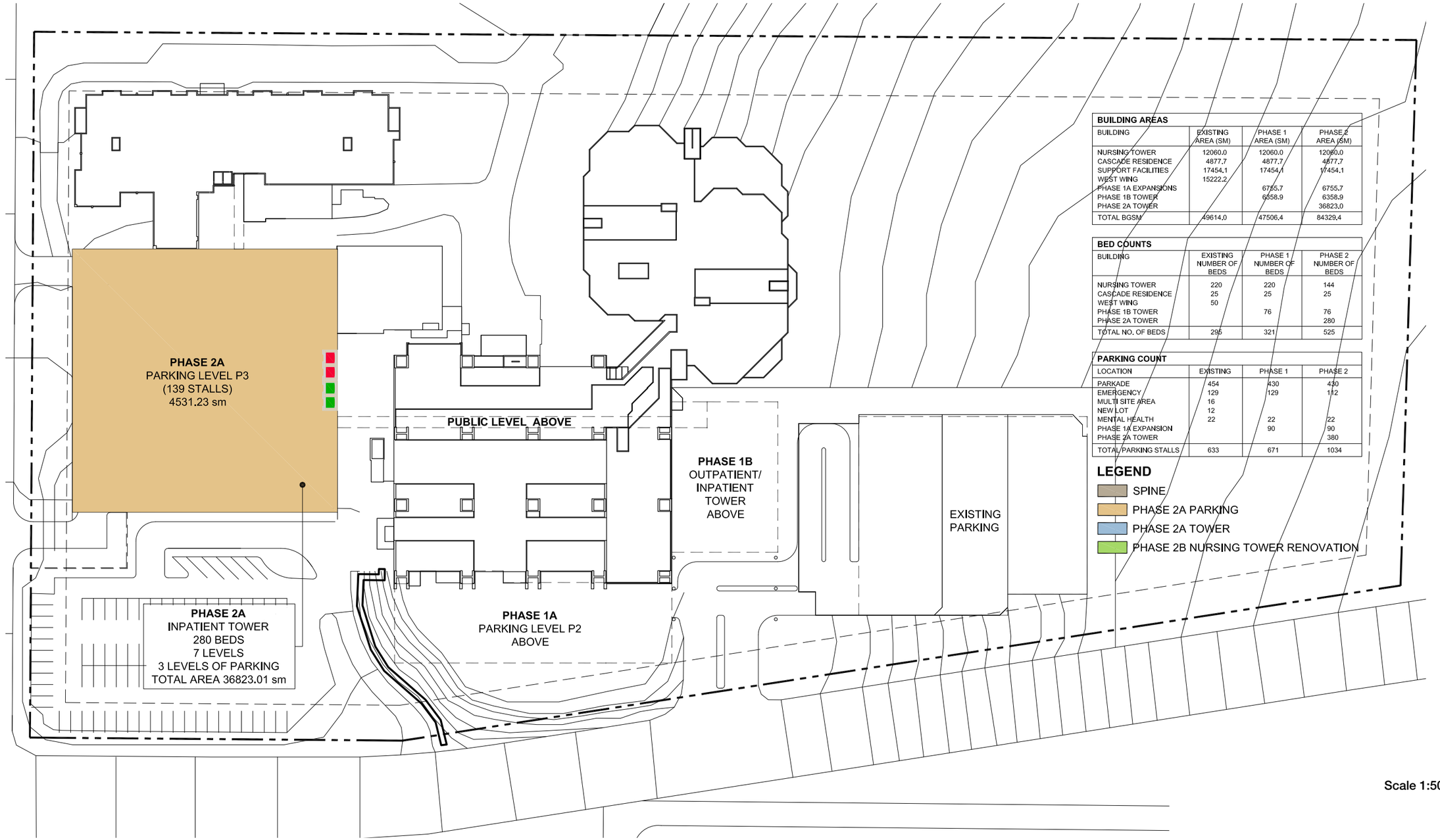
10.4 Site Opportunities by Level — Phase 1 Level 4



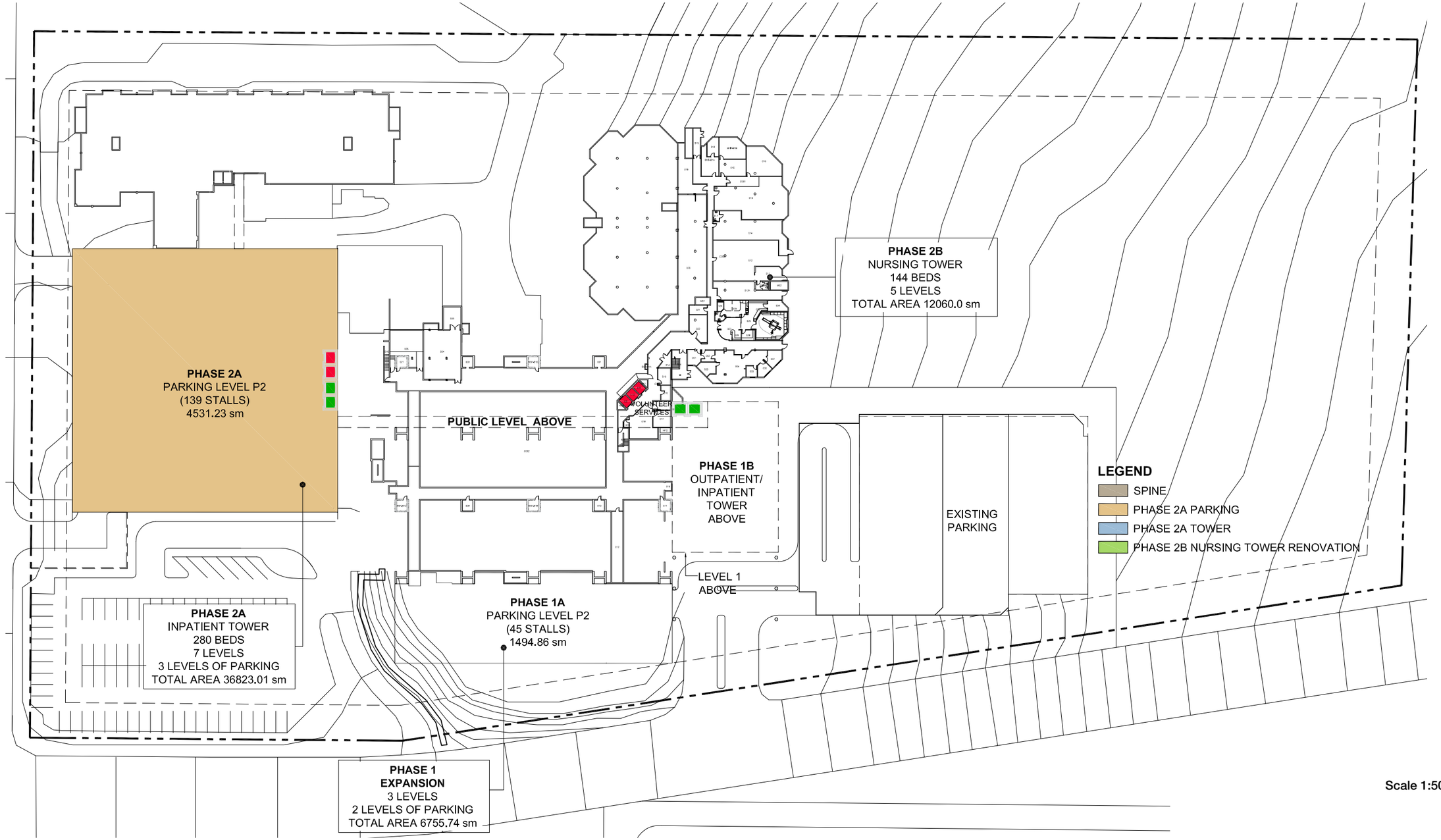
10.4 Site Opportunities by Level — Phase 1 Level 5



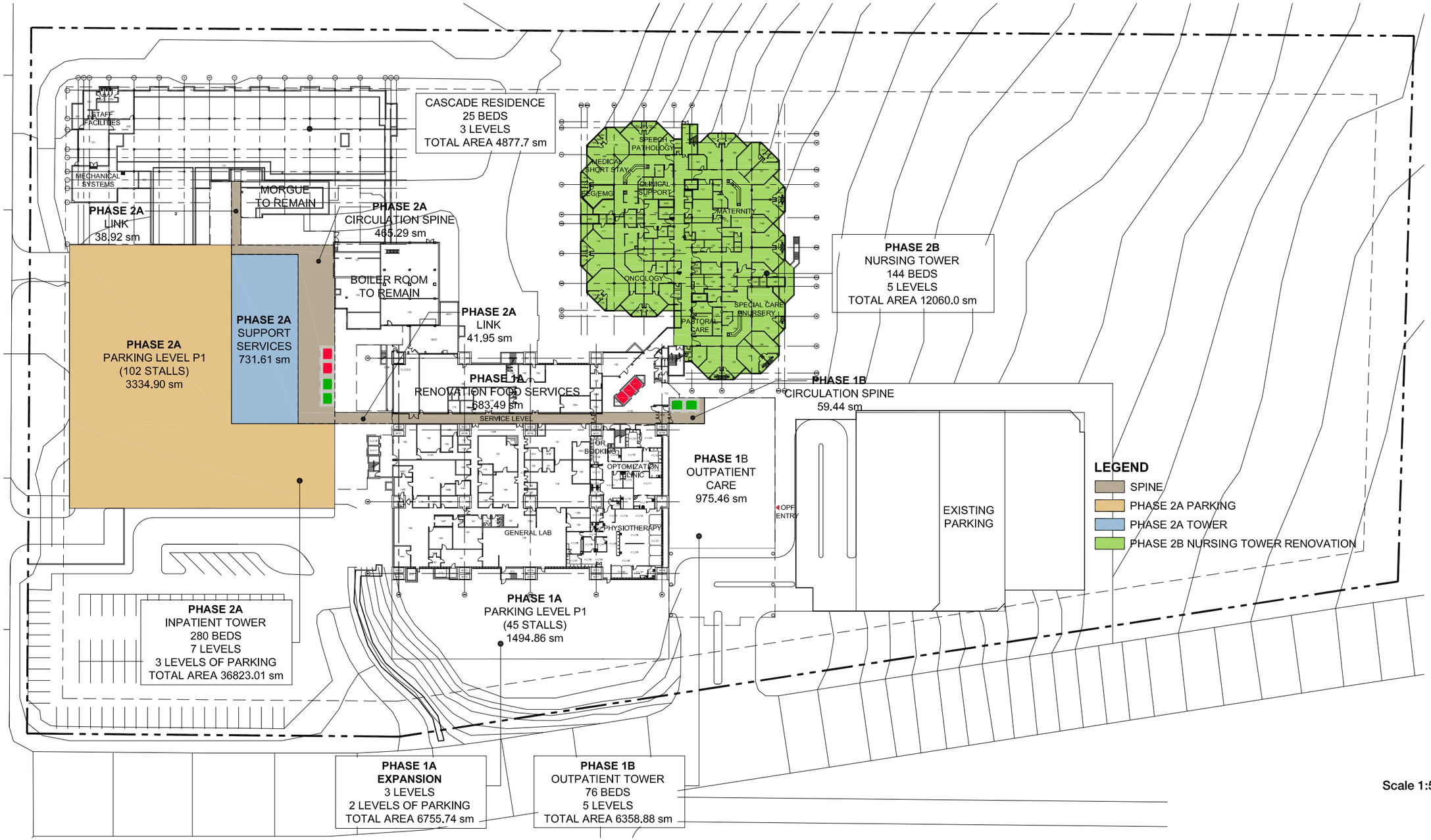
10.4 Site Opportunities by Level — Phase 2 Level P3



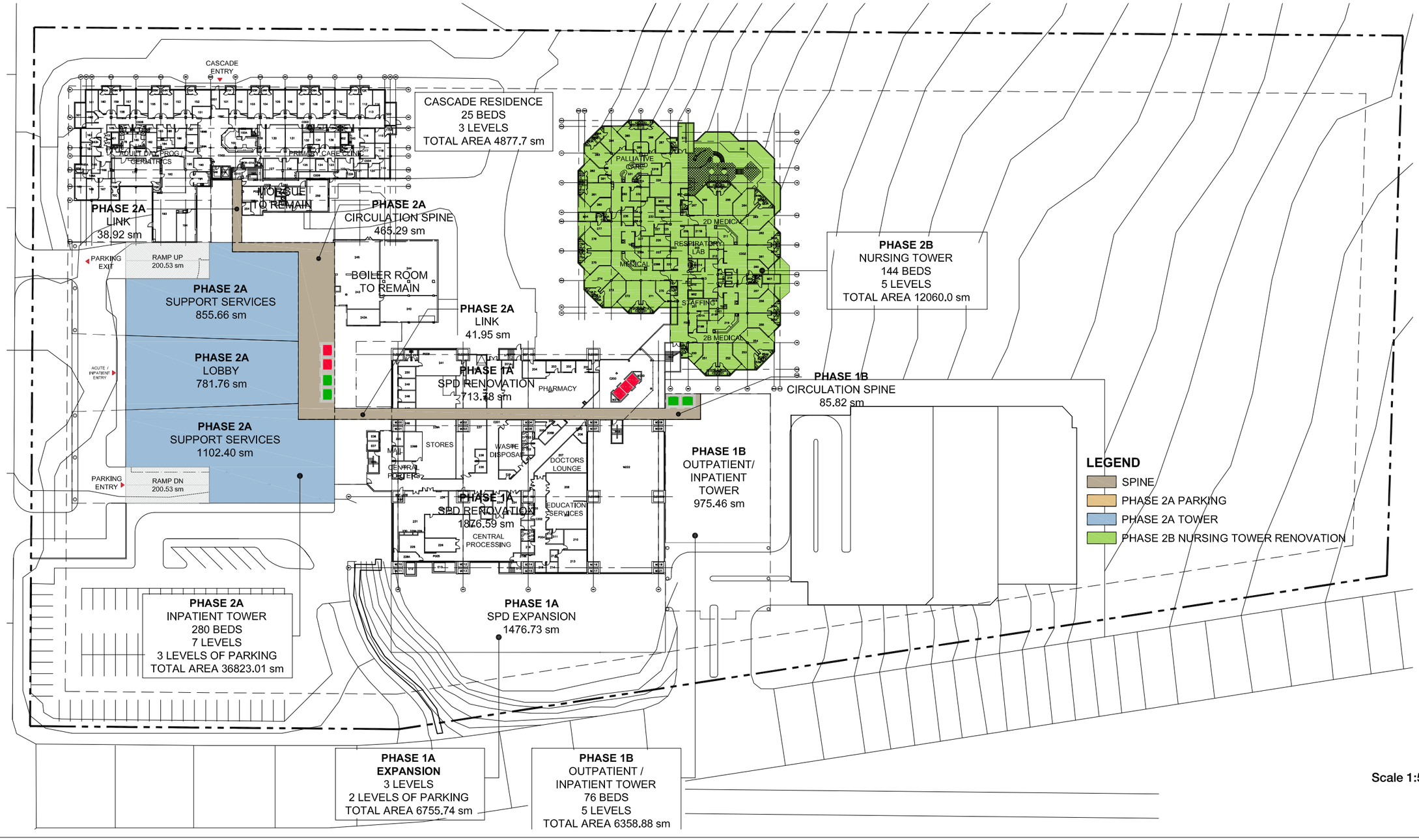
10.4 Site Opportunities by Level — Phase 2 Level 0



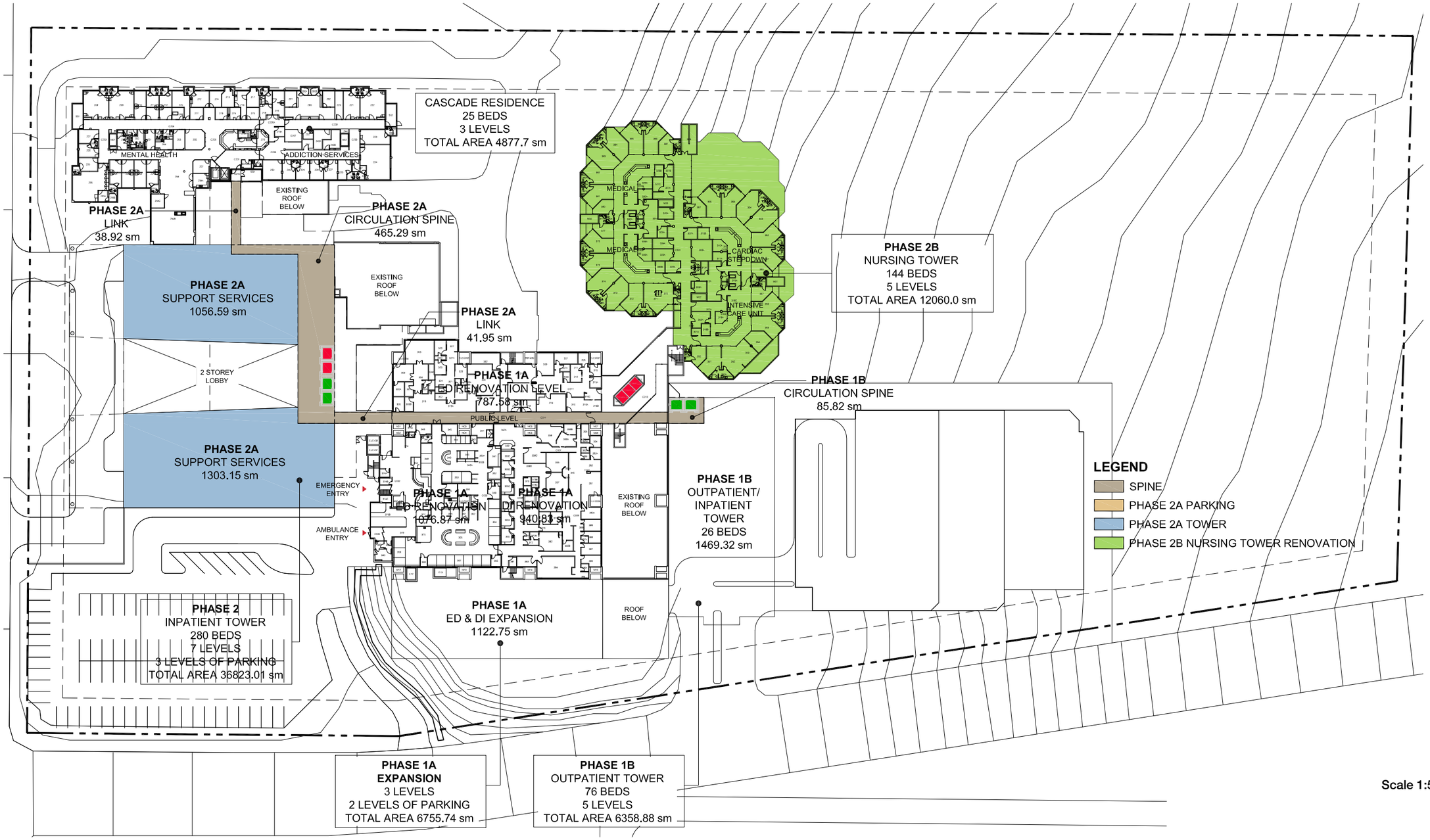
10.4 Site Opportunities by Level — Phase 2 Level 1



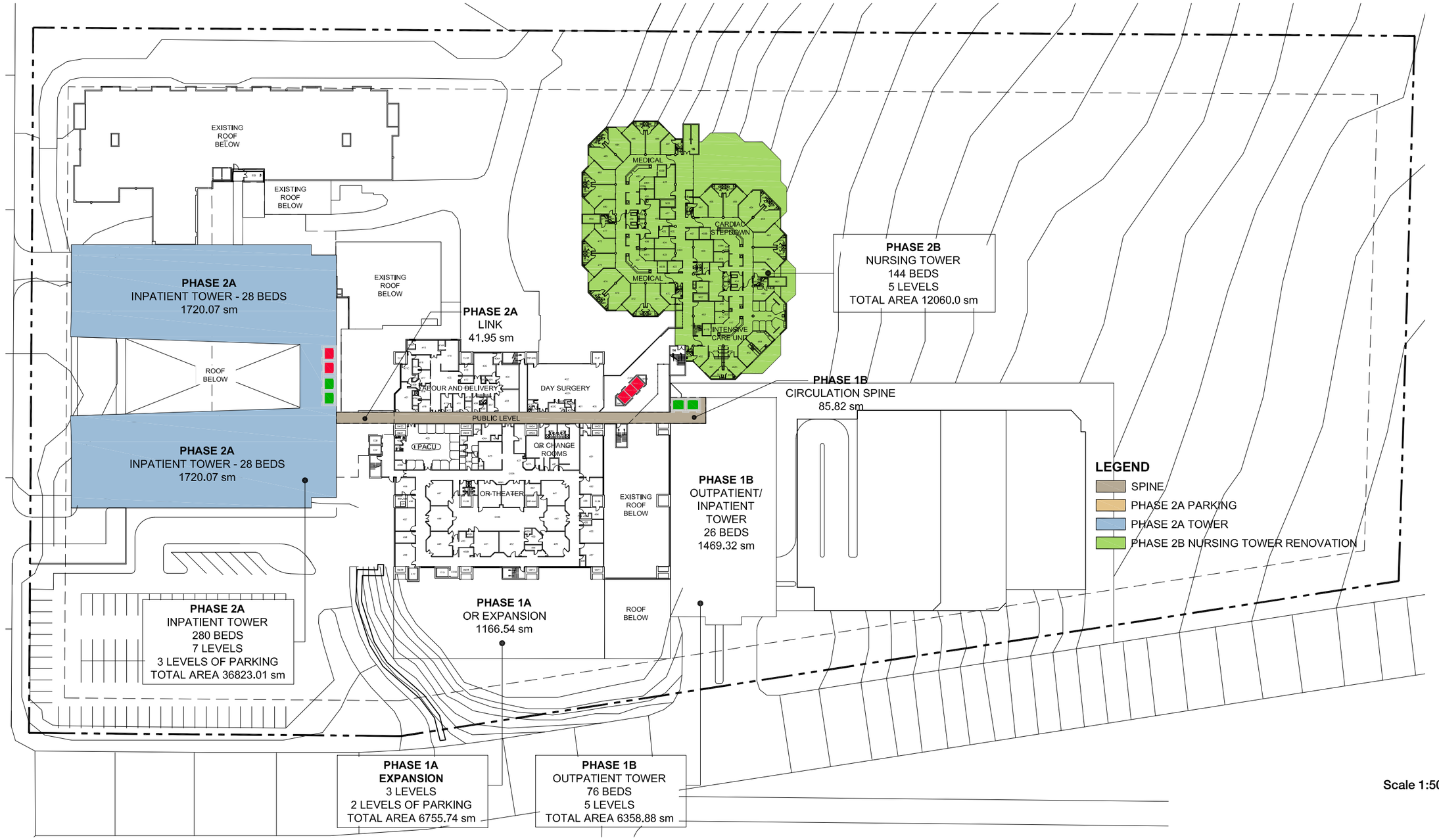
10.4 Site Opportunities by Level — Phase 2 Level 2



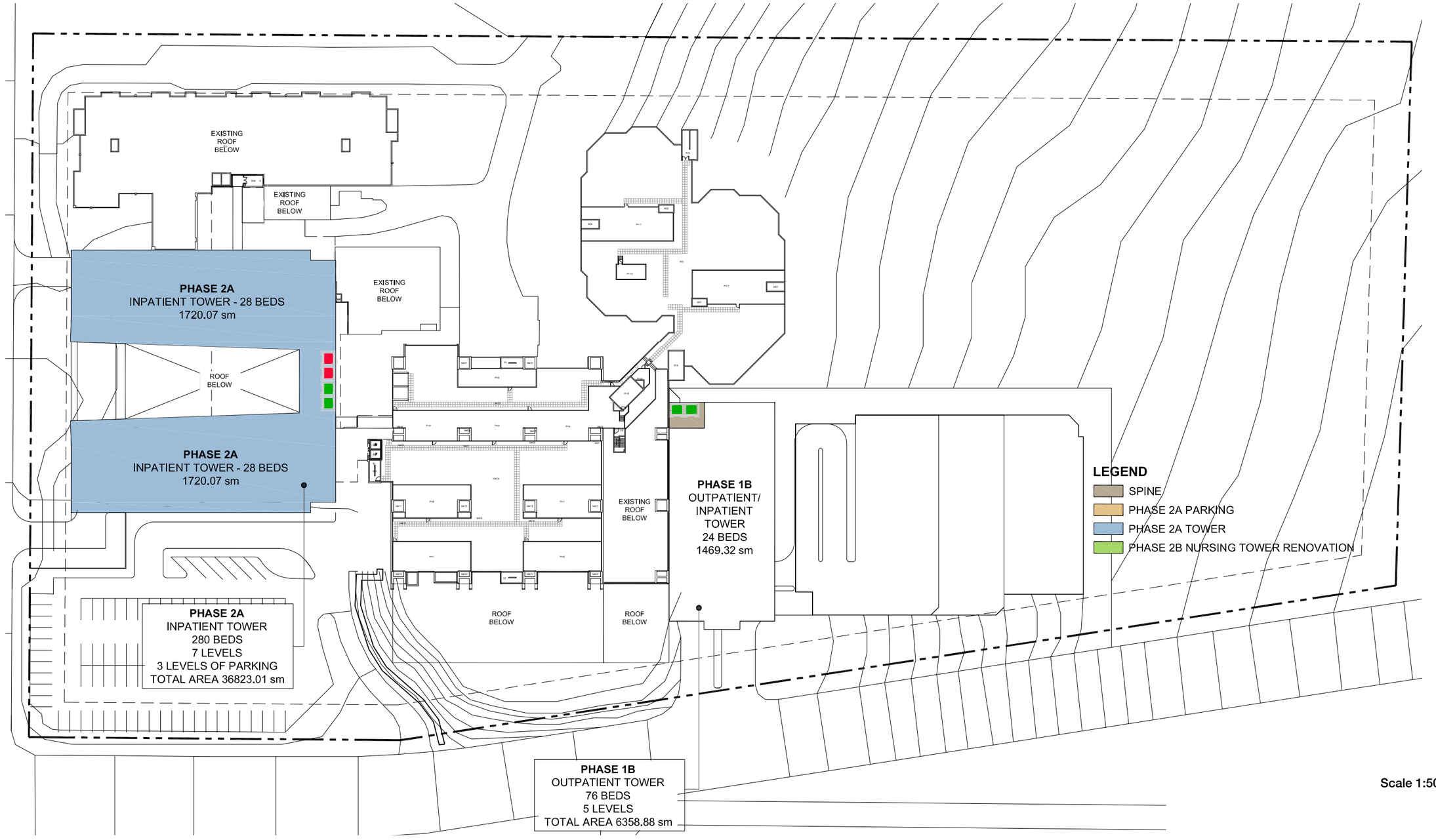
10.4 Site Opportunities by Level — Phase 2 Level 3



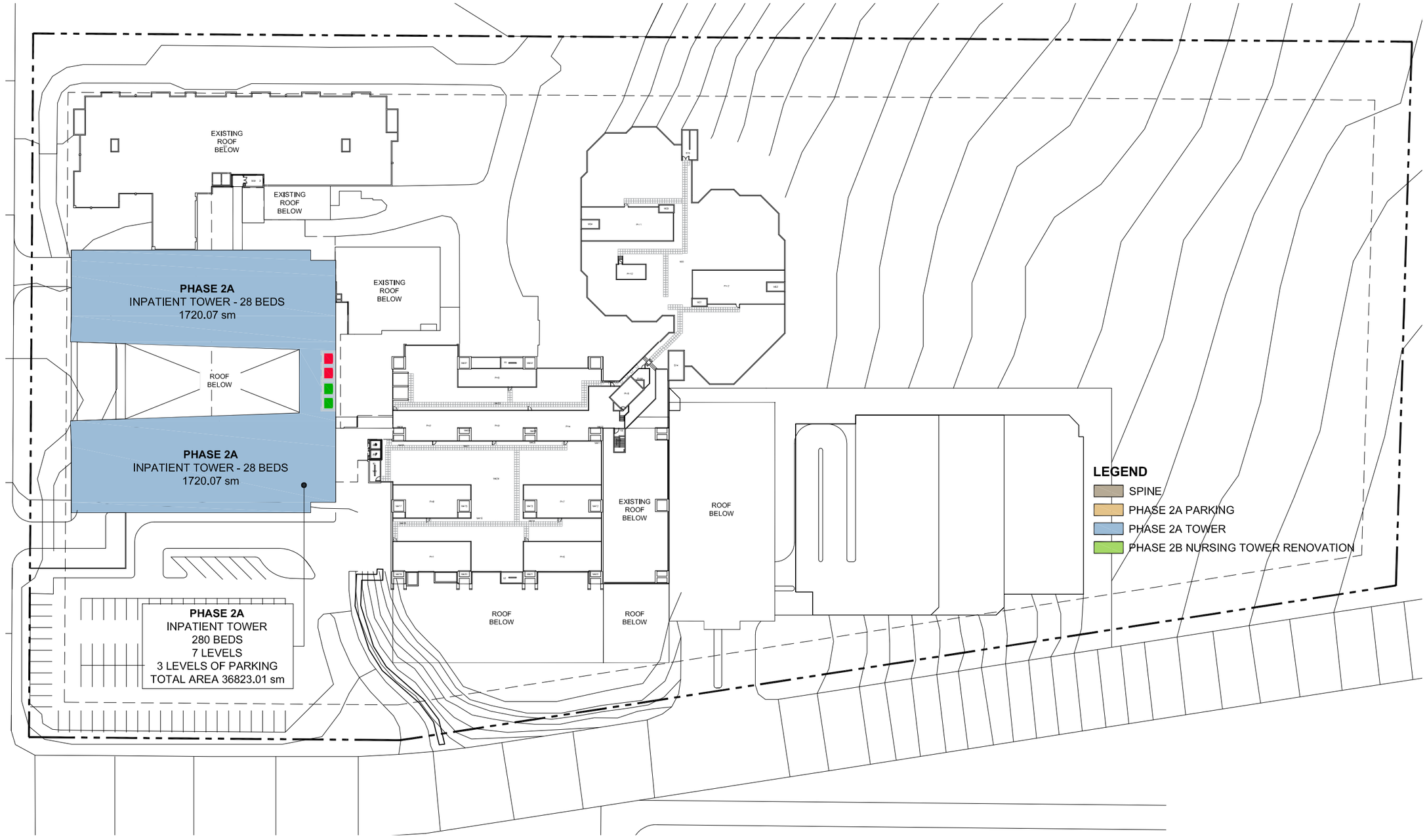
10.4 Site Opportunities by Level — Phase 2 Level 4



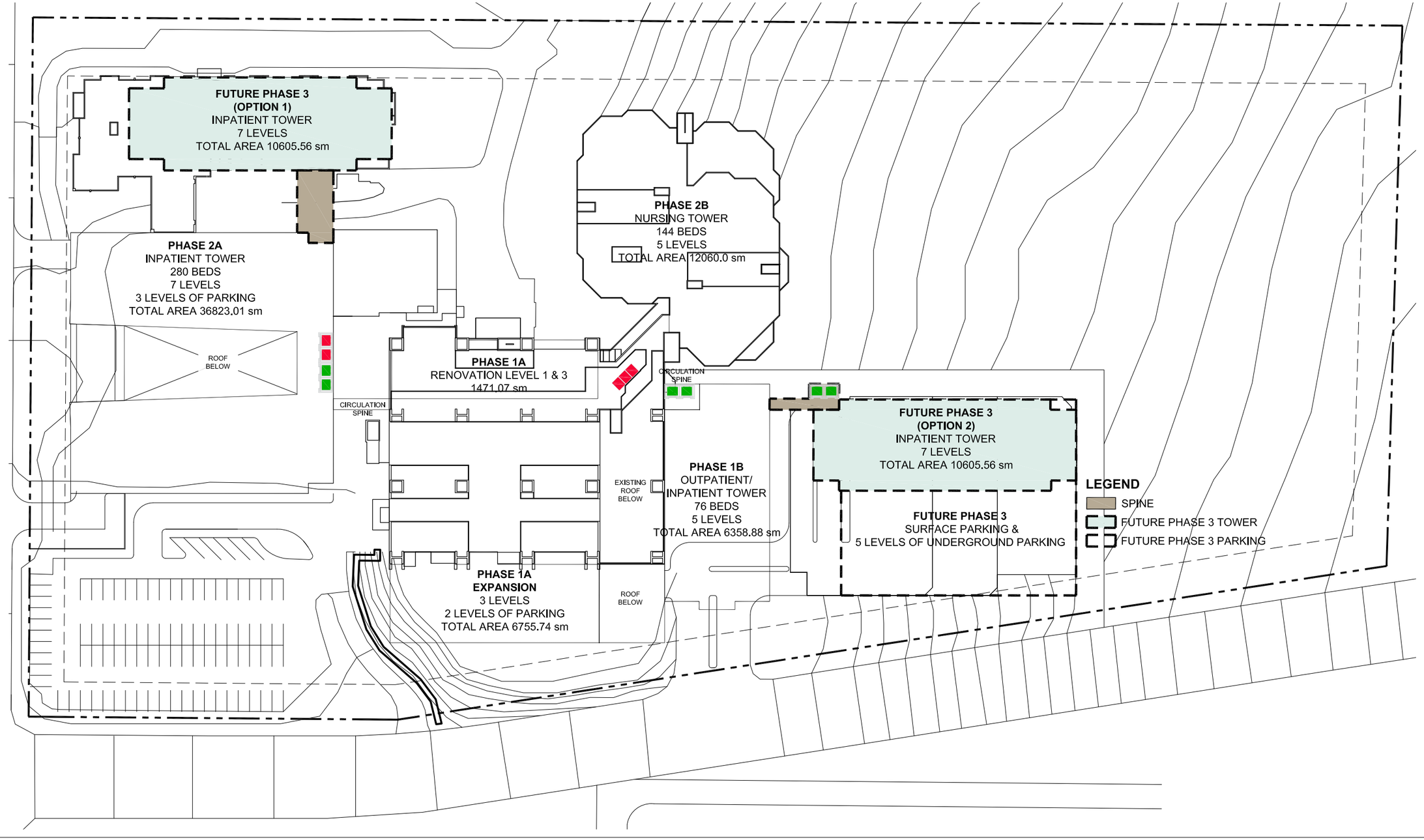
10.4 Site Opportunities by Level — Phase 2 Level 5



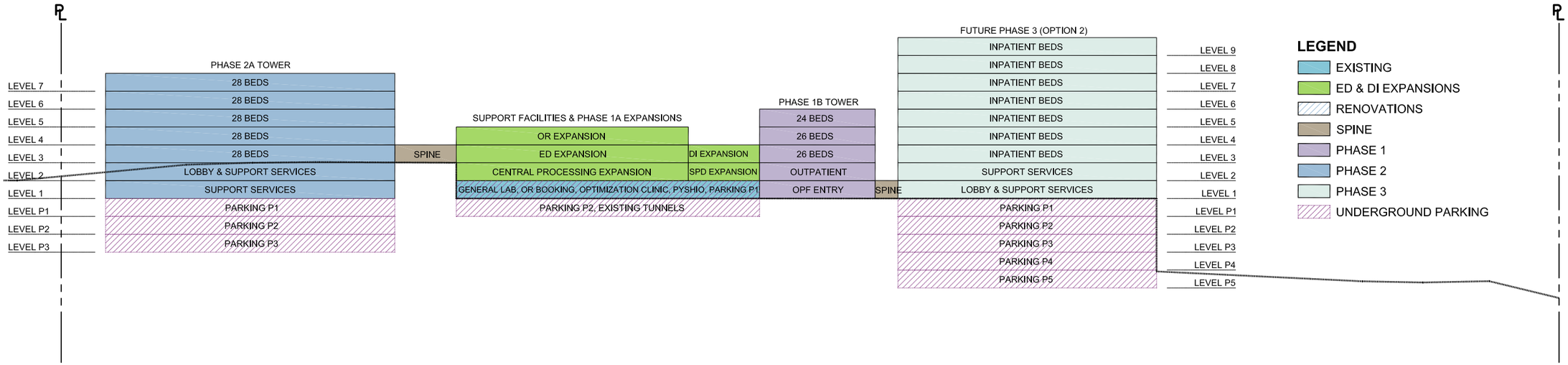
10.4 Site Opportunities by Level — Phase 2 Level 6–8

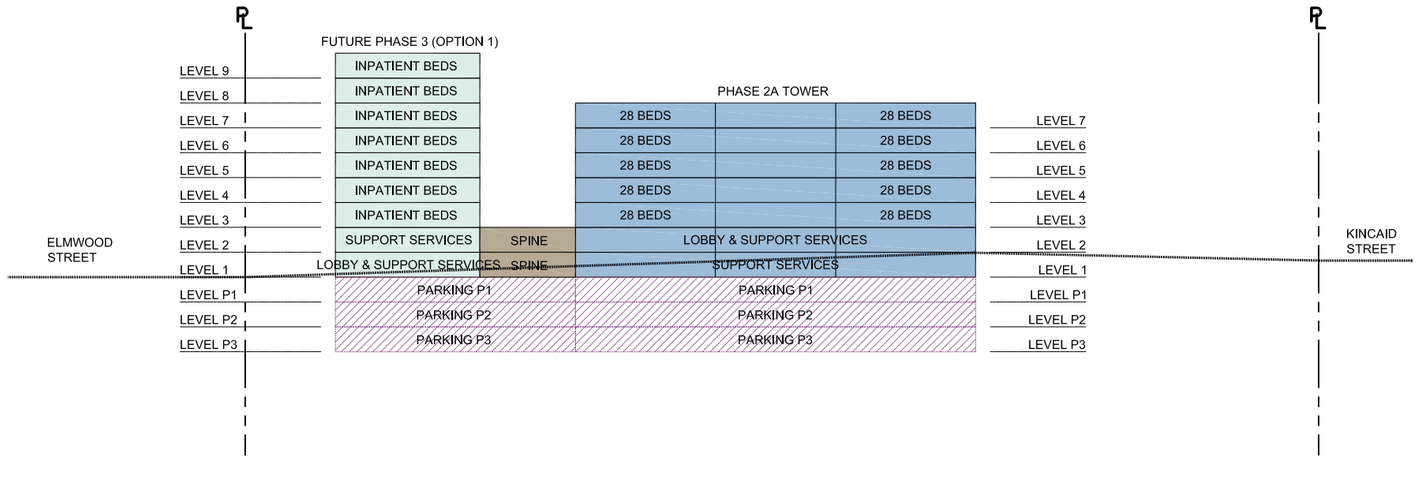


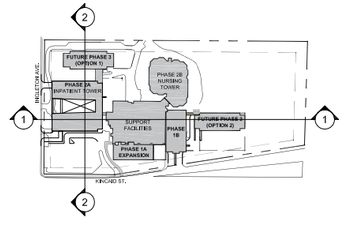
10.4 Site Opportunities by Level — Phase 3



10.5 Site Section(s) & Stacking







There is a range in possible development area as represented by the two models for development planning within this document. The *drawings (Section 10)* represent current and best practice design informed at a high level by growth of programs and bed targets. The *Master Program (Section 6)* is informed by application of design standards to the maximum standard, plus program needs and requirements based on growth scenarios. While the former model may be best design practice, it does not reflect the reality of the site and actual services. The latter model, on the other hand has not been evaluated within an integrated service plan and value analysis for affordability.

Given this, the cost of potential development was tested to both models. A class D cost estimate has been prepared by BTY Consultants. (refer to *Appendix D* for summary of breakdowns). A budget range is provided that reflects the current state of development planning. This range of projected areas/ cost is shown on the table below.

Costing by Phase

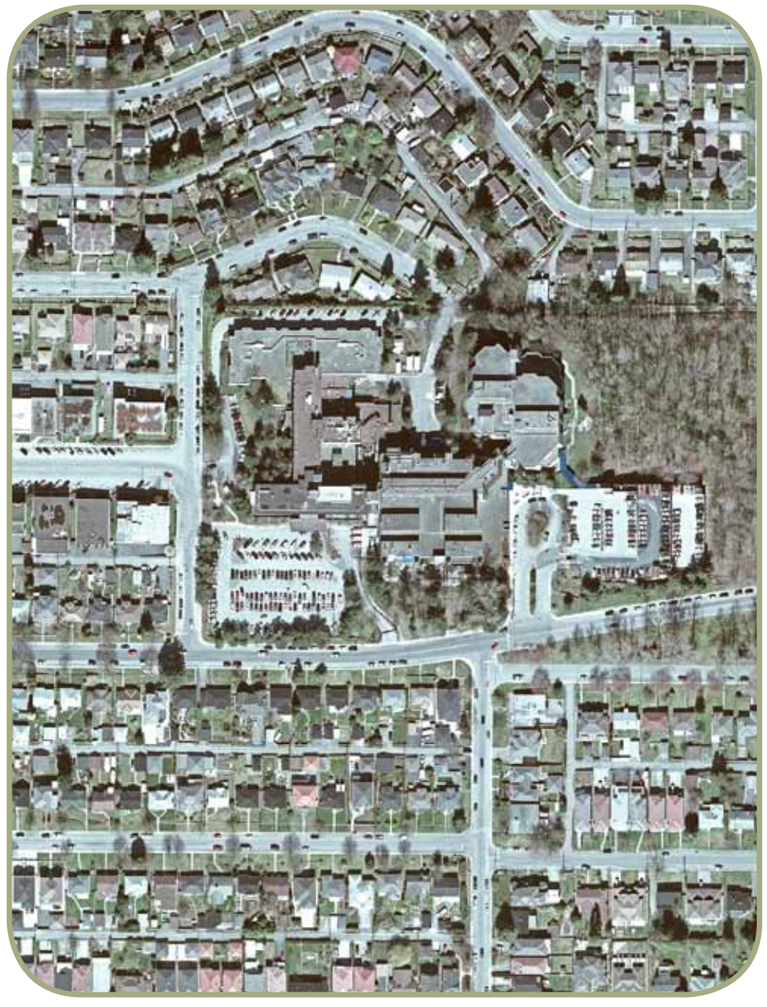
Phase	Beds	Area (Gross Square Meters)				Cost			
		Low	High	Range	%	Low	High	Range	%
Current./ Existing	295	49,514							
Phase 1A (Note 1)		6,756	7,922	1,167	17%	$ 106,416,200	$ 119,951,300	$ 13,535,100	13%
Phase 1B	321 (2)	6,359	9,298	2,939	46%	$ 67,226,800	$ 97,104,100	$ 29,877,300	44%
Total Site		47,407	51,512	4,105	09%	$ 173,643,000	$ 217,055,400	$ 43,412,400	25%
Phase 2A (Note 3)	576	36,823	44,797	7,974	22%	$ 245,707,500	$ 307,415,000	$ 61,707,500	25%
Phase 2B (old Nurse Tower)	500					$ 98,035,900	$ 98,035,900	$ -	00%
Total Site	**84,230**	**96,308**	**12,079**	**14%**	**$ 517,386,400**	**$ 622,506,300**	**$ 105,119,900**	**20%**	

Notes:
(1) Low = 3 levels plus 2 parking, High = 4 levels plus two parking
(2) West Wing removed (- 50 beds), add 76 beds at new tower. The high degree of variance represents service planning uncertainly for ambulatory care.
(3) Low = 5 levels, High = 7 levels. Bed count is prior to renovation of Nursing Tower – this excess capacity enables phased renovations to reconfigured units

In summary, for the renewal and expansion of Burnaby Hospital to a 500 bed facility, a (rounded) capital plan of $520million to $625 million is needed. A $550 million capital plan represents the 30 percentile of this range. Further development of planning is needed to refine service planning, standards of practice and associated new and renovated scope, phasing and cash flow.

Greenfield Comparator

The Master Site Plan for Burnaby Hospital contains projections for services and space requirements for the next ten years. This was evaluated as to how the current land and facilities could accommodate both these projections and align with ongoing progressive sustaining investments. This approach was compared to the cost of acquiring a new (generic) site and a complete new hospital being constructed. While the master plan projects a capital investment plan of with an investment range of $520 to $625 million in order to fully bring the site up to projected requirements in alignment with best practice and contemporary standards, the equivalent investment on a green field site would require an investment of $962 million to $1.16 billion as well as additional project costs for procurement, life cycle costs and project management.



A Appendix A

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
West Wing	2	Support Services	**Food & Nutrition Services**	The current location is a long way from the acute care units which increases labour requirements to transport food and nutrition							1		
				Flooring needs to be replaced to reduce slip/fall hazard								1	
				The area is so large there is some inefficiency for staff when getting supplies.							1		2
				Unable to offer preferred food service delivery model (to offer choice at point of delivery so that patients can order a meal) due to lack of phones and/or internet access at bedside.	2		1					3	
				Most patient care units do not have kitchenettes where patients can access food. The food supplies are stored behind the care station and access by patients is limited.			2	1			2	1	
West Wing	2	Support Services	**Housekeeping & Waste Management**	A centralized depot for dirty equipment cleaning and increased storage for clean equipment/beds/stretchers is needed.		3		3			2	3	
				Supplies (paper towel, toilet paper, soap, hand sanitizer, etc.) are located in the West Wing of the Hospital – if additional supplies are required during a shift, staff have to go to the West Wing to pick them up							2	2	
				As there is no centralized storage for equipment, staff spends unnecessary time searching for and transporting equipment required by the clinical staff.							2	2	
			Clinical Nutrition	Limited space to discuss care planning and education with patient in a private manner				2				3	
				Allocated space for tube feeding products on wards would be beneficial							2	2	
				Recently been running out of tube feeding pumps due to increased numbers of TF patients			2				2		
				More storage on the wards is needed for equipment							2	2	
				Would like to see food available for patient on a 24 hour basis.			2	2					
				Limited space in some wards for nourishment in ward kitchens/ or fridges are too small.				2				2	
				Limited space for conferences and meetings with families				2				2	
West Wing	2	Clinical Support Services	**Morgue (Laboratory Medicine)**	Family viewing area in Morgue should be larger to accommodate more than 2-3 people.				2				2	
				Equipment for handling and transferring of cadavers in morgue/autopsy suite is needed to ensure safety of staff handling bodies.		1					2		
				Workspace in Morgue could benefit from upgrading to improve ergonomics and workflow.							2		
West Wing	3	Administration & Related Services	**Leaders & Regional Programs**	Need for additional flex space for regional staff							2	1	
				Inadequate space to support EOC					1			1	
West Wing	3	Administration & Related Services	**Physician Facilities**	Closer adjacency between HRD and Physician Lounge requested							2		

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
				Physician Lounge reported to be underutilized							1		1
West Wing	3	Administration & Related Services	**Staffing Office (short call)**	Workspace does not have access to daylight		1						2	
West Wing	3	Administration & Related Services	**UBC Medical School**	Call rooms located far from clinical areas		1					2	1	
				Current space does not allow for program expansion						2		2	
West Wing	3	Administration & Related Services	**Volunteer Resources - Gift Shop**	Shop is in best location, but workroom would be better attached to Shop							1		
				Easy access for robbery with direct access from front doors; but it is a busy location, so there are normally people there except eves and weekends		2							
				Better short-term parking close by would be advantageous			1						
				Too small – needs to be 3 X the size or more						1			
				Far away from Volunteer Resources and out of the way for most staff			1						
				Space is too small to allow patients in wheelchairs			1					1	
				Carts are kept in locked area of the lounge on the “0” level. Too far away.							1		
				Too far away. Must store in Gift Shop Work Room on 3rd floor or on “0” Level									
				Gift Shop needs to be accessible for deliveries of stock. i.e. entrance where trucks can park for a few minutes while delivering.			1						
				Work Room down the hall; storage room attached to Gift Shop way too small.						1			
West Wing	3	Administration & Related Services	**Volunteer Resources - Lottery Booth**	Would like to have Gift Shop large enough to accommodate the Lotto Booth also							1		
West Wing	3	Administration & Related Services	**Volunteer Resources - 3rd Floor Wayfinding**	3rd floor location is perfect. We need a similar station at the 1st floor entrance, and have had many requests by staff/managers to provide service at 1st floor entrance. Unable to do so without a Volunteer Station.			2					2	
				Too small – needs to be 3 X the size or more						1			
				Far away from Volunteer Resources and we supervise the Volunteer Wayfinders, consequently they rely on Admin, but this is not the role of Admin staff							1		
				No place for wheelchairs			1						
				Not large enough space but otherwise works well – need wheelchair location inside and close by									
				Booth is fine, but entrance area too small									

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
				Could be a little larger behind station, but pretty good as is									
				Would be great if they had access to list of patient rooms, etc., to be able to look up room numbers for people									
				Need a telephone, hidden from public, but that does not have to be taken out of the wall and locked away every night.									
				Need staxi/wheelchair station inside at main entrance			2						
				Staxis/wheelchairs outside and are often wet as a result									
				Staxis/wheelchairs need to be inside so they are not wet and cold									
				Way too small. No seated waiting area for patients/families waiting for pickup						2			
West Wing	3	Administration & Related Services	**Burnaby Hospital Foundation**	Expand current space to accommodate future growth and improve the image of the Foundation.	2								
West Wing	3	Clinical Services	**EEG/EMG/Neurodiagnostics Clinic**	lack of family/patient meeting space to discuss test results in private				2					
				inadequate environmental controls for light, sound, and temperature which are required to ensure accurate test results				**3**				3	
				no sinks in rooms which are essential to warm patient limbs for accurate test results				2					
				Difficult to maneuver pt and equipment in small rooms.		2							
				patient charts are kept in patient examination/testing room					2				
	3	Clinical Services	**Multiple Sclerosis/Neurology Clinic**	Size of space is inadequate for quality patient care and suitable staff work environment				**3**		**3**			
				Air conditioning is required for patient comfort & accurate test results		2							
				Area does not fully meet standards for persons with mobility disorders; wheelchair maneuverability is very limited.		2							
				Service could potentially be moved out of acute care									
West Wing	3	Support Services	**Food & Nutrition Services - Cafeteria**	A secondary exit from behind the servery is requested		2							
West Wing	3	Support Services	**Registration Services**	Waiting area is cramped; lack of auditory privacy for patients when registering					2				
				Difficult to navigate from Level One Hospital/parkade entrance to Registration area which is in another building on Level Three (distance and wayfinding issues)								2	
				Inefficient layout of desks in Registration area (due to fixed building structure)							2		
				Lack of adequate physical separation between registrants and staff		2							

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
				Patients register on Level Three; inpatient areas and outpatient clinics are in various locations throughout the Hospital (walking distance and wayfinding issue)			2						
				Supervisor's office location does not allow easy oversight of Registration area							2		
				Cramped workspace in ED with limited patient privacy					2				
West Wing	4	Clinical Services	**Transitional Care Unit**	No space issues identified - residential care - long term goal is to move offsite									
West Wing	4	Clinical Services	**4 West B Medical**	Poor air quality and temperature control impacting patients and staff				3					
				Up to 4 patients per room					3				
				patient visibility and staff access to pts is poor due to long corridors		3							
				increase in staff travel time within and between units/buildings							1		
				Units do not fully meet standards for safe elder care.		3							
				Inadequate storage space leading to inaccessibility, wasted staff time and/or risk of cross contamination of supplies and equipment							1		
				Medication preparation standards cannot be met.					3				
				Standard of 80% single rooms and 10% negative pressure single room with ante room not met					3				
				Human waste disposal units and washrooms shared by multiple patients.		3							
				Limited bedside space contributes to lack of patient/family privacy and confidentiality; lack of space supporting family centered care					3				
				Insufficient space for family and/or interdisciplinary team conferences									
				Insufficient space to support staff/student education/research							2		
				Insufficient "touch-down" or work space for members of the interdisciplinary team.							2		
West Wing	5	Clinical Services	**ACE Unit**	Up to four patients per room					3				
				Standard of 80% single rooms and 10% negative pressure single room with ante room not met					3				
				Lack of appropriate number of staff handwashing stations					3				
				Inadequate storage space leading to inaccessibility, wasted staff time and/or risk of cross contamination of supplies and equipment							1		
				Units do not fully meet standards for safe elder care e.g. secured access/egress		3							
				Washrooms shared by multiple patients.		3							

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
				Limited bedside space contributes to lack of patient/family privacy and confidentiality; lack of space supporting family centered care					3				
				Insufficient "touch-down" or work space for members of the interdisciplinary team.							2		
				Insufficient space for family and/or interdisciplinary team conferences							2		
				Insufficient space to support staff/student education/research							2		
West Wing	5	Clinical Services	**Pediatric Urgent Care Clinic**	Current location exposes children/families to potential infections from adjacent ACE inpatient unit		3							
				Environment not child/family friendly				1					
				No adjacency to public entrance/parking							1		
				Office space utilized for private physician services						1			
West Wing	5	Clinical Support Services	**Therapy/Speech-Language**	lack of storage space leading to hallways crowded with equipment							2		
				Difficult location for out-patients to find - long distance from public entrance							2		
				Adjacencies inadequate - should be co-located with other Rehab disciplines							2		
				OT splint manufacturing service could potentially be moved off campus									
West Wing	5	Support Services	**Facilities Management**	Shops and admin areas are widely dispersed							2		
				Inadequate ventilation in shops		3							
				Large and bulky materials need to be brought to shops via elevator							2		
				Very limited contractor / service vehicle parking located far away from office where they need to sign in.							2		
				Staff space does not afford a safe, quality work environment		3							
				Overall lay-out of the area does not support efficient, effective care/ service delivery							2		
				Current space is not utilized to maximum efficiency							2		
				Insufficient volume of equipment available to support efficient care delivery			2						
				Stretcher and bed storage space is inadequate						2			
				Current space allocation for supplies and replenishment is not used to maximum efficiency							2		
West Wing	6	Support Services	**Information Services**	create a data centre (increase HVAC and UPS power)						2			
				inadequate space to secure and break down shipments of PCs						2			

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
				upgrade networks				3		3			
				inadequate training room capacity						2			
				upgrade telephone system				2					
West Wing	6	Support Services	**Biomedical Engineering**	Inadequate size of space for receiving/decanting/staging near the entrance to the work area						2			
				Inadequate amount of holding space for equipment awaiting parts for repair to be completed						1			
				Insufficient space to accommodate parts/supplies and equipment being worked on at work benchs						1			
				Lack of storage space						1			
				Lack of workspace for visitors and staff expansion.						1			
West Wing	6	Administration & Related Services	**Safety/Workplace Health**										
West Wing	7	Clinical Services	**Healthy Heart Program**	Poor air quality and temperature control impacting patients and staff		2							
				Aerobic exercise room is crowded with equipment & patients				2					
				Difficult location for public to find - long distance from public entrance							1		
				isolated location poses staff risks after hours		2							
				Service could potentially be moved out of acute care									
West Wing	7	Clinical Services	**Diabetes Education Center (DEC)**	Poor air quality and temperature control impacting patients and staff		2							
				Waiting area and classroom too small for client population						2			
				Difficult location for public to find - long distance from public entrance							2		
				Area does not fully meet standards for safe elder care; wheelchair maneuverability is limited.						1			
				Service could potentially be moved off campus									
West Wing	7	Clinical Support Services	**Allied Health - Social Work**	Poor air quality and temperature control impacting staff		2							
				Shared offices too noisy for private client conversations				2					
				Office location increases in staff travel time within and between units/buildings							1		

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
West Wing	7	Clinical Support Services	**Community Connections/Home Health**	Poor air quality and temperature control impacting patients and staff		2							
				Office location increases in staff travel time within and between units/buildings							1		
				isolated location poses staff risks after hours		2							
Cascade	Basement	Clinical Services	**MHSU - Patient Gym**	No issues identified									
Cascade	1 & 2	Clinical Services	**MHSU - Outpatient Program**	The clients are able to directly access the program from outside on the ground floor. It is more difficult for clients and their families to access through the hospital. It would be helpful to have more signage and orientating other staff in the hospital to our programs.			1						
				There is limited parking for clients and when these stalls are full, clients have to park their cars in meter parking and same is limited.			1			1			
				There could be better signage directly clients and their families to the outpatient programs vs. the inpatient acute program.			1						
				Some offices could be smaller in size to best utilize space.						1			
				The group rooms could be redesigned for better set up for education/groups for clients.							1		
				With having the programs in one area allows for convenience in re-allocating the use of space.									
				Medication rooms could use redesigning to allow for examination table, refrigerator (medications), space to store medications (depots), sink, and preparation area.							1		
				The space could be better utilized if the laid out of the room was more appropriate for group room set up and teaching.							1		
				The file room with our paper charts is distance from some of our programs.							1		
				Outpatient services require larger centralized location on the main floor.							2		
				Current space is poorly designed.							2		
				Not enough storage space for medications and supplies.						2			
				Require an allocated space for equipment.							1		
Cascade	2	Clinical Services	**MHSU - Inpatient Program**	The unit is on the second floor and would be safer on the first floor due to incidents of patients shattering window(s) and attempts made to jump out window(s).		3							
				Exit past the space where physio was located allows patients to leave the hospital.		3							
				Entry/arrival not satisfactory - not able to bring patients through to the unit from the hospital from the third floor due to narrowness of the hallway.		3							
				Limited parking for patient's and lengthy walk for staff who park in the paid parkade and or nearby the hospital.			1						

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
				Current space is inadequate to meet demand: Space for 28 patients (three of these beds are over census beds). If more beds are required to accommodate over census, would not be within standards for the available space.						2			
				The location of the nursing station is not central and does not allow for efficiency of patient flow and care.							2		
				The unit is not well laid out with the location of the patient rooms, nursing station, storage for supplies for staff to access in providing care.							2		
				There is a lack of privacy with having shared space between patients of either two patients to a rooms and with having two dorms (male and female) with four patients sharing a room.					**3**				
				We do not have any designated space allocated for the a patient(s) to have privacy and space to meet with their families.					**3**				
				There sinks in the hallways are not automatic turn off/on for staff to have designated space to wash their hands. There are two shared washrooms with one designated for males and one for females rather than the patient having one washroom in each room to reduce the risk of infection. There is one shower room which is unisex for the patients' use.		**3**			**3**				
				The old physio space (across from IPU) could be renovated to be a part of the IPU.									
				The nursing station location is not appropriate for the operation of the unit.		**3**							
				It is a large open space and difficulties locating the patients. The location of the cameras could be better situated for visibility.		**3**							
				There is not enough work space for staff to complete their charting and or computers in the office for staff to access to view electronic records/process orders on the computers and print off form imprint.						2			
				The space is too small to accommodate staff when they are pouring their medication. Medication room physical to the public from the window to office. Not enough space to adequately place medications in cupboards.		**3**			**3**				
				Need for more space for patient belongings and for medical equipment (BP machines…).						2			
Support	Basement	Administration & Related Services	**Volunteer Resources - Offices & Lounge**	Needs to be in a location visible to the public to encourage volunteer recruitment			**1**						
				Evening and weekend volunteers are isolated		**1**							
				Education Rooms are not adequate; hard to book for Volunteer training sessions; need larger room to handle large-scale volunteer recognition events						**1**			
Support	1	Clinical Services											
Support	1	Clinical Services	**OR Booking**	Additional workstation required							**1**		
Support	1	Clinical Support Services	**Laboratory Medicine & Pathology**	Campus is on a hill creating two main entrances - creates confusion for patients trying to find the Laboratory.			**1**						

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
				Lab has doors/windows to exterior which may present security issues.		2							
				Ventilation may be improved if lab located closer to roof or fans pulling exhaust from lab hoods.		3							
				Proximity to clinical wards, ER/ICU and other critical care areas not ideal for laboratory access			1						
				Current entry doorway is a heavy double door which does not have any accessibility options such as motorized or automated opening for wheelchair patients. Doors are hard to open for elderly and overall not elder friendly.			1						
				Distance to ER is not far but requires an elevator or stairs which are down a hallway. Distance to OR is great and this has resulted in pathologists preferring to have frozen section tissue brought down to lab for processing rather than attending in the OR area. Distance to older buildings is great and takes extended time to reach mental health wards.							1		
				Many facility problems have occurred causing expenses e.g. leaking pipes, limited electrical								2	
				Outpatient space reaches capacity on some mornings and proper space for private registration is not currently available. Additional storage space is needed.						2			
				Lab space is available however use of space could be optimized and workflows improved.								2	
				Private space for patient registration is needed.					3				
				Family viewing area in Morgue should be larger to accommodate more than 2-3 people.						2			
				A dedicated dirty utility room for linen and waste would be beneficial.		3			3				
				If a large increase in outpatients occurs, space for waiting/seating/phlebotomy would need to be increased.						1			
				Additional storage space is needed for slide and block for Anatomical Pathology.						2			
				Space is spread out and for after hours staffing the distance are great and travel across multiple areas increases time and reduces efficiency.							2		
				Additional workstations for staff working on projects or commissioning new equipment. Improved space for teaching in all areas would add to academic activities.						1			
				Some areas have moved or condensed to reduce travel of after hours staff but more improvements could be accomplished with a LEAN review and renovations.							2		2
				Staff lunch room is available however this is a converted clinical space and has been improvised to be a break room.							1		2
				Empty space is not used well and departmentalization creates increased travel and reduced efficiency.							2		
				A dedicated room for pathologists to use a multi-headed microscope for consultation and case reviews/education is needed.						1			
				Staff lockers, coat areas are minimal and not secure.						1			

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
				Workstations and equipment consume large areas of clinical workspace and leaves limited bench space in some areas for handling specimens and performing specimen related activities.							2		
				Front desk is main area where paper exchange is used and limited counter/desk space exists for efficient work.							2		
				Storage is mostly on carts in the departments but ability to organize and improve supply usage is limited. Accessioning supplies are not efficient as they are spread out across department area							2		
				Improved and better organized supply space would improve efficiency of operations.							2		
				Phlebotomy room is very close to registration desk and privacy is not ideal.					3				
Support	1	Administration & Related Services	**Library Services**	None identified									
Support	1	Support Services	**Hospital Records Department**	Closer adjacency preferred with Physician's Lounge to insure efficient communication so that patient records can be completed in a timely manner;							1		
				Need for dedicated work area that is quiet/private for physicians, researchers and auditors who need to work with records in the HRD.							1		
Support	1	Administration & Related Services	**Volunteer Resources - Patient Education &**	Close to 1st floor entrance is good, but not visible behind the elevator block			1						
				Might be better closer to patient care units. But ok where it is, and great that it's close to Volunteer Resources offices			1						
				Somewhat isolated, can't be seen from entrance so some risk involved here e.g. for volunteers working alone at night			1						
				Would be ideal to have a secure accessible computer with internet connection outside the Centre so that visitors/patients/families could access internet when the Centre is not open			1						
				Not visible, and not near patient care areas. But it is close to a main entrance.			1						
Support	2	Administration & Related Services	**Education Services**	None identified									
Support	2	Clinical Program	**Sterile Processing Department**	Current space too small for assembly; Area very small since elevator corridor added						3			
				Inadequate processing and inspection areas for set assembly promote errors		3							
				Overall lay-out of the area does not support efficient, effective care/ service delivery							2		
				There are insufficient number work spaces for staff						2			
				The staff change in the public washrooms that serve the meeting rooms across the hall		2							

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
				The space is at capacity - there is no room to take on more work.						3			
				Support areas for staff are not appropriate in size and number						2			
				Equipment needs upgrading; no auto load and unload on washers; all manually loaded and unloaded							3		
				No sinks for processing eye instruments; Need more loading carts for sterilizer		3							
				Cooling area for sterile goods inadequate						3			
				Stock levels should be more closely aligned with usage; Delays from Warehouse mean over stocking and has space impacts							1		
				Replacement of flooring- pock marks and cracks		3							
				Replacement of ceiling - not to standards; dirty		3							
				better HVAC monitoring and controls- need inline dehumidification, portable dehumidifiers and fans against CSA and accreditation standards.		3						3	
				Wireless computers and phone systems. Communication with OR is of prime concern. The goods are all downstairs and the phone is often not working due to restrictions in building. Should be efficient and always. Current phones are same as regular household phones and have too many dead zones. If sterile instruments are not located in the OR, success of a case cart system is contingent on proper communications.		3						3	
Support	2	Support Services	**Laundry & Linen**	Storage for laundry carts (both soiled and clean) on units is inadequate		3							
				Storage of laundry in department for emergency use requires enclosed cupboards		3							
				Many carts in relatively small space - require staff to move heavy carts manually		3				3			
Support	2	Support Services	**In Hospital Replenishment**	Access to the department is not controlled with potential safety and security impacts;		3							
				The staging area is long and narrow, becomes crowded and a difficult place to work and does not allow a clean to dirty flow;		3				3			
				There is no closed storage for materials that remain in the department, suitably seismically restrained, that would help maintain cleanliness of supplies and provide a more organized work environment for staff;		3							
				Open fencing separating this area from Laundry and Linen contributes to potential airborne contamination of supplies being transported to patient care areas;		3							
				Flooring is uneven and not sealed;		3							
				There is no ability to clean equipment;		3							
				This department open to the Loading Dock and outside materials can be transported into the Hospital.		3							
			Housekeeping - Waste Disposal										2

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
Support	2	Clinical Support Services	**Pharmacy**	Surveillance camera would be beneficial: although the Pharmacy Department is centrally located in low traffic area with close proximity to the Loading Dock, this may be a security risk .		3							
				Lack of designated area/counter space for handling hazardous drug preparations - hazardous drug preparation/storage is not meeting standards		3			3				
				Lack of foot pedal / "no touch" sinks, as required by standard		3							
				Narcotic Vault is too small		3			3				
				Inadequate space for compounding/pre-packing medications					3				
				Inadequate space for receiving deliveries and orders – need a designated area for receipt of hazardous drugs					3				
				Inadequate separation of ante rooms for IV and Chemo Sterile Preparation room; lack of change room/washroom inside department for changing into hospital scrubs; lack of space for second biological safety cabinet for chemo preparation (to manage increased chemotherapy volumes over the past 3 years)					3				
				Need for bigger IV and Chemo Sterile Preparation room					3				
				Lack of dedicated areas for returned medications from nursing units						2			
				Inadequate number of workspaces for terminals for dispensary activities (order entry, verification and checking); insufficient space to empty cage deliveries from PDDC				2					
				Some administrative offices located outside department due to lack of office space within the department							1		
				Need to separate staff lunch room from medication storage area as per requirement from workplace health to prevent cross-contamination of medication and food/drinks		3			3				
				Space is lacking for storage of paper information						1			
				Lack of wireless capabilities								2	
				Lack of sufficient electrical outlets for increased equipment capacities								2	
				Need for increased physical space for medications stored in patient care areas					3				
				Video surveillance in nursing unit med room/narcotic cabinets		2							
Support	2	Administration & Related Services	**Doctors Lounge**	Space reported to be poorly utilized									2
Support	3	Clinical Support Services	**Medical Imaging**	The size of the entry/reception area, which accommodates twenty people, is inadequate for the maximum number of people (patients and family members) who may require seating						1			
				Space is required for recovery of patients (from interventional procedures such as biopsies, tube placements and drainages.				2					

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
				Though CT is well placed, access for stretchers from the ER could be improved.			1						
				Access for patients from ER is through door next to reception. This configuration is not optimal, as patients must enter MI directly by reception desk, creating potential issues with privacy. This door is currently kept shut as noise from the ER is considerable.				2					
				Additional space would be required to expand services such as ultrasound and general radiography. Cannot expand any service within current footprint.						2			
Support	3	Clinical Support Services	**Nuclear Medicine**	Larger foot print and/or redesign to help reduce staff radiation exposure – currently meets regulations but could be improved		3							
				Would be advantageous to have separate access and holding area for inpatients versus outpatients			1						
				Parking is always listed as poor on our patient departmental surveys			1						
				Need space to isolate patients with infections		3							
				Radiopharmacy could use some additional storage space						1			
				Limited waiting room space						1			
Support	3	Clinical Services	**Emergency Department**	Security not always present, need to have main office in front entrance.		2							
				Many exit routes for psych clients at risk: assessment stabilization unit in IPU.		2							
				Access is challenging for anyone arriving other than by ambulance, as there is limited space for a private vehicle to be parked and a patient helped inside. And for those who may come by bus, it is a good uphill trek from one or two of the stops, and then there are stairs. Not elder friendly!			2						
				Ambulance offload area could have improved desk area.						1			
				Supertrack, cast clinic across the hall and should be all together: MDU could be adjacent if space allows.							2		
				Although convenient, closest parking is very expensive; on street parking, or in the parkade, requires people to walk uphill; possibly they can come in at first floor entrance, and then to ED through the hospital, but this entrance is not always open, and finding the ED not that simple.			2						
				ED IV Therapy could be managed in MDU, if MDU was adjacent.							2		
				Crowded, congested, unable to expand and pull back as necessary as current space always in use. Insufficient space/privacy for psychiatric clients, 2nd pediatric bay required, 2nd resus bay required, insufficient space in supertrack and with volume and types of patients, no multipurpose room (conscious sedation): Expansion into current cardiology space, moving psychiatric assessment/stabilization psychiatric clients to IPU						3			

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	**results in ongoing or likely life safety or harm**	**results in a failure to achieve service access targets or priorities**	**results in a failure to achieve sustained or consistent service quality**	**results in a failure to achieve mandatory service accreditation or certification**	**results in a failure to achieve capacity targets/requirements**	**results in a failure to achieve operational efficiency (flows, adjacencies)**		
				Supertrack across the hall from the main ED, decreases some staffing efficiencies. Although our 3 streaming units are very affective.							2		
				Psychiatric interview in RAZ is ineffective and difficult to give best patient care.		2							
				No privacy, small areas, throughout entire department, infection control issues: single rooms, glass separation.		3							
				Family room often used for psych interview room.				3					
				Insufficient acute stretchers, isolation rooms to allow for cohorting and isolation. Additional negative pressure room required closer to acute for seriously ill patients. Need to incorporate capability to create a 6- 10 isolation "zone" that has a separate entry and exit with monitoring capability. This could be used as part of the regular ED to expand and retract when needed, and then as an isolated area when needed.		3							
				Triage area small, noisy behind desk, space could be improved to accommodate, pairing of registration/triage nurse							2		
				During dayshift, not enough desk/computers available. No private area in RAZ for dictating of clinical discussion/computer access/desk. EHS desk area required.							2		
				Supertrack across the hall creates increase travel time/staffing efficiencies							2		
				Not enough desk space, especially on dayshift						2			
				Acute med room small, unable to have more than 2 nurses at a time		3			3				
				Lack of space for supplies and equipment						2			
Support	3	Clinical Services	**Cardiology Diagnostics**	Patient Preparation area has very limited privacy				**3**					
				Temperature control and medical gases are required in the cardiac testing area		2							
				Limited space contributes to lack of patient/family privacy; difficult to maintain confidentiality		2							
				Additional work stations required for on-line access to ECGs							2		
				clerical workstation required for pt, registration & booking							2		
				Third stress testing area is required							2		
				Inadequate storage space leading to risk of cross contamination of supplies and equipment				**3**					
Support	3	Clinical Services	**Rapid Access Clinic**	size and location of clinic are adequate									
			ED Ambulatory Care (Short Term IV, Cast Clinic etc)	inadequate space for IV patients in this location; adjacency to MDU preferred				2					

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
				Cast Clinic could be moved but requires adjacency to ED and MI									
Support	3	Clinical Services	**Surgical - Operating Room/PACU**	Holding area is very small						2			
				Lack space to prep patients e.g. regional blocks						2			
Support	4	Clinical Services		Lack of a separate recovery suite to accommodate the needs of patients having C-sections				1					
				Need better storage systems within each Operating Room e.g. cupboards that have clear see though doors on them							1		
				Need better storage system within Sterile Core (rolling shelves preferred)							1		
				Lack of work space for nurses in individual ORs							2		
				Lack space to store Imaging equipment - currently using space in the holding area						1			
				Sterilized equipment housed in SPD on a different floor – elevator takes time to get equipment and phone system does not always work		2							
				Any increase in surgical procedures will increase the need for storage space						1			
				Insufficient space to accommodate family members In PACU				2					
				Insufficient space for storage in PACU							1		
Support	4	Clinical Services	**Labour and Delivery**	Unit does not meet standards of SRMC best practice model	2								
				Potential multiple pt. transfers due to lack of co-location/adjacency with post-partum & NICU		3							
				Birthing rooms are too small by current standards							2		
				Inadequate family waiting space				2					
				Inadequate staff work space and equipment storage							2		
Support	4	Clinical Services	**Surgical Day Care Unit**	On busy days, there is not enough space for pre and post op patients						1			
				Lack of patient privacy and hence confidentiality		3							
				Lacks family support space				2					
				Dirty utility room inadequate size		2							
				Storage space for supplies is inadequate						2			

Legend:

Low	1
Medium	2
High	3

Building	Level	Functional Group	Component Name	Space Issue/Opportunity	Strategic Priority	Patient/Staff Safety/Outcomes	Service Access	Service Quality	Accreditation or Certification	Service Capacity	Operational Efficiency	Infrastructure	Capacity Available
					impacts ability to achieve a strategic priority	results in ongoing or likely life safety or harm	results in a failure to achieve service access targets or priorities	results in a failure to achieve sustained or consistent service quality	results in a failure to achieve mandatory service accreditation or certification	results in a failure to achieve capacity targets/requirements	results in a failure to achieve operational efficiency (flows, adjacencies)		
Nursing Tower	Basement	Administration & Related Services	**People & Organization Development**	No space issues identified									
Nursing Tower	Basement	Clinical Support Services	**MRI**	No space issues identified									
Nursing Tower	Basement	Administration & Related Services	**Staff Facilities**	No space issues identified									
Nursing Tower	Basement		**Storage**	No space issues identified									
Nursing Tower	1	Clinical Services	**Oncology Clinic**	Service could potentially be moved to ambulatory care building									

Bundle Name	Priority	Master Program Component	Location	Objectives				Immediate Issues	Risks	Opportunities			Next Steps
										Short term 0-3 years	Medium term 4-10 years	Long term 10 +years	
				Standards Compliance	Quality Care Environme	Operational Efficiency	Capacity						
Inpatient Units	Very High	**Cardiac Inpatient Unit**	**Nursing Tower 3**	✓	✓	✓	✓			1.Increase handwashing and equipment cleaning,add touch down spaces,washrooms, waste disposal 2.Increase wheechair accessibility 3.Single room occupancy,negative pressure	1. Increase space 2.Add beds 3. Correct proximity issues 4. Layout optimization		1. Development site plan to match space/infrastructure requirements to demand
		Tertiary Hospice Palliative Care Unit	**Nursing Tower 2**	✓	✓	✓	✓			1. Increase workspaces			
		Maternity/Newborn Inpatient Unit	**Support 4**	✓	✓	✓	✓						
		Neonatal Intensive Care Unit	**Nursing Tower 1**	✓	✓	✓	✓			1. Resolve access/security 2. Handwashing and equipment cleaning			
		General Medical Surgical Inpatient Units	**Nursing Tower 2,3,4**	✓	✓	✓	✓			1. Increase touchdown workspaces 2. Waste disposal and washrooms 3. Eldercare, wheelchair accessibility			
		Older Adult Program – ACE Unit & Consultation	**52-58 Level 5**	✓	✓	✓	✓			1. Increase handwashing, washrooms, 2. Increase staff touchdown stations			
		Mental Health and Substance Use Inpatient Unit	**Cascade 2,3**	✓	✓	✓	✓			1. Correct inefficient plan 2 . Better wayfinding			
		Transitional Care Unit	**52-58 Level 4**	✓	✓	✓	✓			1. Move offsite			
Emergency	Very High	**Emergency Department (includes Cast Clinic)**	**Support 3**	✓	✓	✓	✓	Space deficiency, plan to relocate Cardiology notional estimate of $1.85m		1. Build security office 2. Functional review 3. Better desk area at ambulance entrance	1. Increase space 2. Correct proximity issues 3. Layout optimization mprove proximity/space issues		1. Confirm space, infrastructure requirements 2. Identify options for meeting current/future needs
Surgical Services	High to Very High	**OR Booking**	**Support 1**	✓	✓	✓	✓	Additional workstation required	Patient /staff safety, capacity	1. Add workstation	1. Increase space 2. Correct proximity issues 3. Layout optimization		1. Assess space, infrastructure, and adjacency requirements 2. Determine critical needs and options for resolution
		Preadmission Clinic	**Support 1**	✓	✓	✓	✓	space deficiency, storage,	Patient /staff safety, capacity	1. Add exam room 2. Functional review			
		Ambulatory Care Clinic	**Nursing Tower 4**	✓	✓	✓	✓	Scope storage, scope cleaning, leaking ceilings, space deficiency	Infection, cross contamination, Accreditation, wait lists	1. Scope cleaning room 2.Functional Review			
		SPD/Medical Device Reprocessing	**Support 2**	✓	✓	✓	✓	IFC issues- ceiling, floors, dehumidification, computer + phone communications,sinks, space deficiency	Infection, cross contamination, Accreditation, Patient /staff safety, capacity	1. Sinks, loading carts for sterilizers 2. Replace ceiling,flooring 3. Equipment upgrade 4. HVAC upgrade 5. Upgrade communications with OR, phones, wireless 6.Functional Review			
		SDCU and Surgical Suite	**Support 4**	✓	✓	✓	✓	Space deficiency, storage, privacy	Patient /staff safety, capacity	1. Better storage systems - with glass doors, rolling shelves 2. More workspaces 3.Functional review			

Bundle Name	Priority	Objectives	Key Issues Next Steps		Master Program Component	Quality Care & Patient Safety	Operations & Business Support	Reputation and Public Image	Physical Assets	Enivronment, Health & Safety	Policy & Standards	Score
Inpatient Units	Very High	Standards Compliance Quality Care Environment Operational Efficiency Capacity	Insufficient space and clinical/operational components 1. Address Critical Issues 2. Development site plan to match space/infrastructure requirements to demand	A.1	Cardiac Inpatient Unit	1	1	1	1	1	1	6
				A.7	Tertiary Hospice Palliative Care Unit	1	1	1	1	1	1	6
				A.9	Maternity/Newborn Inpatient Unit	1	1	1	1	1	1	6
				A.11	Neonatal Intensive Care Unit	1	1	1	1	1	1	6
				A.13	General Medical Surgical Inpatient Units	1	1	1	1	1	1	6
				A.17	Older Adult Program – ACE Unit & Consultation	1	1	1	1	1	1	6
				A.15	Mental Health and Substance Use Inpatient Unit	1	1	1	1	1	1	6
				A.19	Transitional Care Unit	1	1	1	1	1	1	6
Emergency	Very High	Standards Compliance Quality Care Environment Operational Efficiency Capacity	Functional Space Challenges/Deficiencies 1. Functional Assessment 2. Validate space/infrastructure requirements 3. Identify options for meeting current/future needs	A.6	Emergency Department (includes Cast Clinic)	1	1	1	1	1	1	6
Surgical Service	High to Very H	Standards Compliance Quality Care Environment Operational Efficiency Capacity	Poor functional fit of Service to Space 1. Address immediate risks 2. Develop clear service plan 3. Functional assessment 4. ID Development Opportunities	A.21	OR Booking, Preadmission Clinic & Ambulatory Care Clinic	1	1	1	1	1	1	6
				A.22	SPD/Medical Device Reprocessing	1	1	1	1	1	1	6
				A.20	SDCU and Surgical Suite		1				1	2
Ambulatory Sen	Medium to Hig	Operational Efficiency Best Use of Sapce	Poor fit of Service to Space 1. Assess/monitor risks 2. Identify opportunities as needed	A.14	Medicine Outpatient Services	1	1				1	3
				A.18	Diabetes Education Centre – Primary Care Program	1	1		1			3
				A.2	Healthy Heart Program			1	1			2
				A.16	Mental Health and Substance Use Outpatient Services			1		1		2
				A.10	Primary Care Maternity Clinic		1					1
Other	Medium	To be determined	1. Assess/monitor risks 2. Identify opportunities as needed	A.4	Diagnostic Cardiology		1					1
				A.5	Critical Care Program (Respiratory Therapy & Pulmonary Function Lab)	1	1			1	1	4
				B.5	Pharmacy	1	1			1	1	4
				A.8	Community Connections – Home & Community Care Program		1		1	1		3
				B.3	Laboratory Medicine & Pathology and Morgue		1		1	1		3
				C.6	In-Hospital Replenishment	1	1		1			3
				A.12	Pediatrics	1	1					2
				C.2	FMO		1			1		2
				B.6	Rehabilitation Program (PT, OT, SW, SLP)		1					1
				C.10	Biomedical Engineering		1					1
				C.3	Food and Nutrition Services		1					1
				C.4	Housekeeping & Waste Management		1					1
				C.5	Laundry and Linen		1					1
				C.9	Health Information Management		1					1
				D.1	Administration and Related Services		1					1
				D.2	Burnaby Hospital Foundation		1					1
				D.3	Volunteer Resources		1					1
				A.3	Rapid Access OP Clinic							0
				B.1	Clinical Nutrition							0
				B.2	Infection Prevention & Control							0
				B.4	Medical Imaging							0
				C.7	IM/IT							0
				C.8	Integrated Protection Services							0

Immediate Priorities

(not in 52+58 buildings)

	Program	Location	Scope	Cost	Risks
1	**Endoscopy**	4th Floor, Nursing Tower	Scope storage, scope cleaning, leaking ceilings, functional review	$.5m	Infection, cross contamination, Accreditation, wait lists
2	**SPD**	Level 2, support	IFC issues- ceiling, floors, dehumidification,computer+ phone communications,sinks, functional review	$.5m	
3	**Negative pressure rooms**	Number and locations TBD		$250k	
4	**Emergency**	Level 3, support	Functional review, plan to relocate Cardiology notional estimate of $1.85m	$1.85m	
5	**Nursing Tower**	All Levels,	Handwashing sinks, patient washrooms not HC accessible, shared showers FMO estimate $813,000 probably low and would reduce census	$1.5m	
6	**FMO items**		Emergency Generator	$3.9m	
		Support	Chiller Replacement	$650k	
			Steam Boiler Replacement	$400k	
			Building envelope issues(roofing, waterproofing walls	$800k	
		Nursing Tower	Asbestos abatement	$1m	
		Cascade	Windows	$300k	
		Cascade	Electrical panels	$160k	
		Cascade	Sprinker deficiencies	$300k	
		Cascade	Door hardware (accessible)	$150k	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 1**

No. 1 **Location:** Gym - Cascade Building

Project Number:	20-13-01	Revision:	0	**U =**	**Unrestrained**
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	**PR =**	**Partially Restrained**
Client:	Bush Bohman Partners	Checked by:	AM	**R =**	**Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-1.1	1.1	Gym					√	U	Gym equipment is seldomly fastened down, but there a methods of doing so without impeding use.
20-13-01-1.2	1.2	Gym					√	U	
20-13-01-1.3	1.3	Gym					√	U	
20-13-01-1.4	1.4	Gym					√	U	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 1**

No. 2 **Location:** **Building Systems - Cascade Building**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-2.1	2.1	Building Systems					√	PR	
20-13-01-2.2	2.2	Building Systems					√	R	Most of the pipe runs in the service tunnels are fastened to the walls.
20-13-01-2.3	2.3	Building Systems					√	R	The restraint installed during the Seismic Mitigation Program is still largely in place.
20-13-01-2.4	2.4	Building Systems					√	PR	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 2**

No. 3 **Location:** **Mental Health- Primary Care - Adult Day - Cascade Building**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-3.1	3.1	Mental Health Offices					√	PR	
20-13-01-3.2	3.2	Mental Health Services					√	PR	
20-13-01-3.3	3.3	Mental Health Services					√	R	The suspended ceilings along egress routes are restrained to the ASTM E580 standard.
20-13-01-3.4	3.4	Mental Health Services					√	PR	While the filing shelf is restrained, none of the files are.

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 3**

No. 4 **Location:** Mental Health - In & Out Patient - Cascade Building

Project Number:	20-13-01	Revision:	0	**U =**	**Unrestrained**
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	**PR =**	**Partially Restrained**
Client:	Bush Bohman Partners	Checked by:	AM	**R =**	**Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-4.1	4.1	Patient Rooms					√	PR	
20-13-01-4.2	4.2	Reception					√	PR	
20-13-01-4.3	4.3	Common area					√	U	
20-13-01-4.4	4.4	Storage					√	U	Stored equipment can be enclosed to avoid toppling and sliding.

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 1**

No. 5 **Location:** **Plant Services/Boiler Plant**

Project Number:	20-13-01	Revision:	0	
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	
Client:	Bush Bohman Partners	Checked by:	AM	

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-5.1	5.1	Boiler Plant					√	R	
20-13-01-5.2	5.2	Boiler Plant					√	R	All the main equipment is anchored due to operating vibration and are generally restrained adequately for seismic forces.
20-13-01-5.3	5.3	Boiler Plant					√	U	Potentially toxic liquids should only be in restrained containers.
20-13-01-5.4	5.4	Boiler Plant					√	R	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 0**

No. 6 **Location:** **Electrical - Mechanical Tunnels**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/ Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-6.1	6.1	Elect./Mech. Tunnels					√	R	
20-13-01-6.2	6.2	Elect./Mech. Tunnels					√	PR	Gas bottles are a significant hazard during seismic events. The chain allows the base of the tank to kick out, levering the valve stem against the wall. Should it break, a rocket is loose in the facility.
20-13-01-6.3	6.3	Elect./Mech. Tunnels					√	PR	
20-13-01-6.4	6.4	Elect./Mech. Tunnels					√	R	

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: **24-Jan-13** **Level 1**

No. **7** **Location:** **Housekeepng - Food Services - North Wing**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-7.1	7.1	Housekeeping					√	PR	
20-13-01-7.2	7.2	Kitchen					√	PR	Kitchens are a particular challenge for seismic restraint. The restraint fittings must be designed to avoid hygiene issues.
20-13-01-7.3	7.3	Dish Washing					√	U	
20-13-01-7.4	7.4	Food Storage					√	U	Food storage shelving is prone to tipping and the unitized construction makes them difficult to restrain.

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 3**

No. 8 **Location:** Cafeteria & Admin. - North Wing

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-8.1	8.1	Cafeteria					√	PR	
20-13-01-8.2	8.2	Admin					√	U	
20-13-01-8.3	8.3	Admin					√	PR	
20-13-01-8.4	8.4	Admin					√	PR	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 4**

No. 9 **Location:** **Medicine 4B & Transitional Care - North & West Wings**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-9.1	9.1	Transitional Care					√	PR	Patient rooms have much of the equipment attached to the walls. Care must always be taken to lock bed wheels.
20-13-01-9.2	9.2	Medicine 4B					√	PR	
20-13-01-9.3	9.3	Medicine 4B					√	PR	
20-13-01-9.4	9.4						√		

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 5**

No. 10 **Location:** West Wing - Plant Maintenance, Occ. Therapy, ACE

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-10.1	10.1	Maintenance					√	U	The maintenance area and stores needs restraint and containerization to assure service performance following a quake.
20-13-01-10.2	10.2	Occupational Health					√	U	
20-13-01-10.3	10.3	ACE					√	PR =	
20-13-01-10.4	10.4	ACE					√	U	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level** 6

No. 11 **Location:** North & West Wings - Biomed Tech, Plant Services, Info. Tech, Support Services

Project Number:	20-13-01	Revision:	0	U = Unrestrained
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	PR = Partially Restrained
Client:	Bush Bohman Partners	Checked by:	AM	R = Restrained

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-11.1	11.1	Biomed Tech					√	PR	
20-13-01-11.2	11.2	Biomed Tech					√	PR	The biomed tech area has large numbers of parts which are not containerized and restrained.
20-13-01-11.3	11.3	Offices					√	U	
20-13-01-11.4	11.4						√		

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 7**

No. 12 **Location:** North & West Wing - Health Heart, Social Work

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-12.1	12.1	Gym					√	U	
20-13-01-12.2	12.2	Offices					√	U	
20-13-01-12.3	12.3						√		
20-13-01-12.4	12.4						√		

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 1**

No. 13 **Location:** **Support Building - Records, Laboratory, Optimization, Physiotherapy**

Project Number:	20-13-01	Revision:	0	**U =**	**Unrestrained**
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	**PR =**	**Partially Restrained**
Client:	Bush Bohman Partners	Checked by:	AM	**R =**	**Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-13.1	13.1	Health Records					√	PR	
20-13-01-13.2	13.2	Lab					√	U	The lab had a large amount of work done during the Seismic Mitigation Program. Some of the restraints have been removed and there is a large amount of new equipment, which has not been restrained.
20-13-01-13.3	13.3	Lab					√	R	
20-13-01-13.4	13.4	Lab					√	U	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 2**

No. 14 **Location:** **Support Building - Laundry, Sterile Processing, Pharmacy**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-14.1	14.1	Laundry					√	U	
20-13-01-14.2	14.2	Sterile Processing					√	U	Very little of the equipment in sterile processing is restrained.
20-13-01-14.3	14.3	Pharmacy					√	U	The pharmacy supplies are largely unrestrained and will take sifnificant time to sort and reshelve following a quake. Should the sprinklers discharge or should the be flooding, much of the product would likely be lost.
20-13-01-14.4	14.4	Pharmacy					√	U	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 3**

No. 15 **Location:** **Support Building - Emergency, Nuclear Medicine, Medical Imaging, Ambulatory Care**

Project Number:	20-13-01	Revision:	0	**U =** **Unrestrained**
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	**PR =** **Partially Restrained**
Client:	Bush Bohman Partners	Checked by:	AM	**R =** **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-15.1	15.1	Emergency					√	PR	The emergency department is a challenge for
20-13-01-15.2	15.2	Nuclear Medicine					√	R	The imaging equipment is well anchored due to the need to avoid movement.
20-13-01-15.3	15.3	Medical Imaging					√	PR	
20-13-01-15.4	15.4	Ambulatory Care					√	U	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 4**

No. 16 **Location:** Support Building - Ors

Project Number:	20-13-01	Revision:	0	
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	
Client:	Bush Bohman Partners	Checked by:	AM	

U = **Unrestrained**

PR = **Partially Restrained**

R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-16.1	16.1	Operating Rooms					√	PR	The operating rooms have had seismic design done on the Zeiss OR microscopes, but other equipment and supplies have not received much attention.
20-13-01-16.2	16.2	Operating Rooms					√	PR	
20-13-01-16.3	16.3	Operating Rooms					√	PR	
20-13-01-16.4	16.4	Operating Rooms					√	PR	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 5**

No. 17 **Location:** **Support Building - Mechanical/Electrical Penthouses**

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

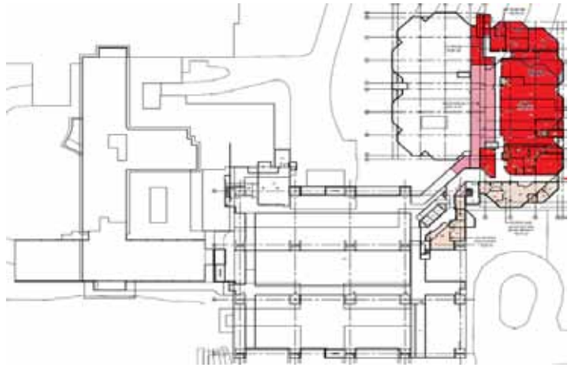
A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-17.1	17.1	Mech/Elec. Penthouses					√	R	
20-13-01-17.2	17.2	Mech/Elec. Penthouses					√	R	The equipment in the mechanical/electrical penthouses received a significant amount of seismic mitigation attention during the Seismic Mitigation Program.
20-13-01-17.3	17.3	Mech/Elec. Penthouses					√	R	
20-13-01-17.4	17.4	Cooling Tower					√	R	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level** 0

No. 18 **Location:** Nursing Tower - Telecom, IT, MRI



Project Number:	20-13-01	Revision:	0	
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	
Client:	Bush Bohman Partners	Checked by:	AM	

U = **Unrestrained**

PR = **Partially Restrained**

R = **Restrained**

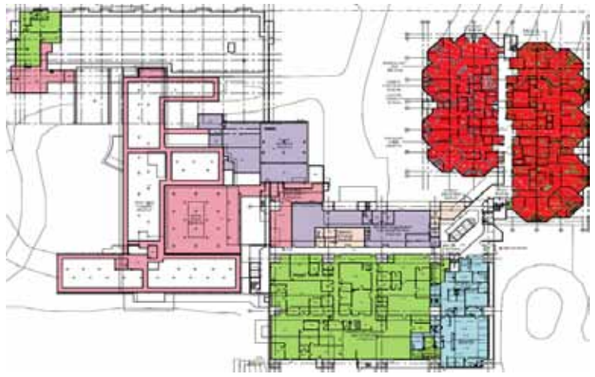
A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-18.1	18.1	Telecom					√	R	The telecom equipment is well anchored.
20-13-01-18.2	18.2	IT					√	U	The IT equipment, on a raised access floor, is not properly restrained and represents a high seismic risk.
20-13-01-18.3	18.3	IT					√	U	
20-13-01-18.4	18.4	MRI					√	R	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 1**

No. 19 **Location:** Nursing Tower - ICU, Neonatal, Medical Day, Oncology



Project Number:	20-13-01	Revision:	0	
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	
Client:	Bush Bohman Partners	Checked by:	AM	

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-19.1	19.1	ICU					√	PR	Much of the equipment in the nursing tower is on wheels for flexible operation, but represents a hazard. Docking stations should be devised.
20-13-01-19.2	19.2	Neonatal					√	PR	
20-13-01-19.3	19.3	Medical Day Care					√	PR	
20-13-01-19.4	19.4	Oncology					√	PR	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 2**

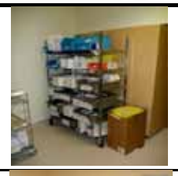
No. 20 **Location:** Nursing Tower - Medical, Hospice

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**

PR = **Partially Restrained**

R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-20.1	20.1	Medical					√	PR	
20-13-01-20.2	20.2	Medical					√	U	
20-13-01-20.3	20.3	Medical					√	U	
20-13-01-20.4	20.4	Hospice					√	PR	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level 3**

No. 21 **Location:** Nursing Tower - ICU, Cardiac, Medical

Project Number:	20-13-01	Revision:	0
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL
Client:	Bush Bohman Partners	Checked by:	AM

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	No.	Area/System/Component	Photo	Schematic Layout (Not to Scale)	I_E= 1.0	1.3	1.5	Rest	Comments
20-13-01-21.1	21.1	ICU					√	U	
20-13-01-21.2	21.2	Cardiac					√	PR	
20-13-01-21.3	21.3	Medical					√	PR	
20-13-01-21.4	21.4	Medical					√	PR	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level** 4

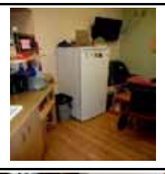
No. 22 **Location:** Nursing Tower - Ambulatory Care, Orthopedics, Surgical

Project Number:	20-13-01	Revision:	0	
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	
Client:	Bush Bohman Partners	Checked by:	AM	

U = **Unrestrained**

PR = **Partially Restrained**

R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-22.1	22.1	Ambulatory Care					√	U	
20-13-01-22.2	22.2	Orthopedics					√	U	
20-13-01-22.3	22.3	Surgical					√	U	
20-13-01-22.4	22.4	Surgical					√	U	

List of Operational & Functional Components

Burnaby Hospital Seismic Risk Screening

Date: 24-Jan-13 **Level** 2

No. 23 **Location:** Exterior Grounds - Tanks

Project Number:	20-13-01	Revision:	0	
Project:	Burnaby Hosp. - OFC Screen	Prepared by:	JL	
Client:	Bush Bohman Partners	Checked by:	AM	

U = **Unrestrained**
PR = **Partially Restrained**
R = **Restrained**

A	B	C	D	E	F	G	H		
OFC Det. #	**No.**	**Area/System/Component**	**Photo**	**Schematic Layout (Not to Scale)**	**I_E= 1.0**	**1.3**	**1.5**	**Rest**	**Comments**
20-13-01-22.1	22.1	Gas Tanks					√	R	The exteriou tanks are all well anchored, although some of the fitting are showing signs of oxidation.
20-13-01-22.2	22.2	Fuel Tanks					√	R	
20-13-01-22.3	22.3						√		
20-13-01-22.4	22.4						√		

Low Range Breakdown – Based on Site Development Drawings (Section 10)

Burnaby Hospital High-Level Master Plan
Program Estimate #1
December 21, 2012

5.0 PROJECT COST ESTIMATE

The estimated project costs may be summarized as follows:

Description	Phase 1A			Phase 1B			Phase 2A			Phase 2B			TOTAL		
	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Total
A. LAND COST	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
1 Land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 Legal Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. CONSTRUCTION	**$32,940,800**	**$28,160,800**	**$61,101,600**	**$0**	**$38,444,800**	**$38,444,800**	**$0**	**$141,237,200**	**$141,237,200**	**$54,337,400**	**$0**	**$54,337,400**	**$87,278,200**	**$207,842,800**	**$295,121,000**
1 New Build	0	21,485,600	21,485,600	0	33,632,500	33,632,500	0	120,390,700	120,390,700	0	0	0	0	175,508,800	175,508,800
2 Renovation	25,989,000	0	25,989,000	0	0	0	0	0	0	49,397,600	0	49,397,600	75,386,600	0	75,386,600
3 Underground Parkade	0	4,036,200	4,036,200	0	0	0	0	16,736,500	16,736,500	0	0	0	0	20,772,700	20,772,700
4 Site Development (Allowance)	0	770,000	770,000	0	1,010,000	1,010,000	0	4,110,000	4,110,000	0	0	0	0	5,890,000	5,890,000
5 Ancillary Works (Interfaces, etc.)	0	1,869,000	1,869,000	0	1,865,300	1,865,300	0	0	0	0	0	0	0	3,734,300	3,734,300
6 Demolition	0	0	0	0	1,937,000	1,937,000	0	0	0	0	0	0	0	1,937,000	1,937,000
7 Existing Central Plant Room Upgrade (Allowance)	3,957,200	0	3,957,200	0	0	0	0	0	0	0	0	0	3,957,200	0	3,957,200
8 Phasing Premium on Renovations	2,994,600	0	2,994,600	0	0	0	0	0	0	4,939,800	0	4,939,800	7,934,400	0	7,934,400
9 Off-Site Works (Excluded)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Asbestos Removal (Excluded)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C. ALLOWANCES	**$8,729,300**	**$4,364,900**	**$13,094,200**	**$0**	**$5,959,000**	**$5,959,000**	**$0**	**$21,891,700**	**$21,891,700**	**$14,399,400**	**$0**	**$14,399,400**	**$23,128,700**	**$32,215,600**	**$55,344,300**
1 Design Contingency (Design & Program Changes)	4,941,100	2,816,100	7,757,200	0	3,844,500	3,844,500	0	14,123,700	14,123,700	8,150,600	0	8,150,600	13,091,700	20,784,300	33,876,000
2 Post Tender Change Order Contingency	3,788,200	1,548,800	5,337,000	0	2,114,500	2,114,500	0	7,768,000	7,768,000	6,248,800	0	6,248,800	10,037,000	11,431,300	21,468,300
D. PROFESSIONAL FEES	**$5,542,200**	**$3,669,000**	**$9,211,200**	**$0**	**$5,008,600**	**$5,008,600**	**$0**	**$18,401,000**	**$18,401,000**	**$9,142,000**	**$0**	**$9,142,000**	**$14,684,200**	**$27,078,600**	**$41,762,800**
1 Programming	83,300	48,800	132,100	0	66,600	66,600	0	244,700	244,700	137,500	0	137,500	220,800	360,100	580,900
2 Architectural	2,708,600	1,831,200	4,539,800	0	2,499,900	2,499,900	0	9,184,200	9,184,200	4,467,900	0	4,467,900	7,176,500	13,515,300	20,691,800
3 Structural	520,900	325,300	846,200	0	444,000	444,000	0	1,631,300	1,631,300	859,200	0	859,200	1,380,100	2,400,600	3,780,700
4 Mechanical	1,041,800	650,500	1,692,300	0	888,100	888,100	0	3,262,600	3,262,600	1,718,400	0	1,718,400	2,760,200	4,801,200	7,561,400
5 Electrical	520,900	325,300	846,200	0	444,000	444,000	0	1,631,300	1,631,300	859,200	0	859,200	1,380,100	2,400,600	3,780,700
6 Cost Consultant	250,000	162,600	412,600	0	222,000	222,000	0	815,600	815,600	412,400	0	412,400	662,400	1,200,200	1,862,600
7 LEED Consultant (Excluded)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 Other Consultants and Disbursements	416,700	325,300	742,000	0	444,000	444,000	0	1,631,300	1,631,300	687,400	0	687,400	1,104,100	2,400,600	3,504,700
E. CONNECTION FEES & PERMITS	**$389,600**	**$337,100**	**$726,700**	**$0**	**$474,000**	**$474,000**	**$0**	**$1,739,700**	**$1,739,700**	**$642,400**	**$0**	**$642,400**	**$1,032,000**	**$2,550,800**	**$3,582,800**
1 Development Cost Charges	0	32,900	32,900	0	58,800	58,800	0	215,600	215,600	0	0	0	0	307,300	307,300
2 Building Permits	389,600	304,200	693,800	0	415,200	415,200	0	1,524,100	1,524,100	642,400	0	642,400	1,032,000	2,243,500	3,275,500
F. MANAGEMENT & OVERHEAD	**$3,854,600**	**$2,520,800**	**$6,375,400**	**$0**	**$3,441,200**	**$3,441,200**	**$0**	**$12,642,400**	**$12,642,400**	**$6,358,200**	**$0**	**$6,358,200**	**$10,212,800**	**$18,604,400**	**$28,817,200**
1 Project Management Fee	1,041,800	813,100	1,854,900	0	1,110,100	1,110,100	0	4,078,200	4,078,200	1,718,400	0	1,718,400	2,760,200	6,001,400	8,761,600
2 Owners Planning and Administrative Cost	520,900	406,600	927,500	0	555,000	555,000	0	2,039,100	2,039,100	859,200	0	859,200	1,380,100	3,000,700	4,380,800
3 Project Insurance	625,100	487,900	1,113,000	0	666,100	666,100	0	2,446,900	2,446,900	1,031,100	0	1,031,100	1,656,200	3,600,900	5,257,100
4 Project Commissioning	416,700	325,300	742,000	0	444,000	444,000	0	1,631,300	1,631,300	687,400	0	687,400	1,104,100	2,400,600	3,504,700
5 Temporary Facilities (Allowance)	416,700	162,600	579,300	0	222,000	222,000	0	815,600	815,600	687,400	0	687,400	1,104,100	1,200,200	2,304,300
6 Moving and Decanting (Allowance)	833,400	325,300	1,158,700	0	444,000	444,000	0	1,631,300	1,631,300	1,374,700	0	1,374,700	2,208,100	2,400,600	4,608,700
G. PROJECT CONTINGENCY (5% of Items D to F)	**$489,300**	**$326,300**	**$815,600**	**$0**	**$446,200**	**$446,200**	**$0**	**$1,639,200**	**$1,639,200**	**$807,100**	**$0**	**$807,100**	**$1,296,400**	**$2,411,700**	**$3,708,100**
H. FURNISHINGS, FITTINGS & EQUIPMENT (Allowance)	**$6,497,300**	**$8,594,200**	**$15,091,500**	**$0**	**$13,453,000**	**$13,453,000**	**$0**	**$48,156,300**	**$48,156,300**	**$12,349,400**	**$0**	**$12,349,400**	**$18,846,700**	**$70,203,500**	**$89,050,200**
SUB-TOTAL	**$58,443,100**	**$47,973,100**	**$106,416,200**	**$0**	**$67,226,800**	**$67,226,800**	**$0**	**$245,707,500**	**$245,707,500**	**$98,035,900**	**$0**	**$98,035,900**	**$156,479,000**	**$360,907,400**	**$517,386,400**
I TAXES (Excluded)	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SUB-TOTAL PROJECT COST	**$58,443,100**	**$47,973,100**	**$106,416,200**	**$0**	**$67,226,800**	**$67,226,800**	**$0**	**$245,707,500**	**$245,707,500**	**$98,035,900**	**$0**	**$98,035,900**	**$156,479,000**	**$360,907,400**	**$517,386,400**
J ESCALATION (Excluded)	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
TOTAL PROJECT COST (December 2012 Dollars)	**$58,443,100**	**$47,973,100**	**$106,416,200**	**$0**	**$67,226,800**	**$67,226,800**	**$0**	**$245,707,500**	**$245,707,500**	**$98,035,900**	**$0**	**$98,035,900**	**$156,479,000**	**$360,907,400**	**$517,386,400**
Gross Floor Area (New Build)		3,766 m²	3,766 m²		6,735 m²	6,735 m²		24,712 m²	24,712 m²		0 m²	0 m²		35,214 m²	35,214 m²
Gross Floor Area (Renovation)	6,079 m²		6,079 m²	0 m²		0 m²	0 m²		0 m²	12,060 m²		12,060 m²	18,139 m²		18,139 m²
Net Building Cost $/m²	$4,275 /m²	$5,705 /m²	$4,822 /m²		$4,994 /m²	$4,994 /m²		$4,872 /m²	$4,872 /m²	$4,096 /m²		$4,096 /m²	$4,156 /m²	$4,984 /m²	$4,703 /m²
Net Construction Cost $/m²	$5,419 /m²	$7,478 /m²	$6,206 /m²		$5,708 /m²	$5,708 /m²		$5,715 /m²	$5,715 /m²	$4,506 /m²		$4,506 /m²	$4,812 /m²	$5,902 /m²	$5,532 /m²
Total Project Cost $/m²	$9,614 /m²	$12,738 /m²	$10,809 /m²		$9,981 /m²	$9,981 /m²		$9,943 /m²	$9,943 /m²	$8,129 /m²		$8,129 /m²	$8,627 /m²	$10,249 /m²	$9,697 /m²

High Range Breakdown – Based on Master Program (Section 6)

Burnaby Hospital High-Level Master Plan
Program Estimate #3
March 8, 2013

5.0 PROJECT COST ESTIMATE

The estimated project costs may be summarized as follows:

Description	Phase 1A			Phase 1B			Phase 2A			Phase 2B			Phase 3A			TOTAL		
	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Sub-Total	Renovation	New Addition	Total
A. LAND COST	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
1 Land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 Legal Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. CONSTRUCTION	**$32,940,800**	**$35,837,300**	**$68,778,100**	**$0**	**$55,163,300**	**$55,163,300**	**$0**	**$176,126,100**	**$176,126,100**	**$54,337,400**	**$0**	**$54,337,400**	**$0**	**$116,428,400**	**$116,428,400**	**$87,278,200**	**$383,555,100**	**$470,833,300**
1 New Build	0	28,484,800	28,484,800	0	49,861,000	49,861,000	0	152,644,500	152,644,500	0	0	0	0	109,205,400	109,205,400	0	340,195,700	340,195,700
2 Renovation	25,989,000	0	25,989,000	0	0	0	0	0	0	49,397,600	0	49,397,600	0	0	0	75,386,600	0	75,386,600
3 Underground Parkade	0	4,036,200	4,036,200	0	0	0	0	18,351,600	18,351,600	0	0	0	0	2,923,900	2,923,900	0	25,311,700	25,311,700
4 Site Development (Allowance)	0	980,000	980,000	0	1,500,000	1,500,000	0	5,130,000	5,130,000	0	0	0	0	3,360,000	3,360,000	0	10,970,000	10,970,000
5 Ancillary Works (Interfaces, etc.)	0	2,336,300	2,336,300	0	1,865,300	1,865,300	0	0	0	0	0	0	0	322,000	322,000	0	4,523,600	4,523,600
6 Demolition	0	0	0	0	1,937,000	1,937,000	0	0	0	0	0	0	0	617,100	617,100	0	2,554,100	2,554,100
7 Existing Central Plant Room Upgrade (Allowance)	3,957,200	0	3,957,200	0	0	0	0	0	0	0	0	0	0	0	0	3,957,200	0	3,957,200
8 Phasing Premium on Renovations	2,994,600	0	2,994,600	0	0	0	0	0	0	4,939,800	0	4,939,800	0	0	0	7,934,400	0	7,934,400
9 Off-Site Works (Excluded)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Asbestos Removal (Excluded)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C. ALLOWANCES	**$8,729,300**	**$5,554,800**	**$14,284,100**	**$0**	**$8,550,300**	**$8,550,300**	**$0**	**$27,299,500**	**$27,299,500**	**$14,399,400**	**$0**	**$14,399,400**	**$0**	**$18,046,400**	**$18,046,400**	**$23,128,700**	**$59,451,000**	**$82,579,700**
1 Design Contingency (Design & Program Changes)	4,941,100	3,583,700	8,524,800	0	5,516,300	5,516,300	0	17,612,600	17,612,600	8,150,600	0	8,150,600	0	11,642,800	11,642,800	13,091,700	38,355,400	51,447,100
2 Post Tender Change Order Contingency	3,788,200	1,971,100	5,759,300	0	3,034,000	3,034,000	0	9,686,900	9,686,900	6,248,800	0	6,248,800	0	6,403,600	6,403,600	10,037,000	21,095,600	31,132,600
D. PROFESSIONAL FEES	**$5,542,200**	**$4,669,000**	**$10,211,200**	**$0**	**$7,186,900**	**$7,186,900**	**$0**	**$22,946,500**	**$22,946,500**	**$9,142,000**	**$0**	**$9,142,000**	**$0**	**$15,168,600**	**$15,168,600**	**$14,684,200**	**$49,971,000**	**$64,655,200**
1 Programming	83,300	62,100	145,400	0	95,600	95,600	0	305,100	305,100	137,500	0	137,500	0	201,700	201,700	220,800	664,500	885,300
2 Architectural	2,708,600	2,330,400	5,039,000	0	3,587,100	3,587,100	0	11,452,900	11,452,900	4,467,900	0	4,467,900	0	7,570,900	7,570,900	7,176,500	24,941,300	32,117,800
3 Structural	520,900	413,900	934,800	0	637,100	637,100	0	2,034,300	2,034,300	859,200	0	859,200	0	1,344,700	1,344,700	1,380,100	4,430,000	5,810,100
4 Mechanical	1,041,800	827,800	1,869,600	0	1,274,300	1,274,300	0	4,068,500	4,068,500	1,718,400	0	1,718,400	0	2,689,500	2,689,500	2,760,200	8,860,100	11,620,300
5 Electrical	520,900	413,900	934,800	0	637,100	637,100	0	2,034,300	2,034,300	859,200	0	859,200	0	1,344,700	1,344,700	1,380,100	4,430,000	5,810,100
6 Cost Consultant	250,000	207,000	457,000	0	318,600	318,600	0	1,017,100	1,017,100	412,400	0	412,400	0	672,400	672,400	662,400	2,215,100	2,877,500
7 LEED Consultant (Excluded)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 Other Consultants and Disbursements	416,700	413,900	830,600	0	637,100	637,100	0	2,034,300	2,034,300	687,400	0	687,400	0	1,344,700	1,344,700	1,104,100	4,430,000	5,534,100
E. CONNECTION FEES & PERMITS	**$389,600**	**$430,000**	**$819,600**	**$0**	**$681,200**	**$681,200**	**$0**	**$2,175,200**	**$2,175,200**	**$642,400**	**$0**	**$642,400**	**$0**	**$1,435,300**	**$1,435,300**	**$1,032,000**	**$4,721,700**	**$5,753,700**
1 Development Cost Charges	0	43,000	43,000	0	85,700	85,700	0	274,800	274,800	0	0	0	0	178,900	178,900	0	582,400	582,400
2 Building Permits	389,600	387,000	776,600	0	595,500	595,500	0	1,900,400	1,900,400	642,400	0	642,400	0	1,256,400	1,256,400	1,032,000	4,139,300	5,171,300
F. MANAGEMENT & OVERHEAD	**$3,854,600**	**$3,207,900**	**$7,062,500**	**$0**	**$4,937,700**	**$4,937,700**	**$0**	**$15,765,500**	**$15,765,500**	**$6,358,200**	**$0**	**$6,358,200**	**$0**	**$10,421,700**	**$10,421,700**	**$10,212,800**	**$34,332,800**	**$44,545,600**
1 Project Management Fee	1,041,800	1,034,800	2,076,600	0	1,592,800	1,592,800	0	5,085,600	5,085,600	1,718,400	0	1,718,400	0	3,361,900	3,361,900	2,760,200	11,075,100	13,835,300
2 Owners Planning and Administrative Cost	520,900	517,400	1,038,300	0	796,400	796,400	0	2,542,800	2,542,800	859,200	0	859,200	0	1,680,900	1,680,900	1,380,100	5,537,500	6,917,600
3 Project Insurance	625,100	620,900	1,246,000	0	955,700	955,700	0	3,051,400	3,051,400	1,031,100	0	1,031,100	0	2,017,100	2,017,100	1,656,200	6,645,100	8,301,300
4 Project Commissioning	416,700	413,900	830,600	0	637,100	637,100	0	2,034,300	2,034,300	687,400	0	687,400	0	1,344,700	1,344,700	1,104,100	4,430,000	5,534,100
5 Temporary Facilities (Allowance)	416,700	207,000	623,700	0	318,600	318,600	0	1,017,100	1,017,100	687,400	0	687,400	0	672,400	672,400	1,104,100	2,215,100	3,319,200
6 Moving and Decanting (Allowance)	833,400	413,900	1,247,300	0	637,100	637,100	0	2,034,300	2,034,300	1,374,700	0	1,374,700	0	1,344,700	1,344,700	2,208,100	4,430,000	6,638,100
G. PROJECT CONTINGENCY (5% of Items D to F)	**$489,300**	**$415,300**	**$904,600**	**$0**	**$640,300**	**$640,300**	**$0**	**$2,044,400**	**$2,044,400**	**$807,100**	**$0**	**$807,100**	**$0**	**$1,351,300**	**$1,351,300**	**$1,296,400**	**$4,451,300**	**$5,747,700**
H. FURNISHINGS, FITTINGS & EQUIPMENT (Allowance)	**$6,497,300**	**$11,393,900**	**$17,891,200**	**$0**	**$19,944,400**	**$19,944,400**	**$0**	**$61,057,800**	**$61,057,800**	**$12,349,400**	**$0**	**$12,349,400**	**$0**	**$43,682,200**	**$43,682,200**	**$18,846,700**	**$136,078,300**	**$154,925,000**
SUB-TOTAL	**$58,443,100**	**$61,508,200**	**$119,951,300**	**$0**	**$97,104,100**	**$97,104,100**	**$0**	**$307,415,000**	**$307,415,000**	**$98,035,900**	**$0**	**$98,035,900**	**$0**	**$206,533,900**	**$206,533,900**	**$156,479,000**	**$672,561,200**	**$829,040,200**
I TAXES (Excluded)	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SUB-TOTAL PROJECT COST	**$58,443,100**	**$61,508,200**	**$119,951,300**	**$0**	**$97,104,100**	**$97,104,100**	**$0**	**$307,415,000**	**$307,415,000**	**$98,035,900**	**$0**	**$98,035,900**	**$0**	**$206,533,900**	**$206,533,900**	**$156,479,000**	**$672,561,200**	**$829,040,200**
J ESCALATION (Excluded)	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
TOTAL PROJECT COST (March 2013 Dollars)	**$58,443,100**	**$61,508,200**	**$119,951,300**	**$0**	**$97,104,100**	**$97,104,100**	**$0**	**$307,415,000**	**$307,415,000**	**$98,035,900**	**$0**	**$98,035,900**	**$0**	**$206,533,900**	**$206,533,900**	**$156,479,000**	**$672,561,200**	**$829,040,200**
Gross Floor Area (New Build)		4,933 m²	4,933 m²		9,819 m²	9,819 m²		31,487 m²	31,487 m²		0 m²	0 m²		20,498 m²	20,498 m²		66,737 m²	66,737 m²
Gross Floor Area (Renovation)	6,079 m²		6,079 m²	0 m²		0 m²	0 m²		0 m²	12,060 m²		12,060 m²	0 m²		0 m²	18,139 m²		18,139 m²
Net Building Cost $/m²	$4,275 /m²	$5,775 /m²	$4,947 /m²		$5,078 /m²	$5,078 /m²		$4,848 /m²	$4,848 /m²	$4,096 /m²		$4,096 /m²		$5,328 /m²	$5,328 /m²	$4,156 /m²	$5,098 /m²	$4,896 /m²
Net Construction Cost $/m²	$5,419 /m²	$7,265 /m²	$6,246 /m²		$5,618 /m²	$5,618 /m²		$5,594 /m²	$5,594 /m²	$4,506 /m²		$4,506 /m²		$5,680 /m²	$5,680 /m²	$4,812 /m²	$5,747 /m²	$5,547 /m²
Total Project Cost $/m²	$9,614 /m²	$12,470 /m²	$10,893 /m²		$9,889 /m²	$9,889 /m²		$9,763 /m²	$9,763 /m²	$8,129 /m²		$8,129 /m²		$10,076 /m²	$10,076 /m²	$8,627 /m²	$10,078 /m²	$9,768 /m²